



ADTRAN OPERATING SYSTEM (AOS)

Command Reference Guide

AOS Version 10.1

All Products

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DOC - Department of Commerce

BIS - Bureau of Industry and Security

BXA - Bureau of Export Administration

Table of Contents

Basic Mode Command Set	16
Enable Mode Command Set	26
Global Configuration Mode Command Set.....	334
DHCP Pool Command Set	548
HDLC Command Set.....	566
IKE Policy Attributes Command Set.....	622
IKE Policy Command Set	628
IKE Client Command Set	641
Crypto Map IKE Command Set	645
Crypto Map Manual Command Set.....	654
Radius Group Command Set.....	665
CA Profile Configuration Command Set.....	667
Certificate Configuration Command Set.....	678
VLAN Configuration Command Set.....	682
VLAN Database Configuration Command Set.....	686
VLAN Interface Config Command Set.....	695
Port Channel Interface Config Command Set.....	734
Ethernet Interface Configuration Command Set.....	758
DDS Interface Configuration Command Set.....	840
HSSI Interface Configuration Command Set	848
Serial Interface Configuration Command Set.....	852
T1 Interface Configuration Command Set	861
DSX-1 Interface Configuration Command Set.....	876
E1 Interface Configuration Command Set	886
G.703 Interface Configuration Command set.....	901
FXS Interface Configuration Command Set	908
FXO Interface Configuration Command Set.....	918
FDL Interface Configuration Command Set.....	929
SHDSL Interface Configuration Command Set	934
Modem Interface Configuration Command Set	946
BRI Interface Configuration Command set.....	950
Frame Relay Interface Config Command Set	961
Frame Relay Sub-Interface Config Command Set	981
ATM Interface Config Command Set	1042
ATM Sub-Interface Config Command Set	1045
ADSL Interface Config Command Set	1109
BGP Configuration Command Set	1113
BGP Neighbor Configuration Command Set	1119
Tunnel Configuration Command Set.....	1135

PPP Interface Configuration Command Set	1189
T3 Interface Configuration Command Set	1263
Loopback Interface Configuration Command Set.....	1274
Line (Console) Interface Config Command Set	1304
Line (Telnet) Interface Config Command Set.....	1315
Router (RIP) Configuration Command Set.....	1322
Router (OSPF) Configuration Command Set	1331
Quality of Service (QoS) Map Commands	1345
Voice User Command Set	1351
AS Path List Command Set.....	1381
Codec List Command Set	1384
Community List Command Set.....	1388
Voice Trunk Group Command Set	1391
Voice Trunk SIP Command Set	1396
Voice Trunk T1 Wink Command Set	1405
Voice CoS Command Set	1420
Voice Ring Group Command Set	1447
Common Commands	1459
Index	1469

REFERENCE GUIDE INTRODUCTION

This manual provides information about the commands that are available with all of the NetVanta Series units.

If you are new to the ADTRAN Operating System's (AOS) Command Line Interface (CLI), take a few moments to review the information provided in the section which follows (*CLI Introduction*).

If you are already familiar with the CLI and you need information on a specific command or group of commands, proceed to *Command Descriptions* on page 14 of this guide.

CLI INTRODUCTION

This portion of the Command Reference Guide is designed to introduce you to the basic concepts and strategies associated with using the AOS CLI.

Accessing the CLI from your PC

All products using the AOS are initially accessed by connecting a VT100 terminal (or terminal emulator) to the **CONSOLE** port located on the rear panel of the unit using a standard DB-9 (male) to DB-9 (female) serial cable. Configure the VT100 terminal or terminal emulation software to the following settings:

- 9600 baud
- 8 data bits
- No parity
- 1 stop bit
- No flow control



For more details on connecting to your unit, refer to the Quick Configuration Guides and Quick Start Guides located on the ADTRAN OS Documentation CD provided with your unit.

Understanding Command Security Levels

The ADTRAN CLI has two command security levels — **Basic** and **Enable**. Both levels support a specific set of commands. For example, all interface configuration commands are accessible only through the Enable security level. The following table contains a brief description of each level.

Level	Access by...	Prompt	With this level you can...
Basic	beginning an AOS session.	>	<ul style="list-style-type: none"> • display system information • perform traceroute and ping functions • open a Telnet session
Enable	entering enable while in the Basic command security level as follows: > enable	#	<ul style="list-style-type: none"> • manage the startup and running configurations • use the debug commands • enter any of the configuration modes



*To prevent unauthorized users from accessing the configuration functions of your AOS product, immediately install an Enable-level password. Refer to the Quick Configuration Guides and Quick Start Guides located on the **ADTRAN OS Documentation** CD provided with your unit for more information on configuring a password.*

Understanding Configuration Modes

The ADTRAN CLI has four configuration modes to organize the configuration commands – Global, Line, Router, and Interface. Each configuration mode supports a set of commands specific to the configurable parameters for the mode. For example, all Frame Relay configuration commands are accessible only through the interface configuration mode (for the virtual Frame Relay interface). The following table contains a brief description of each level.

Mode	Access by...	Sample Prompt	With this mode you can...
Global	entering config while at the Enable command security level prompt. For example: >enable #config term	(config)#	<ul style="list-style-type: none"> • set the system's Enable-level password(s) • configure the system global IP parameters • configure the SNMP parameters • enter any of the other configuration modes
Line	specifying a line (console or Telnet) while at the Global Configuration mode prompt. For example: >enable #config term (config)# line console 0	(config-con0)#	<ul style="list-style-type: none"> • configure the console terminal settings (datarate, login password, etc.) • create Telnet logins and specify their parameters (login password, etc.)
Router	entering router rip or router ospf while at the Global Configuration mode prompt. For example: >enable #config term (config)# router rip	(config-rip)#	<ul style="list-style-type: none"> • configure RIP or OSPF parameters • suppress route updates • redistribute information from outside routing sources (protocols)

Mode	Access by...	Sample Prompt	With this mode you can...
Interface	specifying an interface (T1, Ethernet, Frame Relay, ppp, etc.) while in the Global Configuration mode. For example: >enable #config term (config)# int eth 0/1	(config-eth 0/1)# (The above prompt is for the Ethernet LAN interface located on the rear panel of the unit.)	<ul style="list-style-type: none"> configure parameters for the available LAN and WAN interfaces

Using CLI Shortcuts

The ADTRAN CLI provides several shortcuts which help you configure your AOS product more easily. See the following table for descriptions.

Shortcut	Description
Up arrow key	To re-display a previously entered command, use the up arrow key. Continuing to press the up arrow key cycles through all commands entered starting with the most recent command.
<Tab> key	Pressing the <Tab> key after entering a partial (but unique) command will complete the command, display it on the command prompt line, and wait for further input.
?	<p>The ADTRAN CLI contains help to guide you through the configuration process. Using the question mark, do any of the following:</p> <ul style="list-style-type: none"> Display a list of all subcommands in the current mode. For example: (config-t1 1/1)#coding ? ami - Alternate Mark Inversion b8zs - Bipolar Eight Zero Substitution Display a list of available commands beginning with certain letter(s). For example: (config)#ip d? default-gateway dhcp-server domain-lookup domain-name domain-proxy Obtain syntax help for a specific command by entering the command, a space, and then a question mark (?). The ADTRAN CLI displays the range of values and a brief description of the next parameter expected for that particular command. For example: (config-eth 0/1)#mtu ? <64-1500> - MTU (bytes)
<Ctrl + A>	Jump to the beginning of the displayed command line. This shortcut is helpful when using the no form of commands (when available). For example, pressing <Ctrl + A> at the following prompt will place the cursor directly after the #: (config-eth 0/1)# ip address 192.33.55.6

Shortcut	Description
<Ctrl + E>	Jump to the end of the displayed command line. For example, pressing <Ctrl + E> at the following prompt will place the cursor directly after the 6: (config-eth 0/1)# ip address 192.33.55.6
<Ctrl + U>	Clears the current displayed command line. The following provides an example of the <Ctrl + U> feature: (config-eth 0/1)# ip address 192.33.55.6 (Press <Ctrl + U> here) (config-eth 0/1)#
<i>auto finish</i>	You need only enter enough letters to identify a command as unique. For example, entering int t1 1/1 at the Global configuration prompt provides you access to the configuration parameters for the specified T1 interface. Entering interface t1 1/1 would work as well, but is not necessary.

Performing Common CLI Functions

The following table contains descriptions of common CLI commands.

Command	Description
do	The do command provides a way to execute commands in other command sets without taking the time to exit the current and enter the desired one. The following example shows the do command used to view the Frame Relay interface configuration while currently in the T1 interface command set: (config)# interface t1 1/1 (config-t1 1/1)# do show interfaces fr 7
no	To undo an issued command or to disable a feature, enter no before the command. For example: no shutdown t1 1/1
copy running-config startup-config	When you are ready to save the changes made to the configuration, enter this command. This copies your changes to the unit's nonvolatile random access memory (NVRAM). Once the save is complete, the changes are retained even if the unit is shut down or suffers a power outage.
show running config	Displays the current configuration.

Command	Description
debug	Use the debug command to troubleshoot problems you may be experiencing on your network. These commands provide additional information to help you better interpret possible problems. For information on specific debug commands, refer to the section <i>Enable Mode Command Set</i> on page 26.
undebug all	To turn off any active debug commands, enter this command.



*The overhead associated with the **debug** command takes up a large portion of your AOS product's resources and at times can halt other processes. It is best to only use the **debug** command during times when the network resources are in low demand (non-peak hours, weekends, etc.).*

Understanding CLI Error Messages

The following table lists and defines some of the more common error messages given in the CLI.

Message	Helpful Hints
%Ambiguous command %Unrecognized Command	The command may not be valid in the current command mode, or you may not have entered enough correct characters for the command to be recognized. Try using the ? command to determine your error. See <i>Using CLI Shortcuts</i> on page 10 for more information.
%Invalid or incomplete command	The command may not be valid in the current command mode, or you may not have entered all of the pertinent information required to make the command valid. Try using the ? command to determine your error. See <i>Using CLI Shortcuts</i> on page 10 for more information.
%Invalid input detected at “^” marker	The error in command entry is located where the caret (^) mark appears. Enter a question mark at the prompt. The system will display a list of applicable commands or will give syntax information for the entry.

COMMAND DESCRIPTIONS

This portion of the guide provides a detailed listing of all available commands for the ADTRAN OS CLI (organized by command set). Each command listing contains pertinent information including the default value, a description of all sub-command parameters, functional notes for using the command, and a brief technology review. To search for a particular command alphabetically, use the *Index*. To search for information on a group of commands within a particular command set, use the linked references given below:

Basic Mode Command Set [on page 16](#)
Enable Mode Command Set [on page 26](#)
Global Configuration Mode Command Set [on page 334](#)
DHCP Pool Command Set [on page 548](#)
HDLC Command Set [on page 566](#)
IKE Policy Attributes Command Set [on page 622](#)
IKE Policy Command Set [on page 628](#)
IKE Client Command Set [on page 641](#)
Crypto Map IKE Command Set [on page 645](#)
Crypto Map Manual Command Set [on page 654](#)
Radius Group Command Set [on page 665](#)
CA Profile Configuration Command Set [on page 667](#)
Certificate Configuration Command Set [on page 678](#)
VLAN Configuration Command Set [on page 682](#)
VLAN Database Configuration Command Set [on page 686](#)
VLAN Interface Config Command Set [on page 695](#)
Port Channel Interface Config Command Set [on page 734](#)
Ethernet Interface Configuration Command Set [on page 758](#)
DDS Interface Configuration Command Set [on page 840](#)
HSSI Interface Configuration Command Set [on page 848](#)
Serial Interface Configuration Command Set [on page 852](#)
TI Interface Configuration Command Set [on page 861](#)
DSX-1 Interface Configuration Command Set [on page 876](#)
E1 Interface Configuration Command Set [on page 886](#)
G.703 Interface Configuration Command set [on page 901](#)
FXS Interface Configuration Command Set [on page 908](#)
FXO Interface Configuration Command Set [on page 918](#)
FDL Interface Configuration Command Set [on page 929](#)
SHDSL Interface Configuration Command Set [on page 934](#)
Modem Interface Configuration Command Set [on page 946](#)
BRI Interface Configuration Command set [on page 950](#)
Frame Relay Interface Config Command Set [on page 961](#)
Frame Relay Sub-Interface Config Command Set [on page 981](#)
ATM Interface Config Command Set [on page 1042](#)
ATM Sub-Interface Config Command Set [on page 1045](#)
ADSL Interface Config Command Set [on page 1109](#)
BGP Configuration Command Set [on page 1113](#)

BGP Neighbor Configuration Command Set on page 1119
Tunnel Configuration Command Set on page 1135
PPP Interface Configuration Command Set on page 1189
T3 Interface Configuration Command Set on page 1263
Loopback Interface Configuration Command Set on page 1274
Line (Console) Interface Config Command Set on page 1304
Line (Telnet) Interface Config Command Set on page 1315
Router (RIP) Configuration Command Set on page 1322
Router (OSPF) Configuration Command Set on page 1331
Quality of Service (QoS) Map Commands on page 1345
Voice User Command Set on page 1351
AS Path List Command Set on page 1381
Codec List Command Set on page 1384
Community List Command Set on page 1388
Voice Trunk Group Command Set on page 1391
Voice Trunk SIP Command Set on page 1396
Voice Trunk T1 Wink Command Set on page 1405
Voice CoS Command Set on page 1420
Voice Ring Group Command Set on page 1447
Common Commands on page 1459

BASIC MODE COMMAND SET

To activate the Basic mode, simply log in to the unit. After connecting the unit to a VT100 terminal (or terminal emulator) and activating a terminal session, the following prompt displays:

>

The following command is common to multiple command sets and is covered in a centralized section of this guide. For more information, refer to the section listed below:

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

enable [on page 17](#)

logout [on page 18](#)

ping <address> [on page 19](#)

show clock [on page 21](#)

show snmp [on page 22](#)

show version [on page 23](#)

telnet <address> [on page 24](#)

traceroute <address> [on page 25](#)

enable

Use the **enable** command (at the Basic Command mode prompt) to enter the Enable Command mode. Use the **disable** command to exit the Enable Command mode. Refer to *Enable Mode Command Set* [on page 26](#) for more information.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The Enable Command mode provides access to operating and configuration parameters and should be password protected to prevent unauthorized use. Use the **enable password** command (found in the Global Configuration mode) to specify an Enable Command mode password. If the password is set, access to the Enable Commands (and all other “privileged” commands) is only granted when the correct password is entered. Refer to *crypto ca authenticate <name>* [on page 354](#) for more information.

Usage Examples

The following example enters the Enable Command mode and defines an Enable Command mode password:

```
>enable
#configure terminal
(config)#enable password ADTRAN
```

At the next login, the following sequence must occur:

```
>enable
Password: *****
#
```

logout

Use the **logout** command to terminate the current session and return to the login screen.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows the logout command being executed in the Basic mode:

```
>logout
```

```
Session now available
```

```
Press RETURN to get started.
```

ping <address>

Use the **ping** command (at the Basic Command mode prompt) to verify IP network connectivity.

Syntax Description

<address>	Specifies the IP address of the system to ping. Entering the ping command with no specified address prompts the user with parameters for a more detailed ping configuration. Refer to <i>Functional Notes</i> (below) for more information.
-----------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.Command was introduced.
-------------	--

Functional Notes

The **ping** command helps diagnose basic IP network connectivity using the Packet InterNet Groper program to repeatedly bounce Internet Control Message Protocol (ICMP) Echo_Request packets off a system (using a specified IP address). The AOS allows executing a standard **ping** request to a specified IP address or provides a set of prompts to configure a more specific **ping** configuration.

The following is a list of output messages from the **ping** command:

!	Success
-	Destination Host Unreachable
\$	Invalid Host Address
X	TTL Expired in Transit
?	Unknown Host
*	Request Timed Out

The following is a list of available extended **ping** fields with descriptions:

Target IP address	Specifies the IP address of the system to ping.
Repeat Count	Specifies the number of ping packets to send to the system (valid range: 1 to 1,000,000).
Datagram Size	Specifies the size (in bytes) of the ping packet (valid range: 1 to 1448).
Timeout in Seconds	Specifies the timeout period after which a ping is considered unsuccessful (valid range: 1 to 5 seconds).
Extended Commands	Specifies whether additional commands are desired for more ping configuration parameters.
Source Address (or interface)	Specifies the IP address to use as the source address in the ECHO_REQ packets.
Data Pattern	Specifies an alphanumerical string to use (the ASCII equivalent) as the data pattern in the ECHO_REQ packets.
Sweep Range of Sizes	Varies the sizes of the ECHO_REQ packets transmitted.
Sweep Min Size	Specifies the minimum size of the ECHO_REQ packet (valid range: 0 to 1448).
Sweep Max Size	Specifies the maximum size of the ECHO_REQ packet (valid range: Sweep Min Size to 1448).
Sweep Interval	Specifies the interval used to determine packet size when performing the sweep (valid range: 1 to 1448).
Verbose Output	Specifies an extended results output.

Usage Examples

The following is an example of a successful **ping** command:

>ping

Target IP address:**192.168.0.30**

Repeat count[1-1000000]:**5**

Datagram Size [1-1000000]:**100**

Timeout in seconds [1-5]:**2**

Extended Commands? [y or n]:**n**

Type CTRL+C to abort.

Legend: '!' = Success '?' = Unknown host '\$' = Invalid host address

'*' = Request timed out '-' = Destination host unreachable

'x' = TTL expired in transit

Pinging 192.168.0.30 with 100 bytes of data:

!!!!

Success rate is 100 percent (5/5) round-trip min/avg/max = 19/20.8/25 ms

show clock

Use the **show clock** command to display the system time and date entered using the **clock set** command. Refer to the section *clock set <time> <day> <month> <year>* [on page 67](#) for more information.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays the current time and data from the system clock:

```
>show clock
```

```
23:35:07 UTC Tue Aug 20 2002
```

show snmp

Use the **show snmp** command to display the system Simple Network Management Protocol (SNMP) parameters and current status of SNMP communications.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example output using the **show snmp** command for a system with SNMP disabled and the default chassis and contact parameters:

```
>show snmp
```

```
Chassis: Chassis ID
Contact: Customer Service
0 Rx SNMP packets
  0 Bad community names
  0 Bad community uses
  0 Bad versions
  0 Silent drops
  0 Proxy drops
  0 ASN parse errors
```

show version

Use the **show version** command to display the current AOS version information.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample **show version** output:

>show version

```
AOS version 06.01.00
  Checksum: 1F0D5243 built on Fri Nov 08 13:12:06 2002
  Upgrade key: de76efcf4c8eeb6901188475dd0917
Boot ROM version 03.00.18
  Checksum: 7A3D built on: Fri Nov 08 13:12:25 2002
Copyright (c) 1999-2002 ADTRAN Inc.
Serial number C14C6308
```

```
UNIT_2 uptime is 0 days 4 hours 59 minutes 43 seconds
```

```
System returned to ROM by Warm Start
Current system image file is "030018adv.biz"
Boot system image file is "030018adv.biz"
```

telnet <address>

Use the **telnet** command to open a Telnet session (through the AOS) to another system on the network.

Syntax Description

<address> Specifies the IP address of the remote system.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example opens a Telnet session with a remote system (**10.200.4.15**):

```
>telnet 10.200.4.15
```

```
User Access Login
```

```
Password:
```


traceroute <address>

Use the **traceroute** command to display the IP routes a packet takes to reach the specified destination.

Syntax Description

<address> Specifies the IP address of the remote system to trace the routes to.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example performs a traceroute on the IP address 192.168.0.1:

```
#traceroute 192.168.0.1
```

Type CTRL+C to abort.

Tracing route to 192.168.0.1 over a maximum of 30 hops

```
  1  22ms  20ms  20ms  192.168.0.65
  2  23ms  20ms  20ms  192.168.0.1
#
```

ENABLE MODE COMMAND SET

To activate the Enable mode, enter the **enable** command at the Basic mode prompt. (If an enable password has been configured, a password prompt will display.) For example:

```
>enable
Password: XXXXXXXX
#
```

The following command is common to multiple command sets and is covered in a centralized section of this guide. For more information, refer to the section listed below:

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

clear commands [begin on page 28](#)

clock auto-correct-dst [on page 65](#)

clock no-auto-correct-dst [on page 66](#)

clock set <time> <day> <month> <year> [on page 67](#)

clock timezone <text> [on page 68](#)

configure [*memory* | *network* | *overwrite-network* | *teminal*] [on page 70](#)

copy <source> <destination> [on page 71](#)

copy console <filename> [on page 73](#)

copy flash <destination> [on page 74](#)

copy <filename> *interface* <interface> <slot/port> [on page 75](#)

copy tftp <destination> [on page 76](#)

copy xmodem <destination> [on page 77](#)

debug commands [begin on page 78](#)

dir [on page 132](#)

dir [<input> | *flash* | *flash* <input>] [on page 133](#)

disable [on page 134](#)

enable [on page 135](#)

erase [<filename> | *startup-config*] [on page 136](#)

events [on page 137](#)

exception report generate [on page 138](#)

factory-default [on page 139](#)

logout [on page 140](#)

ping <address> [on page 141](#)

ping stack-member [on page 143](#)

reload [*cancel* | *in* <*delay*>] [on page 144](#)

show commands [begin on page 145](#)

telnet <*address*> [on page 326](#)

telnet stack-member <*unit id*> [on page 327](#)

terminal length <*text*> [on page 328](#)

traceroute <*address*> *source* <*address*> [on page 329](#)

undebug all [on page 330](#)

vlan database [on page 331](#)

wall <*message*> [on page 332](#)

write [*dynvoice-config* | *erase* | *memory* | *network* | *terminal*] [on page 333](#)

clear access-list <listname>

Use the **clear access-list** command to clear all counters associated with all access lists (or a specified access list).

Syntax Description

<listname> Optional. Specifies the name (label) of an access list.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example clears all counters for the access list labeled **MatchAll**:

```
>enable
#clear access-list MatchAll
```

clear arp-cache

Use the **clear arp-cache** command to remove all dynamic entries from the Address Resolution Protocol (ARP) cache table.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example removes all dynamic entries from the ARP cache:

```
>enable  
#clear arp-cache
```

clear arp-entry <address>

Use the **clear arp-entry** command to remove a single entry from the Address Resolution Protocol (ARP) cache.

Syntax Description

<address> Specifies the IP address of the entry to remove.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example removes the entry for 10.200.4.56 from the ARP cache:

```
>enable
#clear arp-entry 10.200.4.56
```

clear bridge <group#>

Use the **clear bridge** command to clear all counters associated with bridging (or for a specified bridge-group).

Syntax Description

<group#> Optional. Specifies a single bridge group (1 to 255).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example clears all counters for bridge group 17:

```
>enable
#clear bridge 17
```

clear buffers max-used

Use the **clear buffers max-used** command to clear the maximum-used statistics for buffers displayed in the **show memory heap** command.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example clears the maximum-used buffer statics:

```
>enable  
#clear buffers max-used
```


clear counters *<interface>* *<interface id>*

Use the **clear counters** command to clear all interface counters (or the counters for a specified interface).

Default Values

<i><interface></i>	Specifies the type of interface counters to clear. Type show interface ? for a list of valid interfaces.
<i><interface id></i>	Specifies the ID of the specific interface to clear (e.g., 1 for port channel 1).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

The following example clears all counters associated with the Ethernet 0/1 interface:

```
>enable
#clear counters ethernet 0/1
```

clear counters media-gateway channel <slot/dsp.channel>

Use the **clear counters media-gateway** command to reset cumulative totals for all RTP channels or for a specific RTP channel.

Variations of this command include the following:

clear counters media-gateway

clear counters media-gateway channel <slot/dsp.channel>

Syntax Description

<slot/dsp.channel> The ID of the media-gateway channel to be reset (for example, 0/1.1).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example resets the counters on media gateway **0/1.1**:

>enable

#clear counters media-gateway channel 0/1.1

Counters on media-gateway channel reset by console.

clear counters port-channel <interface id>

Use the **clear counters port-channel** command to reset counters on the specified port channel.

Syntax Description

<interface id> Defines a valid interface ID (e.g., 1 for port channel 1).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example clears all counters for port channel 1:

```
>enable
#clear counters port-channel 1
```

clear counters vlan <vlan id>

Use the **clear counters vlan** command to reset counters on the specified VLAN interface.

Syntax Description

<vlan id> Specifies a valid VLAN interface ID (1 to 4094).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example resets the counters on VLAN interface 7:

```
>enable
#clear counters vlan 7
```

clear counters voice-trunk [all | <trunk id>]

Use the **clear counters voice-trunk** command to reset counters on all voice trunks or on a specific voice trunk.

Syntax Description

all	Clears all voice trunk counters.
<trunk id>	Specifies trunk's 2-digit identifier following T (for example, T01).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example resets the counters for all configured voice trunks:

```
>enable
#clear counters voice-trunk all
```

clear crypto ike sa <policy priority>

Use the **clear crypto ike sa** command to clear existing IKE security associations (SAs), including active ones.

Syntax Description

<policy priority> Optional. Clears out all existing IKE SAs associated with the designated policy priority. This number is assigned using the **crypto ike policy** command. Refer to *crypto ike* on [page 363](#) for more information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Usage Examples

The following example clears the entire database of IKE SAs (including the active associations):

```
>enable
#clear crypto ike sa
```

clear crypto ipsec sa

Use the **clear crypto ipsec sa** command to clear existing IPsec security associations (SAs), including active ones.

Variations of this command include the following:

clear crypto ipsec sa

clear crypto ipsec sa entry *<ip address>* **ah** *<SPI>*

clear crypto ipsec sa entry *<ip address>* **esp** *<SPI>*

clear crypto ipsec sa map *<map name>*

clear crypto ipsec sa peer *<ip address>*

Syntax Description

entry <i><ip address></i>	Clears only the SAs related to a certain destination IP address.
ah <i><SPI></i>	Clears only a portion of the SAs by specifying the authentication header (AH) protocol and a security parameter index (SPI). You can determine the correct SPI value using the show crypto ipsec sa command.
esp <i><SPI></i>	Clears only a portion of the SAs by specifying the encapsulating security payload (ESP) protocol and an SPI. You can determine the correct SPI value using the show crypto ipsec sa command.
map <i><map name></i>	Clears only the SAs associated with the crypto map name given.
peer <i><ip address></i>	Clears only the SAs associated with the far-end peer IP address given.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

clear ip dhcp-server binding [* | <ip address>]

Use the **clear ip dhcp-server binding** command to clear Dynamic Host Configuration Protocol (DHCP) server binding entries from the database.

Syntax Description

*	Clears all automatic binding entries.
<ip address>	Clears a specific binding entry. Enter the source IP address (format is A.B.C.D).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Functional Notes

A DHCP server binding represents an association between a MAC address and an IP address that was offered by the unit to a DHCP client (i.e., most often a PC). Clearing a binding allows the unit to offer that IP address again, should a request be made for one.

Usage Examples

The following example clears a DHCP server binding for the IP address **125.25.47.4**:

```
>enable
#clear ip dhcp-server binding 125.25.47.4
```


clear dump-core

The **clear dump-core** command clears diagnostic information appended to the output of the **show version** command. This information results from an unexpected unit reboot.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example clears the entire database of IKE SAs (including the active associations):

```
>enable
#clear dump-core
```

clear event-history

Use the **clear event-history** command to clear all messages logged to the local event-history.



*Messages cleared from the local event-history (using the **clear event-history** command) are no longer accessible.*

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example clears all local event-history messages:

```
>enable
#clear event-history
```

clear gvrp statistics [all | interface <interface>]

Use the **clear gvrp statistics** command to clear counter statistics on GVRP interfaces.

Syntax Description

all	Clears the information for all GVRP interfaces.
interface < interface >	Clears the information for the specified interface. Type clear gvrp statistics interface ? for a complete list of applicable interfaces.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example clears counter statistics on the GVRP interfaces:

```
>enable
#clear gvrp statistics all
```

clear host <hostname>

Use the **clear host** command to clear a hostname when using the DNS Proxy.

Syntax Description

hostname Optional name in table or * clears all dynamic hosts.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example clears all dynamic hostnames:

```
>enable
#clear host *
```

clear ip bgp [| <as-number> | <ip address>*] [*in | out | soft*]**

Use the **clear ip bgp** command to clear BGP neighbors as specified.

Syntax Description

*	Clears all BGP neighbors.
<i><as-number></i>	Clears all BGP neighbors with the specified AS number. Range is 1 to 65,535.
<i><ip address></i>	Clears the BGP neighbor with the specified IP address.
in	Causes a “soft” reset inbound with a neighbor, reprocessing routes advertised by that neighbor.
out	Causes a “soft” reset outbound with a neighbor, re-sending advertised routes to that neighbor.
soft	Causes a “soft” reset both inbound and outbound.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **clear ip bgp** command must be issued to re-initialize the BGP process between the peers matching the given arguments. Most neighbor changes, including changes to prefix-list filters, do not take effect until the **clear** command is issued. A hard reset clears the TCP connection with the specified peers, which results in clearing the table. This method of clearing is disruptive and causes peer routers to record a route flap for each route.

The **out** version of this command provides a soft reset out to occur by causing all routes to be re-sent to the specified peer(s). TCP connections are not torn down, so this method is less disruptive. Output filters/policies are re-applied before sending the update.

The **in** version of this command provides a soft reset in to occur by allowing the router to receive an updated table from a peer without tearing down the TCP connection. This method is less disruptive and does not count as a route flap. Currently, all of the peer's routes are stored permanently, even if they are filtered by a prefix list. The command causes the peer's routes to be reprocessed with any new parameters.

Usage Examples

The following example causes a hard reset with peers with an AS number of 101:

```
>enable  
#clear ip bgp 101
```

clear ip igmp group [*<group-address>* | *<interface>*]

Use the **clear ip igmp group** command to clear entries from the Internet Group Management Protocol (IGMP) tables. If no address or interface is specified, all non-static IGMP groups are cleared with this command.

Syntax Description

<i><group-address></i>	Optional. Specifies the multicast IP address of the multicast group.
<i><interface></i>	Optional. Designates the display of parameters for a specific interface (in the format type slot/port). For example: eth 0/1 .

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 9.1	Command was expanded to include HDSL and tunnel interfaces.

Usage Examples

The following example shows output for the **show igmp groups** command before and after a **clear ip igmp group** command is issued. This example clears the IGMP entry that was registered dynamically by a host. Interfaces that are statically joined are not cleared:

#show ip igmp groups

```
IGMP Connected Group Membership
Group Address
Interface
Uptime
Expires
Last Reporter
172.0.1.50
Loopback100
01:22:59
00:02:46
172.23.23.1
172.1.1.1
Ethernet0/1
```

00:00:14
00:02:45
1.1.1.2
172.1.1.1
Loopback100
01:22:59
00:02:46
172.23.23.1

#clear ip igmp group**#show ip igmp groups**

IGMP Connected Group Membership
Group Address
Interface
Uptime
Expires
Last Reporter

This version of the command clears all dynamic groups that have the specified output interface (Ethernet 0/1):

#clear ip igmp group ethernet 0/1

This version of the command clears the specified group on all interfaces where it is dynamically registered:

#clear ip igmp group 172.1.1.1

clear ip policy-sessions

Use the **clear ip policy-sessions** command to clear policy class sessions. You may clear all the sessions or a specific session. Use the **show ip policy-sessions** command to view a current session listing. The following lists the complete syntax for the **clear ip policy-sessions** commands:

clear ip policy-sessions

```
clear ip policy-sessions <classname> [ahp | esp | gre | icmp | tcp | udp | <protocol>] <source ip>
<source port><dest ip><dest port>
```

```
clear ip policy-sessions <classname> [ahp | esp | gre | icmp | tcp | udp | <protocol>] <source ip>
<source port><dest ip><dest port> [destination | source] <nat ip><nat port>
```

Syntax Description

<classname>	Alphanumeric descriptor for identifying the configured access policy (access policy descriptors are not case-sensitive).
<protocol>	Specifies protocol (valid range: 0-255).
<source ip>	Specifies the source IP address (format is A.B.C.D).
<source port>	Specifies the source port (in hex format for ahp, esp, and gre; decimal for all other protocols).
<dest ip>	Specifies the destination IP address (format is A.B.C.D).
<dest port>	Specifies the destination port (in hex format for ahp, esp, and gre; decimal for all other protocols).
[destination source]	For NAT sessions, this specifies whether to select a NAT source or NAT destination session.
<nat ip>	For NAT sessions, this specifies the NAT IP address (format is A.B.C.D).
<nat port>	For NAT sessions, this specifies the NAT port (in hex format for ahp, esp, and gre; decimal for all other protocols).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

The second half of this command, beginning with the source IP address may be copied and pasted from a row in the **show ip policy-sessions** table for easier use.

Usage Examples

The following example clears the Telnet association (TCP port 23) for policy class "pclass1" with source IP address 192.22.71.50 and destination 192.22.71.130:

>enable

#clear ip policy-sessions pclass1 tcp 192.22.71.50 23 192.22.71.130 23

clear ip policy-stats <classname> entry <policy class #>

Use the **clear ip policy-stats** command to clear statistical counters for policy classes.

Syntax Description

<classname>	Optional. Specifies the policy class to clear. If no policy class is specified, statistics are cleared for all policies.
entry	Optional. Use this optional keyword to clear statistics of a specific policy class entry.
<policy class #>	Optional. Specifies the policy class entry number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example clears statistical counters for all policy classes:

```
>enable
#clear ip policy-stats
```

The following example clears statistical counters for the policy class **MatchALL**:

```
>enable
#clear ip policy-stats MatchALL
```

clear ip prefix-list <listname>

Use the **clear ip prefix-list** command to clear the IP prefix list hit count shown in the **show ip prefix-list detail** command output. Refer to *show ip prefix-list [detail | summary] <listname>* on page 220 for more information.

Syntax Description

<listname> Specifies hit count statistics of the IP prefix list to clear.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example clears the hit count statistics for prefix list **test**:

```
>enable
#clear ip prefix-list test
```

clear ip route [* | <ip address> <subnet mask>]

Use the **clear ip route** command to remove all learned routes from the IP route table. Static and connected routes are not cleared by this command.

Syntax Description

*	Delete all destination routes.
<ip address>	Specify the IP address of the destination routes to be deleted.
<subnet mask>	Specify the subnet mask of the destination routes to be deleted

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example removes all learned routes from the route table:

```
>enable
#clear ip route *
```

clear lldp counters

Use the **clear lldp counters** command to reset all LLDP packet counters to 0 on all interfaces.

Syntax Description

No subcommands.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example resets all LLDP counters:

```
>enable
#clear lldp counters
```

clear lldp counters interface <interface>

Use the **clear lldp counters interface** command to reset all LLDP packet counters to 0 for a specified interface.

Syntax Description

<interface> Clears the information for the specified interface. Type **clear lldp counters interface ?** for a complete list of applicable interfaces.

Default Values

No default values are necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example resets the counters on a PPP interface:

```
>enable
#clear lldp counters interface ppp 1
```

clear lldp neighbors

Use the **clear lldp neighbors** command to remove all neighbors from this unit's database. As new LLDP packets are received, the database will contain information about neighbors included in those frames.

Syntax Description

No subcommands.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command generates output indicating the names of any neighbors deleted from the database and the name of the interface on which the neighbor was learned.

Usage Examples

The following example clears LLDP neighbor **Switch_1** from the Ethernet interface 0/7:

```
>enable
#clear lldp neighbors
LLDP: Deleted neighbor "Switch_1" on interface eth 0/7
#
```

clear mac address-table dynamic [address <mac address> | <interface id>]

Use the **clear mac address-table dynamic** command to remove dynamic MAC addresses from the MAC address table.

Syntax Description

address <mac address> Removes a specific MAC address from the table (format: AA:AA:AA:AA:AA:AA).
<interface id> Removes the MAC address of a specific interface. Type **clear mac address-table dynamic interface ?** for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example removes the dynamic address A0:B1:C2:D3:E4:A1 from the MAC address table:

```
>enable
#clear mac address-table dynamic address A0:B1:C2:D3:E4:A1
```

The following example removes all dynamic addresses from the MAC address table:

```
>enable
#clear mac address-table dynamic
```

clear port-security [dynamic | sticky]

Use the **clear port-security** command to clear the dynamic or sticky secure MAC addresses associated with an interface. This can be done on a per-address or per-port basis. Variations of this command include the following:

```
clear port-security dynamic address <address>
clear port-security dynamic interface <interface id>
clear port-security sticky address <address>
clear port-security sticky interface <interface id>
```

Syntax Description

dynamic	Clears the dynamic MAC addresses.
sticky	Clears the sticky secure MAC addresses.
address	Clears the information for the specified address.
interface	Clears the information for the specified interface. Type clear port-security sticky interface ? or clear port-security dynamic interface ? for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following command clears all dynamic secure MAC addresses associated with the Ethernet interface 0/1:

```
>enable
#clear port-security dynamic interface eth 0/1
```

clear port-security violation-count <interface id>

Use the **clear port-security violation-count** command to clear the violation count associated with a particular interface.

Syntax Description

<interface id> Clears the information for the specified Ethernet interface. Type **clear port-security violation-count interface ?** for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following command clears the violation count associated with the Ethernet interface 0/1:

```
>enable  
#clear port-security violation-count eth 0/1
```

clear pppoe <ppp interface id>

Use the **clear pppoe** command to terminate the current PPPoE client session and cause the AOS to attempt to re-establish the session.

Syntax Description

<interface id> Specifies the PPP interface ID number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example ends the current PPPoE client session for ppp 1:

```
>enable
#clear pppoe 1
```

clear qos map

Use the **clear qos map** command to clear the statistics for all defined QoS maps or to view detailed information for maps meeting user-configured specifications.

Variations of this command include the following:

```
clear qos map <map name>
clear qos map <map name> <sequence number>
clear qos map interface <interface id>
```

Syntax Description

<i><map name></i>	Specifies the name of a defined QoS map.
<i><sequence number></i>	Specifies one of the map's defined sequence numbers.
<i><interface></i>	Specifies an interface for which to clear QoS map statistics (for just that interface). Type clear qos map interface ? for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example clears statistics for all defined QoS maps:

```
#clear qos map
```

The following example clears statistics for all entries in the **priority** QoS map:

```
#clear qos map priority
```

The following example clears statistics in entry **10** of the **priority** QoS map:

```
#clear qos map priority 10
```

The following example clears QoS statistics for a specified interface:

```
#clear qos map interface frame-relay 1
```



*The **clear counters** command clears ALL interface statistics (including QoS map interface statistics).*

clear spanning-tree counters [interface <interface id>]

The **clear spanning-tree counters** command clears the following counts: BPDU transmit, BPDU receive, and number of transitions to forwarding state.

Syntax Description

interface <interface id> Optional. Specifies a single interface. Enter **clear spanning-tree counters ?** for a complete list of interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example clears the spanning tree counters for Ethernet 0/10:

```
>enable
#clear spanning-tree counters interface eth 0/10
```

clear spanning-tree detected-protocols [interface <interface id>]

Use the **clear spanning-tree detected-protocols** command to restart the protocol migration process.

Syntax Description

interface	Optional. Specifies the ethernet , gigabit ethernet , or port channel interface.
<interface id>	Optional. Specifies a valid interface ID. Type clear spanning-tree detected-protocols interface ? for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The switch has the ability to operate using the rapid spanning-tree protocol or the legacy 802.1D version of spanning-tree. When a BPDU (bridge protocol data unit) of the legacy version is detected on an interface, the switch automatically regresses to using the 802.1D spanning-tree protocol for that interface. Issue the **clear spanning-tree detected-protocols** command to return to rapid spanning-tree operation.

Usage Examples

The following example re-initiates the protocol migration process on Ethernet interface 0/3:

```
>enable
#clear spanning-tree detected-protocols interface ethernet 0/3
```

The following example re-initiates the protocol migration process on all interfaces:

```
>enable
#clear spanning-tree detected-protocols
```


clock auto-correct-dst

The **clock auto-correct-dst** command allows the automatic one-hour correction for Daylight Saving Time (DST). Use the **clock no-auto-correct-dst** command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example allows for automatic DST correction:

```
>enable
#clock auto-correct-dst
```

clock no-auto-correct-dst

The **clock no-auto-correct-dst** command allows you to override the automatic one-hour correction for Daylight Saving Time (DST).

Syntax Description

No subcommands.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

Many time zones include an automatic one-hour correction for daylight saving time at the appropriate time. You may override it at your location using this command.

Usage Examples

The following example overrides the one-hour offset for DST:

```
>enable
#clock no-auto-correct-dst
```

clock set *<time>* *<day>* *<month>* *<year>*

Use the **clock set** command to configure the system software clock. For the command to be valid, all fields must be entered. Refer to the **Usage Example** below for an example.

Syntax Description

<i><time></i>	Sets the time (in 24-hour format) of the system software clock in the format HH:MM:SS (hours:minutes:seconds).
<i><day></i>	Sets the current day of the month (valid range: 1 to 31).
<i><month></i>	Sets the current month (valid range: January to December). You need only enter enough characters to make the entry unique. This entry is not case-sensitive.
<i><year></i>	Sets the current year (valid range: 2000 to 2100).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the system software clock for 3:42 pm, August 22 2004:

```
>enable
#clock set 15:42:00 22 Au 2004
```

clock timezone <text>

The **clock timezone** command sets the unit's internal clock to the timezone of your choice. This setting is based on the difference in time (in hours) between Greenwich Mean Time (GMT) or Central Standard Time (CST) and the timezone for which you are setting up the unit. Use the **no** form of this command to disable this feature.

Syntax Description

Subcommands are specified in the *Functional Notes* section for this command.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

The following list shows sample cities and their timezone codes.

clock timezone +1-Amsterdam	clock timezone +5:30
clock timezone +1-Belgrade	clock timezone +5:45
clock timezone +1-Brussels	clock timezone +6-Almaty
clock timezone +1-Sarajevo	clock timezone +6-Astana
clock timezone +1-West-Africa	clock timezone +6-Sri-Jay
clock timezone +10-Brisbane	clock timezone +6:30
clock timezone +10-Canberra	clock timezone +7-Bangkok
clock timezone +10-Guam	clock timezone +7-Kranoyarsk
clock timezone +10-Hobart	clock timezone +8-Bejing
clock timezone +10-Vladivostok	clock timezone +8-Irkutsk
clock timezone +11	clock timezone +8-Kuala-Lumpur
clock timezone +12-Auckland	clock timezone +8-Perth
clock timezone +12-Fiji	clock timezone +8-Taipei
clock timezone +13	clock timezone +9-Osaka
clock timezone +2-Athens	clock timezone +9-Seoul
clock timezone +2-Bucharest	clock timezone +9-Yakutsk
clock timezone +2-Cairo	clock timezone +9:30-Adelaide
clock timezone +2-Harare	clock timezone +9:30-Darwin
clock timezone +2-Helsinki	clock timezone -1-Azores
clock timezone +2-Jerusalem	clock timezone -1-Cape-Verde
clock timezone +3-Baghdad	clock timezone -10
clock timezone +3-Kuwait	clock timezone -11
clock timezone +3-Moscow	clock timezone -12
clock timezone +3-Nairobi	clock timezone -2
clock timezone +3:30	clock timezone -3-Brasilia
clock timezone +4-Abu-Dhabi	clock timezone -3-Buenos-Aires
clock timezone +4-Baku	clock timezone -3-Greenland
clock timezone +4:30	clock timezone -3:30
clock timezone +5-Ekaterinburg	clock timezone -4-Atlantic-Time
clock timezone +5-Islamabad	clock timezone -4-Caracus

Usage Examples

The following example sets the timezone for Santiago, Chile.

```
>enable
```

```
#clock timezone -4-Santiago
```

configure [memory | network | overwrite-network | terminal]

Use the **configure** command to enter the Global Configuration mode or to configure the system from memory. Refer to *Global Configuration Mode Command Set* on page 334 for more information.

Syntax Description

memory	Configures the active system with the commands located in the default configuration file stored in NVRAM.
network	Configures the system from a TFTP network host.
overwrite-network	Overwrites NVRAM memory from a TFTP network host.
terminal	Enters the Global Configuration mode.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enters the Global Configuration mode from the Enable mode:

```
>enable
#configure terminal
(config)#
```

copy <source> <destination>

Use the **copy** command to copy any file from a specified source to a specified destination.

Syntax Description

<source>	Specifies the current location of the file. Valid sources include: running-config (current running configuration file), startup-config (configuration file located in NVRAM), or a filename (located in FLASH memory).
<destination>	Specifies the destination of the copied file. Valid destinations include: running-config (current running configuration file), startup-config (configuration file located in NVRAM), or a filename (located in FLASH memory).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates a copy of the file **myfile.biz** (located in FLASH memory) and names it **newfile.biz**:

```
>enable  
#copy myfile.biz newfile.biz
```

The following example creates a backup copy of the startup configuration file (and places in FLASH memory):

```
>enable  
#copy startup-config backup.bak
```

The following example copies the current running-configuration file to the startup configuration file located in NVRAM:

```
>enable  
#copy running-config startup-config
```


copy console <filename>

Use the **copy console** command to copy the console's input to a text file. To end copying to the text file, type **<Ctrl+D>**. The file will be saved in the AOS root directory.

Syntax Description

<filename> Specifies destination file for console input.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

The copy console command works much like a line editor. Prior to pressing **<Enter>**, changes can be made to the text on the line. Changes can be made using **<Delete>** and **<Backspace>** keys. The text can be traversed using the arrow keys, **<Ctrl+A>** (to go to the beginning of a line), and **<Ctrl+E>** (to go to the end of a line). To end copying to the text file, type **<Ctrl+D>**. The file will be saved in the AOS root directory. Use the **dir** command to see a list of files in the root directory.

Usage Examples

The following example copies the console input into the file **config** (located in the AOS root directory):

```
>enable
#copy console config
```

copy flash <destination>

Use the **copy flash** command to copy a file located in flash memory to a specified destination.

Syntax Description

<destination> Specifies the destination of the copied file. Valid destinations include **tftp** and **xmodem**.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example copies the contents of the unit's flash memory to a TFTP server:

```
>enable
#copy flash tftp
```

copy *<filename>* **interface** *<interface>* *<slot/port>*

Use the **copy interface** command to copy a file to a specified interface.

Syntax Description

<i><filename></i>	Specifies file name of source file.
<i><interface></i>	Specifies interface to be upgraded.
<i><slot/port></i>	Specifies slot and port number of interface.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example upgrades the ADSL interface with the firmware file **configfile**:

```
>enable
#copy configfile interface adsl 0/1
```

copy tftp <destination>

Use the **copy tftp** command to copy a file located on a network Trivial File Transfer Protocol (TFTP) server to a specified destination.

Syntax Description

<i><destination></i>	Specifies the destination of the file copied from the TFTP server. Valid destinations include: flash (FLASH memory), startup-config (the configuration file stored in NVRAM), or running-config (the current running configuration file). After entering copy tftp and specifying a destination, the AOS prompts for the following information:
<i>Address of remote host:</i>	IP address of the TFTP server.
<i>Source filename:</i>	Name of the file to copy from the TFTP server.
<i>Destination filename:</i>	Specifies the filename to use when storing the copied file to FLASH memory. (Valid only for the copy tftp flash command.)

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example copies **myfile.biz** from the TFTP server (10.200.2.4) to flash memory and labels it **newfile.biz**:

```
>enable
#copy tftp flash
```

```
Address of remote host?10.200.2.4
Source filename myfile.biz
Destination filename newfile.biz
Initiating TFTP transfer...
Received 45647 bytes.
Transfer Complete!
#
```

copy xmodem <destination>

Use the **copy xmodem** command to copy a file (using the XMODEM protocol) to a specified destination. XMODEM capability is provided in terminal emulation software such as HyperTerminal™.

Syntax Description

<i><destination></i>	Specifies the destination of the copied file. Valid destinations include: flash (FLASH memory), startup-config (the configuration file stored in NVRAM), or running-config (the current running configuration file). After entering copy xmodem and specifying a destination, the AOS prompts for the following information:
<i>Destination filename:</i>	Specifies the filename to use when storing the copied file to FLASH memory. (Valid only for the copy flash command.)

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example copies a .biz file to flash memory and labels it newfile.biz:

```
>enable
#copy xmodem flash
Destination filename newfile.biz
Begin the Xmodem transfer now...
Press CTRL+X twice to cancel
CCCCCC
```

The AOS is now ready to accept the file on the **CONSOLE** port (using the XMODEM protocol). The next step in the process may differ depending on the type of terminal emulation software you are using. For HyperTerminal, you will now select **Transfer > Send File** and browse to the file you wish to copy. Once the transfer is complete, information similar to the following is displayed:

```
Received 231424 bytes.
Transfer complete.
```

debug aaa

Use the **debug aaa** command to activate debug messages associated with authentication from the AAA subsystem. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug aaa** events include connection notices, login attempts, and session tracking.

Usage Examples

The following is sample output for this command:

```
>enable
#debug aaa
AAA: New Session on portal 'TELNET 0 (172.22.12.60:4867)'.
AAA: No list mapped to 'TELNET 0'. Using 'default'.
AAA: Attempting authentication (username/password).
AAA: RADIUS authentication failed.
AAA: Authentication failed.
AAA: Closing Session on portal 'TELNET 0 (172.22.12.60:4867)'.
```

debug access-list <listname>

Use the **debug access-list** command to activate debug messages (for a specified list) associated with access list operation. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

<listname> Specifies a configured access list.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

The **debug access-list** command provides debug messages to aid in troubleshooting access list issues.

Usage Examples

The following example activates debug messages for the access list labeled **MatchAll**:

```
>enable  
#debug access-list MatchAll
```

debug arp

Use the **debug arp** command to activate debug messages associated with IP ARP transactions. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates debug messages associated with ARP transactions:

```
>enable
#debug arp
```


debug atm events

Use the **debug atm events** command to display events on all ATM ports and all virtual circuits. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates ATM event messages:

```
>enable
#debug atm events
```

debug atm oam <vcd> loopback [end-to-end | segment] <LLID>

Use the **debug atm oam** command to display Operation, Administration, and Maintenance (OAM) packets for an ATM virtual circuit descriptor (VCD). Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable debug messages.

Variations of this command include the following:

debug atm oam <vcd>

debug atm oam <vcd> loopback [end-to-end | segment]

debug atm oam <vcd> loopback [end-to-end | segment] <LLID>

Syntax Description

<vcd>	Shows OAM packets for a specific VCD.
loopback	Configures an OAM loopback.
end-to-end	Configures an end-to-end OAM loopback.
segment	Configures a segment loopback.
<LLID>	Specifies 16-byte OAM loopback location ID (LLID).

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates ATM OAM debug messages for VCD 1:

```
>enable
```

```
#debug atm oam 1
```

debug atm packet [interface atm | vc] <ATM port | VPI/VCI> vcd <vcd number>

Use the **debug atm packet** command to activate debug messages associated with packets on ATM ports and virtual circuits. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Variations of this command include the following:

debug atm packet

debug atm packet [interface atm | vc] <port id>

debug atm packet interface atm <port id> vcd <port>

Syntax Description

interface atm	Shows packets on a specific ATM port and on all virtual circuits.
vc	Shows packets on a specific virtual circuit.
<ATM port>	Specifies ATM port number.
<VPI/VCI>	Specifies virtual path identifier and virtual channel identifier (VPI/VCI).
vcd	Shows packets on specific virtual circuit descriptors (VCD).
<vcd number>	Specifies a VCD port number.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates debug ATM packet debug messages on ATM port 1:

```
>enable
```

```
#debug atm packet interface atm 1
```

debug bridge

Use the **debug bridge** command to display messages associated with bridge events. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates bridge debug messages:

```
>enable  
#debug bridge
```

debug crypto [ike | ike negotiation | ike client authentication | ike client configuration | ipsec | pki]

Use the **debug crypto** command to activate debug messages associated with IKE and IPsec functions. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

ike	Displays all IKE debug messages.
ike negotiation	Displays only IKE key management debug messages (e.g., handshaking).
ike client authentication	Displays IKE client authentication messages as they occur.
ike client configuration	Displays mode-config exchanges as they take place over the IKE SA. It is enabled independently from the ike negotiation debug described previously.
ipsec	Displays all IPsec debug messages.
pki	Displays all PKI (public key infrastructure) debug messages.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
Release 6.1	Debug pki command introduced.

Usage Examples

The following example activates the IPsec debug messages:

```
>enable
#debug crypto ipsec
```

debug dial-backup

Use the **debug dial-backup** command to activate debug messages associated with dial-backup operation. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 2.1	Additional debug messages were implemented for dial-backup operation to ADTRAN's IQ and Express Series products.

Functional Notes

The **debug dial-backup** command activates debug messages to aid in the troubleshooting of dial-backup links.

Usage Examples

The following example activates debug messages for dial-backup operation:

```
>enable
#debug dial-backup
```

debug dialup-interfaces

Use the **debug dialup-interfaces** command to generate debug messages used to aid in troubleshooting problems with all dialup interfaces such as the modem or the BRI cards. Use the **no** version of this command to disable it.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

When enabled, these messages provide status information on incoming calls, dialing and answering progress, etc. These messages also give information on why certain calls are dropped or rejected. It is beneficial to use this command when troubleshooting dial backup (in addition to the **debug dial-backup** command).

Usage Examples

The following example activates the debug messages for dialup interfaces:

```
>enable
#debug dialup-interfaces
```

debug dynamic-dns [verbose]

Use the **debug dynamic-dns** command to display debug messages associated with dynamic DNS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

verbose Turns on verbose messaging.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example activates dynamic DNS debug messages:

```
>enable  
#debug dynamic-dns verbose
```


debug firewall

Use the **debug firewall** command to activate debug messages associated with the AOS firewall operation. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug firewall** command activates debug messages to provide real-time information about the AOS stateful inspection firewall operation.

Usage Examples

The following example activates the debug messages for the AOS stateful inspection firewall:

```
>enable  
#debug firewall
```

debug firewall alg sip [verbose]

Use the **debug firewall alg sip** command to activate debug messages associated with Session Initiation Protocol (SIP) information with AOS firewall operation. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

verbose Enables detailed debug messages.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example activates debug messages associated with SIP information with AOS firewall operation:

```
>enable
#debug firewall alg sip
```

debug frame-relay [events | llc2 | lmi]

Use the **debug frame-relay** command to activate debug messages associated with the Frame Relay operation. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

events	Activates debug messages for generic Frame Relay events (such as Frame Relay interface state).
llc2	Activates debug messages for the logical link control layer.
lmi	Activates debug messages for the local management interface (such as DLCI status signaling state, etc.).

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug frame-relay** command activates debug messages to aid in the troubleshooting of Frame Relay links.

Usage Examples

The following example activates all possible debug messages associated with Frame Relay operation:

```
>enable
#debug frame-relay events
#debug frame-relay llc2
#debug frame-relay lmi
```

debug frame-relay multilink <interface>

Use the **debug frame-relay multilink** command to activate debug messages associated with Frame Relay multilink operation. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

<interface> Optional. Activates debug messages for the specified interface. Type **debug frame-relay multilink ?** for a complete list of applicable interfaces.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Usage Examples

The following example activates debug messages associated with multilink operation for all Frame Relay interfaces:

```
>enable
#debug frame-relay multilink
```

debug gvrp bpdus

Use the **debug gvrp bpdus** command to see debug messages showing all GVRP configuration messages sent and received on the switch.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

With GVRP enabled on many ports, this command can produce a lot of output. To see these messages just for individual interfaces, refer to the command *debug gvrp interface <interface> [bpdus | vlans]* on [page 94](#).

Usage Examples

The following example displays debug messages showing GVRP configuration messages sent and received on Ethernet interface 0/24:

```
>enable
#debug gvrp bpdus
2000.07.31 23:15:51 GVRP BPDUS.eth 0/24: TX = (Len:2 LeaveAll) (Len:4 JoinIn Vlan:1) (End) ... SENT
2000.07.31 23:15:52 GVRP BPDUS.eth 0/24: RX = (Len:4 Empty Vlan:2) (Len:4 JoinIn Vlan:20) (end)
2000.07.31 23:15:52 GVRP BPDUS.eth 0/24: TX = (Len:4 JoinIn Vlan:1) (End) ... SENT
2000.07.31 23:15:52 GVRP BPDUS.eth 0/24: RX = (Len:4 JoinIn Vlan:20) (end)
2000.07.31 23:16:00 GVRP BPDUS.eth 0/24: RX = (Len:2 LeaveAll) (end)
#
```

debug gvrp interface <interface> [bpdus | vlans]

Use the **debug gvrp interface** command to see GVRP debug messages related to a particular interface.

Syntax Description

<interface>	Activates debug messages for the specified interface. Type debug gvrp interface ? for a complete list of applicable interfaces.
bpdus	Displays debug messages showing all GVRP configuration messages sent and received on the interface.
vlans	Displays debug messages showing all GVRP-related VLAN changes occurring on the interface.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays debug messages showing GVRP configuration messages sent and received on Ethernet interface 0/24:

>enable

#debug gvrp interface ethernet 0/24 bpdus

2000.07.31 23:15:51 GVRP BPDUS.eth 0/24: TX = (Len:2 LeaveAll) (Len:4 JoinIn Vlan:1) (End) ... SENT

2000.07.31 23:15:52 GVRP BPDUS.eth 0/24: RX = (Len:4 Empty Vlan:2) (Len:4 JoinIn Vlan:20) (end)

2000.07.31 23:15:52 GVRP BPDUS.eth 0/24: TX = (Len:4 JoinIn Vlan:1) (End) ... SENT

2000.07.31 23:15:52 GVRP BPDUS.eth 0/24: RX = (Len:4 JoinIn Vlan:20) (end)

2000.07.31 23:16:00 GVRP BPDUS.eth 0/24: RX = (Len:2 LeaveAll) (end)

debug gvrp vlans <vlan number>

Use the **debug gvrp vlans** command to see debug messages showing all GVRP-related VLAN changes.

Syntax Description

<vlan number>	Optional. Displays debug messages showing all GVRP-related VLAN changes for this VLAN only. Range: 1 to 4094.
---------------	---

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

With GVRP enabled on many ports, this command can produce a lot of output. To see these messages just for individual interfaces, refer to the command *debug gvrp interface <interface> [bpdus | vlans]* on [page 94](#).

Usage Examples

The following example displays debug messages showing GVRP-related VLAN changes for VLAN 1:

```
>enable
#debug gvrp vlans 1
#
2000.07.31 22:05:42 GVRP VLANS: Creating dynamic VLAN 20
2000.07.31 22:05:42 GVRP VLANS.eth 0/24: Dynamically adding port to VLAN 20
#
2000.07.31 22:05:56 INTERFACE_STATUS.eth 0/24 changed state to down
2000.07.31 22:06:08 GVRP VLANS.eth 0/24: Dynamically removing port from VLAN 20
2000.07.31 22:06:08 GVRP VLANS: Last port removed from VLAN 20, destroying VLAN
```

debug hdlc [errors | verbose]

Use the **debug hdlc** command to activate debug messages associated with the HDLC interface. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

errors	Enables protocol error and statistic messages.
verbose	Enables detailed debug messages.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates detailed debug messages associated with the HDLC interface:

```
>enable
#debug hdlc verbose
```


debug interface <interface>

Use the **debug interface** command to activate debug messages associated with the specified interface. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

<interface>	Activates debug messages for the specified interface. Type debug interface ? for a complete list of applicable interfaces.
-------------	---

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 6.1	Command was expanded to include T1 and FXS interfaces.
Release 7.1	Command was expanded to include FXO interface.
Release 9.1	Command was expanded to include tunnel interface.

Functional Notes

The **debug interface** command activates debug messages to aid in the troubleshooting of physical interfaces.

Usage Examples

The following example activates all possible debug messages associated with the Ethernet port:

```
>enable
#debug interface ethernet
```

debug interface adsl events

Use the **debug interface adsl events** command to activate debug messages associated with ADSL events. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates debug messages for ADSL events:

```
>enable
#debug interface adsl events
```

debug ip bgp [events | in | out | keepalives | updates | updates quiet]

Use the **debug ip bgp** command to activate debug messages associated with IP BGP. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

events	Displays significant BGP events such as a neighbor state change.
in/out	Displays the same information as debug ip bgp , but limits messages to the specified direction (in or out).
keepalives	Displays BGP keepalive packets.
updates	Displays detailed information on BGP updates for all neighbors.
updates quiet	Displays summary information about BGP neighbor updates. (Note: updates quiet displays a one-line summary of what update displays in 104 lines.)

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

If no arguments are given, the **debug ip bgp** command displays general BGP events such as sent/received message summaries, route processing actions, and results. Keepalive packets are not debugged with this command.

Usage Examples

The following example enables debug messages on general outbound BGP messages and events:

```
>enable
#debug ip bgp out
#07:42:39: BGP OUT 10.15.240.1[2]: Transmitting msg, type=UPDATE (2), len=142
```

debug ip dhcp-client

Use the **debug ip dhcp-client** command to activate debug messages associated with DHCP client operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug ip dhcp-client** command activates debug messages to provide information on DHCP client activity in the AOS. The AOS DHCP client capability allows interfaces to dynamically obtain an IP address from a network DHCP server.

Usage Examples

The following example activates debug messages associated with DHCP client activity:

```
>enable
#debug ip dhcp-client
```

debug ip dhcp-server

Use the **debug ip dhcp-server** command to activate debug messages associated with DHCP server operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug ip dhcp-server** command activates debug messages to provide information on DHCP server activity in the AOS. The AOS DHCP server capability allows the AOS to dynamically assign IP addresses to hosts on the network.

Usage Examples

The following example activates debug messages associated with DHCP server activity:

```
>enable
#debug ip dhcp-server
```

debug ip dns-client

Use the **debug ip dns-client** command to activate debug messages associated with DNS (domain naming system) client operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug ip dns-client** command activates debug messages to provide information on DNS client activity in the AOS. The IP DNS capability allows for DNS-based host translation (name-to-address).

Usage Examples

The following example activates debug messages associated with DNS client activity:

```
>enable
#debug ip dns-client
```

debug ip dns-proxy

Use the **debug ip dns-proxy** command to activate debug messages associated with DNS (domain naming system) proxy operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug ip dns-proxy** command activates debug messages to provide information on DNS proxy activity in the AOS. The IP DNS capability allows for DNS-based host translation (name-to-address).

Usage Examples

The following example activates debug messages associated with DNS proxy activity:

```
>enable
#debug ip dns-proxy
```

debug ip http [verbose]

Use the **debug ip http** command to activate debug messages associated with HTTP operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

verbose Activates detailed debug messages for HTTP operation.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example activates debug messages associated with HTTP activity:

```
>enable  
#debug ip http
```


debug ip icmp [send | recv]

Use the **debug ip icmp** command to show all ICMP messages as they come into the router or are originated by the router. If an optional keyword (**send** or **recv**) is not used, all results are displayed. Use the **no** form of this command to disable the debug messages.

Syntax Description

send	Optional. Keyword which allows you to only display ICMP messages sent by the router.
recv	Optional. Keyword which allows you to only display ICMP messages received by the router.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the **debug ip icmp** send and receive messages for the AOS:

>enable

#debug ip icmp

ICMP SEND: From (0.0.0.0) to (172.22.14.229) Type=8 Code=0 Length=72 Details:echo request

ICMP RECV: From (172.22.14.229) to (10.100.23.19) Type=0 Code=0 Length=72 Details:echo reply

ICMP SEND: From (0.0.0.0) to (172.22.14.229) Type=8 Code=0 Length=72 Details:echo request

ICMP RECV: From (172.22.14.229) to (10.100.23.19) Type=0 Code=0 Length=72 Details:echo reply

ICMP RECV: From (172.22.255.200) to (10.100.23.19) Type=11 Code=0 Length=36 Details:TTL equals 0 during transit

ICMP RECV: From (172.22.14.229) to (10.100.23.19) Type=3 Code=3 Length=36 Details:port unreachable

ICMP RECV: From (172.22.14.229) to (10.100.23.19) Type=3 Code=3 Length=36 Details:port unreachable

debug ip igmp <group-address>

Use the **debug ip igmp** command to enable debug messages for IGMP transactions (including helper activity).

Syntax Description

<group-address> Optional. Specifies the IP address of a multicast group.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1 Command was introduced.

Usage Examples

The following example enables IGMP debug messages for the specified multicast group:

```
>enable
#debug ip igmp 224.1.1.1
```

debug ip mrouting

Use the **debug ip mrouting** command to activate debug messages associated with multicast table routing events. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following sample activates **ip mrouting** debug messages:

```
>enable
#debug ip mrouting
```

debug ip ospf

Use the **debug ip ospf** command to activate debug messages associated with OSPF routing operations. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

adj	Displays OSPF adjacency events.
database-timer	Displays OSPF database timer.
events	Displays OSPF events.
flood	Displays OSPF flooding.
hello	Displays OSPF hello events.
lsa-generation	Displays OSPF link state advertisement generation.
packet	Displays OSPF packets.
retransmission	Displays OSPF retransmission events.
spf	Displays OSPF shortest-path-first calculations.
tree	Displays OSPF database tree.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example of **debug ip ospf** command results:

```
>enable
```

```
#debug ip ospf flood
```

```
OSPF: Update LSA: id=c0a8020d rtid=192.168.2.13 area=11.0.0.0 type=1
OSPF: Update LSA: id=0b003202 rtid=11.0.50.2 area=11.0.0.0 type=1
OSPF: Queue delayed ACK lasid=0b003202 lsartid=11.0.50.2 nbr=11.0.50.2
OSPF: Rx ACK lasid=c0a8020d lsartid=192.168.2.13 nbr=11.0.50.2
OSPF: Received LSA ACK LSA_ID=-64.-88.2.13 LSA_RT_ID=-64.-88.2.13
OSPF: Rx ACK lasid=00000000 lsartid=192.168.2.13 nbr=11.0.50.2
OSPF: Received LSA ACK LSA_ID=0.0.0.0 LSA_RT_ID=-64.-88.2.13
OSPF: Sending delayed ACK
OSPF: Update LSA: id=c0a8020d rtid=192.168.2.13 area=11.0.0.0 type=1
OSPF: Flooding out last interface
OSPF: Update LSA: id=0b003202 rtid=11.0.50.2 area=11.0.0.0 type=1
```

debug ip rip [events]

Use the **debug ip rip** command to activate debug messages associated with Routing Information Protocol (RIP) operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

events Optional. Displays only RIP protocol events.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The **debug ip rip** command activates debug messages to provide information on Routing Information Protocol (RIP) activity in the AOS. RIP allows hosts and routers on a network to exchange information about routes.

Usage Examples

The following example activates debug messages associated with RIP activity:

```
>enable
#debug ip rip
```

debug ip tcp [events]

Use the **debug ip tcp events** command to activate debug messages associated with significant TCP events such as state changes, retransmissions, session aborts, etc., in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.



These debug events are logged for packets that are sent or received from the router. Forwarded TCP packets are not included.

Syntax Description

events Optional. Displays only TCP protocol events.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Functional Notes

In the **debug ip tcp events** information, TCB stands for TCP task control block. The numbers which sometimes appear next to TCB (e.g., **TCB5** in the following example) represent the TCP session number. This allows you to differentiate debug messages for multiple TCP sessions.

Usage Examples

The following is sample output for this command:

```
>enable
```

```
#debug ip tcp events
```

```
2003.02.17 07:40:56 IP.TCP EVENTS TCP: Allocating block 5
2003.02.17 07:40:56 IP.TCP EVENTS TCB5: state change: FREE->SYNRCVD
2003.02.17 07:40:56 IP.TCP EVENTS TCB5: new connection from 172.22.75.246:3473 to
10.200.2.201:23
2003.02.17 07:40:56 IP.TCP EVENTS TCB5: state change: SYNRCVD->ESTABLISHED
[172.22.75.246:3473]
2003.02.17 07:41:06 IP.TCP EVENTS TCB5: Connection aborted -- error = RESET
2003.02.17 07:41:06 IP.TCP EVENTS TCB5: De-allocating tcb
```


debug ip tcp md5

Use the **debug ip tcp md5** command to activate debug messages that detail the results of each incoming TCP packet's MD5 authentication with an internal route in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Debug messages will only be generated for TCP ports that have MD5 authentication enabled.

Usage Examples

The following example activates debug messages associated with incoming TCP packet's MD5 authentication:

```
>enable
#debug ip tcp md5
```

debug ip udp

Use the **debug ip udp** command to activate debug messages associated with UDP send and receive events in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.



These debug events are logged for packets that are sent or received from the router. Forwarded UDP packets are not included.



The overhead associated with this command takes up a large portion of your router's resources and at times can halt other router processes. It is best to only use the command during times when the network resources are in low demand (non-peak hours, weekends, etc.).

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

In the **debug ip udp** information, the message **no listener** means that there is no service listening on this UDP port (i.e., the data is discarded).

Usage Examples

The following is sample output for this command:

```
>enable  
#debug ip udp
```

```
2003.02.17 07:38:48 IP.UDP RX: src=10.200.3.236:138, dst=10.200.255.255:138, 229 bytes, no listener
```

```
2003.02.17 07:38:48 IP.UDP RX: src=10.200.2.7:138, dst=10.200.255.255:138, 227 bytes, no listener
```

```
2003.02.17 07:38:48 IP.UDP RX: src=10.200.201.240:138, dst=10.200.255.255:138, 215 bytes, no  
listener
```

debug isdn events

Use the **debug isdn events** command to activate debug messages associated with ISDN events in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

The `debug ip rip` command activates debug messages to provide information on Routing Information Protocol (RIP) activity in the AOS. RIP allows hosts and routers on a network to exchange information about routes.

Usage Examples

The following example activates debug messages associated with ISDN activity:

```
>enable
#debug isdn events
```

debug lldp [rx | tx] verbose

Use the **debug lldp** command to display debug output for all LLDP receive and transmit packets.

Syntax Description

rx	Shows information about received packets.
tx	Shows information about transmitted packets.
verbose	Shows detailed debugging information.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates all possible debug messages associated with LLDP operation:

```
>enable
#debug lldp rx
#debug lldp tx
#debug lldp verbose
```

debug port-auth [general | packet [both | rx | tx] | auth-sm | bkend-sm | reauth-sm | supp-sm]

Use the **debug port-auth** command to generate debug messages used to aid in troubleshooting problems during the port authentication process. Use the **no** version of this command to disable the messages.

Syntax Description

general	Optional. Displays configuration changes to the port authentication system.
packet both	Optional. Displays packet exchange information in both receive and transmit directions.
packet rx	Optional. Displays packet exchange information in the receive-only direction.
packet tx	Optional. Displays packet exchange information in the transmit-only direction.
auth-sm	Optional. Displays AuthPAE-state machine information.
bkend	Optional. Displays backend-state machine information.
reauth-sm	Optional. Displays reauthentication-state machine information.
supp-sm	Optional. Displays supplicant-state machine information.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 1000, 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 9.1	Command was introduced.
Release 10.1	New options were introduced.

Usage Examples

The following example activates port authentication debug information on received packets:

```
>enable
#debug port-auth packet rx
Rcvd EAPOL Start for sess 1 on int eth 0/2
```

debug port security

Use the **debug port security** command to display messages associated with port security. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates port security debug messages:

```
>enable  
#debug port security
```

debug ppp [authentication | errors | negotiation | verbose]

Use the **debug ppp** command to activate debug messages associated with point-to-point protocol (PPP) operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

authentication	Activates debug messages pertaining to PPP authentication (CHAP, PAP, EAP, etc.).
errors	Activates debug messages that indicate a PPP error was detected (mismatch in negotiation authentication, etc.).
negotiation	Activates debug messages associated with PPP negotiation.
verbose	Activates detailed debug messages for PPP operation.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug ppp** command activates debug messages to provide information on PPP activity in the system. PPP debug messages can be used to aid in troubleshooting PPP links.

Usage Examples

The following example activates debug messages associated with PPP authentication activity:

```
>enable
#debug ppp authentication
```


debug pppoe client

Use the **debug pppoe client** command to activate debug messages associated with point-to-point protocol over Ethernet (PPPoE) operation in the AOS. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, and 4000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates debug messages associated with PPPoE activity:

```
>enable
#debug pppoe client
```

debug radius

Use the **debug radius** command to enable debug messages from the RADIUS subsystem. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug radius** messages show the communication process with the remote RADIUS servers.

Usage Examples

The following is an example output for the **debug radius** command:

```
>enable
#debug radius
```

```
RADIUS AUTHENTICATION: Sending packet to 172.22.48.1 (1645).
```

```
RADIUS AUTHENTICATION: Received response from 172.22.48.1.
```

**debug sip [cldu | location | manager | registrar <extension> |
registration <extension>]**

Use the **debug sip** command to activate debug messages associated with SIP events. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

cldu	Activates SIP CLDU event debug messages.
location	Activates SIP location database event debug messages.
manager	Activates SIP stack manager event debug messages.
registrar	Activates SIP registrar event debug messages.
<extension>	Specifies a specific extension.
registration	Activates SIP registration event debug messages.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates all debug messages associated with SIP events:

```
>enable  
#debug sip
```

debug sip stack [debug | errors | exceptions | info | messages | verbose | warnings]

Use the **debug sip stack** command to activate debug messages associated with SIP stack events. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

debug	Activates SIP stack debug event debug messages.
errors	Activates SIP stack error event debug messages.
exceptions	Activates SIP stack exception event debug messages.
info	Activates SIP stack info event debug messages.
messages	Activates all SIP debug messages.
verbose	Activates all SIP stack event debug messages.
warnings	Activates SIP stack warning event debug messages.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates all debug messages associated with SIP stack events:

```
>enable
#debug sip stack
```

debug sntp

Use the **debug sntp** command to enable debug messages associated with the Simple Network Time Protocol (SNTP). All SNTP Packet Exchanges and time decisions are displayed with these debugging events enabled. Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **debug sntp** command activates debug messages to aid in troubleshooting SNTP protocol issues.

Usage Examples

The following is an example output for the **debug sntp** command:

```
>enable
#debug sntp
#config term
(config)#sntp server timeserver.localdomain
```

```
2002.12.11 15:06:37 SNTP.CLIENT sent Version 1 SNTP time request to 63.97.45.57
2002.12.11 15:06:37 SNTP.CLIENT received SNTP reply packet from 63.97.45.57
2002.12.11 15:06:37 SNTP.CLIENT setting time to 12-11-2002 15:06:02 UTC
2002.12.11 15:06:37 SNTP.CLIENT waiting for 86400 seconds for the next poll interval
```

debug spanning-tree bpdud [receive | transmit | all]

Use the **debug spanning-tree bpdud** command to display BPDU (bridge protocol data unit) debug messages. When enabled, a debug message is displayed for each BPDU packet that is transmitted or received by the unit.

Syntax Description

receive	Displays debug messages for BPDU packets received by the unit.
transmit	Displays debug messages for BPDU packets transmitted by the unit.
all	Displays debug messages for BPDU packets that are transmitted and received by the unit.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays debug messages for BPDU packets that are transmitted and received by the unit:

```
>enable
#debug spanning-tree bpdud all
```

debug spanning-tree [config | events | general | root]

Use the **debug spanning-tree** command to enable the display of spanning-tree debug messages.

Syntax Description

config	Enables the display of spanning-tree debug messages when configuration changes occur.
events	Enables the display of debug messages when spanning-tree protocol events occur.
general	Enables the display of general spanning-tree debug messages.
root	Enables the display of debug messages related to the spanning-tree root.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the display of general spanning-tree debug messages:

```
>enable
#debug spanning-tree general
```

debug stack [SW_API | verbose]

Use the **debug stack** command to enable switch-stacking debug messages.

Syntax Description

SW_API	Enables messages specific to the stack ports.
verbose	Enables messages specific to the stack protocol.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the possible debug stack messages:

```
>enable
#debug stack SW_API
#debug stack verbose
```


debug system

Use the **debug system** command to enable debug messages associated with system events (i.e., login, logouts, etc.). Debug messages are displayed (real-time) to the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

No subcommands.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates debug messages associated with system information:

```
>enable  
#debug system
```

debug voice [**phonemanager** <slot:port> | **rtp** [**channel** | **manager** | **provider** | **verbose**] | **smdr** <number> | **stationaccount** <station> | **switchboard** [**ccm** | <subsource>] | **toneservices** | **trunkaccount** <trunk> <appearance> | **trunkmanager** <trunk> | **trunkport** <slot:port>]

Use the **debug voice** command to activate debug messages associated with voice functionality. Debug messages are displayed (real-time) on the terminal (or Telnet) screen. Use the **no** form of this command to disable the debug messages.

Syntax Description

phonemanager <slot:port>	Activates phone manager event debug messages. Specifies specific slot:port.
rtp	Activates RTP event debug messages.
channel	Specifies RTP channel events.
manager	Specifies RTP manager events.
provider	Specifies RTP provider events.
verbose	Specifies all RTP event.
smdr <number>	Activates SMDR event debug messages. Specifies SMDR events to or from number.
stationaccount <station>	Activates station account event debug messages. Specifies specific station.
switchboard	Activates switchboard event debug messages.
ccm <subsource>	Activates call connection manager messages. Specifies subsource.
toneservices	Activates debug messages associated with tone service events.
trunkaccount <trunk> <appearance>	Activates trunk account event debug messages. Specifies specific trunk. Specifies specific trunk appearance.
trunkmanager	Activates trunk manager event debug messages.
trunkport	Activates trunkport event debug messages.

Default Values

By default, all debug messages in the AOS are disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
Release 10.1	Toneservices option was added.

Usage Examples

The following example activates all debug messages associated with voice functionality:

```
>enable  
#debug voice
```

dir

Use the **dir** command to display a directory list of files on the system.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from the **dir** command:

```
>enable
```

```
#dir
```

```
Files:
```

```
988161 NV3200A-02-00-11.biz
  1152 startup-config
  1113 startup-config.bak
1739729 030018adv.biz
231424 boot030015.biz
1352150 NV3200A-E03-00-17.biz
232894 boot030018.biz
1812281 NV3200A-E03-00-20-adv.biz
6366976 bytes used, 335104 available, 6702080 total
```

dir [*<input>* | flash | flash *<input>*]

Use the **dir** command to list all of the files stored in flash.

Syntax Description

<i><input></i>	Lists all files stored in flash that match the specified pattern.
flash	Lists all files stored in flash.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following is example lists all files stored in flash:

```
>enable
#dir flash
```

disable

Use the **disable** command to exit the Enable mode and enter the Basic Command mode.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example exits the Enable mode and enters the Basic Command mode:

```
#disable  
>
```

enable

Use the **enable** command to enter a password for the Enable Command mode.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Functional Notes

The Enable Command mode provides access to operating and configuration parameters and should be password protected to prevent unauthorized use. Use the **enable password** command (found in the Global Configuration mode) to specify an Enable Command mode password. If the password is set, access to the Enable Commands (and all other “privileged” commands) is only granted when the correct password is entered. Refer to *enable password [md5] <password>* [on page 374](#) for more information.

Usage Examples

The following example enters the Enable Command mode and defines an Enable Command mode password:

```
>enable
Password: *****
#
```

erase [*<filename>* | startup-config]

Use the **erase** command to erase the specified file.

Syntax Description

<i><filename></i>	Specifies the name of the file (located in FLASH memory) to erase.
startup-config	Erases the startup configuration file stored in NVRAM.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example erases the startup configuration file stored in NVRAM:

```
>enable
#erase startup-config
```

If a new startup-configuration file is not specified before power-cycling the unit, the AOS will initialize using a default configuration.

events

Use the **events** command to enable event reporting to the current CLI session. Use the **no** form of this command to disable all event reporting to the current CLI session.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables event reporting:

```
>enable  
#events
```

exception report generate

Use the **exception report generate** command to immediately generate an exception report.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example immediately generates an exception report:

```
>enable
#exception report generate
```

factory-default

Use the **factory-default** command to reset the unit to the factory default settings.



*Performing an AOS **factory-default** disrupts data traffic.*

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300 and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

After you issue this command, the system responds by first warning you that restoring the factory default settings will erase the current configurations. It then asks if you would like to proceed. Choose **n** to return to the command prompt (no configuration changes are made). Choose **y** to erase the startup-configuration, replace it with the factory-default configuration, and reboot the unit. After reboot, the new configuration takes effect.

Usage Examples

The following example resets the unit to factory default settings:

```
>enable
#factory-default
```

```
WARNING - Restoring the factory default settings will erase the current startup and running configurations
and will reboot the unit.
```

```
Restore factory default settings?[y/n]y
```

```
Startup configuration written.
```

```
Rebooting the system. Please wait...
```

logout

Use the **logout** command to terminate the current session and return to the login screen.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows the logout command being executed in Enable mode:

```
>enable
```

```
#logout
```

```
Session now available
```

```
Press RETURN to get started.
```

ping <address>

Use the **ping** command (at the Enable mode prompt) to verify IP network connectivity.

Syntax Description

<address>	Optional. Specifies the IP address of the system to ping. Entering the ping command with no specified address prompts the user with parameters for a more detailed ping configuration. Refer to <i>Functional Notes</i> (below) for more information.
-----------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **ping** command helps diagnose basic IP network connectivity using the Packet Internet Groper program to repeatedly bounce Internet Control Message Protocol (ICMP) Echo_Request packets off a system (using a specified IP address). The AOS allows executing a standard **ping** request to a specified IP address or provides a set of prompts to configure a more specific **ping** configuration.

The following is a list of output messages from the **ping** command:

!	Success
-	Destination Host Unreachable
\$	Invalid Host Address
X	TTL Expired in Transit
?	Unknown Host
*	Request Timed Out

The following is a list of available extended **ping** fields with descriptions:

Target IP address:	Specifies the IP address of the system to ping.
Repeat Count:	Specifies the number of ping packets to send to the system (valid range: 1 to 1,000,000).
Datagram Size:	Size (in bytes) of the ping packet (valid range: 1 to 1448).
Timeout in Seconds:	If a ping response is not received within the timeout period, the ping is considered unsuccessful (valid range: 1 to 5 seconds).
Extended Commands:	Specifies whether additional commands are desired for more ping configuration parameters.
Source Address:	Specifies the IP address to use as the source address in the ECHO_REQ (or interface) packets.
Data Pattern:	Specifies an alphanumeric string to use (the ASCII equivalent) as the data pattern in the ECHO_REQ packets.
Sweep Range of Sizes:	Varies the sizes of the ECHO_REQ packets transmitted.
Sweep Min Size:	Specifies the minimum size of the ECHO_REQ packet (valid range: 0 to 1488).
Sweep Max Size:	Specifies the maximum size of the ECHO_REQ packet (valid range: Sweep Min Size to 1448).
Sweep Interval:	Specifies the interval used to determine packet size when performing the sweep (valid range: 1 to 1448).
Verbose Output:	Specifies an extended results output.

Usage Examples

The following is an example of a successful **ping** command:

```
>enable
```

```
#ping
```

```
Target IP address:192.168.0.30
```

```
Repeat count[1-1000000]:5
```

```
Datagram Size [1-1000000]:100
```

```
Timeout in seconds [1-5]:2
```

```
Extended Commands? [y or n]:n
```

```
Type CTRL+C to abort.
```

```
Legend: '!' = Success '?' = Unknown host '$' = Invalid host address
```

```
      '**' = Request timed out '-' = Destination host unreachable
```

```
      'x' = TTL expired in transit
```

```
Pinging 192.168.0.30 with 100 bytes of data:
```

```
!!!!
```

```
Success rate is 100 percent (5/5) round-trip min/avg/max = 19/20.8/25 ms
```

ping stack-member

Use the **ping stack-member** command to ping a member of the stack.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is available only in stack-master mode.

Usage Examples

The following example pings a member of the stack:

```
>enable
```

```
#ping stack-member 3
```

```
Type CTRL+C to abort.
```

```
Legend: '!' = Success, '?' = Unknown host, '$' = Invalid host address
```

```
      '*' = Request timed out, '-' = Destination host unreachable
```

```
      'x' = TTL expired in transit
```

```
Sending 5, 100-byte ICMP Echos to 169.254.0.3, timeout is 2 seconds:
```

```
!!!!
```

```
Success rate is 100 percent (5/5), round-trip min/avg/max = 2/2.2/3 ms
```

```
#
```

reload [cancel | in <delay>]

Use the **reload** command to preform a manual reload of the AOS.



*Performing an AOS **reload** disrupts data traffic.*

Syntax Description

cancel	Optional. Deactivates a pending reload command.
in	Optional. Specifies a delay period the AOS will wait before reloading.
<delay>	Specifies the delay period in minutes (mmm) or hours and minutes (hh:mm).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example reloads the AOS software in 3 hours and 27 minutes:

```
>enable
#reload in 03:27
```

The following example reloads the AOS software in 15 minutes:

```
>enable
#reload in 15
```

The following example terminates a pending reload command:

```
>enable
#reload cancel
```


show access-lists <listname>

Use the **show access-lists** command to display all configured access lists in the system (or a specific list).

Syntax Description

<listname> Optional. Specifies a particular access list to display.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

The **show access-lists** command displays all configured access lists in the system. All entries in the access list are displayed, and a counter indicating the number of packets matching the entry is listed.

Usage Examples

The following is a sample output from the **show access-lists** command:

```
>enable
```

```
#show access-lists
```

```
Standard access list MatchAll
permit host 10.3.50.6 (0 matches)
permit 10.200.5.0 wildcard bits 0.0.0.255 (0 matches)
extended access list UnTrusted
deny icmp 10.5.60.0 wildcard bits 0.0.0.255 any source-quench (0 matches)
deny tcp any (0 matches)
```

show arp [realtime]

Use the **show arp** command to display the Address Resolution Protocol (ARP) table.

Syntax Description

realtime Displays full-screen output in real time. See the **Functional Notes** below for more information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.
Release 10.1 **Realtime** option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample output of the **show arp** command:

```
>enable
```

```
#show arp
```

ADDRESS	TTL (min)	MAC ADDRESS	LAST UPDATED (min)	INTERFACE
192.168.30.36	13	00:E0:7D:88:1A:B9	4260	eth 0/1
192.168.30.253	17	02:60:8C:DD:0A:CE	4264	eth 0/1
224.0.0.9	71578541	01:00:5E:00:00:09	0	eth 0/2

show atm [pvc | traffic] interface atm <interface>

Use the **show atm** command to display information specific to the ATM interface.

Variations of this command include the following:

show atm pvc

show atm [pvc | traffic] interfaces atm <interface>

Syntax Description

pvc	Displays ATM PVC information.
traffic	Displays ATM traffic information.
<i><sub-interface number></i>	Displays the ATM PVC information, for the specified sub-interface (x.x) number.
<i><atm port interface></i>	Displays the ATM port traffic information, for the specified ATM port number (valid range: 1 to 1023).
<i><atm vcl interface></i>	Displays the ATM VCL traffic information, for the specified ATM VCL number (valid range: 1 to 1023).

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from this command:

>enable

#show atm pvc interface atm 1.1

Name	VPI	VCI	Encap Type	SC	Peak Kbps	Avg/Min Kbps	Burst Cells	Status
atm 1.1	0	200	SNAP	N/A	0	0	0	Active

show bridge *<interface>* *<slot/port>* *<bridge group #>*

Use the **show bridge** command to display a list of all configured bridge groups (including individual members of each group). Enter an interface or a bridge number to display the corresponding list.

Syntax Description

<interface> *<slot/port>* Optional. Displays all bridge groups associated with the specific interface. Type the **show bridge ?** command to display a list of applicable interfaces.

<bridgegroup#> Optional. Displays a specific bridge group

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Release 9.1 Command was expanded to include HDLC interface.

Usage Examples

The following is a sample output from the **show bridge** command:

>enable

#show bridge

Total of 300 station blocks 295 free

Address	Action	Interface	Age	Rx Count	Tx Count
00:04:51:57:4D:5A	forward	eth 0/1	0	7133392	7042770
00:04:5A:57:4F:2A	forward	eth 0/1	0	402365	311642
00:10:A4:B3:A2:72	forward	eth 0/1	4	2	0
00:A0:C8:00:8F:98	forward	eth 0/1	0	412367	231
00:E0:81:10:FF:CE	forward	fr 1.17	0	1502106	1486963

show buffers [realtime]

Use the **show buffers** command to display the statistics for the buffer pools on the network server.

Syntax Description

realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
-----------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample output from the **show buffers** command:

```
>enable
```

```
#show buffers
```

```
Buffer handles: 119 of 2000 used.
```

Pool	Size	Total	Used	Available	Max. Used
0	1800	1894	119	1775	122
1	2048	64	0	64	0
2	4096	32	0	32	0
3	8192	4	0	4	0
4	16384	2	0	2	0
5	32768	2	0	2	0
6	65536	2	0	2	0

show buffers users [realtime]

Use the **show buffers users** command to display a list of the top users of packet buffers. Typically, this command will only be used as a debug tool by ADTRAN personnel.

Syntax Description

realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
-----------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample from the **show buffers users** command:

```
>enable
```

```
#show buffers users
```

```
Number of users: 7
```

Rank	User	Count
1	0x0052f4f8	59
2	0x0051a4fc	32
3	0x00528564	8
4	0x0053c1c8	7
5	fixedsize	5
6	0x001d8298	2

7	0x0010d970	1
8	0x00000000	0
9	0x00000000	0
10	0x00000000	0
11	0x00000000	0
12	0x00000000	0
13	0x00000000	0
14	0x00000000	0
15	0x00000000	0

show channel-group

Use the **show channel-group** command to display detailed information regarding port aggregation of a specified channel group (i.e., channel groups and their associated ports).

Variations of this command include the following:

show channel-group port-channel load-balance

show channel-group summary

show channel-group <channel group #> summary

Syntax Description

port-channel load-balance	Displays the current load-balance scheme.
summary	Summarizes the state of all channel groups or of a specific channel group (if specified by the <channel group #> argument).
<channel group #>	Channel group ID (16).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample from the **show channel-group** command:

>**enable**

#**show channel-group summary**

Channel Group	Port channel	Associated Ports
-----	-----	-----
1	1	eth 0/2 eth 0/3
2	2	eth 0/5 eth 0/6 eth 0/7

show clock [detail]

Use the **show clock** command to display the system time and date entered using the **clock set** command. Refer to the section *clock set <time> <day> <month> <year>* [on page 67](#) for more information.

Syntax Description

detail Optional. Use this optional keyword to display more detailed clock information, including the time source.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example displays the current time and data from the system clock:

```
>show clock
```

```
23:35:07 UTC Tue Aug 20 2002
```

show configuration

Use the **show configuration** command to display a text printout of the startup configuration file stored in NVRAM.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample output of the **show configuration** command:

```
>enable
#show configuration
!
!
no enable password
!
ip subnet-zero
ip classless
ip routing
!
event-history on
no logging forwarding
logging forwarding priority-level info
no logging email
!
ip policy-timeout tcp all-ports 600
ip policy-timeout udp all-ports 60
ip policy-timeout icmp 60
!
```

```
!  
!  
interface eth 0/1  
  speed auto  
  no ip address  
  shutdown  
!  
interface dds 1/1  
  shutdown  
!  
interface bri 1/2  
  shutdown  
!  
!  
ip access-list standard Outbound  
  permit host 10.3.50.6  
  permit 10.200.5.0 0.0.0.255  
!  
!  
ip access-list extended UnTrusted  
  deny icmp 10.5.60.0 0.0.0.255 any source-quench  
  deny tcp any any  
!  
no ip snmp agent  
!  
!  
!  
line con 0  
  no login  
!  
line telnet 0  
  login  
line telnet 1  
  login  
line telnet 2  
  login  
line telnet 3  
  login  
line telnet 4  
  login  
!
```

show connections

Use the **show connections** command to display information (including TDM group assignments) for all active connections.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from the **show connections** command:

```
>enable
```

```
#show connections
```

```
Displaying all connections....
```

```
Conn ID
```

```
From
```

```
To
```

```
1
```

```
ppp 1
```

```
e1 1/1, tdm-group 1
```

show crypto ca [certificates | crls | profiles]

Use the **show crypto ca** command to display information regarding certificates and profiles.

Syntax Description

certificates	Displays information on all certificates.
crls	Displays a summary of all certificate revocation lists (CRLs) for each CA.
profiles	Displays information on all configured CA profiles.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced (enhanced software version only).
-------------	--

Usage Examples

The following is a sample from the **show crypto ca certificates** command:

```
>enable
#show crypto ca certificates
CA Certificate
  Status: Available
  Certificate Serial Number: 012d
  Subject Name: /C=FI/O=SSH Communications Security/OU=Web test/CN=Test CA 1
  Issuer: /C=FI/O=SSH Communications Security/OU=Web test/CN=Test CA 1
  CRL Dist. Pt: /C=FI/O=SSH Communications Security/OU=Web test/CN=Test CA 1
  Start date is Jan  9 16:25:15 2003 GMT
  End date is Dec 31 23:59:59 2003 GMT
  Key Usage:
    Non-Repudiation
    Key Encipherment
    Data Encipherment
    CRL Signature
    Encipherment Only
```

show crypto ike

Use the **show crypto ike** command to display information regarding the IKE configuration.

Variations of this command include the following:

show crypto ike client configuration pool

show crypto ike client configuration pool <poolname>

show crypto ike policy

show crypto ike policy <policy priority>

show crypto ike remote-id <remote-id>

show crypto ike sa

Syntax Description

client configuration pool	Displays the list of all configured IKE client configuration pools.
<poolname>	Displays detailed information regarding the specified IKE client configuration pool.
policy	Displays information on all IKE policies. Indicates if client configuration is enabled for the IKE policies and displays the pool names.
<policy priority>	Displays detailed information on the specified IKE policy. This number is assigned using the crypto ike policy command. Refer to crypto ike on page 363 for more information.
remote-id <remote-id>	Displays information on all IKE information regarding the remote-id. The remote-id value is specified using the crypto ike remote-id command (refer to crypto ike remote-id on page 367).
sa	Displays the configuration of active IKE security associations.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample from the **show crypto ike policy** command:

```
>enable
#show crypto ike policy
Crypto IKE Policy 100
  Main mode
  Using System Local ID Address
  Peers:
  63.105.15.129
  initiate main
  respond anymode
  Attributes:
  10
  Encryption: 3DES
  Hash: SHA
  Authentication: Pre-share
  Group: 1
  Lifetime: 900 seconds
```

show crypto ipsec

Use the **show crypto ipsec** command to display information regarding the IPsec configuration.

Variations of this command include the following:

show crypto ipsec sa

show crypto ipsec sa address *<ip address>*

show crypto ipsec sa map *<mapname>*

show crypto ipsec transform-set

show crypto ipsec transform-set *<transform-set name>*

Syntax Description

sa	Displays all IPsec security associations.
sa address <i><ip address></i>	Displays all IPsec security associations associated with the designated peer IP address.
sa map <i><mapname></i>	Displays all IPsec security associations associated with the designated crypto map name.
transform-set	Displays all defined transform sets.
<transform-set name>	Displays information for a specific transform set.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

show crypto map

Use the **show crypto map** command to display information regarding crypto map settings.

Variations of this command include the following:

show crypto map

show crypto map *<interface>*

show crypto map *<map name>*

show crypto map *<map name>* *<map number>*

Syntax Description

<i><interface></i>	Displays the crypto map settings for the specified interface. Type show interfaces ? for a complete list of valid interfaces.
<i><map name></i>	Specifies a specific crypto map name.
<i><map number></i>	Specifies a specific crypto map number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

show debugging

Use the **show debugging** command to display a list of all activated debug message categories.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample output from the **show debugging** command:

```
>enable
```

```
#show debugging
```

```
debug access-list MatchAll
debug firewall
debug ip rip
debug frame-relay events
debug frame-relay llc2
debug frame-relay lmi
```

show dial-backup interfaces

Use the **show dial-backup interfaces** command to display all configured dial-backup interfaces and the associated parameters for each.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include PPP dial backup.

Usage Examples

The following example enters the Enable mode and uses the show command to display dial-backup interface information:

```
>enable
#show dial-backup interfaces
Dial-backup interfaces...
fr 1.16 backup interface:
  Backup state:  idle
  Backup protocol: PPP
  Call mode:    originate
  Auto-backup:  enabled
  Auto-restore: enabled
  Priority:     50
  Backup delay: 10 seconds
  Restore delay: 10 seconds
  Connect timeout: 60 seconds

  Redial retries: unlimited
  Redial delay: 10 seconds
Backup enabled all day on the following days:
  Sunday Monday Tuesday Wednesday Thursday Friday Saturday
```

Backup phone number list:

Number	Call Type	min/max DS0s	Backup I/F
5551212	analog	1/1	ppp 2

show dialin interfaces

Use the **show dialin interfaces** command to display information regarding remote console dialin.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from the **show dialin interfaces** command:

```
>enable
```

```
#show dialin interfaces
```

```
Dialin interfaces...
```

```
modem 1/3 dialin interface:
```

```
  Connection Status: Connected
```

```
  Caller ID info: name-John Smith number-5551212 time-14:23:10 2/17/2003
```

show dynamic-dns

Use the **show dynamic-dns** command to show information related to the dynamic DNS configuration.

Syntax Description

No subcommands.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from this command:

```
>enable
#show dynamic-dns
eth 0/1:
  Hostname: host
  Is Updated: no
  Last Registered IP: 10.15.221.33
  Last Update Time: 00:00:00 UTC Thu Jan 01 1970
```

show event-history

Use the **show event-history** command to display all entries in the current local event-history log.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The event history provides useful information regarding the status of the system and individual port states. Use the event history as a troubleshooting tool when identifying system issues. The following is a sample event-history log.

>enable

#show event-history

```
Using 526 bytes
2002.07.12 15:34:01 T1.t1 1/1 Yellow
2002.07.12 15:34:01 INTERFACE_STATUS.t1 1/1 changed state to down.
2002.07.12 15:34:02 T1.t1 1/1 No Alarms
2002.07.12 15:34:02 INTERFACE_STATUS.t1 1/1 changed state to up.
2002.07.12 15:34:03 INTERFACE_STATUS.eth 0/1 changed state to up.
2002.07.12 15:34:10 OPERATING_SYSTEM Warm Start
2002.07.12 15:34:12 PPP.NEGOTIATION LCP up
2002.07.12 15:34:12 PPP.NEGOTIATION IPCP up
```

show fan-tach

Use the **show fan-tach** command to view the unit's current fan speed.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example shows the current fan speed:

>enable

#show fan-tach

Fan Tach (in rpm)	Current	Min	Max	Avg
Processor	8160	8100	17804	8544
Chassis 1	3060	3060	31380	4237
Chassis 2	3120	3060	31560	4277

show flash

Use the **show flash** command to display a list of all files currently stored in FLASH memory.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample **show flash** output:

```
>enable
```

```
#show flash
```

```
Files:
```

```
245669 010100boot.biz
1141553 new.biz
   821 startup-config
   1638 startup-config.old
1175679 020016.biz
   821 startup-config.bak
2572304 bytes used 4129776 available 6702080 total
```

show frame-relay fragment [frame-relay <port.sublink>]

Use the **show frame-relay fragment** command to display FRF.12 statistics for Frame Relay sublinks enabling FRF.12 fragmentation.

Syntax Description

frame-relay <port.sublink> Optional. Displays detailed FRF.12 statistics for the specified Frame Relay sublink (if FRF.12 is enabled on that sublink).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following are sample outputs from various **show frame-relay fragment** commands:

>enable

#show frame-relay fragment

interface	dlci	frag_size	rx_frag	tx_frag	dropped_frag
fr 1.1	17	100	46	48	0
fr 1.2	18	200	42	21	0

>enable

#show frame-relay fragment frame-relay 1.1

DLCI = 17 FRAGMENT SIZE = 100

rx frag. pkts	46	tx frag. pkts	48
rx frag. bytes	4598	tx frag. bytes	4724
rx non-frag. pkts	18	tx non-frag. pkts	28
rx non-frag. bytes	1228	tx non-frag. bytes	1960
rx assembled pkts	23	tx pre-fragment pkts	34
rx assembled bytes	5478	tx pre-fragment bytes	6324
dropped reassembling pkts	0	dropped fragmenting pkts	0
rx out-of-sequence fragments	0		
rx unexpected beginning fragment	0		

show frame-relay

Use the **show frame-relay** command to display configuration and status parameters for configured virtual Frame Relay interfaces.

Variations of this command include the following:

show frame-relay lmi

show frame-relay pvc

show frame-relay pvc interface frame-relay *<interface>*

show frame-relay pvc realtime

Syntax Description

lmi	Displays Link Management Interface (LMI) statistics for each virtual Frame Relay interface.
pvc	Displays Permanent Virtual Circuit (PVC) configuration and statistics for all virtual Frame Relay interfaces (or a specified interface).
frame-relay	Optional. Displays Frame Relay PVC statistics for a specific Frame Relay interface.
<i><interface></i>	Specifies the virtual Frame Relay interface (for example fr 1).
realtime	Displays full-screen output in realtime. See the Functional Notes below for more information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following are sample outputs from various **show frame-relay** commands:

>enable

#show frame-relay lmi

```
LMI statistics for interface FR 1 LMI TYPE = ANSI
Num Status Enq. Sent 79    Num Status Msgs Rcvd 71
Num Update Status Rcvd 12  Num Status Timeouts 5
```

>enable

#show frame-relay pvc

```
Frame Relay Virtual Circuit Statistics for interface FR 1
      Active      Inactive      Deleted      Static
local    2          0          0          2
DLCI = 16 DLCI USAGE = LOCAL PVC STATUS = ACTIVE INTERFACE = FR 1.16
MTU: 1500
input pkts: 355          output pkts: 529          in bytes: 23013
out bytes: 115399        dropped pkts: 13          in FECN pkts: 0
in BECN pkts: 0          in DE pkts: 0            out DE pkts: 0
pvc create time: 00:00:00:12          last time pvc status changed: 00:00:13:18
DLCI = 20 DLCI USAGE = LOCAL PVC STATUS = ACTIVE INTERFACE = FR 1.20
MTU: 1500
input pkts: 0            output pkts: 44          in bytes: 0
out bytes: 22384        dropped pkts: 11          in FECN pkts: 0
in BECN pkts: 0          in DE pkts: 0            out DE pkts: 0
pvc create time: 00:00:01:25          last time pvc status changed: 00:00:13:18
```

show frame-relay multilink <interface> detailed

Use the **show frame-relay multilink** command to display information associated with the Frame Relay multilink interface.

Syntax Description

<interface>	Optional. Specifies the display of information for a specific interface. Enter the show frame-relay multilink ? command for a complete list of interfaces.
detailed	Optional. Displays more detailed information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample output from this command:

```
>enable
#show frame-relay multilink
Bundle: frame-relay 1 is DOWN; class A bundle
Near-end BID: MFR1; Far-end BID: unknown
```

show garp timer

Use the **show garp timer** command to see the current configured GARP application timer values.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays the current configured GARP application timer values:

>enable

#show garp timer

Timer	Timer Value (milliseconds)
-----	-----
Join	200
Leave	600
LeaveAll	10000

show gvrp configuration

Use the **show gvrp configuration** command to show a GVRP configuration summary for the switch.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays a GVRP configuration summary for the switch:

```
>enable
#show gvrp configuration
Global GVRP Configuration:
GVRP Feature is currently enabled globally.
GVRP Timers (milliseconds)
Join 200
Leave 600
LeaveAll 20000
Port based GVRP Configuration:
GVRP enabled ports
-----
eth 0/24

#
```

show gvrp statistics interface <interface>

Use the **show gvrp statistics interface** command to show statistics related to GVRP.

Syntax Description

<interface>	Shows the information for the specified interface. Type show gvrp statistics interface ? for a complete list of applicable interfaces.
-------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays statistics related to GVRP for Ethernet interface 0/24:

```
>enable
#show gvrp statistics interface ethernet 0/24
Name: eth 0/24
Join Empty Received: 0
Join In Received: 272
Empty Received: 30
Leave Empty Received: 0
Leave In Received: 0
Leave All Received: 28
Join Empty Transmitted: 0
Join In Transmitted: 286
Empty Transmitted: 28
Leave Empty Transmitted: 0
Leave In Transmitted: 0
Leave All Transmitted: 115
#
```


show hosts [verbose]

Use the **show hosts** command to display information such as the domain name, name lookup service, a list of name server hosts, and the cached list of host names and addresses on the network to which you can connect.

Syntax Description

verbose	Enables detailed messaging.
----------------	-----------------------------

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1

Functional Notes

The list below describes the fields contained in the host table:

- **Flags:** Indicate whether the entry is permanent (P) or temporary (T) and if the entry is OK or expired (EXP).
- **Age:** Indicates the age of the entry.
- **Type:** Shows the protocol type.
- **Address:** Displays the IP address for the entry.

Usage Examples

The following example is sample output from the **show hosts** command:

```
>enable
```

```
#show hosts
```

```
Name/address lookup uses domain name service
```

```
DNS Proxy is disabled
```

```
Default domain is not set
```

```
Name servers are 1.1.1.1 2.2.2.2
```

Host	Flags	Age	Type	Address
Example1	(P OK)	--	IP	1.1.1.1
Example2	(P OK)	--	IP	2.2.2.2

show interfaces <interface>

Use the **show interfaces** command to display configuration parameters and current statistics for all interfaces (or a specified interface).

Syntax Description

<interface>	Optional. Specific interface to display. Type show interfaces ? for a complete list of valid interfaces.
performance-statistics	Optional. Displays the current 15-minute interval, the current 24-hour totals, and all 96 stored intervals.
performance-statistics total-24-hour	Optional. Displays the current 24-hour totals and the past seven 24-hour intervals.
performance-statistics <x-y>	Shows the current 15-minute interval, the current 24-hour totals, and all intervals from x through y. This command is basically the same thing as the performance-statistics command with the added function of allowing you to specify a particular interval (or range of intervals) to display rather than displaying all 96. <i>Note: If you want to display the 24th interval, enter (for example) show interface t1/1 performance-statistics 24-24. Entering show interface t1 1/1 performance-statistics 24 results in displaying the 24-hour statistics. Any number other than 24 (between 1 and 96) results in the correct display of the selected interval (e.g., show interface t1 1/1 performance-statistics 4 shows the fourth interval).</i>
realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
version	Optional. Displays current version information (e.g., model and list number, software version, etc.) for the T1 interface.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 6.1	Command was updated to include performance-statistics option.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following are samples from various **show interfaces** commands:

>enable

#show interfaces t1 1/1

t1 1/1 is UP

T1 coding is B8ZS framing is ESF

Clock source is line FDL type is ANSI

Line build-out is 0dB

No remote loopbacks No network loopbacks

DS0 Status: 123456789012345678901234

NNNNNNNNNNNNNNNNNNNNNNNNNNNN

Line Status: -- No Alarms --

Current Performance Statistics:

0 Errored Seconds 0 Bursty Errored Seconds

0 Severely Errored Seconds 0 Severely Errored Frame Seconds

0 Unavailable Seconds 0 Path Code Violations

0 Line Code Violations 0 Controlled Slip Seconds

0 Line Errored Seconds 0 Degraded Minutes

#show interfaces modem 1/2

modem 1/2 is UP

Line status: on-hook

Caller ID will be used to route incoming calls

0 packets input 0 bytes 0 no buffer

0 runts 0 giants 0 throttles

0 input errors 0 CRC 0 frame

0 abort 0 ignored 0 overruns

0 packets output 0 bytes 0 underruns

0 input clock glitches 0 output clock glitches

0 carrier lost 0 cts lost

#show interfaces eth 0/1

Ip address is 10.200.1.50
Netmask is 255.255.0.0
MTU is 1500
Fastcaching is Enabled
RIP Authentication is Disabled
RIP Tx uses global version value
RIP Rx uses global version value

#show interfaces dds 1/1

dds 1/1 is UP line protocol is UP
Encapsulation FRAME-RELAY (fr 1)
Loop rate is set to 56000 actual rate is 56000
Clock source is line
Data scrambling is disabled
No Loopbacks
75 packets input 6108 bytes 0 no buffer
0 runts 0 giants 0 throttles
0 input errors 0 CRC 0 frame
0 abort 0 ignored 0 overruns
81 packets output 11496 bytes 0 underruns
0 input clock glitches 0 output clock glitches
0 carrier lost 0 cts lost

#show interfaces fr 1

TDM group 10 line protocol is UP
Encapsulation FRAME-RELAY (fr 1)
463 packets input 25488 bytes 0 no buffer
0 runts 0 giants 0 throttles
0 input errors 0 CRC 0 frame
0 abort 0 ignored 0 overruns
864 packets output 239993 bytes 0 underruns
0 input clock glitches 0 output clock glitches
0 carrier lost 0 cts lost

Line Status: -- No Alarms --

Current Performance Statistics:

0 Errored Seconds 0 Bursty Errored Seconds
0 Severely Errored Seconds 0 Severely Errored Frame Seconds
0 Unavailable Seconds 0 Path Code Violations
0 Line Code Violations 0 Controlled Slip Seconds
0 Line Errored Seconds 0 Degraded Minutes

#show interfaces fr 1.100*

fr 1.100 is Active

Ip address is 63.97.45.57, mask is 255.255.255.248

Interface-dlci is 100

MTU is 1500 bytes, BW is 96000 Kbit (limited)

Average utilization is 53%

*Note: If the user has configured a **Bc** and **Be** value on the virtual circuit, the bandwidth (**BW**) displayed is the sum of those values (Bc + Be). If not, the value for **BW** is the speed of the interface. The **Average utilization** displayed is the average utilization of the displayed bandwidth. If the bandwidth number is the Bc + Be value, the **(limited)** text appears (as shown above).

show interfaces adsl <slot/port> information [atuc | atur | bit-allocation]

Use the **show interfaces adsl** command to display information related to the ADSL port.

Syntax Description

<slot/port>	Specifies interface slot and port number.
atuc	Shows ADSL interface remote information.
atur	Shows ADSL local information.
bit-allocation	Shows ADSL DMT bit-allocation table.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows sample output for this command:

```
>enable
#show interfaces adsl 0/1 information
adsl 0/1 line information
adsl 0/1 Local Line Information
  Vendor Id:          4144544E
  Serial Number:     EngBetaREVC01D
  Firmware Version:
  ADSL Capabilites   G.DMT, G.LITE, ADSL2, ADSL2+
adsl 0/1 Remote Line Information
  Vendor Id:          54535443
  Serial Number:     00000000
  Firmware Version:   1
  ADSL Capabilites   G.DMT, G.LITE, ADSL2, ADSL2+
```

show interfaces shdsl <slot/port>

Use the **show interfaces shdsl** command to display configuration parameters and current statistics for the SHDSL interfaces (or a specified interface).

Variations of this command include the following:

show interfaces shdsl <slot/port>

show interfaces shdsl <slot/port> **performance-statistics**

show interfaces shdsl <slot/port> **performance-statistics total-24-hour**

show interfaces shdsl <slot/port> **performance-statistics** <x-y>

show interfaces shdsl <slot/port> **version**

Syntax Description

<slot/port>	Specifies interface slot and port number.
performance statistics	Optional. Displays the current 15-minute interval, the current 24-hour totals, and all 96 stored intervals.
performance-statistics total-24-hour	Optional. Displays the current 24-hour totals and the past seven 24-hour intervals.
performance-statistics <x-y>	Shows the current 15-minute interval, the current 24-hour totals, and all intervals from x through y. This command is basically the same as the performance-statistics command with the added function of allowing you to specify a particular interval (or range of intervals) to display rather than displaying all 96. <i>Note: If you wish to display the 24th interval, enter show interface shdsl 1/1 performance-statistics 24-24. Entering show interface shdsl 1/1 performance-statistics 24 results in displaying the 24-hour statistics. Any number other than 24 (between 1 and 96) results in the correct display of the selected interval (e.g., show interface shdsl 1/1 performance-statistics 4 shows the 4th interval).</i>
version	Optional. Displays current version information (e.g., model and list number, software version, etc.) for the SHDSL interface.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

The following is a list of output messages from the **show interfaces shdsl** command:

Equipment Type	Shows whether the unit is operating in CPE (NT) mode or CO (LT) mode.
Line Rate	Shows the current line rate. The line rate is the data rate + 8 kbps. Therefore, a rate of 2056 kbps implies an actual data rate of 2048 kbps.
Alarms	Shows the current alarm conditions. Possible alarms are: <ul style="list-style-type: none">• LOS• LOSW - Loss of synchronization word (related to frame sync)• Loop attenuation (loop attenuation margin threshold has been reached or exceeded; this threshold is user selectable and disabled by default)• SNR margin (SNR margin threshold has been reached or exceeded; this threshold is also user programmable)• CRC• Segment defect• Segment anomaly
Loop Status	Shows additional information about the loop status as well as the Embedded Operations Channel (EOC). Possible messages are: <ul style="list-style-type: none">• SHDSL training complete (marginal signal quality). Establishing EOC...• SHDSL training complete (marginal signal quality). EOC is up.• SHDSL training complete. EOC is down.• SHDSL training complete. EOC is up.• SHDSL training in progress.
Loopback State	Shows the state of local and remote loopbacks. Possible local loopback messages are: <ul style="list-style-type: none">• Local dual-sided loopback• Local customer transparent loopback• Local customer non-transparent loopback• Local transparent network loopback• Local non-transparent network loopback• No local loopbacks Possible remote loopback messages are: <ul style="list-style-type: none">• Remote dual-sided loopback• Remote customer transparent loopback• Remote customer non-transparent loopback• Remote transparent network loopback• Remote non-transparent network loopback• No remote loopbacks
SNR margin	Shows the current, minimum, and maximum signal-to-noise ratio of the line. These may be cleared using the clear counters shdsl <slot/port> command.

Functional Notes (Continued)

Loop Attenuation	Shows the current, minimum, and maximum loop attenuation of the line. These may be cleared using the clear counters shdsl <slot/port> command.
Performance Stats	Shows current interval line statistics. These statistics may be cleared through the use of the clear counters shdsl <slot/port> command, but the number of elapsed seconds will continue running and accumulating time.

Usage Examples

The following is sample output from the **show interfaces shdsl** command:

```
>enable
```

```
#show interfaces shdsl 1/1
```

```
shdsl 1/1 is UP, line protocol is DOWN
Encapsulation FRAME-RELAY IETF (fr 1)
Equipment type is cpe
Line rate is 2056kbps
No alarms.
SHDSL training complete. EOC is up.
No local loopbacks, No remote loopbacks
SNR margin is 18dB currently, 15dB minimum, 30dB maximum
Loop attenuation is 1dB currently, 1dB minimum, 1dB maximum
```

```
Current 15-minute performance statistics (115 seconds elapsed):
```

```
0 code violations, 0 loss of sync word seconds
0 errored seconds, 0 severely errored seconds
0 unavailable seconds
```

```
Packet Statistics:
```

```
0 packets input, 0 bytes, 0 no buffer
0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame
0 abort, 0 ignored, 0 overruns
32 packets output, 0 bytes, 0 underruns
0 input clock glitches, 0 output clock glitches
0 carrier lost, 0 cts lost
```

Technology Review

A network loopback loops data toward the network (away from the unit). A customer loopback loops data toward the router. The router does not instigate customer-side loopbacks, only network loopbacks (remote or local). The reason for this is that the customer interface is internal to the router. There is little use for looping back router data on itself.

A transparent loopback is one in which the unit loops back one side (i.e., network) and also allows the same incoming data to be passed through to the customer side. A non-transparent loopback is one which loops back one side of the interface (network) but sends idle codes to the other side (customer). The AOS defaults to non-transparent loopbacks. The reason for this is that sending test patterns into the IP stack could cause unpredictable behavior. However, it is still possible for the network to send a transparent loopback request. Such requests will be accepted.

show interfaces switchport [vlans]

The **show interfaces switchport** command displays the operational and configured state of switch-specific parameters on all ports.

Syntax Description

vlans	Shows VLAN membership information for a specific switchport or series of switchports.
--------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 6.1	Command was introduced.
Release 10.1	VLANS option was introduced.

Functional Notes

The output of this command is restricted to switch-only information.

Usage Examples

The following is sample output from the **show interfaces switchport** command:

```
>enable
#show interfaces switchport

Name: eth 0/1
Switchport: enabled
Administrative mode: access
Negotiation of Trunking: access
Access mode VLAN: 1
Trunking Native mode VLAN: 1
Trunking VLAN Enabled: 1-4094

Name: eth 0/2
Switchport: enabled
Administrative mode: access
Negotiation of Trunking: access
Access mode VLAN: 12.....
```

show ip access-lists <listname>

Use the **show ip access-lists** command to display all configured IP access lists in the system.

Syntax Description

<listname> Optional. Specifies a particular access list to display.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

The **show ip access-lists** command displays all configured IP access lists in the system. All entries in the access list are displayed, and a counter indicating the number of packets matching the entry is listed.

Usage Examples

The following is a sample output from the **show ip access-lists** command:

>enable

#show ip access-lists

Standard IP access list MatchAll

 permit host 10.3.50.6 (0 matches)

 permit 10.200.5.0 wildcard bits 0.0.0.255 (0 matches)

Extended IP access list UnTrusted

 deny icmp 10.5.60.0 wildcard bits 0.0.0.255 any source-quench (0 matches)

 deny tcp any any (0 matches)

show ip arp [realtime]

Use the **show ip arp** command to display the Address Resolution Protocol (ARP) table.

Syntax Description

realtime	Displays full-screen output in realtime. See the Functional Notes below for more information.
-----------------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample output of the **show ip arp** command:

>enable

#show ip arp

ADDRESS	TTL (min)	MAC ADDRESS	LAST UPDATED (min)
192.168.30.36	13	00:E0:7D:88:1A:B9	4260
192.168.30.253	17	02:60:8C:DD:0A:CE	4264
224.0.0.9	71578541	01:00:5E:00:00:09	0

show ip as-path-list [<listname>]

Use the **show ip as-path-list** command to display any AS path lists that have been configured in the router, along with any permit and deny clauses in each list.

Syntax Description

<listname>	Optional. Specifies that the command display only the list matching the specified AS path listname. If not specified, all AS path lists are displayed.
------------	--

Default Values

By default, this command displays all AS path lists.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

In the following example, all AS path lists defined in the router are displayed.

```
>enable
#show ip as-path-list
ip as-path-list AsPathList1:
  permit 100
  permit 200
  permit 300
  deny 6500
ip as-path-list AsPathList2:
  permit 400
  permit 500
```

In the following example, only the AS Path List with the name **AsPathList2** is displayed.

```
>enable
#show ip as-path-list AsPathList2
ip as-path-list AsPathList2:
  permit 400
  permit 500
```

show ip bgp community [<community number> . . . <community number> | internet | no export| local-as | no-advertise] [exact]

Use the **show ip bgp community** command to display only those routes learned via BGP that match the community numbers specified in the command. If no communities are specified, all BGP routes are shown.

Syntax Description

<community-number>	Optional. Displays routes that contain this value in their community attribute. This is a numeric value that can be an integer from 1 to 4,294,967,295 or string in the form "aa:nn", where the value of "aa" is the AS number and the value of "nn" is the community number. Multiple community-number parameters can be present in the command.
internet	Optional. Displays routes that contain this value in their community attribute. This represents the well-known reserved community number for the INTERNET community.
local-as	Optional. Displays routes that contain this value in their community attribute. This represents the well-known reserved community number for NO_EXPORT_SUBCONFED. Routes containing this attribute should not be advertised to external BGP peers.
no-export	Optional. Displays routes containing this value in the community attribute. This represents the well-known reserved community number for NO_EXPORT. Routes containing this attribute should not be advertised to BGP peers outside a confederation boundary.
no-advertise	Optional. Displays routes containing this value in the community attribute. This represents the well-known reserved community number for NO_ADVERTISE. Routes containing this attribute should not be advertised to any BGP peer.
exact	Optional. Displays BGP routes with the community numbers specified and <i>only</i> those specified.

Default Values

By default, this command displays all BGP routes.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

In the following example, all BGP routes are displayed whose community numbers match those listed in the **show ip bgp community** command.

>enable

#show ip bgp community local-as 10:405

BGP local router ID is 10.22.131.241, local AS is 302.

Status codes: * valid, > best, i - internal, o - local

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Path
10.22.152.20/30	10.22.131.10	304		302 300 1 3 4 i
10.22.152.24/29	10.22.131.10	304		302 300 1 3 4 5 i
10.22.152.36/30	10.22.131.10	304		302 300 1 3 4 i
10.22.152.52/30	10.22.131.10	304		302 300 1 3 4 i
11.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
12.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
13.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
14.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
20.0.0.0/30	10.22.131.10	304		302 300 1 3 4 5 i
21.0.0.0/30	10.22.131.10	304		302 300 1 3 4 5 i

Total RIB entries = 10

Information displayed includes: the ID of this router and its Autonomous System (AS) number; the destination Network address of the route learned; the Next Hop address to that network; the Metric; the Local Preference value (set using the **set local-preference** command); and the AS Path to the destination network.

The following is a sample output for the show-ip bgp community command with an exact match specified: BGP routes with the community numbers specified and *only* those specified are shown

>enable

#show ip bgp community 1001 2001 3001 exact

BGP local router ID is 192.168.9.1, local AS is 252.

Status codes: * valid, > best, i - internal, o - local

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	NextHop	Metric	LocPrf	Path
* 192.168.11.0/24	10.22.27.251			249 251 i
* 192.168.12.0/24	10.22.27.251			249 251 i
*> 192.168.32.0/24	10.22.27.249			249 i
*> 192.168.33.0/24	10.22.27.249			249 i

Total RIB entries = 4

show ip bgp community-list <community-list-name> [exact]

Use the **show ip bgp community-list** command to display BGP routes that are permitted by the specified community list.

Syntax Description

<community-list-name> Specifies the name of the community list whose routes you wish to see.

exact Optional. Specifying this option restricts the routes displayed to only those whose community lists exactly match those specified in the named community list. If this parameter is omitted, all routes matching any part of the specified community list will be displayed.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

In the following example, all BGP routes are displayed whose community numbers match those defined in the community list named CList1.

>enable

#show ip bgp community-list CList1

BGP local router ID is 10.22.131.241, local AS is 302.

Status codes: * valid, > best, i - internal, o - local

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Path
10.22.152.20/30	10.22.131.10	304		302 300 1 3 4 i
10.22.152.24/29	10.22.131.10	304		302 300 1 3 4 5 i
10.22.152.36/30	10.22.131.10	304		302 300 1 3 4 i
10.22.152.52/30	10.22.131.10	304		302 300 1 3 4 i
11.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
12.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
13.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
14.0.0.0/30	10.22.131.10	304		302 300 1 3 4 6 i
20.0.0.0/30	10.22.131.10	304		302 300 1 3 4 5 i
21.0.0.0/30	10.22.131.10	304		302 300 1 3 4 5 i

Total RIB entries = 10

Information displayed includes: the ID of this router and its Autonomous System number, the destination Network address of the route learned, the Next Hop address to that network, the Metric, the Local Preference value (set using the "set local-preference *" command), and the Autonomous System Path to the destination network.

show ip bgp [regexp <expression> | summary]

Use the **show ip bgp** command to display a summary of the BGP route table.

Syntax Description

<expression>	Specifies the regular expression to filter on.
regexp	Displays routes whose autonomous system (AS) path matches the regular expression specified.
summary	Displays a summary of the status for all BGP.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Entries that are not filtered by prefix lists are marked with an asterisk (*) to show they are valid. Entries that are deemed the best path to advertised route are marked with a caret (>).

Usage Examples

The following sample output of the **show ip bgp** command shows all of the entries in the BGP database.

Router#show ip bgp

BGP local router ID is 192.168.3.1, local AS is 304.

Status codes: * valid, > best, i - internal, o - local

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	Next Hop	Metric	LocPrf	Path
*> 10.22.130.8/29	10.22.131.1			302 i
*> 10.22.130.8/29	10.22.131.9			302 i
10.22.130.8/29	10.22.132.9			303 304 302 i
*> 10.22.130.240/28	10.22.131.1			302 300 i
*> 10.22.130.240/28	10.22.131.9			302 300 i
* i10.22.130.240/28	10.22.132.1		100	303 300 i

* 10.22.130.240/28	10.22.132.9			303 300 i
*> 10.22.131.0/29	10.22.131.1			302 i
*> 10.22.131.0/29	10.22.131.9			302 i
	10.22.131.0/29			303 304 302 i
*> 10.22.131.8/29	10.22.131.1			302 i
*> 10.22.131.8/29	10.22.131.9			302 i
	0.22.131.8/29			303 304 302 i
*> 10.22.131.16/29	10.22.131.1			302 i
*> 10.22.131.16/29	10.22.131.9			302 i
* i10.22.131.16/29	10.22.132.1	0	100	303 i
* 10.22.131.16/29	10.22.132.9	0		303 i
*> 10.22.131.240/28	10.22.131.1			302 i
*> 10.22.131.240/28	10.22.131.9			302 i
* i10.22.131.240/28	10.22.132.1		100	303 300 i
* 10.22.131.240/28	10.22.132.9			303 300 i
* 10.22.132.0/29	10.22.131.1	0		302 303 i
* 10.22.132.0/29	10.22.131.9	0		302 303 i
* i10.22.132.0/29	10.22.132.1	0	100	303 i
*> 10.22.132.0/29	10.22.132.9	0		303 i
*> o10.22.132.8/29	0.0.0.0			i
* 10.22.132.8/29	10.22.131.1	0		302 303 i
* 10.22.132.8/29	10.22.131.9	0		302 303 i
* 10.22.132.8/29	10.22.132.9	0		303 i
* 10.22.132.240/28	10.22.131.1			302 300 i
* 10.22.132.240/28	10.22.131.9			302 300 i
* i10.22.132.240/28	10.22.132.1	0	100	303 i
*> 10.22.132.240/28	10.22.132.9	0		303 i
*> o10.22.134.0/29	0.0.0.0			i
* i10.22.134.0/29	10.22.134.1		100	i
	10.22.134.0/29			302 304 i
	10.22.134.0/29			303 304 i
*> i10.22.134.8/29	10.22.134.10		100	i
	10.22.134.8/29			302 304 i
	10.22.134.8/29			303 304 i
*> i10.22.134.16/29	10.22.134.1		100	i
*> i10.22.134.16/29	10.22.134.26		100	i
	10.22.134.16/29			302 304 i
	10.22.134.16/29			303 304 i
*> o10.22.134.24/29	0.0.0.0			i
* i10.22.134.24/29	10.22.134.26		100	i
	10.22.134.24/29			302 304 i
	10.22.134.24/29			303 304 i
*> o10.22.134.32/29	0.0.0.			i
* i10.22.134.32/29	10.22.134.34		100	i

```

10.22.134.32/29 10.22.131.9 303 304 i
*> i10.22.134.40/29 10.22.134.10 100 i
10.22.134.40/29 10.22.131.9 302 304 i
10.22.134.40/29 10.22.132.9 303 304 i
*> i10.22.134.48/29 10.22.134.26 100 i
*> i10.22.134.48/29 10.22.134.34 100 i
10.22.134.48/29 10.22.131.9 302 304 i
10.22.134.48/29 10.22.132.9 303 304 i
*> i10.22.134.56/29 10.22.134.26 100 i
10.22.134.56/29 10.22.131.9 302 304 i
10.22.134.56/29 10.22.132.9 303 304 i
*> i10.22.134.64/29 10.22.134.26 100 i
*> i10.22.134.64/29 10.22.134.34 100 i
10.22.134.64/29 10.22.131.9 302 304 i
10.22.134.64/29 10.22.132.9 303 304 i
*> i10.22.134.80/29 10.22.134.26 100 i
10.22.134.80/29 10.22.131.9 302 304 i
10.22.134.80/29 10.22.132.9 303 304 i
10.22.135.0/29 10.22.131.9 333 302 304 305 i
10.22.135.0/29 10.22.132.9 303 304 305 i
*> i10.22.135.0/29 10.22.134.82 333 100 305 i
10.22.135.8/29 10.22.131.9 333 302 304 305 i
10.22.135.8/29 10.22.132.9 303 304 305 i
*> i10.22.135.8/29 10.22.134.82 333 100 305 i
*> i192.168.1.0/24 10.22.134.1 100 i
*> i192.168.2.0/24 10.22.134.26 100 i
*> o192.168.3.0/24 0.0.0.0 i
*> i192.168.4.0/24 10.22.134.34 100 i
*> i192.168.6.0/24 10.22.134.82 333 100 305 i
Total RIB entries = 80

```

The following sample output of the **show ip bgp summary** command shows a summarized list of the configured BGP neighbors as well as their status and statistics.

Router#show ip bgp summary

BGP router identifier 192.168.3.1, local AS number 304

8 network entries, 5 paths, and 23 BGP path attribute entries

Neighbor	V	AS	MsgRcvd	MsgSent	InQ	OutQ	Up/Down	State/PfxRcd
10.22.131.1	4	302	95	104	0	0	01:30:06	9
10.22.131.9	4	302	97	105	0	0	01:30:07	21
10.22.132.9	4	303	200	179	0	0	02:43:09	21
10.22.134.1	4	304	166	178	0	0	02:43:15	3
10.22.134.10	4	304	174	179	0	0	02:43:24	7

10.22.134.26	4	304	172	174	0	0	02:41:43	10
10.22.134.34	4	304	164	174	0	0	02:41:40	4

The following sample output of the **show ip bgp regexp _303_** command shows all of the entries in the BGP database that contain "303" in the AS path.

Router#show ip bgp regexp _303_

BGP local router ID is 192.168.3.1, local AS is 304.

Status codes: * valid, > best, i - internal, o - local

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	NextHop	Metric	LocPrf	Path
10.22.130.8/29	10.22.132.9			303 304 302 i
* i10.22.130.240/28	0.22.132.1		100	303 300 i
* 10.22.130.240/28	10.22.132.9			303 300 i
10.22.131.0/29	10.22.132.9			303 304 302 i
10.22.131.8/29	10.22.132.9			303 304 302 i
* i10.22.131.16/29	10.22.132.1	0	100	303 i
* 10.22.131.16/29	10.22.132.9	0		303 i
* i10.22.131.240/28	10.22.132.1		100	303 300 i
* 10.22.131.240/28	10.22.132.9			303 300 i
* 10.22.132.0/29	10.22.131.1	0		302 303 i
* 10.22.132.0/29	10.22.131.9	0		302 303 i
* i10.22.132.0/29	10.22.132.1	0	100	303 i
*> 10.22.132.0/29	10.22.132.9	0		303 i
* 10.22.132.8/29	10.22.131.1	0		302 303 i
* 10.22.132.8/29	10.22.131.9	0		302 303 i
* 10.22.132.8/29	10.22.132.9	0		303 i
* i10.22.132.240/28	10.22.132.1	0	100	303 i
*> 10.22.132.240/28	10.22.132.9	0		303 i
10.22.134.0/29	10.22.132.9			303 304 i
10.22.134.8/29	10.22.132.9			303 304 i
10.22.134.16/29	10.22.132.9			303 304 i
10.22.134.24/29	10.22.132.9			303 304 i
10.22.134.32/29	10.22.132.9			303 304 i
10.22.134.40/29	10.22.132.9			303 304 i
10.22.134.48/29	10.22.132.9			303 304 i
10.22.134.56/29	10.22.132.9			303 304 i
10.22.134.64/29	10.22.132.9			303 304 i
10.22.134.80/29	10.22.132.9			303 304 i
10.22.135.0/29	10.22.132.9			303 304 305 i
10.22.135.8/29	10.22.132.9			303 304 305 i

Total RIB entries = 30

show ip bgp <network ip> [</length> | <network-mask>]

Use the **show ip bgp <network ip>** command to display details about the specified route, including the advertising router IP address, router ID, and the list of neighbors to which this route is being advertised.

Syntax Description

<network ip>	Shows only routes for the specified network.
</length>	Optional. Shows only routes for the specified network matching the prefix length (e.g., /24).
<network-mask>	Optional. Shows only routes for the specified network matching the network mask (e.g., 255.255.255.0).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows detailed output of this command:

```
>enable
#show ip bgp 10.15.240.0/28
BGP routing table entry for 10.15.240.0/28
Paths: (1 available, best #1)
  Advertised to peers:
    1.1.5.10
    100 1
    10.15.43.17 from 10.15.43.17 (8.1.1.1)
      Origin IGP, metric 2, valid, external, best
```

show ip bgp neighbors <ip address>

Use the **show ip bgp neighbors** command to display information for the specified neighbor. Variations of this command include the following:

show ip bgp neighbors

show ip bgp neighbors <ip address>

show ip bgp neighbors <ip address> [advertised-routes | received-routes | routes]

Syntax Description

<ip address>	Displays information for the specified neighbor. If no IP address is entered, information for all neighbors is displayed.
advertised-routes	Displays all routes being advertised to the specified neighbor. Command output is the same as for show ip bgp except filtered to only the BGP routes being advertised to the specified neighbor.
received-routes	Displays all routes (accepted and rejected) advertised by the specified neighbor. Routes may be rejected by inbound filters such as prefix list filters.
routes	Displays all accepted received routes advertised by the specified neighbor. Routes displayed have passed inbound filtering. This command output is the same as show ip bgp except the output is filtered to those learned from the specified neighbor.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Entries that are not filtered by prefix lists are marked with an asterisk (*) to show they are valid. Entries that are deemed the best path to advertised route are marked with a caret (>).

Usage Examples

The following are output variations of the **show ip bgp neighbors** command:

>enable

#show ip bgp neighbors

BGP neighbor is 10.15.43.17, remote AS 100, external link
 Configured hold time is 180, keepalive interval is 60 seconds
 Default minimum time between advertisement runs is 30 seconds
 Connections established 6; dropped 5
 Last reset: Interface went down

Connection ID: 15

BGP version 4, remote router ID 8.1.1.1

BGP state is Established, for 01:55:05

Negotiated hold time is 180, keepalive interval is 60 seconds

Message statistics:

InQ depth is 0, OutQ depth is 0

Local host: 10.15.43.18, Local port: 179

	Sent	Rcvd
Opens:	1	1
Notifications:	0	0
Updates:	0	8
Keepalives:	116	116
Unknown:	0	0
Total:	117	125

Foreign host: 10.15.43.17, foreign port: 1048

Flags: passive open

#show ip bgp neighbors 10.15.43.34 advertised-routes

BGP local router ID is 10.0.0.1, local AS is 101.

Status codes: * valid, > best, i - internal

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	NextHop	Metric Path
*> 1.0.0.0/8	10.15.43.17	1 100 i
*> 2.0.0.0/9	10.15.43.17	1 100 i

#show ip bgp neighbors 10.15.43.17 received-routes

BGP local router ID is 10.0.0.1, local AS is 101.

Status codes: * valid, > best, i - internal

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	NextHop	Metric Path
*> 1.0.0.0/8	10.15.43.17	1 100 i
*> 2.0.0.0/9	10.15.43.17	1 100 i

#show ip bgp neighbors 10.15.43.17 routes

BGP local router ID is 10.0.0.1, local AS is 101.

Status codes: * valid, > best, i - internal

Origin codes: i - IGP, e - EGP, ? - incomplete

Network	NextHop	Metric Path
*> 1.0.0.0/8	10.15.43.17	1 100 i
*> 2.0.0.0/9	10.15.43.17	1 100

show ip cache

Use the **show ip cache** command to display the fast cache table.

Syntax Description

No subcommands.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example shows sample output from the **show ip cache** command:

>enable

#show ip cache

DESTINATION	INTERFACE	NEXT HOP	USE COUNT	MAC ADDRESS
10.17.6.52	Loopback	127.0.0.1	231	
172.22.77.80	eth 0/1	10.17.254.254	0	00:A0:C8:11:BA:32
10.17.255.255	Loopback	127.0.0.1	16	

show ip community-list [<community-list-name>]

Use the **show ip community-list** command to display any or all defined community lists in the router configuration.

Syntax Description

<community-list-name> Optional. Specifies the name of the community list you wish to display. If this parameter is omitted, all defined community lists will be displayed.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example shows two community lists, one of which permits all routes containing community number 10:67, and another which permits routes containing community number 10:68 and the internet community number, but denies routes containing community number 10:45.

NetVanta4305#show ip community-list

```
ip community-list CommList1:
  permit 10:67
ip community-list CommList2:
  permit 10:68 internet
  deny 10:45
```

show ip dhcp-client lease <interface>

Use the **show ip dhcp-client lease** command to display all Dynamic Host Client Protocol (DHCP) lease information for interfaces that have dynamically assigned IP addresses.

Syntax Description

<interface> Optional. Displays the information for the specified interface. Type **show ip dhcp-client lease ?** for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Usage Examples

The following is a sample output from the **show dhcp-client lease** command:

>enable

#show dhcp-client lease

Interface: ethernet 0/1

Temp IP address: 10.100.23.64 Mask: 0.0.0.0

DHCP Lease server: 10.100.23.207 State: Bound (3)

Lease: 120 seconds

Temp default gateway address: 0.0.0.0

Client-ID: N/A

show ip dhcp-server binding <client ip address>

Use the **show ip dhcp-server binding** command to display the Dynamic Host Client Protocol (DHCP) server client table with associated information.

Syntax Description

<client ip address> Optional. Specifies a particular client IP address.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Usage Examples

The following is a sample output from the **show ip dhcp-server binding** command:

>enable

#show ip dhcp-server binding

IP Address	Client Id	Lease Expiration	Client Name
10.100.23.64	01:00:a0:c8:00:8f:b3	Aug 15 2002 11:02 AM	Router

show ip igmp groups <group-address>

Use the **show ip igmp groups** command to display the multicast groups that have been registered by directly connected receivers using IGMP. If no group address is specified, all groups are shown with this command.

Syntax Description

<group-address> Optional. Displays IP address of a multicast group.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1 Command was introduced.

Usage Examples

The following is sample output from this command:

>enable

#show ip igmp groups

IGMP Connected Group Membership

Group Address	Interface	Uptime	Expires	Last Reporter
172.0.1.50	Loopback100	00:42:57	00:02:50	172.23.23.1
172.1.1.1	Ethernet0/1	00:05:26	00:02:51	1.1.1.2
172.1.1.1	Loopback100	00:42:57	00:02:51	172.23.23.1

show ip igmp interface <interface>

Use the **show ip igmp interface** command to display multicast-related information per-interface. If no interface is specified, this command shows information for all interfaces.

Syntax Description

<interface>	Designates the display of information for a specific interface (in the format type slot/port). Enter the show ip igmp interface ? command for a complete list of interfaces.
-------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

The following is sample output from this command:

```
>enable
#show ip igmp interface
eth 0/1 is UP
Ip Address is 10.22.120.47, netmask is 255.255.255.0
IGMP is enabled on interface
Current IGMP version is 2
IGMP query interval is 60 seconds
IGMP querier timeout is 120 seconds
IGMP max query response time is 10 seconds
Last member query count is 2
Last member query response interval is 1000 ms
IGMP activity: 548 joins, 0 leaves
IGMP querying router is 0.0.0.0
IGMP helper address is disabled
```


show ip interfaces [*<interface>* | **brief**]

Use the **show ip interfaces** command to display the status information for all IP interfaces (or a specific interface).

Syntax Description

<i><interface></i>	Optional. Displays status information for a specific interface. If no interface is entered, status information for all interfaces is displayed. Type show ip interfaces ? for a complete list of applicable interfaces.
brief	Use this optional keyword to display an abbreviated version of interface statistics for all IP interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

The following is a sample output of the **show ip interfaces** command:

>enable

#show ip interfaces

```
eth 0/1 is UP, line protocol is UP
Ip address is 10.10.10.1
Netmask is 255.255.255.0
MTU is 1500
Fastcaching is Enabled
RIP Authentication is Disabled
RIP Tx uses global version value
RIP Rx uses global version value
```

show ip mroute [*<group-address>* | *<interface>*] [summary]

Use the **show ip mroute** command to display IP multicasting routing table information.

Syntax Description

<i><group-address></i>	Optional. Displays IP address of a multicast group.
<i><interface></i>	Optional. Designates the display of parameters for a specific interface (in the format type slot/port). For example: eth 0/1.
summary	Optional. Displays a single-line summary for each entry in the IP multicast routing table.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

The following is sample output from this command:

```
>enable
#show ip mroute
IP Multicast Routing Table
Timers: Uptime/Expires
(*, 239.2.170.3), 01:03:19/00:00:00
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    fr 1.20, Forward, 01:03:19/00:01:48
(*, 224.1.1.1), 00:00:01/00:02:58, RP 0.0.0.0, flags: DCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list: <-- because lo 100 ifc is joined
    Loopback100, Forward/Dense, 00:00:01/00:00:00
(*, 17.0.1.50), 00:00:01/00:02:58, RP 0.0.0.0, flags: DCL
  Incoming interface: Null, RPF nbr 0.0.0.0
  Outgoing interface list:
    Loopback100, Forward/Dense, 00:00:01/00:00:00
```

show ip ospf

Use the **show ip ospf** command to display general information regarding OSPF processes.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample output from the show ip ospf command:

```
>enable
```

```
#show ip ospf
```

```
Summary of OSPF Process with ID: 192.2.72.101
  Supports only single Type Of Service routes (TOS 0)
  SPF delay timer: 5 seconds, Hold time between SPF: 10 seconds
  LSA interval: 240 seconds
  Number of external LSAs: 0, Checksum Sum: 0x0
  Number of areas: 0, normal: 0, stub: 0, NSSA: 0
```

show ip ospf database

Use the **show ip ospf database** command to display information from the OSPF database regarding a specific router. There are several variations of this command which you can use to obtain information about different OSPF link state advertisements. The variations are shown below:

```

show ip ospf <area-id> database
show ip ospf <area-id> database adv-router <ip address>
show ip ospf <area-id> database database-summary
show ip ospf <area-id> database external <link-state-id>
show ip ospf <area-id> database external <link-state-id> adv-router <ip address>
show ip ospf <area-id> database network <link-state-id>
show ip ospf <area-id> database network <link-state-id> adv-router <ip address>
show ip ospf <area-id> database router <link-state-id>
show ip ospf <area-id> database router <link-state-id> adv-router <ip address>
show ip ospf <area-id> database summary <link-state-id>
show ip ospf <area-id> database summary <link-state-id> adv-router <ip address>

```

Syntax Description

<area id>	Optional. Displays area ID number associated with the OSPF address range. This range is defined in the network router configuration command used to define the particular area. Refer to <i>network <ip address> <wildcard> area <area id></i> on page 1338 for more information.
<link-state-id>	Optional. Identifies the portion of the internet environment that is being described by the advertisement. The value needed in this field is tied to the advertisement's LS type.
<ip address>	Enter in the form <A.B.C.D>.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The link state ID differs depending on whether the link state advertisement in question describes a network or a router.

If describing a network, this ID is one of the following:

- The network's IP address. This is true for type 3 summary link advertisements and in autonomous system external link advertisements.
- An address obtained from the link state ID. If the network link advertisement's link state ID is masked with the network's subnet mask, this will yield the network's IP address.

If describing a router, this ID is always the router's OSPF router ID.

Usage Examples

```
>enable
```

```
#show ip ospf database
```

show ip ospf interface <interface>

Use the **show ip ospf interface** command to display OSPF information for a specific interface.

Syntax Description

<interface> Optional. Displays the interface type. Type **show ip ospf interface ?** for a complete list of applicable interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

The following example shows OSPF information for the PPP 1 interface.

```
>enable
#show ip ospf interface ppp 1
```

show ip ospf neighbor <interface> <neighbor id> [detail]

Use the **show ip ospf neighbor** command to display OSPF neighbor information for a specific interface.

Syntax Description

<interface>	Optional. Displays the interface type. Type show ip ospf neighbor ? for a complete list of applicable interfaces.
<neighbor id>	Optional. Specifies a specific neighbor's router ID.
detail	Optional. Enter this keyword to display details on all neighbors.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

>enable

#show ip ospf neighbor

show ip ospf summary-address

Use the **show ip ospf summary-address** command to display a list of all summary address redistribution information for the system.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

>enable

#show ip ospf summary-address

show ip policy-class <polycyname>

Use the **show ip policy-class** command to display a list of currently configured access policies. Refer to *ip policy-class <polycyname> max-sessions <number>* on [page 436](#) for information on configuring access policies.

Syntax Description

<polycyname> Optional. Specifies a policy class name for a single policy for which to display information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following is a sample output from the **show ip policy-class** command:

```
>enable
```

```
#show ip policy-class
```

```
ip policy-class max-sessions 0
```

```
Policy-class "Trusted":
```

```
0 current sessions (6000 max)
```

```
Entry 1 - allow list MatchAll
```

show ip policy-sessions <polycyname>

Use the **show ip policy-sessions** command to display a list of current policy class associations. Refer to *ip policy-class <polycyname> max-sessions <number>* [on page 436](#) for information on configuring access policies.

Syntax Description

<polycyname> Optional. Specifies a policy class name for a single policy for which to display information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

>enable

#show ip policy-sessions

show ip policy-stats <polycyname>

Use the **show ip policy-stats** command to display a list of current policy class statistics. Refer to *ip policy-class* <polycyname> *max-sessions* <number> [on page 436](#) for information on configuring access policies.

Syntax Description

<polycyname> Optional. Specifies a policy class name for a single policy for which to display information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

>enable

#show ip policy-stats

show ip prefix-list [detail | summary] <listname>

Use the **show ip prefix-list** command to display BGP prefix list information.

Syntax Description

detail	Shows a listing of the prefix list rules and their hit counts.
summary	Shows information about the entire prefix list.
<listname>	Specifies to display information for a particular prefix list.

Default Values

No default values are necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

If the **show ip prefix-list** command is issued with no arguments, a listing of the prefix-list rules but no hit count statistics is displayed.

Usage Examples

The following example displays information about the prefix list **test**.

>enable

#show ip prefix-list test

```
ip prefix-list test: 4 entries
  seq 5 permit 0.0.0.0/0 ge 8 le 8
  seq 10 deny 0.0.0.0/0 ge 9 le 9
  seq 15 permit 0.0.0.0/0 ge 10 le 10
  seq 20 deny 0.0.0.0/0 ge 11
```

show ip protocols

Use the **show ip protocols** command to display IP routing protocol parameters and statistics.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following is a sample output from the **show ip protocols** command:

>enable

#show ip protocols

Sending updates every 30 seconds, next due in 8 seconds

Invalid after 180 seconds, hold down time is 120 seconds

Redistributing: rip

Default version control: send version 2, receive version 2

Interface Send Ver. Rec Ver.

eth 0/1 2 2

ppp 1 2 2

Routing for networks:

1.1.1.0/24

show ip route [connected | ospf | rip | static | table | bgp | summary | summary realtime | <ip address> <subnet>]

Use the **show ip route** command to display the contents of the IP route table.

Syntax Description

connected	Optional. Displays only the IP routes for directly connected networks.
ospf	Optional. Displays only the IP routes associated with OSPF.
rip	Optional. Displays only the IP routes that were dynamically learned through RIP.
static	Optional. Displays only the IP routes that were statically entered.
table	Optional. Displays a condensed version of the IP route table.
bgp	Displays only the IP routes associated with BGP.
summary	Optional. Displays a summary of all IP route information.
summary realtime	Optional. Displays full-screen output in realtime. See the Functional Notes below for more information.

<ip address><subnet> Displays only the IP routes to destinations within the given address and subnet.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample output from the **show ip route** command:

>enable

#show ip route rip

Codes: C - connected S - static R - RIP O - OSPF IA - OSPF inter area
N1 - OSPF NSSA external type 1 N2 - OSPF NSSA external type 2
E1 - OSPF external type 1 E2 - OSPF external type 2

Gateway of last resort is 10.200.254.254 to network 0.0.0.0

The following example shows how to display IP routes learned via BGP. The values in brackets after a BGP route entry represent the entry's administrative distance and metric:

>enable

#show ip route bgp

Codes: C - connected, S - static, R - RIP, O - OSPF, B - BGP
IA - OSPF inter area, N1 - OSPF NSSA external type 1
N2 - OSPF NSSA external type 2, E1 - OSPF external type 1
E2 - OSPF external type 2

Gateway of last resort is 10.15.43.17 to network 0.0.0.0

```
B 1.0.0.0/8 [30/0] via 10.15.43.17, fr 1.17
B 2.0.0.0/9 [30/0] via 10.15.43.17, fr 1.17
B 2.128.0.0/10 [30/0] via 10.15.43.17, fr 1.17
B 2.192.0.0/11 [30/0] via 10.15.43.17, fr 1.17
B 2.224.0.0/12 [30/0] via 10.15.43.17, fr 1.17
B 2.240.0.0/13 [30/0] via 10.15.43.17, fr 1.17
B 2.248.0.0/14 [30/0] via 10.15.43.17, fr 1.17
```

show ip traffic [realtime]

Use the **show ip traffic** command to display all IP traffic statistics.

Syntax Description

realtime Displays full-screen output in real time. See the **Functional Notes** below for more information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

```
>enable
#show ip traffic
```


show lldp

Use the **show lldp** command to display LLDP timer configuration.

Syntax Description

No subcommands.

Default Values

No default values are necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows a sample LLDP timer configuration:

```
>enable
```

```
#show lldp
```

```
Global LLDP information:
```

```
Sending LLDP packets every 30 seconds
```

```
Sending TTL of 120 seconds
```

show lldp device <system name>

Use the **show lldp device** command to display specific neighbor information about a given neighbor.

Syntax Description

<system name>	Specifies the system name of the neighbor to display.
---------------	---

Default Values

No default values are necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

If there is more than one neighbor with the same system name, all neighbors with that system name will be displayed.

Usage Examples

The following example shows specific information about a neighbor for the system name **Router**:

>enable

#show lldp device Router

Chassis ID: 00:A0:C8:02:DD:2A (MAC Address)

System Name: Router

Device Port: eth 0/1 (Locally Assigned)

Holdtime: 30

Platform: NetVanta 3305

Software: Version: 08.00.22.sw1.D, Date: Mon Nov 01 10:28:55 2004

Capabilities: Bridge, Router

Enabled Capabilities: Router

Local Port: eth 0/3

Management Addresses:

Address Type: IP version 4, Address: 10.23.10.10

Interface Type: Interface Index, Interface Id: 2

show lldp interface <interface>

Use the **show lldp interface** command to display LLDP configuration and statistics for interfaces on this device.

Syntax Description

<interface> Displays the information for the specified interface. Type **show lldp interface ?** for a complete list of applicable interfaces.

Default Values

No default values are necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example shows LLDP configuration and statistics for the Ethernet 0/1 interface:

```
>enable
#show lldp interface ethernet 0/1
eth 0/1 (TX/RX)
  0 packets input
  0 input errors
  0 TLV errors, 0 TLVs Discarded
  0 packets discarded
  8799 packets output
  0 neighbor ageouts
#
```

show lldp neighbors [interface <interface> | <interface type> | detail | realtime]

Use the **show lldp neighbors interface** command to display information about neighbors of this device learned about via LLDP.

Syntax Description

<interface>	Displays a summary of all neighbors learned about through the specified interface (e.g., eth 0/1). Type show lldp neighbors interface ? for a complete list of applicable interfaces.
<interface type>	Displays a summary of all neighbors learned about through interfaces of the specified type (e.g., eth).
detail	Optional. Shows detailed neighbor information for the specified interface or interface type.
realtime	Displays full-screen output in real time. See the Functional Notes below for more information.

Default Values

No default values necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following examples show detailed information about a device's neighbors:

```
>enable
#show lldp neighbors interface eth 0/3 detail
Chassis ID: 00:A0:C8:02:DD:2A (MAC Address)
System Name: Router
```

Device Port: eth 0/1 (Locally Assigned)
Holdtime: 38
Platform: NetVanta 3305
Software: Version: 08.00.22.sw1.D, Date: Mon Nov 01 10:28:55 2004
Capabilities: Bridge, Router
Enabled Capabilities: Router
Local Port: eth 0/3
Management Addresses:
Address Type: IP version 4, Address: 10.23.10.10
Interface Type: Interface Index, Interface Id: 2

show lldp neighbors statistics

Use the **show lldp neighbors statistics** command to display statistics about LLDP neighbor table actions.

Syntax Description

No subcommands.

Default Values

There are no default values necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

This command shows information about the changes in this device's neighbor table. The information displayed indicates the last time a neighbor was added to or removed from the table as well as the number of times neighbors were inserted into or deleted from the table.

Usage Examples

The following example shows sample output for this command:

```
>enable
```

```
#show lldp neighbors statistics
```

System Last Change Time	Inserts	Deletes	Drops	Age outs
10-15-2004 14:24:56	55	3	1	1

System Last Change Time - Shows the time at which the most recent change occurred in the neighbor table.

Inserts - Shows the number of times neighbors have been added to the table.

Deletes - Shows how many times neighbors have been deleted from the table because an interface was shut down.

Drops - Shows how many times the insertion of a new neighbor into the table failed because the table was full.

Age outs - Shows how many times neighbors have been removed from the table because no new updates were received from that neighbor before its time-to-live timer expired.

show mac address-table

Use the **show mac address-table** command to display all static and dynamic entries in the MAC address table for all VLANs and physical interfaces.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is sample output from the **show mac address-table** command:

```
>enable
```

```
#show mac address-table
```

```
Mac Address Table
```

```
-----
```

Vlan	Mac Address	Type	Ports
1	aa:bb:ee:d1:c2:33	STATIC	eth 0/18
1	00:00:00:00:00:00	STATIC	CPU
2	00:90:2b:7d:30:00	DYNAMIC	eth 0/1
2	00:a0:c8:00:8e:a6	DYNAMIC	eth 0/1
2	00:a0:c8:00:8f:ba	DYNAMIC	eth 0/1
2	00:a0:c8:00:8f:73	DYNAMIC	eth 0/1
2	00:a0:c8:00:00:00	DYNAMIC	eth 0/1
2	00:a0:c8:01:ff:02	DYNAMIC	eth 0/1
2	00:a0:c8:01:09:d3	DYNAMIC	eth 0/1
2	00:a0:c8:01:13:34	DYNAMIC	eth 0/1
2	00:a0:c8:01:14:4a	DYNAMIC	eth 0/1
2	00:a0:c8:03:95:4b	DYNAMIC	eth 0/1
2	00:a0:c8:05:00:89	DYNAMIC	eth 0/1

Usage Examples

2	00:a0:c8:05:00:ac	DYNAMIC	eth 0/1
2	00:a0:c8:05:00:ad	DYNAMIC	eth 0/1
2	00:a0:c8:05:00:c2	DYNAMIC	eth 0/1

show mac address-table address

Use the **show mac address-table address** command to display all MAC addresses known by the AOS.

Variations of this command include the following:

```
show mac address-table address <mac address>
show mac address-table address <mac address> interface <interface type> <interface id>
show mac address-table address <mac address> interface <interface type> <interface id>
  vlan <vlan id>
show mac address-table address <mac address> vlan <vlan id>
```

Syntax Description

<mac address>	Specifies a valid 48-bit MAC address.
interface <interface type>	Shows information for a specific interface. Type show mac address-table address interface ? for a list of valid interfaces.
<interface id>	Specifies a valid slot/port interface ID (e.g., 0/1).
vlan <vlan id>	Specifies a valid VLAN interface ID (1 to 4094).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following sample from the **show mac address-table address** command displays information regarding a specific MAC address from the MAC address table:

```
>enable
#show mac address-table address 00:a0:c8:7d:30:00
Mac Address Table
```

```
-----
Vlan          Mac Address          Type          Ports
-----
2             00:a0:c8:7d:30:00    DYNAMIC      eth 0/1
```

The following sample from the **show mac address-table address** command displays information regarding a specific MAC address and interface from the MAC address table:

>enable

#show mac address-table address 00:a0:c8:7d:30:00 ethernet 0/1

Mac Address Table

Vlan	Mac Address	Type	Ports
2	00:a0:c8:7d:30:00	DYNAMIC	eth 0/1

Total Mac Addresses for this criterion: 1

#

show mac address-table aging-time

Use the **show mac address-table aging-time** command to display information regarding the amount of time dynamic entries remain in the MAC address table.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample from the **show mac address-table aging-time** command for a switch configured with an address-table aging-time:

```
>enable
#show mac address-table aging-time
```

```
Aging Time
-----
300      Seconds
```

show mac address-table count

Use the **show mac address-table count** command to display information regarding the number of MAC addresses in use (both static and dynamic).

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is a sample from the **show mac address-table count** command:

```
>enable
```

```
#show mac address-table count
```

```
Mac Table Entries:
```

```
-----
```

```
Dynamic Address Count   : 19
```

```
Static Address Count    : 3
```

```
Total Mac Addresses    : 23
```

```
Total Mac Address Space Available: 8169
```

show mac address-table dynamic

Use the **show mac address-table dynamic** command to display all dynamic MAC addresses learned by the AOS.

Variations of this command include the following:

show mac address-table dynamic

show mac address-table dynamic address *<mac address>*

show mac address-table dynamic address *<mac address>* **interface** *<interface type>* *<interface id>*

show mac address-table dynamic address *<mac address>* **interface** *<interface type>* *<interface id>*
vlan *<vlan id>*

show mac address-table dynamic address *<mac address>* **vlan** *<vlan id>*

show mac address-table dynamic interface *<interface type>* *<interface id>*

show mac address-table dynamic interface *<interface type>* *<interface id>* **vlan** *<vlan id>*

show mac address-table dynamic vlan *<vlan id>*

Syntax Description

address <i><mac address></i>	Specifies a valid 48-bit MAC address.
interface <i><interface type></i>	Shows information for a specific interface. Type show mac address-table dynamic interface ? for a list of valid interfaces.
<i><interface id></i>	Specifies a valid slot/port interface ID (e.g., 0/1).
vlan <i><vlan id></i>	Specifies a valid VLAN interface ID (1 to 4094).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample from the **show mac address-table dynamic** command:

```
>enable
```

```
#show mac address-table dynamic
```

```
Mac Address Table
```

Vlan	Mac Address	Type	Ports
1	00:a0:c8:7d:30:00	DYNAMIC	eth 0/1
1	00:a0:c8:05:89:09	DYNAMIC	eth 0/2
1	00:a0:c8:07:d9:d2	DYNAMIC	eth 0/5
1	00:a0:c8:07:d9:19	DYNAMIC	eth 0/7
1	00:a0:c8:09:95:6b	DYNAMIC	eth 0/7
1	00:a0:c8:0a:2d:7c	DYNAMIC	eth 0/12
1	00:a0:c8:f6:e9:a6	DYNAMIC	eth 0/24
1	00:a0:c8:01:0a:ef	DYNAMIC	eth 0/23
1	00:a0:c8:0c:74:80	DYNAMIC	eth 0/20
1	00:a0:c8:15:5a:9f	DYNAMIC	eth 0/7
1	00:a0:c8:6c:71:49	DYNAMIC	eth 0/2
1	00:a0:c8:77:78:c1	DYNAMIC	eth 0/3
1	00:a0:c8:6b:53:7b	DYNAMIC	eth 0/4
1	00:a0:c8:72:e6:d6	DYNAMIC	giga-eth 0/2
1	00:a0:c8:05:00:e6	DYNAMIC	giga-eth 0/1

```
Total Mac Addresses for this criterion: 15
```

show mac address-table interface [*<interface type>* *<interface id>* | **vlan** *<vlan id>*]

Use the **show mac address-table interface** command to display information regarding MAC address table entries specific to a certain interface.

Syntax Description

<i><interface type></i>	Shows information for a specific interface type. Type show mac address-table interface ? for a list of valid interfaces.
<i><interface id></i>	Shows address-table information related to a specific interface (e.g., eth 0/1).
vlan <i><vlan id></i>	Shows address-table information related to a specific VLAN. Specifies a valid VLAN interface ID (1 to 4094).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example of the **show mac address-table interface eth 0/1** command displaying MAC address-table entries specifically on Ethernet 0/1:

>enable

#show mac address-table interface ethernet 0/1

Mac Address Table

Vlan	Mac Address	Type	Ports
2	00:90:2b:7d:30:00	DYNAMIC	eth 0/1
2	00:a0:c8:05:00:ac	DYNAMIC	eth 0/1
2	00:a0:c8:05:00:ad	DYNAMIC	eth 0/1
2	00:a0:c8:05:00:c2	DYNAMIC	eth 0/1
2	00:a0:c8:05:01:6e	DYNAMIC	eth 0/1
2	00:a0:c8:07:d9:d2	DYNAMIC	eth 0/1
2	00:a0:c8:08:cb:78	DYNAMIC	eth 0/1
2	00:a0:c8:09:8b:a1	DYNAMIC	eth 0/1
2	00:a0:c8:09:95:6b	DYNAMIC	eth 0/1
2	00:a0:c8:0a:2d:7c	DYNAMIC	eth 0/1

Total Mac Addresses for this criterion: 10

show mac address-table static

Use the **show mac address-table static** command to display all static MAC addresses known by the AOS.

Variations of this command include the following:

show mac address-table static

show mac address-table static address *<mac address>*

show mac address-table static address *<mac address>* **interface** *<interface type>* *<interface id>*

show mac address-table static address *<mac address>* **interface** *<interface type>* *<interface id>*
vlan *<vlan id>*

show mac address-table static address *<mac address>* **vlan** *<vlan id>*

show mac address-table static interface *<interface type>* *<interface id>*

show mac address-table static interface *<interface type>* *<interface id>* **vlan** *<vlan id>*

show mac address-table static vlan *<vlan id>*

Syntax Description

address <i><mac address></i>	Specifies a valid 48-bit MAC address.
interface <i><interface type></i>	Shows information for a specific interface. Type show mac address-table static interface ? for a list of valid interfaces.
<i><interface id></i>	Specifies any valid slot/port interface ID (e.g., 0/1).
vlan <i><vlan id></i>	Specifies a valid VLAN interface ID (1 to 4094).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample from the **show mac address-table static** command:

```
>enable
```

```
#show mac address-table static
```

```
Mac Address Table
```

```
-----
```

Vlan	Mac Address	Type	Ports
-----	-----	-----	-----
1	00:a0:c8:00:88:40	STATIC	CPU

```
Total Mac Addresses for this criterion: 1
```

show media-gateway [channel <slot/dsp.channel> | info | session <slot/dsp.channel> | summary [active]]

Use the **show media-gateway** command to show cumulative totals for all RTP channels.

Syntax Description

channel	Shows cumulative totals for individual RTP channels.
<slot/dsp.channel>	Specifies the ID of the media-gateway channel to be displayed.
info	Shows media-gateway information.
session	Shows current RTP sessions.
summary	Shows summary of last active and current RTP sessions.
active	Shows summary of currently active RTP sessions.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows sample output from the show **media-gateway** command:

```
>enable
#show media-gateway
Media-Gateway
  1 slots, 1 DSPs, 24 channels
  0 total sessions, 0 active sessions, 00:00:00 total session duration
  0 total rx packets, 0 total rx bytes
  0 total lost packets, 0 total unknown packets
  0 total tx packets, 0 total tx bytes
  0 highest max depth
  0 total discards, 0 total overflows, 0 total underflows
  0 total out-of-orders
  Last clearing of counters: 9:46 PM Thu, Jan 1, 1970
#
```

show memory [heap | realtime | uncached-heap]

Use the **show memory** command to display statistics regarding memory including memory allocation and buffer use statistics. Shows how memory is in use (broken down by memory size) and how much memory is free.

Syntax Description

heap	Shows how much memory is in use (broken down by memory block size) and how much memory is free.
uncached-heap	NetVanta 300, 1000, and 1000R only.
realtime	Displays full-screen output in real time. See the Functional Notes below for more information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units. Uncached-heap only applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 3.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample output from the **show memory heap** command:

>enable

#show memory heap

Memory Heap:

HeapFree: 2935792

HeapSize: 8522736

Block Managers:

Mgr	Size	Used	Free	Max-Used
0	0	58	0	58
1	16	1263	10	1273
2	48	1225	2	1227
3	112	432	2	434
4	240	140	3	143
5	496	72	2	74
6	1008	76	1	26
7	2032	25	1	26
8	4080	2	1	3
9	8176	31	1	32
10	16368	8	0	8
11	32752	5	1	6
12	65520	3	0	30
13	131056	0	0	0

show modules [verbose]

The **show modules** command displays information on the current system setup.

Syntax Description

verbose Enables detailed messaging.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 5000 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example displays the modules installed in the unit.

>**enable**

#**show modules**

Slot	Ports	Type	Serial #	Part #	H/W Rev
0	3	Netvanta 5305	*****	1200990L1	A
1	1	T3 Module	*****	1200832L1	A
2	-	Empty	-----	-----	-----
3	-	Empty	-----	-----	-----
4	-	Empty	-----	-----	-----
5	-	Empty	-----	-----	-----
6	-	Empty	-----	-----	-----
7	-	Empty	-----	-----	-----

show monitor session [*<session-number>* | all]

Use the **show monitor session** command to display information regarding a specified monitor session or to display this information for all sessions.

Syntax Description

<i><session-number></i>	ID of the monitor session. Only one session is allowed.
all	Shows all sessions.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample from the **show monitor session** command:

```
>enable
```

```
#show monitor session 1
```

```
Monitor Session 1
```

```
-----
```

```
Source Ports:
```

```
  RX Only:  None
```

```
  TX Only:  None
```

```
  Both:    eth 0/2, eth 0/3
```

```
Destination Port: eth 0/6
```

show output-startup

Use the **show output-startup** command to display startup configuration output line-by-line. This output can be copied into a text file and then used as a configuration editing tool.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample output from the **show output-startup** command:

```
>enable
#show output-startup

!
#!
#hostname "UNIT_2"
UNIT_2#no enable password
UNIT_2#!
UNIT_2#ip subnet-zero
UNIT_2#ip classless
UNIT_2#ip routing
UNIT_2#!
UNIT_2#event-history on
UNIT_2#no logging forwarding
UNIT_2#logging forwarding priority-level info
UNIT_2#no logging email
etc....
```

show port-auth [detailed | statistics | summary] [interface <interface id>]

Use the **show port-auth** command to view port authentication information.

Syntax Description

detailed	Displays detailed port authentication information.
statistics	Displays port authentication statistics.
summary	Displays a summary of port authentication settings.
interface <interface id>	Displays port authentication information for the specified interface. Interface ID consists of the interface type and ID number. Type show port-auth interface ? for a list of valid interfaces.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays the port authentication information:

>enable

#show port-auth

Global Port-Authentication Parameters:

re-authentication enabled:	False
reauth-period:	3600
quiet-period:	60
tx-period:	30
supp-timeout:	30
server-timeout:	30
reauth-max:	2
max-req:	2

Port-Authentication Port Summary:

Interface	Status	Type	Mode	Authorized
eth 0/1	disabled	port-based	n/a	n/a
eth 0/2	disabled	port-based	n/a	n/a
eth 0/3	disabled	port-based	n/a	n/a
eth 0/4	disabled	port-based	n/a	n/a
eth 0/5	disabled	port-based	n/a	n/a
eth 0/6	disabled	port-based	n/a	n/a
eth 0/7	disabled	port-based	n/a	n/a
eth 0/8	disabled	port-based	n/a	n/a
eth 0/9	disabled	port-based	n/a	n/a
eth 0/10	disabled	port-based	n/a	n/a
eth 0/11	disabled	port-based	n/a	n/a
eth 0/12	disabled	port-based	n/a	n/a
eth 0/13	disabled	port-based	n/a	n/a
eth 0/14	disabled	port-based	n/a	n/a
eth 0/15	disabled	port-based	n/a	n/a
eth 0/16	disabled	port-based	n/a	n/a
eth 0/17	disabled	port-based	n/a	n/a
eth 0/18	disabled	port-based	n/a	n/a
eth 0/19	disabled	port-based	n/a	n/a
eth 0/20	disabled	port-based	n/a	n/a
eth 0/21	disabled	port-based	n/a	n/a
eth 0/22	disabled	port-based	n/a	n/a
eth 0/23	disabled	port-based	n/a	n/a
eth 0/24	disabled	port-based	n/a	n/a

Port Authentication Port Details:

Port-Authentication is disabled on eth 0/1

Port-Authentication is disabled on eth 0/2

show port-security [address | interface <interface id> | port-expiration] detailed

Use the **show port-security** command to display port security information.

Syntax Description

address	Displays a list of secure MAC addresses for all interfaces currently configured for port security.
interface	Filters the output to include only information for a particular interface.
port-expiration	Displays the ports currently participating in port expiration and the amount of time left until the port is shutdown.
detailed	Displays information for all interfaces, even if not configured for port expiration.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following displays all secure MAC addresses related to the Ethernet 0/1 interface:

```
>enable
```

```
#show port-security interface eth 0/1 address
```

VLAN	Mac Address	Type of Entry	Interface	Remaining Time
1	00:a0:c8:0a:c6:4a	Dynamic-Secure	eth 0/1	--
1	00:a0:c8:0a:c6:4b	Dynamic-Secure	eth 0/1	--

```
Dynamic Address Count : 2
```

```
Static Address Count : 0
```

```
Sticky Address Count : 0
```

```
Total Address Count : 2
```

show power inline <slot/port>

Use the **show power inline** command to display power information (in watts) for devices connected to power over Ethernet (PoE) interfaces. The command also displays the PoE interfaces that can be powered, whether the interfaces are powered or not, and the IEEE class for the device(s) connected to the PoE interfaces.

Syntax Description

<code><slot/port></code>	Optional. Specifies the slot/port of a PoE interface. If specified, the command only displays information related to that interface.
--------------------------------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays power information for all PoE interfaces:

```
>enable
```

```
#show power inline
```

Interface	Admin	Oper	Power (watts)	Class
eth 0/1	auto	off	n/a	n/a
eth 0/2	auto	off	n/a	n/a
eth 0/3	auto	off	n/a	n/a
eth 0/4	auto	on	3.1	Class 0
eth 0/5	auto	off	n/a	n/a
eth 0/6	off	n/a	n/a	n/a
eth 0/7	off	n/a	n/a	n/a
eth 0/8	off	n/a	n/a	n/a
eth 0/9	auto	on	2.4	Class 1
...				

show power supply

The **show power supply** command displays the power supply status. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example displays the power supply status:

```
>enable
```

```
#show power supply
```

```
Power supply 1 is OK.
```

```
Power supply 2 is not present.
```

show pppoe

Use the **show pppoe** command to display all pppoe settings and associated parameters.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example enters the Enable mode and uses the **show** command to display pppoe information:

```
>enable
```

```
#show pppoe
```

```
ppp 1
```

```
  Outgoing Interface: eth 0/1
```

```
  Outgoing Interface MAC Address: 00:A0:C8:00:85:20
```

```
  Access-Concentrator Name Requested: FIRST VALID
```

```
  Access-Concentrator Name Received: 13021109813703-LRVLGAOS90W_IFITL
```

```
  Access-Concentrator MAC Address: 00:10:67:00:1D:B8
```

```
  Session Id: 64508
```

```
  Service Name Requested: ANY
```

```
  Service Name Available:
```

```
  PPPoE Client State: Bound (3)
```

```
  Redial retries: unlimited
```

```
  Redial delay: 10 seconds
```

```
Backup enabled all day on the following days:
```

```
  Sunday Monday Tuesday Wednesday Thursday Friday Saturday
```

```
Backup phone number list:
```

Number	Call Type	min/max DS0s	Backup I/F
5551212	analog	1/1	ppp 2

show processes [cpu | cpu realtime | history | queue | stack]

Use the **show processes** command to display process statistic information.

Syntax Description

cpu	Displays informations about processes that are currently active.
cpu realtime	Displays full-screen CPU output in real time. See the Functional Notes below for more information.
history	Displays the process switch history.
queue	Displays process queue utilization.
stack	Displays process stack usage.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 10.1	New option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample output from the **show processes cpu** command:

>enable

#show processes cpu

processes cpu

System load: 7.07% Min: 0.00% Max 85.89%

Context switch load: 0.21%

Task	Task	Invoked	Exec	Time	Runtime	Load %
D	Name	PRI STAT	(count)	(usec)	(usec)	(1sec)
0	Idle	0 W	129689	1971	927923	92.79
1	FrontPanel	249 W	9658	165	3202	0.32
3	Stack Usage	11 W	485	305	325	0.03
4	Q Test 1	10 W	50	4	0	0.00
5	Q Test 2	11 W	50	6	0	0.00
10	Clock	20 W	1443	24	55	0.01
11	PacketRouting	250 W	31656	10	3871	0.39
12	Thread Pool	50 W	161	159	0	0.00
13	IKE	10 W	2	341	0	0.00
14	RouteTableTick	50 W	49	874	874	0.09

....etc.

show qos [cos-map | dscp-cos | interface <interface id> | queuing]

Use the **show qos** command to display information regarding quality of service (QoS) and cost of service (CoS) settings.

Syntax Description

cos-map	Displays the CoS priority-to-queue map. The map outlines which CoS priority is associated with which queue.
dscp-cos	Displays the Differentiated Services Codepoint (DSCP) to CoS map settings.
interface <interface id>	Displays the QoS settings on a specific interface (Ethernet, Gigabit Ethernet, or Port Channel).
queuing	Displays the type of queuing being used. If weighted round robin (WRR) queuing is enabled, the command also displays the weight of each queue.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 6.1	Command was introduced.
Release 7.1	Command was expanded to include the dscp-cos option.

Usage Examples

The following is sample output from the **show qos cos-map** command:

```
>enable
#show qos cos-map
CoS Priority : 0 1 2 3 4 5 6 7
Priority Queue : 1 1 2 2 3 3 4 4
```

The following is sample output from the **show qos interface** command for Ethernet 0/8 interface:

```
>enable
#show qos interface ethernet 0/8
Ethernet 0/8
trust state: trusted
default CoS: 0
```

The following is sample output from the **show qos queuing** command with WRR queuing enabled:

```
>enable
#show qos queuing
Queue-type: wrr
Expedite queue: disabled
wrr weights:
qid - weight
1 - 12
2 - 45
3 - 55
4 - 65
```

show qos map

The **show qos map** command outputs information about the QoS map. This information differs based on how a particular map entry is defined.

Variations of this command include the following:

show qos map

show qos map *<map name>*

show qos map *<map name>* *<sequence number>*

show qos map interface *<interface ID>*

Syntax Description

<i><map name></i>	Specifies the name of a defined QoS map.
<i><sequence number></i>	Specifies one of the map's defined sequence numbers.
<i><interface ID></i>	Specify an interface to display QoS map information for just that interface (e.g., Frame Relay, PPP, or ATM). Enter the show qos map interface ? command for a complete list of interfaces.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC interface.

Usage Example

>enable

#show qos map

qos map priority

map entry 10

match IP packets with a precedence value of 6
priority bandwidth: 400 (kilobits/sec) burst: default
packets matched by map: 125520

map entry 20

match ACL icmp
packets matched by map: 99

map entry 30

match RTP packets on even destination ports between 16000 and 17000
packets matched by map: 0

map entry 50

match ACL tcp
packets matched by map: 4326

map entry 60

match IP packets with a dscp value of 2
set dscp value to 6
packets matched by map: 0

map entry 70

match NetBEUI frames being bridged by the router
priority bandwidth: 150 (kilobits/sec) burst: default
packets matched by map: 0

qos map tcp_map

map entry 10

match ACL tcp
priority bandwidth: 10 (kilobits/sec) burst: default
set precedence value to 5
packets matched by map: 0

map entry 20

match IP packets with a precedence value of 3
priority bandwidth: 50 (kilobits/sec) burst: default
packets matched by map: 0

The following example shows the “priority” Qos Map and all entries in that map:

>enable

#show qos map priority

```
qos map priority
map entry 10
  match IP packets with a precedence value of 6
  priority bandwidth: 400 (kilobits/sec) burst: default
  packets matched by map: 125520

map entry 20
  match ACL icmp
  packets matched by map: 99

map entry 30
  match RTP packets on even destination ports between 16000 and 17000
  packets matched by map: 0

map entry 50
  match ACL tcp
  packets matched by map: 4326

map entry 60
  match IP packets with a dscp value of 2
  set dscp value to 6
  packets matched by map: 0

map entry 70
  match NetBEUI frames being bridged by the router
  priority bandwidth: 150 (kilobits/sec) burst: default
  packets matched by map: 0
```

The following example shows a particular qos map entry (in this case map entry 10):

>enable

#show qos map priority 10

```
qos map priority
map entry 10
  match IP packets with a precedence value of 6
  priority bandwidth: 400 (kilobits/sec) burst: default
  packets matched by map: 125520
```

The following examples show Qos Map interface stats associated with the map defined for an interface:

>enable

#show qos map interface frame-relay 1

fr 1

qos-policy out: priority

map entry 10

match IP packets with a precedence value of 6

budget 145/10000 bytes (current/max)

priority bandwidth: 400 (kilobits/sec)

packets matched on interface: 27289

packets dropped: 98231

map entry 20

not configured for rate limiting

map entry 30

not configured for rate limiting

map entry 50

not configured for rate limiting

map entry 60

not configured for rate limiting

map entry 70

match NetBEUI frames being bridged by the router

budget 3750/3750 bytes (current/max)

priority bandwidth: 150 (kilobits/sec)

packets matched on interface: 0

packets dropped: 0

show queue <interface>

Use the **show queue** command to display conversation information associated with an interface queue. This command shows summary and per-conversation information.

Syntax Description

<interface>	Displays the queueing information for the specified interface. Type the show queue ? command to display a list of valid interfaces.
-------------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC interface.

Usage Examples

The following is a sample output from the **show queue** command:

>enable

#show queue fr 1

Queueing method: weighted fair

Output queue: 18/25/200/64/1027 (size/highest/max total/threshold/drops)

Conversations 2/4/256 (active/max active/max total)

(depth/weight/highest/discards) 12/256/33/0

Conversation 10, linktype: ip, length: 67

source: 10.100.23.11, destination: 10.200.2.125, id: 0x0000, ttl: 47,

TOS: 0 prot: 17 (udp), source port 99, destination port 99

(depth/weight/highest/discards) 6/256/25/0

Conversation 23, linktype: ip, length: 258

source: 10.100.23.11, destination: 10.200.2.125, id: 0x0000, ttl: 47,

TOS: 0 prot: 6 (tcp), source port 16, destination port 16

show queuing [fair]

Use the **show queuing** command to display information associated with configured queuing methods.

Syntax Description

fair Optional. Keyword used to display only information on the weighted fair queuing configuration.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is a sample output from the **show queuing** command:

>enable

#show queuing

Interface	Discard threshold	Conversation subqueues
fr 1	64	256
fr 2	64	256
ppp 1	64	256

show radius statistics

Use the **show radius statistics** command to display various statistics from the RADIUS subsystem. These statistics include number of packets sent, number of invalid responses, number of timeouts, average packet delay, and maximum packet delay. Statistics are shown for both authentication and accounting packets.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is an example output using the **show radius statistics** command:

>**enable**

#**show radius statistics**

	Auth.	Acct.
Number of packets sent:	3	0
Number of invalid responses:	0	0
Number of timeouts:	0	0
Average delay:	2 ms	0 ms
Maximum delay:	3 ms	0 ms

show route-map [*<name>*]

Use the **show route-map** command to display any route maps that have been configured in the router. It displays any match and set clauses associated with the route map, as well as the number of incoming routes that have matched each route map.

Syntax Description

<name> Optional. Displays only the route map matching the specified name.

Default Values

By default, this command displays all defined route maps.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

In the example below, all route maps in the router are displayed.

>enable

#show route-map

```
route-map RouteMap1, permit, sequence 10
```

```
Match clauses:
```

```
community (community-list filter): CommList1
```

```
Set clauses:
```

```
local-preference 250
```

```
BGP Filtering matches: 75 routes
```

```
route-map RouteMap1, permit, sequence 20
```

```
Match clauses:
```

```
community (community-list filter): CommList2
```

```
Set clauses:
```

```
local-preference 350
```

```
BGP Filtering matches: 87 routes
```

```
route-map RouteMap2, permit, sequence 10
```

```
Match clauses:
```

```
ip address (access-lists): 192.168.1.1
```

Set clauses:
 metric 100
BGP Filtering matches: 10 routes
route-map RouteMap2, permit, sequence 20
Match clauses:
 ip address (access-lists): 192.168.2.1
Set clauses:
 metric 200
BGP Filtering matches: 12 routes

In the example below, only the route map with the name "RouteMap2" is displayed.

>enable

#show route-map RouteMap2

route-map RouteMap2, permit, sequence 10
Match clauses:
 ip address (access-lists): 192.168.1.1
Set clauses:
 metric 100
BGP Filtering matches: 10 routes
route-map RouteMap2, permit, sequence 20
Match clauses:
 ip address (access-lists): 192.168.2.1
Set clauses:
 metric 200
BGP Filtering matches: 12 routes

show rtp resources

Use the **show rtp resources** command to display RTP resource information.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following is sample output for this command:

>enable

#show rtp resources

DSP	Channel	Type	Port	Status
0/1	1	RTP	N/A	Available
0/1	2	RTP	N/A	Available
0/1	3	RTP	N/A	Available
0/1	4	RTP	N/A	Available
0/1	5	RTP	N/A	Available
0/1	6	RTP	N/A	Available
0/1	7	RTP	N/A	Available
0/1	8	RTP	N/A	Available
0/1	9	RTP	N/A	Available
0/1	10	RTP	N/A	Available
0/1	11	RTP	N/A	Available
0/1	12	RTP	N/A	Available
0/1	13	RTP	N/A	Available
0/1	14	RTP	N/A	Available
0/1	15	RTP	N/A	Available
0/1	16	RTP	N/A	Available

0/1	17	RTP	N/A	Available
0/1	18	RTP	N/A	Available
0/1	19	RTP	N/A	Available
0/1	20	RTP	N/A	Available
0/1	21	RTP	N/A	Available
0/1	22	RTP	N/A	Available
0/1	23	RTP	N/A	Available
0/1	24	RTP	N/A	Available

show running-config

Use the **show running-config** command to display a text print of all the non-default parameters contained in the current running configuration file. Use the **verbose** keyword to display a text print of the entire configuration (including parameters in their default state). Specific portions of the running-config may be displayed, based on the command entered.

Variations of this command include the following:

show running-config

show running-config access-lists

show running-config access-lists verbose

show running-config checksum

show running-config interface *<interface type>* *<interface id>*

show running-config interface *<interface type>* *<interface id>* **verbose**

show running-config policy-class

show running-config policy-class verbose

show running-config qos-map

show running-config qos-map verbose

show running-config verbose

Syntax Description

access-lists	Displays the current running configuration for all configured IP access lists.
checksum	Optional. Displays the encrypted Message Digest 5 (MD5) version of the running configuration.
interface <i><interface type></i>	Displays the current running configuration for a particular interface. Type show running-config interface ? for a list of valid interfaces.
<i><interface id></i>	Specifies any valid slot/port interface (e.g., 0/1).
policy-class	Displays the current running configuration for all configured policy classes.
qos-map	Displays the current running configuration for all configured QoS maps.
verbose	Optional. Displays the entire running configuration to the terminal screen (versus only the non-default values).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 9.1	Command was expanded to include HDLC and tunnel interfaces.

Usage Examples

The following is a sample output from the **show running-config** command:

```
>enable
#show running-config
Building configuration...
!
no enable password
!
ip subnet-zero
ip classless
ip routing
!
event-history on
no logging forwarding
logging forwarding priority-level info
no logging email
!
ip policy-timeout tcp all-ports 600
ip policy-timeout udp all-ports 60
ip policy-timeout icmp 60
!
interface eth 0/1.....
```

show running-config voice [**ani** | **class-of-service** <*rule set*> | **grouped-trunk** <*trunk*> | **ring-group** <*ring group*> | **trunk** <*trunk id*> | **user** <*extension*> | **verbose**]

Use the **show running-config voice** command to show running voice configurations.

Syntax Description

ani	Displays ANI substitution configurations.
class-of-service < <i>rule set</i> >	Displays voice class-of-service (CoS) configurations. Specifies name of the CoS rule set.
grouped-trunk < <i>trunk</i> >	Displays voice trunk group configurations. Specifies the name of the trunk group.
ring-group < <i>ring group</i> >	Displays ring group configurations. Specifies extension of ring group.
trunk < <i>trunk id</i> >	Displays voice trunk configurations. Specifies trunk's 2-digit identifier following T (for example, T01).
user < <i>extension</i> >	Displays voice user configurations. Specifies extension of user.
verbose	Displays detailed voice running configurations.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows sample output from the **show running-config voice** command:

```
>enable
```

```
#show voice running-config voice
```

```
Building configuration...
```

```
!
```

```
voice hold-reminder 15
```

```
voice flashhook mode interpreted
```

```
!
```

```
!
```

```
voice dial-plan 1 local 8000
```



```
!  
!  
!  
voice class-of-service set1  
  billing-codes  
!  
voice class-of-service set2  
!  
voice class-of-service "set 1"  
!  
voice codec-list trunk  
  default  
  codec g711ulaw  
  codec g729  
!  
voice codec-list "list 1"  
!  
voice codec-list list1  
!  
!  
voice trunk T99 type t1-rbs supervision wink role network  
!  
voice trunk T01 type sip  
!  
voice trunk T07 type t1-rbs supervision wink role network  
!  
voice trunk T02 type t1-rbs supervision wink role network  
!  
voice trunk T03 type t1-rbs supervision wink role network  
!  
voice trunk T12 type sip  
!  
!  
voice grouped-trunk TEST  
  no description  
  reject 900XXXXXXXX  
!  
!  
voice grouped-trunk TESTGROUP  
  no description  
!  
!  
voice grouped-trunk TRUNK1  
  no description
```

show sip [resources | statistics | trunk-registration | user-registration]

Use the **show sip** command to display SIP statistical and registration information.

Syntax Description

resources	Displays SIP server statistic information.
statistics	Displays SIP server statistic information.
trunk-registration	Displays social SIP slient registration information.
user-registration	Displays local SIP server registration information.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows sample output from the **show sip trunk-registration** command:

```
>enable
```

```
#show sip trunk-registration
```

```
Ext   Register Expire Grant Success Redirect Challenge Failed Timeout
-----
4433  NO       0    0    0    0    0    0    #
```

show snmp

Use the **show snmp** command to display the system Simple Network Management Protocol (SNMP) parameters and current status of SNMP communications.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example output using the **show snmp** command for a system with SNMP disabled and the default Chassis and Contact parameters:

```
>enable
```

```
#show snmp
```

```
Chassis: Chassis ID
```

```
Contact: Customer Service
```

```
0 Rx SNMP packets
```

```
  0 Bad community names
```

```
  0 Bad community uses
```

```
  0 Bad versions
```

```
  0 Silent drops
```

```
  0 Proxy drops
```

```
  0 ASN parse errors
```

show sntp

Use the **show sntp** command to display the system Simple Network Time Protocol (SNTP) parameters and current status of SNTP communications.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

```
>enable  
#show sntp
```

show spanning-tree <bridgegroup#>

Use the **show spanning-tree** command to display the status of the spanning-tree protocol.

Syntax Description

<bridgegroup#> Optional. Displays spanning-tree for a specific bridge group.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is an example output using the **show spanning-tree** command:

```
>enable
```

```
#show spanning-tree
```

```
Spanning Tree enabled protocol ieee
```

```
Root ID Priority 32768
```

```
Address 00:a0:c8:00:88:41
```

```
We are the root of the spanning tree
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Bridge ID Priority 32768
```

```
Address 00:a0:c8:00:88:41
```

```
Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec
```

```
Aging Time 300
```

Interface	Role	Sts	Cost	Prio.Nbr	Type
eth 0/2	Desg	FWD	19	128.2	P2p
eth 0/3	Desg	FWD	19	128.3	P2p
eth 0/4	Desg	FWD	19	128.4	P2p
giga-eth 0/1	Desg	FWD	4	128.25	P2p
giga-eth 0/2	Desg	FWD	4	128.26	P2p

show spanning-tree active [detail]

Use the **show spanning-tree active** command to display the spanning-tree status on active interfaces only.

Syntax Description

detail Optional. Keyword which displays the spanning-tree protocol status in detail.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is an example output using the **show spanning-tree active** command:

>enable

#show spanning-tree active

Spanning Tree enabled protocol ieee

Root ID Priority 32768

Address 00:a0:c8:00:88:41

We are the root of the spanning tree

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Bridge ID Priority 32768

Address 00:a0:c8:00:88:41

Hello Time 2 sec Max Age 20 sec Forward Delay 15 sec

Aging Time 300

eth 0/9 Desg FWD 19 128.9 P2p

eth 0/24 Desg FWD 19 128.24 P2p

Interface	Role	Sts	Cost	Prio.Nbr	Type
eth 0/2	Desg	FWD	19	128.2	P2p
eth 0/3	Desg	FWD	19	128.3	P2p
eth 0/9	Desg	FWD	19	128.9	P2p

show spanning-tree blockedports

Use the **show spanning-tree blockedports** command to display ports that are currently in a blocked state.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example output using the **show spanning-tree blockedports** command:

```
>enable
#show spanning-tree blockedports
Blocked Interfaces List
-----
eth 0/3
giga-eth 0/2
p-chan 1
Number of blocked ports (segments) in the system : 3
```

show spanning-tree detail [active]

Use the **show spanning-tree detail** command to display the spanning-tree protocol information in detail.

Syntax Description

active	Optional. Keyword which displays spanning-tree protocol information for only active interfaces.
---------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

show spanning-tree interface ethernet <interface id> [active | active detail | cost | detail | detail active | edgeport | priority | rootcost | state]

Use the **show spanning-tree interface ethernet** command to display spanning-tree protocol information for a particular Ethernet interface.

Syntax Description

<slot/port>	Specify the slot and port number of the Ethernet interface.
active	Optional. Keyword which displays information for an active Ethernet interface.
active detail	Optional. Keyword which displays detailed spanning-tree protocol information for an active Ethernet interface.
cost	Optional. Keyword which displays only spanning-tree protocol path cost information for an Ethernet interface.
detail	Optional. Keyword which displays detailed spanning-tree protocol information for an Ethernet interface.
detail active	Optional. Keyword which displays detailed spanning-tree protocol information for an active Ethernet interface.
edgeport	Optional. Keyword which displays information for all Ethernet interfaces configured as edgeports.
priority	Optional. Keyword which displays only spanning-tree protocol priority information for an Ethernet interface.
rootcost	Optional. Keyword which displays only spanning-tree protocol root path cost information for an Ethernet interface.
state	Optional. Keyword which displays only spanning-tree protocol state information for an Ethernet interface.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example output using the **show spanning-tree interface ethernet** command:

>enable

#show spanning-tree interface ethernet 0/2

Interface	Role	Sts	Cost	Prio.Nbr	Type
-----	-----	-----	-----	-----	-----
eth 0/2	Desg	LIS	19	128.2	P2p

show spanning-tree interface gigabit-ethernet <interface id> [active | active detail | cost | detail | detail active | priority | rootcost | state]

Use the **show spanning-tree interface gigabit-ethernet** command to display spanning-tree protocol information for a particular Gigabit Ethernet interface.

Syntax Description

<slot/port>	Specify the slot and port number of the Gigabit Ethernet interface.
active	Optional. Keyword which displays information for an active Gigabit Ethernet interface.
active detail	Optional. Keyword which displays detailed spanning-tree protocol information for an active Gigabit Ethernet interface.
cost	Optional. Keyword which displays only spanning-tree protocol path cost information for a Gigabit Ethernet interface.
detail	Optional. Keyword which displays detailed spanning-tree protocol information for a Gigabit Ethernet interface.
detail active	Optional. Keyword which displays detailed spanning-tree protocol information for an active Gigabit Ethernet interface.
priority	Optional. Keyword which displays only spanning-tree protocol priority information for a Gigabit Ethernet interface.
rootcost	Optional. Keyword which displays only spanning-tree protocol root path cost information for a Gigabit Ethernet interface.
state	Optional. Keyword which displays only spanning-tree protocol state information for a Gigabit Ethernet interface.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example output using the **show spanning-tree interface gigabit-ethernet** command:

>enable

#show spanning-tree interface gig 0/2

Interface	Role	Sts	Cost	Prio.Nbr	Type
-----	-----	-----	-----	-----	-----
gig-eth 0/2	Desg	FWD	19	128.27	P2p

show spanning-tree interface port-channel <interface id> [active | active detail | cost | detail | detail active | edgeport | priority | rootcost | state]

Use the **show spanning-tree interface port-channel** command to display spanning-tree protocol information for a particular port channel interface.

Syntax Description

<slot/port>	Specify the slot and port number of the port channel interface.
active	Optional. Keyword which displays information for an active port channel interface.
active detail	Optional. Keyword which displays detailed spanning-tree protocol information for an active port channel interface.
cost	Optional. Keyword which displays only spanning-tree protocol path cost information for a port channel interface.
detail	Optional. Keyword which displays detailed spanning-tree protocol information for a port channel interface.
detail active	Optional. Keyword which displays detailed spanning-tree protocol information for an active port channel interface.
edgeport	Optional. Keyword which displays information for all port channel interfaces configured as edgeports.
priority	Optional. Keyword which displays only spanning-tree protocol priority information for a port channel interface.
rootcost	Optional. Keyword which displays only spanning-tree protocol root path cost information for a port channel interface.
state	Optional. Keyword which displays only spanning-tree protocol state information for a port channel interface.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced
-------------	------------------------

Usage Examples

The following is an example output using the **show spanning-tree interface port-channel** command:

>enable

#show spanning-tree interface port-channel 1

Interface	Role	Sts	Cost	Prio.Nbr	Type
-----	-----	-----	-----	-----	-----
p-chan 1	Desg	FWD	19	128.27	P2p

show spanning-tree pathcost method

Use the **show spanning-tree pathcost method** command to display the default pathcost method being used.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output using the **show spanning-tree pathcost method** command. In this case 32-bit values are being used when calculating path costs:

```
>enable
```

```
#show spanning-tree pathcost method
```

```
Spanning tree default pathcost method used is long
```

show spanning-tree realtime

Use the **show spanning-tree realtime** command to display full-screen spanning tree information in real time.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is sample output using the **show spanning-tree realtime** command.

```
>enable
#show spanning-tree realtime
```


show spanning-tree root [address | cost | detail | forward-time | hello-time | id | max-age | port | priority | priority system-id]

Use the **show spanning-tree root** command to display information regarding the spanning-tree protocol root.

Syntax Description

address	Optional. Keyword used to display the address of the spanning-tree root .
cost	Optional. Keyword used to display the path cost of the spanning-tree root.
detail	Optional. Keyword used to display the spanning-tree root information in detail.
forward-time	Optional. Keyword used to display the forward-time of the spanning-tree root.
hello-time	Optional. Keyword used to display the hello-time of the spanning-tree root.
id	Optional. Keyword used to display the ID of the spanning-tree root.
max-age	Optional. Keyword used to display the maximum age of the spanning-tree root.
port	Optional. Keyword used to display the port of the spanning-tree root.
priority	Optional. Keyword used to display the priority of the spanning-tree root.
priority system-id	Optional. Keyword used to display the priority and system-id of the spanning-tree root.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is an example output using the **show spanning-tree root** command:

```
>enable
```

```
#show spanning-tree root
```

Root ID	Root Cost	Hello Time	Max Age	Fwd Dly	Root Port
8191 00:a0:c8:b9:bb:82	108	2	20	15	eth 0/1

show spanning-tree summary

Use the **show spanning-tree summary** command to display a brief summary of the spanning tree.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following is an example output using the **show spanning-tree summary** command:

>enable

#show spanning-tree summary

Spanning tree default pathcost method is short

Blocking	Listening	Learning	Forwarding	STP Active
-----	-----	-----	-----	-----
0	0	0	12	12

show stack [candidates | candidates realtime | realtime | topology | topology realtime]

Use the **show stack** command to view the status of all the switches configured for stacking.

Syntax Description

show stack	Displays the mode of the switch as either master or member. If the mode is master, this command also gives the status of the stack members.
candidates	Displays all units that have registered with this stack master. This option is only available on a switch configured as a stack master.
candidates realtime	Displays candidates output in real time.
realtime	Displays full-screen output in real time. See Functional Notes below for more information.
topology	Displays the stack topology. This option is only available on a switch configured as a stack master.
topology realtime	Displays the stack topology output in real time.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

The stack candidates are a list of units that could be added to the stack. They are not yet members. Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following example displays the configuration of the switch stack while in stack-master mode:

```
>enable
```

```
#show stack
```

```
Stack mode is MASTER
```

```
Management Vlan is 2386, firmware version is 08.00.18.D
```

```
Stack network is 169.254.0.0/24
```

```
Stack members...
```

Member	Mac Address	Mgmt IP Address	Source Interface	State
2	00:A0:C8:02:CF:C0	169.254.0.2	Stack port	Up
3	00:A0:C8:00:8C:20	169.254.0.3	Stack port	Up
#				

Member	stack member's Unit ID
MAC address	stack member's MAC address
Mgmt IP Address	stack member's IP address
Source Interface	interface that the stack member was learned from
State	Up (member is up and functioning properly); Down (member was at one time functioning, but we have lost contact with it); Waiting (we are waiting for the unit to register with us; when he does, we will add it to the stack); Denied (the unit could not be added to the stack because the stack protocol versions were not compatible).

The following example displays the configuration of the switch stack while in stack-member mode:

```
>enable
```

```
#show stack
```

```
Stack mode is STACK-MEMBER
```

```
My Unit ID is 3, management Vlan is 2386
```

```
Stack management network is 169.254.0.0/24
```

```
Stack Master info:
```

```
Master is "Switch", learned via giga-eth 0/1
```

```
IP address is 169.254.0.1, MAC address is 00:DE:AD:00:65:83
```

```
#
```

The following example displays all units that have registered with this stack-master.

>enable

#show stack candidates

Displaying all known Stack candidates...

MAC Address	System Name	Source Interface	AOS Revision
00:A0:C8:00:8C:20	LabSwitch1	stack port	08.00.18
00:A0:C8:00:F5:6C	LabSwitch2	stack port	08.00.19.D
00:A0:C8:02:CF:C0	LabSwitch3	stack port	08.00.20.D

#

show startup-config

Use the **show startup-config** command to display a text printout of the startup configuration file stored in NVRAM.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample output of the **show startup-config** command:

```
>enable
#show startup-config
!
!
no enable password
!
ip subnet-zero
ip classless
ip routing
!
event-history on
no logging forwarding
logging forwarding priority-level info
no logging email
!
ip policy-timeout tcp all-ports 600
ip policy-timeout udp all-ports 60
ip policy-timeout icmp 60
!
```

```
!  
!  
interface eth 0/1  
  speed auto  
  no ip address  
  shutdown  
!  
interface dds 1/1  
  shutdown  
!  
interface bri 1/2  
  shutdown  
!  
!  
ip access-list standard MatchAll  
  permit host 10.3.50.6  
  permit 10.200.5.0 0.0.0.255  
!  
!  
ip access-list extended UnTrusted  
  deny icmp 10.5.60.0 0.0.0.255 any source-quench  
  deny tcp any any  
!  
no ip snmp agent  
!  
!  
!
```

show startup-config checksum

Use the **show startup-config checksum** command to display the MD5 checksum of the unit's startup configuration.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in conjunction with the **show running-config checksum** command to determine whether the configuration has changed since the last time it was saved.

Usage Examples

The following example displays the MD5 checksum of the unit's startup configuration:

```
>enable
#show startup-config checksum
10404D5DAB3FE35E307B6A79AC6AC8C0
#

#show running-config checksum
10404D5DAB3FE35E307B6A79AC6AC8C0
#
```


show system

The **show system** command shows the system version, timing source, power source, and alarm relay status.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following is sample output for this command:

```
>enable
#show system
ADTRAN, Inc. OS version 07.00.20
  Checksum: 3B2FCC0F, built on Tue Jun 01 13:36:36 2004
Boot ROM version 07.00.20
  Checksum: 604D, built on: Tue Jun 01 13:59:11 2004
Copyright (c) 1999-2004, ADTRAN, Inc.
Platform: Total Access 900
Serial number TechPub
Flash: 8388608 bytes DRAM: 33554431 bytes
ICP uptime is 0 days, 0 hours, 53 minutes, 50 seconds
System returned to ROM by External Hard Reset
Current system image file is "070020.biz"
Boot system image file is "070020.biz"
Power Source: AC
Primary System clock source config: t1 0/1
Secondary System clock source config: t1 0/1
Active System clock source: t1 0/1
Alarm Relay: OPEN
```

show tcp info [realtime] <control block>

Use the **show tcp info** command to display TCP control block information in the AOS. This information is for troubleshooting and debug purposes only. For more detailed information, you can optionally specify a particular TCP control block. When a particular TCP control block is specified, the system provides additional information regarding crypto map settings that the **show tcp info** command does not display.

Syntax Description

realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
<control block>	Optional. Specify a particular TCP control block for more detailed information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample from the **show tcp info** command:

>enable

#show tcp info

TCP TCB Entries

ID	STATE	LSTATE	OSTATE	TYPE	FLAGS	RPORT	LPORT	SWIN	SRT	INTERFACE
0	FREE	FREE	FREE	SRVR	0	0	0	0	0	NONE
1	LISTEN	FREE	FREE	CONN	0	0	21	0	0	NONE
2	LISTEN	FREE	FREE	CONN	0	0	80	0	0	NONE
3	LISTEN	FREE	FREE	CONN	0	0	23	0	0	NONE
4	LISTEN	FREE	FREE	CONN	0	0	5761	0	0	NONE
5	FREE	FREE	FREE	SRVR	0	0	0	0	0	NONE
.										
.										
31	FREE	FREE	FREE	SRVR	0	0	0	0	0	NONE

show tech [terminal]

Use the **show tech** command to save technical information to file showtech.txt.

Syntax Description

terminal	Displays technical information to terminal.
-----------------	---

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example saves all technical information to the file showtech.txt:

```
>enable
```

```
#show tech
```

show temperature

Use the **show temperature** command to display the unit temperature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from the **show temperature** command:

```
>enable
```

```
#show temperature
```

```
Temperature: 33 degrees C
```

show toneservices resources

Use the **show toneservices resources** command to display Digital Signal Processor (DSP) tone information.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following is sample output for this command:

>enable

#show toneservices resources

DSP	Channel	Type	Port	Status
0/1	1	RTP	N/A	Available
0/1	2	RTP	N/A	Available
0/1	3	RTP	N/A	Available
0/1	4	RTP	N/A	Available
0/1	5	RTP	N/A	Available
0/1	6	RTP	N/A	Available
0/1	7	RTP	N/A	Available
0/1	8	RTP	N/A	Available
0/1	9	RTP	N/A	Available
0/1	10	RTP	N/A	Available
0/1	11	RTP	N/A	Available
0/1	12	RTP	N/A	Available
0/1	13	RTP	N/A	Available
0/1	14	RTP	N/A	Available
0/1	15	RTP	N/A	Available

0/1	16	RTP	N/A	Available
0/1	17	RTP	N/A	Available
0/1	18	RTP	N/A	Available
0/1	19	RTP	N/A	Available
0/1	20	RTP	N/A	Available
0/1	21	RTP	N/A	Available
0/1	22	RTP	N/A	Available
0/1	23	RTP	N/A	Available
0/1	24	RTP	N/A	Available

show udp info [realtime] <session id>

Use the **show udp info** command to display User Datagram Protocol (UDP) session information.

Syntax Description

realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
<session id>	Specifies ID of session to display. Valid range is 0 to 31.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following example shows sample output from the **show udp info** command:

```
>enable
```

```
#show udp info
```

```
UDP Session Entries
```

ID	Local Port	IP Address	Socket
2	520	0.0.0.0	1
3	0	0.0.0.0	4
4	161	0.0.0.0	5
5	8	127.0.0.1	7

6	10	0.0.0.0	11
7	6	127.0.0.1	16
8	4	127.0.0.1	17
9	14	127.0.0.1	18
10	12	127.0.0.1	19

show users [realtime]

Use the **show users** command to display the name (if any) and state of users authenticated by the system. Displayed information includes:

- Connection location (for remote connections this includes TCP information)
- Username of authenticated user
- Current state of the login (in process or logged in)
- Current enabled state
- Time the user has been idle on the connection

Syntax Description

realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
-----------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample of **show users** output:

```
>enable
#show users
```

- CONSOLE 0 'adtran' logged in and enabled
Idle for 00:00:00
- TELNET 0 (172.22.12.60:3998) 'password-only' logged in (not enabled)
Idle for 00:00:14
- FTP (172.22.12.60:3999) 'adtran' logged in (not enabled)
Idle for 00:00:03

show version

Use the **show version** command to display the current AOS version information.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample **show version** output:

```
>enable
```

```
#show version
```

```
AOS version: 02.01.00
Checksum: 1505165C Built on: Fri Aug 23 10:23:13 2002
Upgrade key: 420987gacs9097gbdsado
BootROM version: 02.01.00
Checksum: DB85 Built on: Mon Aug 19 10:33:03 2002
Copyright 1999-2002 ADTRAN Inc.
Serial number b104
```

```
Router uptime is 0 days 3 hours 9 minutes 54 seconds
System returned to ROM by External Hard Reset
System image file is "020100.biz"
```

show voice ani [match]

Use the **show voice ani** command to display voice ANI substitution parameters.

Syntax Description

match Displays a specific ANI substitution entry.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Functional Notes

Examples and rules of use.

MATCH #	SUBST #
1. 256-963-XXXX	9-963-XXXX
2. NXX-NXX-XXXX	9-1-NXX-NXX-XXXX
3. \$	9\$

MATCH Number Rules -

1. All “,” characters are ignored.
2. All “[“ and “]” brackets must match and contain numbers only [123].
3. If using a “\$” wildcard, it is the only character allowed.
4. “X” matches [0-9], “N” matches [2-9].

Usage Examples

The following example displays voice ANI information:

```
>enable
#show voice ani
```

show voice available

Use the **show voice available** command to list FXS ports that are not associated with a user.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays FXS ports that are not associated with a user:

```
>enable
#show voice available
```

show voice current-mode

Use the **show voice current-mode** command to display the current voice service mode.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays the current voice service mode:

```
>enable
#show voice service-mode
```

show voice dial-plan [*<template number>*]

Use the **show voice dial-plan** command to view number display templates.

Syntax Description

<template number> Displays information about a specific number display template.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example displays information about number display template 1:

```
>enable
```

```
#show voice dial-plan 1
```

```
Type          ID   Pattern
-----
Always Permitted  1   NXXNXXXXXX
```


show voice did [groups | other | users]

Use the **show voice did** command to display Direct Inward Dialing (DID) information.

Syntax Description

groups	Displays all DID entries for ring groups.
other	Displays all non-user and non-ring group DID entries.
users	Displays all DID entries for users.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays DID entries for ring groups:

```
>enable
#show voice did groups
```

show voice directory [extension | last]

Use the **show voice directory** command to display Direct Inward Dialing (DID) information.

Syntax Description

extension	Displays all extensions sorted by extension number.
other	Displays all extensions sorted by the user's last name.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays all extensions sorted by extension number:

```
>enable
#show voice directory extension
Ext      Name
-----
5200     Smith, Bill
6000     Peters, Scott
6001     Jones, Eve
6002     Patterson, Bill
6003     Scott, Julie
```

show voice extensions

Use the **show voice extensions** command to display all of the current voice extensions and their status.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example displays all extensions and the status of the extension:

>enable

#show voice directory extension

AccountID	Idle/Ring/Busy	Available	DND	FWD
T01	Idle	*	-	-
T06	Idle	*	-	-
T02	Idle	*	-	-
5200	Idle	*	-	-
6000	Idle	*	-	-
6001	Idle	*	-	-
6002	Idle	*	-	-
6003	Idle	*	-	-
T03	Idle	*	-	-
2	Idle	*	-	-
1234	Idle	*	-	-

show voice grouped-trunk

Use the **show voice grouped-trunk** command to display all voice trunk groups.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example displays all voice trunk groups:

>enable

#show voice trunked-group

Name	Resource-Selection	Description
------	--------------------	-------------

SIP	linear	SIP trunk
DSX	linear	DSX trunk
DXS	linear	DXS trunk

show voice ring-group [*<number>*]

Use the **show voice ring-group** command to display all ring groups.

Syntax Description

<i><number></i>	Displays information about a specific ring group extension.
-----------------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays all ring groups:

>enable

#show voice ring-group

ring-group 1234 type: linear

description:

Number of calls allowed: 1

First	Last	Ext	Logged In
-------	------	-----	-----------

Order	NumRings	Action
-------	----------	--------

1	2	None
2	2	None
3	2	None
4	2	None
5	2	None

ring-group 2 type: linear

description:

Number of calls allowed: 1

First	Last	Ext	Logged In
-------	------	-----	-----------

Order	NumRings	Action
-------	----------	--------

1	2	None
2	2	None
3	2	None
4	2	None
5	2	None

show voice service-mode <day>

Use the **show voice service-mode** command to display all voice service mode transitions.

Syntax Description

<day>	Displays all voice service mode transitions for a specific day. Enter the name of the day.
--------------------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays all voice service mode transitions for Tuesday:

```
>enable
#show voice service-mode tuesday
```

show voice spre [local | network]

Use the **show voice spre** command to display all special prefix (SPRE) codes.

Syntax Description

local	Displays all SPRE codes used locally.
network	Displays all SPRE codes passed through to the network.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays all local SPRE codes:

```
>enable
#show voice spre local
```


show voice switchboard

Use the **show voice switchboard** command to display all voice switchboard extensions.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example displays all voice switchboard extensions:

```
>enable
#show voice switchboard
Ext
----
1234
2
5200
6000
6001
6002
6003
```

show voice trunk [connects | <trunk id>]

Use the **show voice trunk** command to display all voice trunks.

Syntax Description

connects	Displays all trunk voice interface connections.
<trunk id>	Displays voice trunk information for a specific trunk ID. Use T01, T02, and so on for the trunk ID.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example displays all voice trunks:

>enable

#show voice trunk

Trunk Name	Resource Selection	Busy Admin. Config.	Busy Admin. Status	Busy Attempts Today	Non Busy Attempts Today	Busy Attempts Total	Non Busy Attempts Total
T01	linear	Not Busy	Not Busy	0	0	0	7
T06	linear	Not Busy	No Connects	0	0	0	0
T02	linear	Not Busy	Not Busy	0	0	0	27
T03	linear	Not Busy	No Connects	0	0	0	0

The following example displays all voice interface connections:

>enable

#show voice switchboard

Trunk	Interface	Slot/Port	Tdm-group	Timeslot
T02	t1	0/2	1	1-24

show voice users [did]

Use the **show voice users** command to display all voice user stations.

Syntax Description

did Displays all users with Direct Inward Dial (DID) extensions.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example displays all voice users:

>**enable**

#**show voice users**

First	Last	Ext	Interface	Description
Janet	Smith	5200	virtual	
Bill	Jones	6000	virtual	
Sam	Sampson	6001	virtual	
Eve	Smith	6002	virtual	
Bob	Wilson	6003	virtual	

show vlan [brief | brief realtime | id <vlan id> | name <vlan name> | realtime]

Use the **show vlan** command to display current VLAN information.

Syntax Description

brief	Optional. Shows an abbreviated version of the VLAN information (brief description).
brief realtime	Displays full-screen output in real time. See the Functional Notes below for more information.
id <vlan id>	Optional. Shows information regarding a specific VLAN, specified by a VLAN interface ID (1 to 4094).
name <vlan name>	Optional. Shows information regarding a specific VLAN, specified by a VLAN interface name (up to 32 characters).
realtime	Displays full-screen output in real time. See the Functional Notes below for more information.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
Release 10.1	Realtime option was introduced.

Functional Notes

Use the **realtime** argument for this command to display full-screen output in real time. Information is continuously updated on the console until you either freeze the data (by pressing the **F** key) or exit realtime mode (by pressing **Ctrl-C**). If there is not enough room on the screen for all available data, the information will truncate at the bottom of the screen. In order to maximize the amount of data displayed, increase the terminal length (using the **#terminal length** command).

Usage Examples

The following is a sample **show vlan** output:

```
>enable
```

```
#show vlan
```

VLAN	Name	Status	Ports
1	Default	active	eth 0/5, eth 0/6, eth 0/8, eth 0/13, eth 0/14, eth 0/15, eth 0/16, eth 0/17, eth 0/18, eth 0/19, eth 0/20, eth 0/21, eth 0/22, eth 0/23, eth 0/24, giga-eth 0/1, giga-eth 0/2

2	accounting	active	eth 0/1, eth 0/2
3	VLAN0003	active	eth 0/3, eth 0/4, eth 0/7, eth 0/9, eth 0/10, eth 0/11, eth 0/12

VLAN	Type	MTU
1	enet	1500
2	enet	1500
3		

The following is an example of the **show vlan name** command that displays VLAN 2 (**accounting** VLAN) information:

```
>enable
```

```
#show vlan name accounting
```

VLAN	Name	Status	Ports
2	accounting	active	eth 0/1, eth 0/2

VLAN	Type	MTU
2	enet	1500

telnet <address>

Use the **telnet** command to open a Telnet session (through the AOS) to another system on the network.

Syntax Description

<address> Specifies the IP address of the remote system.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example opens a Telnet session with a remote system (**10.200.4.15**):

```
>enable
```

```
#telnet 10.200.4.15
```

```
User Access Login:
```

```
Password:
```

telnet stack-member <unit id>

Use the **telnet stack-member** command to Telnet to a stack member.

Syntax Description

<unit id> Specifies unit ID of the stack member to connect to via a Telnet session.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

This command is only available when in stack-master mode.

Usage Examples

The following example Telnets to a member of the stack:

```
>enable
#telnet stack-member 3
```

Trying Stack Member 3...Press Ctrl+C to abort

terminal length <text>

The **terminal length** command sets the number of rows (lines) for a terminal session. Use the **no** form of this command to disable this feature. This command is only valid for the current session and returns to the default (24 rows) when the session closes.

Syntax Description

No subcommands.

Default Values

The default setting for this command is 24 rows.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the number of rows to 30.

```
>enable
#terminal length 30
```

traceroute <address> **source** <address>

Use the **traceroute** command to display the IP routes a packet takes to reach the specified destination.

Syntax Description

<address>	Optional. Specifies the IP address of the remote system to trace the routes to.
source <address>	Optional. Specifies the IP address of the interface to use as the source of the trace.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is a sample **traceroute** output:

```
>enable
```

```
#traceroute 192.168.0.1
```

```
Type CTRL+C to abort.
```

```
Tracing route to 192.168.0.1 over a maximum of 30 hops
```

```
  1  22ms  20ms  20ms  192.168.0.65
  2  23ms  20ms  20ms  192.168.0.1
#
```

The following example specifies the source of the trace. The ip address **10.10.10.10** is the destination address:

```
>enable
```

```
#traceroute 10.10.10.10 source 192.168.0.3
```

undebug all

Use the **undebug all** command to disable all activated debug messages.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example disabled all activated debug messages:

```
>enable  
#undebug all
```

vlan database

Use the **vlan database** command to enter the VLAN Database Configuration mode. Refer to the section *VLAN Database Configuration Command Set* on [page 686](#) for more information.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enters the VLAN Configuration mode:

```
>enable
#vlan database
```

wall <message>

Use the **wall** command to send messages to all users currently logged in to the AOS unit.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends the message "Reboot in 5 minutes if no objections" to the CLI screen of everyone currently connected:

```
>enable
```

```
#wall Reboot in 5 minutes if no objections
```

write [dynvoice-config | erase | memory | network | terminal]

Use the **write** command to save the running configuration to the unit's nonvolatile random access memory (NVRAM) or a TFTP server. Also use the **write** command to clear NVRAM or to display the running configuration on the terminal screen. Entering the **write** command with no other arguments copies your configuration changes to the unit's NVRAM. Once the save is complete, the changes are retained even if the unit is shut down or suffers a power outage.

Syntax Description

dynvoice-config	Optional. Writes dynvoice configuration information to the unit's NVRAM.
erase	Optional. Erases the configuration files saved to the unit's NVRAM.
memory	Optional. Saves the current configuration to NVRAM. Refer to <i>copy <source> <destination></i> on page 71 for more information.
network	Optional. Saves the current configuration to the network TFTP server. Refer to <i>copy tftp <destination></i> on page 76 for more information.
terminal	Optional. Displays the current configuration on the terminal screen.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example saves the current configuration to the unit's NVRAM:

```
>enable
#write memory
```

GLOBAL CONFIGURATION MODE COMMAND SET

To activate the Global Configuration mode, enter the **configuration** command at the Enable Security mode prompt. For example:

```
>enable
#configure terminal
(config)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

description <text> on page 1464

do on page 1465

end on page 1466

exit on page 1467

shutdown on page 1468

All other commands for this command set are described in this section in alphabetical order.

aaa commands begin on page 336

arp <ip address> <mac address> *arpa* on page 344

banner [exec | login | motd] <character> <message> <character> on page 345

boot config [cflash | flash] <filename> [cflash | flash] <backup filename> on page 346

boot system flash <filename> [no-backup | <backup filename>] on page 347

boot voip [default | flash <filename>] on page 348

bridge commands on page 349

clock source [internal | t1 <slot/port>] [secondary] on page 350

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port> on page 351

crypto commands begin on page 354

enable password [md5] <password> on page 374

event-history on page 376

event-history priority [error | fatal | info | notice | warning] on page 377

exception report [filename <filename>] on page 379

fip authentication <listname> on page 381

garp timer [join | leave | leaveall] <timer value> on page 382

gvrp on page 383

hostname <name> [on page 384](#)

interface commands [begin on page 385](#)

ip commands [begin on page 387](#)

line [*console* | *telnet*] <line-number> <ending number> [on page 458](#)

lldp [*minimum-transmit-interval* | *reinitialization-delay* | *transmit-interval* | *tll-multiplier*] <numeric value> [on page 460](#)

logging commands [begin on page 462](#)

mac address-table aging-time <aging time> [on page 475](#)

mac address-table static <mac address> *bridge* <bridge id> *interface* <interface> [on page 476](#)

mac address-table static <mac address> *vlan* <vlan id> *interface* <interface> [on page 477](#)

modem countrycode [<countrycode>] [on page 478](#)

monitor session <session number> [*destination interface* <interface id> | *source interface* <interface id> | *no tag*] [*both* | *rx* | *tx*] [on page 481](#)

port-auth default [on page 482](#)

port-auth max-req <number> [on page 483](#)

port-auth re-authentication [on page 484](#)

port-auth timeout [*quiet-period* <seconds> | *re-authperiod* <seconds> | *tx-period* <seconds>] [on page 485](#)

port-channel load-balance [*dst-mac* | *src-mac*] [on page 486](#)

power-supply shutdown automatic [on page 487](#)

qos commands [begin on page 488](#)

radius-server [on page 494](#)

radius-server host [on page 496](#)

route-map <map-name> [*permit* | *deny*] <sequence number> [on page 497](#)

router bgp [on page 498](#)

router ospf [on page 499](#)

router rip [on page 500](#)

snmp-server commands [begin on page 502](#)

sntp retry-timeout <time> [on page 514](#)

sntp server <address or hostname> *version* <1-3> [on page 515](#)

sntp wait-time <time> [on page 516](#)

spanning tree commands [begin on page 517](#)

stack [*master* | *member* | *vlan*] <master> <member> <vlan> [on page 526](#)

username <username> *password* <password> [on page 528](#)

voice commands [begin on page 529](#)

vlan <vlan id> [on page 547](#)

aaa authentication [banner | fail-message | password-prompt | username-prompt]

Use the **aaa authentication** command to control various features of the AAA subsystem authentication process. For more detailed information on AAA functionality, refer to the *Technology Review* section of the command *aaa* on [page 341](#).

Syntax Description

banner	Sets the banner shown before user authentication is attempted. The banner can be multiple lines.
fail-message	Sets the message shown if user authentication fails. The message can be multiple lines.
password-prompt	Sets the prompt for the user's password. The prompt is a single line. Enclose the string in quotation marks.
username-prompt	Sets the prompt for the user's name. The prompt is a single line. Enclose the string in quotation marks.

Default Values

banner	User Access Verification
fail-message	Authentication Failed
password-prompt	Password:
username-prompt	Username:

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

aaa authentication enable default [none | line | enable | group <groupname> | group radius]

Use the **aaa authentication enable default** command to create (or change) the list of methods used for privileged mode access authentication. For more detailed information on AAA functionality, refer to the *Technology Review* section of the command *aaa on* [page 341](#).

Syntax Description

none	Access automatically granted.
line	Use the line password for authentication.
enable	Use the enable password for authentication.
group <groupname>	Use the specified group of remote servers for authentication.
group radius	Use all defined RADIUS servers for authentication.

Default Values

If there is no default list configured, the default behavior is to use the enable password for the unit. If there is no password configured, consoles are allowed in (prevents a lock-out).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

A user is authenticated by trying the list of methods from first to last until a method succeeds or fails. If a method is unable to complete, the next method is tried. The group falls through if the servers in the remote group could not be found.

Note that enable access is a password-only process. The local-user database cannot be used and the username given to any remote RADIUS server is **\$enab15\$**. The only list name allowed is **default**.

Usage Examples

(config)#**aaa authentication enable default line**

aaa authentication port-auth default [group <groupname> | group radius | local | none]

Use the **aaa authentication port-auth default** command to create a default list for port authentication. For more detailed information on AAA functionality, refer to the *Technology Review* section of the command *aaa* on [page 341](#).

Syntax Description

group <groupname>	Specifies using the specified group of remote servers for authentication.
group radius	Specifies using all defined RADIUS servers for authentication.
local	Specifies using the local user database for authentication.
none	Automatically grants access.

Default Values

The login list named **default** is the default list used to authenticate users when no other list is assigned to the line.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example specifies that the local user database be used for port authentication:

```
(config)#aaa authentication port-auth default local
```

aaa authentication login [*<listname>* default] [none | line | enable | local | group *<groupname>* | group radius]

Use the **aaa authentication login** to create (or change) a list of methods for user authentication. For more detailed information on AAA functionality, refer to the *Technology Review* section of the command *aaa on page 341*.

Syntax Description

<i><listname></i>	Specifies the name of the list.
default	Specifies the default list used to authenticate users when no other list is assigned.
none	Access automatically granted.
line	Use the line password (Telnet 0-4 or console 0-1) for authentication.
enable	Use the enable password for authentication.
local	Use the local user database for authentication.
group <i><groupname></i>	Use the specified group of remote servers for authentication.
group radius	Use all defined RADIUS servers for authentication..

Default Values

The login list named **default** is the default list used to authenticate users when no other list is assigned to the line.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

A user is authenticated by trying the list of methods from first to last until a method succeeds or fails. If a method is unable to complete, the next method is tried. The local user database falls through to the next method if the username does not appear in the database. The group falls through if the servers in the remote group could not be found. Refer to the command *radius-server on page 494* for information on defining RADIUS server groups.

Usage Examples

```
(config)#aaa authentication login myList local group myGroup line
(config)#aaa authentication login default local
```

aaa group server radius <listname>

Use the **aaa group server radius** command to group pre-defined RADIUS servers into named lists. For more detailed information on AAA functionality, refer to the *Technology Review* section of the command *aaa* on [page 341](#).

Syntax Description

<listname> Specifies the name of the list.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Use the **radius-server** command to specify RADIUS servers before adding them to a group. This command enters a mode for adding individual servers to the named group. Refer to *Radius Group Command Set* on [page 665](#) for more information.

The default group cannot be changed and includes all RADIUS servers in the order they were specified by the **radius-server** commands.

Usage Examples

The following example creates the named list **myServers** and enters the RADIUS group:

```
(config)#aaa group server radius myServers
(config-sg-radius)#
```

aaa on

Use the **aaa on** command to activate the AAA subsystem. Use the **no** form of this command to deactivate AAA.

Syntax Description

No subcommands.

Default Values

By default, AAA is not activated.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

By default, the AAA subsystem is turned off and authentication follows the line technique (local, line, etc.). Once activated, the AAA lists override the methods specified in the line command.

Usage Examples

The following example activates the AAA subsystem:

```
(config)#aaa on
```

Technology Review

AAA stands for authentication, authorization, and accounting. The AOS AAA subsystem currently supports authentication. Authentication is the means by which a user is granted access to the device (router). For instance, a username/password is authenticated before the user can use the CLI. VPN clients can also verify username/password before getting access through the device.

There are several methods that can be used to authenticate a user:

NONE	Instant access
LINE-PASSWORD	Use the line password (telnet 0-4 or console 0-1)
ENABLE-PASSWORD	Use the enable password
LOCAL-USERS	Use the local-user database
GROUP <groupname>	Use a group of remote RADIUS servers

The AAA system allows users to create a named list of these methods to attempt in order (if one fails, it falls to the next one on the list). This named list is then attached to a portal (telnet 0-4 or console 0-1). When a user Telnets in or accesses the terminal, the AAA system uses the methods from the named list to authenticate the user.

The AAA system must be turned on to be active. By default it is off. Use the **aaa on** command to activate the AAA system.

If a portal is not explicitly assigned a named list, the name **default** is automatically assigned to it. Users can customize the **default** list just like any other list. If no **default** list is configured, the following default behavior applies (defaults are based on portal):

- Instant access (NONE) is assigned to the console using the **default** list (when the list has not been configured).
- The local-user database is used for Telnet sessions using the **default** list (when the list has not been configured).
- No access is granted for FTP access using the **default** list (when the list has not been configured).

Methods fail (and therefore cause the system to proceed to the next configured method) under the following circumstances:

- LINE and ENABLE passwords fall through if there are no LINE or ENABLE passwords configured.
- LOCAL-USERS fall through if the given user is not in the database.
- RADIUS server groups fall through if the given server(s) cannot be contacted on the network.

Example

For a default list defined with the order [LINE, ENABLE, LOCAL, and GROUP **mygroup**], the following statements are true:

- If there is no LINE password, the list falls through to the ENABLE password.
- If there is no ENABLE password, the AAA system prompts the user for a username and password for the local-user database.
- If the given user is not in the local list, the username and password are handed to the remote servers defined in **mygroup**.
- A failure at any point (password not matching) denies access.

If the AAA process falls through the list completely, system behavior is based on portal:

- Console access is granted if the process falls completely through (this prevents a lock-out condition).
- Telnet and FTP are denied access.

aaa processes <threads>

Use the **aaa processes** command to set the number of threads available to the AAA subsystem. Use the **no** form of this command to return to the default setting. For more detailed information on AAA functionality, refer to the *Technology Review* section of the command *aaa on* [page 341](#).

Syntax Description

<threads> Specifies the number of threads available to the AAA subsystem. Range: 1 to 64.

Default Values

By default, this is set to 1 process.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Increasing this number may speed up simultaneous authentication at the cost of system resources (e.g., memory).

Usage Examples

The following example specifies five available threads for the AAA subsystem:

```
(config)#aaa processes 5
```

arp <ip address> <mac address> arpa

Use this command to enter static entries into the address resolution protocol (ARP) table.

Syntax Description

arpa	Sets the standard address resolution protocol for this interface.
<ip address>	Specifies the IP address.
<mac address>	Specifies the MAC address.

Default Values

The default for this command is **arpa**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
Release 6.1	Command was extended to include NetVanta 2000 Series units.

Usage Examples

The following example enables standard ARP for the VLAN interface:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#arp 196.173.22.253 00:A0:C8:00:00:01 arpa
```

banner [exec | login | motd] <character> <message> <character>

Use the **banner** command to specify messages to be displayed in certain situations. Use the **no** form of this command to delete a previously configured banner.

Syntax Description

exec	Creates a message to be displayed when any exec-level process takes place.
login	Creates a message to be displayed before the username and password login prompts.
motd	Creates a message-of-the-day (MOTD) banner.
<character>	Specifies the banner text delimiter character. Press Enter after the delimiter to begin input of banner text.
<message>	Specifies the text message you wish to display. End with the character that you specified as your delimiter.

Default Values

By default, no banners are configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Banners appear in the following order (if configured):

- MOTD banner appears at initial connection.
- Login banner follows the MOTD banner.
- Exec banner appears after successful login.

Usage Examples

The following example configures the system to display a message of the day:

```
(config)#banner motd *The system will be shut down today from 7PM to 11PM*
```

boot config [cflash | flash] <filename> [cflash | flash] <backup filename>

Use the **boot config** command to modify system boot parameters.

Syntax Description

cflash	Specifies primary/backup configuration file located in CompactFlash memory.
flash	Specifies primary/backup configuration file located in flash memory.
<filename>	Specifies the filename of the configuration file (filenames are case-sensitive).
<backup filename>	Specifies a name for the backup configuration file.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 2000, 3000, 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies the file *myimage.biz*, stored in flash memory, as the startup image:

```
(config)#boot system flash myimage.biz
```

boot system flash <filename> [no-backup | <backup filename>]

Use the **boot system flash** command to specify the system image loaded at startup.

Syntax Description

<filename>	Specifies the filename (located in flash memory) of the image (filenames are case-sensitive) - image files should have a .biz extension
no-backup	Specifies that no backup image is to be saved to the system.
<backup filename>	Specifies a name for the backup image.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Detailed instructions for upgrading the AOS and loading files into flash memory are found on the **ADTRAN OS Documentation** CD.

boot voip [default | flash <filename>]

Use the **boot voip** command to specify the VoIP image file loaded at startup.

Syntax Description

default	Use default VoIP image.
flash	Boot from flash memory.
<filename>	Specifies the filename (located in flash memory) of the image (file names are case-sensitive). Image files should have a .biz extension.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Functional Notes

Detailed instructions for upgrading the AOS and loading files into flash memory are found on the *ADTRAN OS System Documentation CD*.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Example

The following example specifies the file *myimage.biz*, stored in flash memory, as the VoIP startup image:

```
(config)#boot voip flash myimage.biz
```

bridge <group#> protocol ieee

The **bridge protocol ieee** command configures a bridge group for the IEEE Spanning-Tree Protocol. Use the **no** form of this command (with the appropriate arguments) to delete this setting.

Syntax Description

<group#>	Specifies a bridge group number (range: 1 to 255).
ieee	Specifies IEEE 802.1 Ethernet spanning-tree protocol.

Default Values

By default, all configured bridge interfaces implement **ieee** spanning-tree protocol.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example deletes the bridge protocol setting for bridge-group 17:

```
(config)#no bridge 17 protocol ieee
```

clock source [internal | t1 <slot/port>] [secondary]

Use the **clock source** command to configure the timing source used for reference timing. Use the **no** form of this command to disable this feature.

Syntax Description

internal	Configures the unit to provide clocking using the internal 1.544 MHz clock generator.
t1 <slot/port>	Configures the unit to recover clocking from the specified T1 or DSX-1 interface (t1 0/1 or t1 0/2).
secondary	Optional. Signifies that the clock source specified in the command is to be the secondary clock source.

Default Values

By default, the primary clock source is set to **t1 0/1**, and the secondary clock source is set to **t1 0/2**.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

If both the primary and secondary clock sources fail, the unit automatically switches to internal timing.

Usage Examples

The following example configures the unit to use an internal timing source:

```
(config)#clock source internal
```

The following example sets the t1 0/1 interface as the primary clock source:

```
(config)#clock source t1 0/1
```

The following example sets the t1 0/2 interface as the secondary clock source:

```
(config)#clock source t1 0/2 secondary
```

cross-connect <#> <from interface> <slot/port> <tdm-group#>
<to interface> <slot/port>

Use the **cross-connect** command to create a cross-connect map from a created TDM group on an interface to a virtual interface.



Changing **cross-connect** settings could potentially result in service interruption.

Syntax Description

<#>	Identifies the cross-connect using a number descriptor or label for (useful in systems that allow multiple cross-connects).
<from interface>	Specifies the interface (physical or virtual) on one end of the cross-connect. Enter cross-connect 1 ? for a list of valid interfaces.
<slot/port>	Used when a physical interface is specified in the <from interface> subcommand (For example: specifying the T1 port of a T1 module would be t1 1/1).
<tdm-group#>	Specifies which configured TDM group to use for this cross-connect. This subcommand only applies to T1 physical interfaces.
<to interface>	Specifies the virtual interface on the other end of the cross-connect. Use the ? to display a list of valid interfaces.
<slot/port>	Used when a physical interface is specified in the <to interface> subcommand. (For example, specifying the primary T1 port of a T1 module would be t1 1/1).

Default Values

By default, there are no configured cross-connects.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the E1 interface.

Functional Notes

Cross-connects provide the mechanism for connecting a configured virtual (layer 2) endpoint with a physical (layer 1) interface. Supported layer 2 protocols include Frame Relay and point-to-point protocol (PPP).

Usage Examples

The following example creates a Frame Relay endpoint and connects it to the T1 1/1 physical interface:

1. Create the Frame Relay virtual endpoint and set the signaling method:

```
(config)# interface frame-relay 1  
(config-fr 1)# frame-relay lmi-type cisco
```

2. Create the sub-interface and configure the PVC parameters (including DLCI and IP address):

```
(config-fr 1)# interface fr 1.1  
(config-fr 1.1)# frame-relay interface-dlci 17  
(config-fr 1.1)# ip address 168.125.33.252 255.255.255.252
```

3. Create the TDM group of 12 DS0s (64K) on the T1 physical interface:
(THIS STEP IS ONLY VALID FOR T1 INTERFACES.)

```
(config)# interface t1 1/1  
(config-t1 1/1)# tdm-group 1 timeslots 1-12 speed 64  
(config-t1 1/1)# exit
```

4. Connect the Frame Relay sub-interface with port T1 1/1:

```
(config)# cross-connect 1 t1 1/1 1 fr 1
```

Technology Review

Creating an endpoint that uses a layer 2 protocol (such as Frame Relay) is generally a four-step process:

Step 1:

Create the Frame Relay virtual endpoint (using the **interface frame-relay** command) and set the signaling method (using the **frame-relay lmi-type** command). Also included in the Frame Relay virtual endpoint are all the applicable Frame Relay timers logging thresholds, encapsulation types, etc. Generally, most Frame Relay virtual interface parameters should be left at their default state. For example, the following creates a Frame Relay interface labeled **7** and sets the signaling method to **ansi**.

```
(config)# interface frame-relay 7  
(config-fr 7)# frame-relay lmi-type ansi
```


Step 2:

Create the sub-interface and configure the PVC parameters. Using the sub-interface , apply access policies to the interface, create bridging interfaces, configure dial-backup, assign an IP address, and set the PVC data-link control identifier (DLCI). For example, the following creates a Frame Relay sub-interface labeled **22**, sets the DLCI to **30**, and assigns an IP address of **193.44.69.253** to the interface.

```
(config-fr 7)# interface fr 7.22  
(config-fr 7.22)# frame-relay interface-dlci 30  
(config-fr 7.22)# ip address 193.44.69.253 255.255.255.252
```

Step 3: (VALID ONLY FOR T1 INTERFACES)

Specify the group of DS0s used for signaling on the T1 interface by creating a TDM group. Group any number of contiguous DS0s together to create a data pipe for layer 2 signaling. Also use the **tdm-group** command to specify the per-DS0 signaling rate on the interface. For example, the following creates a TDM group labeled **9** containing 20 DS0s (each DS0 having a data rate of 56 kbps).

```
(config)# interface t1 1/1  
(config-t1 1/1)# tdm-group 9 timeslots 1-20 speed 56  
(config-t1 1/1)# exit
```

Step 4:

Make the association between the layer 2 endpoint and the physical interface using the **cross-connect** command. Supported layer 2 protocols include Frame Relay and point-to-point protocol (PPP). For example, the following creates a cross-connect (labeled **5**) to make an association between the Frame Relay virtual interface (**fr 7**) and the TDM group configured on interface t1 1/1 (**tdm-group 9**).

```
(config)# cross-connect 5 t1 1/1 9 fr 7
```

crypto ca authenticate <name>

Use the **crypto ca authenticate** command to initiate CA authentication procedures.

Syntax Description

<name>	Specifies a CA profile using an alphanumeric string up to 32 characters.
--------	--

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The type of authentication procedure is based on the **enrollment** command and its settings. Refer to *enrollment terminal* on page 671 and *enrollment url <url>* on page 672 for more information. When **enrollment** is set to **terminal**, the CA authentication process is done manually, as shown in the following *Usage Examples*.

Usage Examples

The following example initiates the CA authentication process:

```
(config)#crypto ca authenticate testCAprofile
```

Enter the base 64 encoded CA certificate. End with two consecutive carriage returns or the word "quit" on a line by itself:

```
-----BEGIN X509 CERTIFICATE-----  
MIIDECCAs6gAwIBAgICAXIwCwYHKoZlZjgEAwUAMF0xCzAJBgNVBAYTAKZJMSQw  
IlgYDVQQKEExtTU0ggQ29tbXVuaWNhdGlvbnMgU2VjdXJpdHkxETAPBgNVBAsTCFdl  
YiB0ZXN0MRlwEAYDVQQDEwIUZXN0IENBIDQwHhcNMjMwMTA5MTYyNTE1WWhcNMDMx  
MjMxMjM1OTU5WjBaMQswCQYDVQQGEwJGSTEKMCIGA1UEChMbU1NIIENvbW11bmlj  
YXRpb25zIFNlbnV3YXR5X509MREwDwYDVQQLEwhXZWlmdGVzdDESMBAGA1UEAxMJVGVz  
dCBDQSA0MIIIBtzCCASsGByqGSM44BAEwggEeA0GBAPTo+NdCW87hOSnuZ7dUL07  
twjZZwY3beLHnDsERhfN8XoOZZcfulKc/lqTrYiu7M5yPJsXQ3u8dbCb6RWFU0A  
T5Nd7/4cNn/hCmhbe6xqsNZUsOcTZJxvClq8thkNo+gXg5bw0fiElgz/IEbFWL  
UzeO8KgM4izkq0CrGtaFAhUA2+ja4RgbbgTgJk+qTXAxicG/8JMCgYBZvcPMO2/Y
```

```
Zc2sXYyrBPtv6k2ZGGYqXAUZ98/txm37JwQGafygePJ/64oeisVeDclF2FTjveex
W5saydjSK00jXjreRZcJFEDmfRhUtWR8K8tm8mEnB3eg9n09lkWibljihHn7n5MF
tBBAdbRHycsr3DyofnieTt3DY78MDsNbgOBhQACgYEA6EKDS2lxdMsogHfVvob
PkDSv2FjOsP5Tomc/tf9jvvuf6+vj9XTw+uAg1BU9/TyjGzAtnRrCvOUkTYoVxRY
vdDOi3GR2RcyNVdGrhYXWY1I5XuB5+NWij8VUQOgfXsJgbEMvPemECeYwQ4ASdhD
vw0E8NI2AEkJXsCAvYfXWzujlzAhMAsGA1UdDwQEAwIBhjASBgNVHRMBAf8ECDAG
AQH/AgEyMAsGByqGSM44BAMFAAMvADAsAhRa0ao0FbRQeWCc2oC24OZ1YZi8egIU
lZhxKAclhXksZHvOj+yIld5x0ec=
-----END X509 CERTIFICATE-----
```

quit

```
Hash: 4e904504dc4e5b95e08129430e2a0b97ceef0ad1394f905b42df2dfb8f751be0244a711bb0
6eddaa2f07dd640c187f14c16fa0bed28e038b28b6741a880539d6ed06a68b7e324bfdde6f3d0b17
83d94e58fd4943f5988a7a0f27f6b6b932dc0410378247160752853858dbe7a1951245cfb14b109e
ffc430e177623720de56f4
```

* Do you accept this certificate? [y]y

crypto ca certificate chain <name>

Use the **crypto ca certificate chain** command to enter the Certificate Configuration for the specified CA. Refer to *Certificate Configuration Command Set* on [page 678](#) for more information.

Syntax Description

<name> Specifies a CA profile using an alphanumeric string (up to 32 characters).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Typically used only in the **running-config** and **startup-config** to restore certificates.

Usage Examples

The following example enters the Certificate Configuration mode for the CA profile **MyProfile**:

```
(config)#crypto ca certificate chain MyProfile
```

crypto ca enroll <name>

Use the **crypto ca enroll** command to begin CA enrollment procedures.

Syntax Description

<name> Specifies a CA profile using an alphanumeric string (up to 32 characters).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The type of enrollment procedure is based on the **enrollment** command and its settings. Refer to *enrollment terminal* [on page 671](#) and *enrollment url <url>* [on page 672](#) for more information. This command initiates a dialog that is used to fill in the parameters that make up an enrollment request to be forwarded to a certificate authority. Note that some of the parameters (such as IP address) may be filled in using the values supplied in the **crypto ca profile** (in which case, the enrollment dialog will not prompt for those parameters). Once all required parameters are defined using the dialog, this command assembles them into an enrollment request to be sent to a certificate authority (including the generation of public and private keys). Refer to *crypto ca profile <name>* [on page 362](#) for more information.

If **enrollment** is set to **terminal**, you may view the request on the terminal screen.

If **enrollment** is set to **url**, the request is sent automatically to the certificate authority using the URL specified by the **enrollment url** command.

Usage Examples

The following example shows a typical enrollment dialog:

```
(config)#crypto ca enroll MyProfile
```

```
**** Press CTRL+C to exit enrollment request dialog. ****
```

```
* Enter signature algorithm (RSA or DSS) [rsa]:rsa
```

```
* Enter the modulus length to use [512]:1024
```

```
* Enter the subject name as an X.500 (LDAP) DN:CN=Router,C=US,L=Huntsville,S=AL
```

```
--The subject name in the certificate will be CN=CN=Router,C=US,L=Huntsville,S=AL.
```

```
* Include an IP address in the subject name [n]:y
```

```
* Enter IP address or name of interface to use:10.200.1.45
```

```
* Include fully qualified domain name [n]:y
```

```
* Enter the fully qualified domain name to use:FullyQualifiedDomainName
```

```
* Include an email address [n]:y
```

```
* Enter the email address to use:myEmail@adtran.commyemail@email.com
```

```
Generating request (including keys)....
```

crypto ca import <name> certificate

Use the **crypto ca import certificate** command to import a certificate manually via the console terminal.

Syntax Description

<name> Specifies a CA profile using an alphanumeric string (up to 32 characters).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Puts CLI in mode where the certificate can be entered manually. Enter **quit** and a carriage return (or simply enter two consecutive carriage returns) to exit this mode. Abort this mode by pressing **Ctrl-C**. This command only applies if the **enrollment** command is set to **terminal**. Refer to *enrollment terminal* on page 671.

Usage Examples

The following example imports a certificate via the console terminal:

```
(config)#crypto ca import MyProfile certificate
```

Enter the PM-encoded certificate. End with two consecutive carriage returns or the word "quit" on a line by itself:

```
-----BEGIN CERTIFICATE-----
```

```
MIIDWTCCAwoAwIBAgIKFLCsOgAAAAAAtjANBgkqhkiG9w0BAQUFADBjMQswCQYD
VQQGEwJVUzEQMA4GA1UECBMHQXkFNQTETMBEGA1UEBxMKSHVudHN2aWxsZTEa
MBGGA1UEChMRQWR0cmFuVGJVjaFN1cHBvcnQxETAPBgNVBAMTCHRzcm91dGVyMB4X
DTAzMDYyNTE0MTM1NVoXDTAzMTIwNjE0NDkxM1owJDEPMA0GA1UEChMGYWR0cmFu
MREwDwYDVQQDEwhNeVJvdXRlcjBcMA0GCSqGSIb3DQEBAQUAA0sAMEgCQQCIUKqs
fbTalej5m9gk2DMsbC9df3TiIbz+7nRx3ZzGw75AQsqEMYeBY5aWi62W59jmxGSE
WX+E8EwBVbZ6JKk5AgMBAAGjggHWMIIIB0jAXBgNVHREEDAOhwQKCgoKggZNeUZx
ZG4wHQYDVR0OBBYEFJAvBRljx1PROnkZ4v0D89yB1eErMIGcBgNVHSMegZQwgZGA
FHGwIRAr11495MgrLNpILzjvrb4JoWekZTBjMQswCQYDVQQGEwJVUzEQMA4GA1UE
CBMHQXkFNQTETMBEGA1UEBxMKSHVudHN2aWxsZTEaMBGGA1UEChMRQWR0cmFu
```

```
VGvjaFN1cHBvcnQxETAPBgNVBAMTCHRzcm91dGVyghAZqI7OwISgsUhfaSeGh0Ot
MGkGA1UdHwRiMGAwLaAroCmGJ2h0dHA6Ly90c3JvdXRlci9DZXJ0RW5yb2xsL3Rz
cm91dGVyLmNybDAvoC2gK4YpZmlsZTovL1xcdHNyb3V0ZXJcQ2VydEVucm9sbF0
c3JvdXRlci5jcmwwgY0GCCsGAQUFBwEBBIGAMH4wPAYIKwYBBQUHMAKGMGh0dHA6
Ly90c3JvdXRlci9DZXJ0RW5yb2xsL3Rzcm91dGVyX3Rzcm91dGVyLmNydDA+Bggr
BgEFBQcwAoYyZmlsZTovL1xcdHNyb3V0ZXJcQ2VydEVucm9sbF0c3JvdXRlci90
c3JvdXRlci5jcnQwDQYJKoZIhvcNAQEFBQADQQBSGD4JbGJGk53qvyy0xXVoMQvy
U8xNjUdvWqjgFOI+2m8ZYJcfhnt11rbP2f3Wm9TpjLe1WuBNxmpNjC9A2ab0
-----END CERTIFICATE-----
```

Success!

crypto ca import <name> crl

Use the **crypto ca import crl** command to import a CRL manually via the console terminal.

Syntax Description

<name> Specifies a CA profile using an alphanumeric string (up to 32 characters).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Puts CLI in a mode where the CRL can be entered manually. Enter **quit** and a carriage return (or simply enter two consecutive carriage returns) to exit this mode. This command only applies if the **enrollment** command is set to **terminal**. Refer to *enrollment terminal* on page 671.

Usage Examples

The following allows you to manually paste in the CA's CRL:

```
(config)#crypto ca import MyProfile crl
```

crypto ca profile <name>

Use the **crypto ca profile** command to define a CA and to enter the CA Profile Configuration. Refer to *CA Profile Configuration Command Set* [on page 667](#) for more information.

Syntax Description

<name> Creates a CA profile using an alphanumeric string (up to 32 characters).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Use this to specify the type of enrollment, as well as enrollment request parameters. Refer to the *Functional Notes* of the command *crypto ca enroll <name>* [on page 357](#) for more information.

Usage Examples

The following example creates the CA profile called **MyProfile** and enters the CA Profile Configuration for that certificate authority:

```
(config)#crypto ca profile MyProfile
Configuring New CA Profile MyProfile.
(ca-profile)#
```

crypto ike

Use the **crypto ike** command to define the system-level local ID for IKE negotiations and to enter the IKE Client or IKE Policy command sets.

Variations of this command include the following:

crypto ike client configuration pool <poolname>

crypto ike local-id address

crypto ike policy <policy priority>

Syntax Description

client configuration pool <poolname> Creates a local pool named the <poolname> of your choice and enters the IKE Client. Clients that connect via an IKE policy that specifies this pool-name will be assigned values from this pool. Refer to the section *IKE Client Command Set* on page 641 for more information.

local-id address Sets the local ID during IKE negotiation to be the IP address of the interface from which the traffic exits. This setting can be overridden on a per-policy basis using the **local-id** command in the IKE Policy (refer to *local-id [address | asn1-dn | fqdn | user-fqdn] <ipaddress or name>* on page 635 for more information).

policy <policy priority> Creates an IKE policy with the <policy priority> of your choice and enters the IKE Policy. Refer to *IKE Policy Command Set* on page 628 for more information.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Usage Examples

The following example creates an IKE policy with a policy priority setting of 1 and enters the IKE Policy for that policy:

```
(config)#crypto ike policy 1
```

Technology Review

The following example configures an AOS product for VPN using IKE aggressive mode with pre-shared keys. The AOS product can be set to initiate IKE negotiation in main mode or aggressive mode. The product can be set to respond to IKE negotiation in main mode, aggressive mode, or any mode. In this example, the device is configured to initiate in aggressive mode and to respond to any mode.

This example assumes that the AOS product has been configured with a WAN IP address of 63.97.45.57 on interface **ppp 1** and a LAN IP address of 10.10.10.254 on interface **ethernet 0/1**. The peer private IP Subnet is 10.10.20.0.

For more detailed information on VPN configuration, refer to the technical support note *VPN Configuration Guide* located on the **ADTRAN OS Documentation** CD provided with your unit.

Step 1:

Enter the Global configuration mode (i.e., config terminal mode).

>enable

#configure terminal

Step 2:

Enable VPN support using the **ip crypto** command. This command allows crypto maps to be applied to interfaces, and enables the IKE server to listen for IKE negotiation sessions on UDP port 500.

(config)#**ip crypto**

Step 3:

Set the local ID. During IKE negotiation, local IDs are exchanged between the local device and the peer device. In the AOS, the default setting for all local IDs are configured by the **crypto ike local-id** command. The default setting is for all local IDs to be the IPv4 address of the interface over which the IKE negotiation is occurring. In the future, a unique system-wide hostname or fully qualified domain name could be used for all IKE negotiation.

(config)#**crypto ike local-id address**

Step 4:

Create IKE policy. In order to use IKE negotiation, an IKE policy must be created. Within the system, a list of IKE policies is maintained. Each IKE policy is given a priority number in the system. That priority number defines the position of that IKE policy within the system list. When IKE negotiation is needed, the system searches through the list, starting with the policy with priority of 1, looking for a match to the peer IP address.

An individual IKE policy can override the system local ID setting by having the **local-id** command specified in the IKE policy definition. This command in the IKE policy is used to specify the type of local ID and the local ID data. The type can be of IPv4 address, fully qualified domain name, or user-specified fully qualified domain name.

An IKE policy may specify one or more peer IP addresses that will be allowed to connect to this system. To specify multiple unique peer IP addresses, the **peer A.B.C.D** command is used multiple times within a single IKE policy. To specify that all possible peers can use a default IKE policy, the **peer any** command is given instead of the **peer A.B.C.D** command inside of the IKE policy. The policy with the **peer any** command specified will match to any peer IP address (and therefore should be given the highest numerical priority number). This will make the policy the last one to be compared against during IKE negotiation.

```
(config)#crypto ike policy 10
(config-ike)#no local-id
(config-ike)#peer 63.105.15.129
(config-ike)#initiate aggressive
(config-ike)#respond anymode
(config-ike)#attribute 10
(config-ike-attribute)#encryption 3des
(config-ike-attribute)#hash sha
(config-ike-attribute)#authentication pre-share
(config-ike-attribute)#group 1
(config-ike-attribute)#lifetime 86400
```

Step 5:

Define the remote ID settings. The **crypto ike remote-id** command is used to define the remote ID for a peer connecting to the system, specify the preshared-key associated with the specific remote ID, and (optionally) determine that the peer matching this remote ID should not use mode config (by using the **no-mode-config** keyword). Refer to *crypto ike remote-id* on page 367 for more information.

```
(config)#crypto ike remote-id address 63.105.15.129 preshared-key mysecret123
```

Step 6:

Define the transform-set. A transform set defines the encryption and/or authentication algorithms to be used to secure the data transmitted over the VPN tunnel. Multiple transform sets may be defined in a system. Once a transform set is defined, many different crypto maps within the system can reference it. In this example, a transform set named **highly_secure** has been created. This transform set defines ESP with authentication implemented using 3DES encryption and SHA1 authentication.

```
(config)#crypto ipsec transform-set highly_secure esp-3des esp-sha-hmac
(cfg-crypto-trans)#mode tunnel
```

Step 7:

Define an IP access list. An extended access control list is used to specify which traffic needs to be sent securely over the VPN tunnel. The entries in the list are defined with respect to the local system. The source IP address will be the source of the traffic to be encrypted. The destination IP address will be the receiver of the data on the other side of the VPN tunnel.

```
(config)#ip access-list extended corporate_traffic
(config-ext-nacl)#permit ip 10.10.10.0 0.0.0.255 10.10.20.0 0.0.0.255 log deny ip any any
```

Step 8:

Create crypto map. A crypto map is used to define a set of encryption schemes to be used for a given interface. A crypto map entry has a unique index within the crypto map set. The crypto map entry will specify whether IKE is used to generate encryption keys or if manually specified keys will be used. The crypto map entry will also specify who will be terminating the VPN tunnel, as well as which transform set or sets will be used to encrypt and/or authenticate the traffic on that VPN tunnel. It also specifies the lifetime of all created IPSec security associations.

```
(config)#crypto map corporate_vpn 1 ipsec-ike
(config-crypto-map)#match address corporate_traffic
(config-crypto-map)#set peer 63.105.15.129
(config-crypto-map)#set transform-set highly_secure
(config-crypto-map)#set security-association lifetime kilobytes 8000
(config-crypto-map)#set security-association lifetime seconds 28800
(config-crypto-map)#no set pfs
```

Step 9:

Configure a public interface. This process includes configuring the IP address for the interface and applying the appropriate crypto map to the interface. Crypto maps are applied to the interface on which encrypted traffic will be transmitted.

```
(config)#interface ppp 1
(config-ppp 1)#ip address 63.97.45.57 255.255.255.248
(config-ppp 1)#crypto map corporate_vpn
(config-ppp 1)#no shutdown
```

Step 10:

Configure a private interface. This process allows all traffic destined for the VPN tunnel to be routed to the appropriate gateway.

```
(config)#interface ethernet 0/1
(config-eth 0/1)#ip address 10.10.10.254 255.255.255.0
(config-eth 0/1)#no shutdown
(config-eth 0/1)#exit
```

crypto ike remote-id

Use the **crypto ike remote-id** command to specify the remote ID and to associate a pre-shared key with the remote ID.



*For VPN configuration example scripts, refer to the technical support note **VPN Configuration Guide** located on the **ADTRAN OS Documentation** CD provided with your unit.*

Syntax Description

address <IPv4 address>	Specifies a remote ID of IPv4 type.
any	Wildcard that allows any remote ID (type and value).
asn1-dn <name>	Specifies an abstract syntax notation distinguished name as the remote ID (enter this value in LDAP format).
fqdn <fqdn>	Specifies a fully qualified domain name (e.g., adtran.com) as the remote ID.
user-fqdn <fqdn>	Specifies a user fully qualified domain name or email address (e.g., user1@adtran.com) as the remote ID.
preshared-key <keyname>	Associates a preshared key with this remote ID.
no-mode-config	Optional. keyword used to specify that the peer matching this remote ID should not use mode config.
no-xauth	Optional. Keyword used to specify that the peer matching this remote ID should not use xauth.
nat-t [v1 v2] [allow force disable]	Optional. Keyword that denotes whether peers matching this remote ID should allow, disable, or force NAT traversal versions 1 and 2.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
Release 5.1	Command was expanded to include the any , asn1-dn , and no-xauth subcommands.
Release 7.1	Command was expanded to include NAT traversal commands.

Functional Notes

The **fqdn** and **user-fqdn** *<fqdn>* line can include wildcard characters. The wildcard characters are "*" for a 0 or more character match and "?" for a single character match. Currently, the "?" cannot be set up using the CLI, but it can be transferred to the unit via the startup-config.

Example for **user-fqdn**:

john*@domain.com

will match:

johndoe@domain.com

johnjohn@adtran.comjohnjohn@myemail.com

john@adtran.comjohn@myemail.com

Example for **fqdn**:

***.domain.com**

will match:

www.domain.com

ftp.domain.com

one.www.domain.com

The **address** remote ID can be in the form of a single host address or in the form of an IP address wildcard.

Example for **address** type:

crypto ike remote id address 10.10.10.0 0.0.0.255

will match:

10.10.10.1

10.10.10.2

and all IP addresses in the form of 10.10.10.X (where X is 0 to 255)

The **asn1-dn** *<name>* line can include wildcard characters. The wildcard characters are "*" for a 0 or more character match and "?" for a single character match. Currently, the "?" cannot be set up using the CLI, but it can be transferred to the unit via the startup-config.

Example for typical **asn1-dn** format with no wildcards:

crypto ike remote-id asn1-dn "CN=MyRouter, C=US, S=ALCA, L=Huntsville, O=Adtran, OU=TechSupport"

(matches only remote ID strings with all fields exactly the same)

Example for typical **asn1-dn** format with wildcards used to match a string within a field:

```
crypto ike remote-id asn1-dn "CN=*, C=*, S=*, L=*, O=*, OU=**"
```

(matches any asn1-dn remote ID string from a peer)

Example for typical **asn1-dn** format with wildcards used to match a portion of the remote ID:

```
crypto ike remote-id asn1-dn "CN=*, C=US, S=ALCA, L=Huntsville, O=Adtran, OU=**"
```

(matches any remote ID string with the same values for the C, S, L, and O fields, and any values in the CN and OU fields)

Example for typical **asn1-dn** format with wildcards used to match a portion of a field:

```
crypto ike remote-id asn1-dn "CN=My*, C=US, S=ALCA, L=Huntsville, O=Adtran, OU=TechSupport"
```

(matches remote ID strings with all fields exactly the same, but with any CN field beginning with "My")

Usage Examples

The following example assigns a remote ID of 63.97.45.57 and associates the preshared key **mysecret** with the remote ID:

```
(config)#crypto ike remote-id address 63.97.45.57 preshared-key mysecret
```

crypto ipsec transform-set <setname> <parameters>

Use the **crypto ipsec transform-set** command to define the transform configuration for securing data (e.g., esp-3des, esp-sha-hmac, etc.). The transform set is then assigned to a crypto map using the map's **set transform-set** command. Refer to *set transform-set <setname1 - setname6>* on page 653.



*For VPN configuration example scripts, refer to the technical support note **VPN Configuration Guide** located on the **ADTRAN OS Documentation** CD provided with your unit.*

Syntax Description

<setname>	Assigns a name to the transform set you are about to define.
<parameters>	Assigns a combination of up to three security algorithms. This field is a valid combination of the following: <ul style="list-style-type: none"> • ah-md5-hmac, ah-sha-hmac • esp-des, esp-3des, esp-aes-128-cbc, esp-aes-192-cbc, esp-aes-256-cbc, esp-null • esp-md5-hmac, esp-sha-hmac

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, and 4000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Crypto map entries do not directly contain the transform configuration for securing data. Instead, the crypto map is associated with transform sets which contain specific security algorithms.

If no transform set is configured for a crypto map, the entry is incomplete and will have no effect on the system.

Usage Examples

The following example first creates a transform set (**Set1**) consisting of two security algorithms (up to three may be defined), and then assigns the transform set to a crypto map (**Map1**):

```
(config)#crypto ipsec transform-set Set1 esp-3des esp-sha-hmac
(cfg-crypto-trans)#exit
```

```
(config)#crypto map Map1 1 ipsec-ike
(config-crypto-map)#set transform-set Set1
```

crypto map

Use the **crypto map** command to define crypto map names and numbers and to enter the associated mode (either Crypto Map IKE or Crypto Map Manual).

Variations of this command include the following:

```
crypto map <mapname> <mapindex> ipsec-ike
crypto map <mapname> <mapindex> ipsec-manual
```



For VPN configuration example scripts, refer to the technical support note **VPN Configuration Guide** located on the **ADTRAN OS Documentation** CD provided with your unit.

Syntax Description

<mapname>	Names the crypto map. You can assign the same name to multiple crypto maps, as long as the map index numbers are unique.
<mapindex>	Assigns a crypto map sequence number.
ipsec-ike	Specifies the Crypto Map IKE (refer to <i>Crypto Map IKE Command Set</i> on page 645). This supports IPsec entries that will use IKE to negotiate keys.
ipsec-manual	Specifies the Crypto Map Manual (refer to <i>Crypto Map IKE Command Set</i> on page 645). This supports manually configured IPsec entries.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Crypto map entries do not directly contain the transform configuration for securing data. Instead, the crypto map is associated with transform sets which contain specific security algorithms (refer to *crypto ipsec transform-set <setname> <parameters>* on page 370).

Crypto map entries do not directly contain the selectors used to determine which data to secure. Instead, the crypto map entry refers to an access control list. An access control list is assigned to the crypto map using the **match address** command (refer to *ike-policy <policy number>* on page 647).

If no transform set or access list is configured for a crypto map, the entry is incomplete and will have no effect on the system.

When you apply a crypto map to an interface (using the **crypto map** command within the interface's mode), you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps that share the same name but have different map index numbers.

Usage Examples

The following example creates a new IPSec IKE crypto map called **testMap** with a map index of **10**:

```
(config)#crypto map testMap 10 ipsec-ike
(config-crypto-map)#
```

Technology Review

A crypto map entry is a single policy that describes how certain traffic is to be secured. There are two types of crypto map entries: **ipsec-manual** and **ipsec-ike**. Each entry is given an index, which is used to sort the ordered list. When a nonsecured packet arrives on an interface, the crypto map set associated with that interface is processed in order. If a crypto map entry matches the nonsecured traffic, the traffic is discarded.

When a packet is to be transmitted on an interface, the crypto map set associated with that interface is processed in order. The first crypto map entry that matches the packet will be used to secure the packet. If a suitable security association (SA) exists, that is used for transmission. Otherwise, IKE is used to establish an SA with the peer. If no SA exists, and the crypto map entry is "respond only," the packet is discarded.

When a secured packet arrives on an interface, its security parameter index (SPI) is used to look up an SA. If an SA does not exist, or if the packet fails any of the security checks (bad authentication, traffic does not match SA selectors, etc.), it is discarded. If all checks pass, the packet is forwarded normally.

enable password [md5] <password>

Use the **enable password** command to define a password (with optional encryption) for accessing the Enable mode. Use the **no enable password** command to remove a configured password.



To prevent unauthorized users from accessing the configuration functions of your device, immediately install an Enable-level password.

Syntax Description

md5	Optional. Specifies Message Digest 5 (MD5) as the encryption protocol to use when displaying the enable password during show commands. If the md5 keyword is not used, encryption is not used when displaying the Enable password during show commands
<password>	Specifies the Enable Security mode password using a string (up to 30 characters in length).

Default Values

By default, there is no configured enable password.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

To provide extra security, the AOS can encrypt the Enable password when displaying the current configuration. For example, the following is a **show configuration** printout (password portion) with an unencrypted Enable password (ADTRAN):

!

enable password ADTRAN

!

Alternately, the following is a **show configuration** printout (password portion) with an Enable password of ADTRAN using MD5 encryption:

!

enable password md5 encrypted 5aa5fbae7d01a90e79fb57705ce74676

!

event-history on

Use the **event-history on** command to enable event logging for the AOS system. Event log messages will not be recorded unless this command has been issued (regardless of the **event-history priority** configured). The event log may be displayed using the **show event-history** command. Use the **no** form of this command to disable the event log.

Syntax Description

No subcommands.

Default Values

By default, the AOS event logging capabilities are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The event history provides useful information regarding the status of the system and individual port states. Use the event history as a troubleshooting tool when identifying system issues. The following is a sample event history log.

#show event-history

```
Using 526 bytes
2002.07.12 15:34:01 T1.t1 1/1 Yellow
2002.07.12 15:34:01 INTERFACE_STATUS.t1 1/1 changed state to down.
2002.07.12 15:34:02 T1.t1 1/1 No Alarms
2002.07.12 15:34:02 INTERFACE_STATUS.t1 1/1 changed state to up.
2002.07.12 15:34:03 INTERFACE_STATUS.eth 0/1 changed state to up.
2002.07.12 15:34:10 OPERATING_SYSTEM Warm Start
2002.07.12 15:34:12 PPP.NEGOTIATION LCP up
2002.07.12 15:34:12 PPP.NEGOTIATION IPCP up
```

Usage Examples

The following example enables the AOS event logging feature:

```
(config)#event-history on
```


event-history priority [error | fatal | info | notice | warning]

Use the **event-history priority** command to set the threshold for events stored in the event history. All events with the specified priority or higher will be kept for viewing in the local event log. The event log may be displayed using the **show event-history** command. Use the **no** form of this command to keep specified priorities from being logged.

Syntax Description

Sets the minimum priority threshold for logging messages to the event history. The following priorities are available (ranking from lowest to highest):

error	Logs events with error and fatal priorities.
fatal	Logs only events with a fatal priority.
info	Logs all events.
notice	Logs events with notice , warning , error , and fatal priorities.
warning	Logs events with warning , error , and fatal priorities.

Default Values

By default, no event messages are logged to the event history.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The event history provides useful information regarding the status of the system and individual port states. Use the event history as a troubleshooting tool when identifying system issues. The following is a sample event history log.

```
Router#show event-history
Using 526 bytes
2002.07.12 15:34:01 T1.t1 1/1 Yellow
2002.07.12 15:34:01 INTERFACE_STATUS.t1 1/1 changed state to down.
2002.07.12 15:34:02 T1.t1 1/1 No Alarms
2002.07.12 15:34:02 INTERFACE_STATUS.t1 1/1 changed state to up.
2002.07.12 15:34:03 INTERFACE_STATUS.eth 0/1 changed state to up.
2002.07.12 15:34:10 OPERATING_SYSTEM Warm Start
2002.07.12 15:34:12 PPP.NEGOTIATION LCP up
2002.07.12 15:34:12 PPP.NEGOTIATION IPCP up
```

Usage Examples

The following example logs all events to the event history:

```
(config)#event-history priority info
```

exception report [filename <filename>]

Use the **exception report** command to specify the output filename for the exception report.

Syntax Description

filename <filename> Optional. Specifies a filename for the exception report other than the default filename.

Default Values

By default, the exception report filename is **exception report-yyyyMMddHHmmss**. (The yyyMMddHHmmss will be automatically replaced with the actual year, month, day, hour, minutes, and seconds.)

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Example

The following example specifies the output filename for an exception report:

```
(config)#exception report file-name example
(config)#exit
#exception report generate
Exception report generated.
#sh flash
  1744 startup-config
  45676 example-20050708080537
#config t
(config)#no exception report file-name
(config)#exit
Appropriate commands must be issued to preserve configuration.
#exception report generate
Exception report generated.
#sh flash
  1744 startup-config
  45676 example-20050708080537
  45900 exception-report-20050708080552
```

event-history on

Use the **event-history on** command to enable event logging for the AOS system. Event log messages will not be recorded unless this command has been issued (regardless of the **event-history priority** configured). The event log may be displayed using the **show event-history** command. Use the **no** form of this command to disable the event log.

Syntax Description

No subcommands.

Default Values

By default, the AOS event logging capabilities are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The event history provides useful information regarding the status of the system and individual port states. Use the event history as a troubleshooting tool when identifying system issues. The following is a sample event history log.

#show event-history

```
Using 526 bytes
2002.07.12 15:34:01 T1.t1 1/1 Yellow
2002.07.12 15:34:01 INTERFACE_STATUS.t1 1/1 changed state to down.
2002.07.12 15:34:02 T1.t1 1/1 No Alarms
2002.07.12 15:34:02 INTERFACE_STATUS.t1 1/1 changed state to up.
2002.07.12 15:34:03 INTERFACE_STATUS.eth 0/1 changed state to up.
2002.07.12 15:34:10 OPERATING_SYSTEM Warm Start
2002.07.12 15:34:12 PPP.NEGOTIATION LCP up
2002.07.12 15:34:12 PPP.NEGOTIATION IPCP up
```

Usage Examples

The following example enables the AOS event logging feature:

```
(config)#event-history on
```

ftp authentication <listname>

Use the **ftp authentication** command to attach AAA login authentication lists to the FTP server (refer to *aaa authentication login* [*<listname> default*] [*none* | *line* | *enable* | *local* | *group <groupname>* | *group radius*] on page 339 for more information). This list is only used if the AAA subsystem has been activated with the **aaa on** command.

Syntax Description

<listname>	Specifies the named list created with the aaa authentication login command. Enter default to use the AAA default login list.
------------	--

Default Values

There is no default configuration for the list. If AAA is turned on but no **ftp authentication** list has been assigned, FTP denies all login attempts.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example attaches the authentication list, **MyList**, to the FTP server:

```
(config)#ftp authentication MyList
```

The following example specifies that the AOS use the default AAA login list for FTP authentication:

```
(config)#ftp authentication default
```

garp timer [join | leave | leaveall] <timer value>

Use the **garp timer** command to adjust the timers used in all GARP applications (currently only GVRP) on the switch.

Syntax Description

join	Specifies the time (in milliseconds) between GARP application join messages.
leave	Specifies the time (in milliseconds) between GARP application leave messages (must be at least 3 times longer than the join timer).
leaveall	Specifies the time (in milliseconds) between GARP application leave all messages (must be greater than the leave timer).
<timer value>	Specifies the timer values.

Default Values

By default, the **join** timer is 200 milliseconds, the **leave** timer is 600 milliseconds, and the **leaveall** timer is 10000 milliseconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

All devices communicating using GARP in the network need to have the same values for these timers. Changing these values is not recommended.

Usage Examples

The following example specifies the time (in milliseconds) between GARP application **leave all** messages:

```
(config)#garp timer leaveall 20000
```

gvrp

Use the **gvrp** command to enable or disable GVRP on the switch globally.

Syntax Description

No subcommands.

Default Values

By default, GVRP is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Disabling GVRP globally will disable GVRP on all interfaces.

Usage Examples

The following example enables GVRP on the switch globally:

```
(config)#gvrp
```

hostname <name>

Creates a name used to identify the unit. This alphanumeric string should be used as a unique description for the unit. This string will be displayed in all prompts.

Syntax Description

<name> Identifies the unit using an alphanumeric string up to 32 characters.

Default Values

<name> Router

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example creates a hostname for the AOS device of **ATL_RTR** to identify the system as the Atlanta router:

```
(config)#hostname ATL_RTR
```


interface <interface> [<slot/port> | <interface id>] [point-to-point]

Use the **interface** command to activate the interface command set for the specified physical or virtual interface. Use the **no** form of this command to delete a configured interface. To activate the interface, enter the **no shutdown** command from within the specific interface command set. For example, (config-ppp 7)#**no shutdown**.

Syntax Description

<interface>	Identifies the physical port type of the installed Network Interface Module (NIM), Dial-Backup Interface Module (DIM), or Ethernet port. Type interface ? for a complete list of valid interfaces.
<slot/port>	Specifies an interface based on its physical location (slot and port). For example, if you have a T1/DSX-1 NIM installed in Slot 1 of an AOS product: <ul style="list-style-type: none"> • The WAN-T1 port would be specified in the CLI as t1 1/1. • The DSX-1 port would be specified as t1 1/2. • If (for example) a BRI DIM backup module is also installed, then the DBU port of the NIM card would be specified as bri 1/3. • If you are specifying a port that is built into the base unit (e.g., the Ethernet port), the slot number is 0. For example, the Ethernet (LAN) port would be specified as eth 0/1.
<interface id>	Specifies the numerical interface ID using a numerical string. Valid range is 1 to 1024. To specify a sub-interface the following syntax applies: interface atm <interface id>.<sub-interface id>. Valid range is 1 to 255.
point-to-point	Optional. Identifies the interface as a point-to-point link (versus multilink). Valid only on interfaces that support point-to-point (e.g., ATM and Frame Relay). By default, all created ATM and Frame Relay interfaces are point-to-point.

Default Values

No default values required for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command expanded to include loopback interface.
Release 8.1	Command expanded to include ATM interface.
Release 9.1	Command expanded to include HDLC interface.

Usage Examples

The following example enters the serial interface mode for a serial module installed in slot 1:

```
(config)#interface serial 1/1
```

interface range <interface type> <slot/port> - <slot/port>

Use the **interface range** command to enter configuration mode for a range of interfaces.

Syntax Description

<interface type>	Specifies the interface type (e.g., ethernet, gigabit ethernet, etc.).
<slot/port>	Specifies the slot/port number of the first interface in the desired range of interfaces to be configured, followed by a hyphen (-) or a comma (,).
<slot/port>	Specifies the slot/port number of the last interface in the desired range of interfaces to be configured.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

All configuration changes made in this mode will apply to all interfaces in the range specified.

Usage Examples

selects seven consecutive Ethernet ports for configuration:

```
(config)#interface range eth 0/1-0/7  
(config-eth 0/1-7)#
```

The following example selects nonconsecutive FXS ports for configuration:

```
(config)#interface range fxs 3/1-2, 3/3, 3/4-6, 3/8  
(config-fxs 3/1-2, 3/3, 3/4-6, 3/8)#
```

ip access-list extended <listname>

Use the **ip access-list extended** command to create an empty access list and enter the extended access-list. Use the **no** form of this command to delete an access list and all the entries contained in it.

The following lists the complete syntax for the **ip access-list extended** commands:

<action> <protocol> <source ip> <source port> <destination ip> <destination port>

Example:

Source IP Address

```
[permit | deny] [ip | tcp | udp] [any | host <A.B.C.D> | <A.B.C.D> <W.W.W.W>]
<source port>* [any | host <A.B.C.D> | <A.B.C.D> <W.W.W.W>] <destination port>*
```

Destination IP Address

Example:

Source IP Address

```
[permit | deny] icmp [any | host <A.B.C.D> | <A.B.C.D> <W.W.W.W>]
[any | host <A.B.C.D> | <A.B.C.D> <W.W.W.W>] <icmp-type>* <icmp-code>* <icmp-message>*
```

Destination IP Address

* = optional

Syntax Description

<listname>	Identifying the configured access list using an alphanumeric descriptor. All access list descriptors are case-sensitive.
<protocol>	Specifies the data protocol such as IP, ICMP, TCP, UDP, or a specific protocol (range: 0 to 255).
<source ip>	Specifies the source IP address used for packet matching. IP addresses can be expressed in one of three ways: <ol style="list-style-type: none"> 1. Using the keyword any to match any IP address. For example, entering deny any will effectively shut down the interface that uses the access list because all traffic will match the any keyword. 2. Using the host <A.B.C.D> to specify a single host address. For example, entering permit host 196.173.22.253 will allow all traffic from the host with an IP address of 196.173.22.253. 3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care". For example, entering permit 192.168.0.0 0.0.0.255 will permit all traffic from the 192.168.0.0/24 network.
<source port>	Optional. The source port is used only when <protocol> is tcp or udp .

The following keywords and port numbers are supported for the *<source port>* field:

any	Matches any destination port.
eq <i><port number></i>	Matches only packets on a given port number.
gt <i><port number></i>	Matches only packets with a port number higher than the one listed.
host <i><port number></i>	Matches a single destination host.
lt <i><port number></i>	Matches only packets with a port number lower than the one listed.
neq <i><port number></i>	Matches only packets that do not contain the specified port number.
range <i><port number></i>	Matches only packets that contain a port number specified in the listed range.

The *<port number>* may be specified using the following syntax: *<0-65535>*. Specifies the port number used by TCP or UDP to pass information to upper layers. All ports below 1024 are considered well-known ports and are controlled by the Internet Assigned Numbers Authority (IANA). All ports above 1024 are dynamically assigned ports that include registered ports for vendor-specific applications

<port list>

The AOS provides a condensed list of port numbers that may be entered using a text name.

The following is the list of UDP port numbers that may be identified using the text name (in **bold**):

biff (Port 512)	ntp (Port 123)
bootpc (Port 68)	pim-auto-rp (Port 496)
bootps (Port 67)	rip (Port 520)
discard (Port 9)	snmp (Port 161)
dnsix (Port 195)	snmptrap (Port 162)
domain (Port 53)	sunrpc (Port 111)
echo (Port 7)	syslog (Port 514)
isakmp (Port 500)	tacacs (Port 49)
mobile-ip (Port 434)	talk (Port 517)
nameserver (Port 42)	tftp (Port 69)
netbios-dgm (Port 138)	time (Port 37)
netbios-ns (Port 137)	who (Port 513)
netbios-ss (Port 139)	xdmcp (Port 177)

The following is the list of TCP port numbers that may be identified using the text name (in **bold**):

bgp (Port 179)	lpd (Port 515)
chargen (Port 19)	nntp (Port 119)
cmd (Port 514)	pim-auto-rp (Port 496)
daytime (Port 13)	pop2 (Port 109)
discard (Port 9)	pop3 (Port 110)
domain (Port 53)	smtp (Port 25)
echo (Port 7)	sunrpc (Port 111)
exec (Port 512)	syslog (Port 514)
finger (Port 79)	tacacs (Port 49)
ftp (Port 21)	talk (Port 517)
gopher (Port 70)	tftp (Port 69)
hostname (Port 101)	telnet (Port 23)
ident (Port 113)	time (Port 37)
irc (Port 194)	uucp (Port 540)
klogin (Port 543)	whois (Port 43)
kshell (Port 544)	www (Port 80)
login (Port 513)	

<destination ip> Specifies the destination IP address used for packet matching.

IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** *<A.B.C.D>* to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the *<A.B.C.D> <wildcard>* format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

<destination port> Optional. Specifies the destination port. Only valid when *<protocol>* is **tcp** or **udp** (Refer to previously listed *<source port>* for more details).

<icmp-type> Optional. Filters packets using ICMP defined (and numbered) messages carried in IP datagrams (used to send error and control information). Valid range is 0 to 255.

<icmp-code> Optional. Filters ICMP packets that are filtered using the ICMP message type (using the *<icmp-type>* keyword) may also be filtered using the ICMP message code (valid range: 0 to 255).

An *<icmp-type>* must be specified when entering an *<icmp-code>*.

<icmp-message> Optional. Filters packets using ICMP descriptive message rather than the corresponding type and code associations.

Default Values

By default, all AOS security features are disabled and there are no configured access lists.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Access control lists (ACLs) are used as packet selectors by other AOS systems; by themselves they do nothing. ACLs are composed of an ordered list of entries with an implicit **deny all** at the end of each list. An ACL entry contains two parts: an action (permit or deny) and a packet pattern. A permit ACL is used to allow packets (meeting the specified pattern) to enter the router system. A deny ACL advances the AOS to the next access policy entry. The AOS provides two types of ACLs: standard and extended. Standard ACLs allow source IP address packet patterns only. Extended ACLs may specify patterns using most fields in the IP header and the TCP or UDP header.

ACLs are performed in order from the top of the list down. Generally, the most specific entries should be at the top and the most general at the bottom.

The following commands are contained in the access-list extended mode:

remark Associates a descriptive tag (up to 80 alphanumeric characters enclosed in quotation marks) to the access list. Enter a functional description for the list such as "This list blocks all outbound web traffic".

log Logs a message (if debug access-list is enabled for this access list) when the access list finds a packet match.

Usage Examples

The following example creates an access list **AllowIKE** to allow all IKE (UDP Port 500) packets from the 190.72.22.55.0/24 network:

```
(config)#ip access-list extended AllowIKE
(config-ext-nacl)#permit udp 190.72.22.55.0 0.0.0.255 eq 500 any eq 500
```

For more details, refer to the *ADTRAN OS System Documentation* CD or the ADTRAN website (www.adtran.com) for technical support notes regarding access-list configuration.

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access control list (using the **ip access-list** command) to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access control policy (using the **ip policy-class** command) that uses a configured access list. AOS access policies are used to allow, discard, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list <access list names> **address** <IP address> **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list <access list names> **interface** <interface> **overload** [**policy**]

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network. The **policy** option specifies the destination policy class.

nat destination list <access list names> **address** <IP address>

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.



Before applying an access control policy to an interface, verify your Telnet connection will not be affected by the policy. If a policy is applied to the interface you are connecting through and it does not allow Telnet traffic, your connection will be lost.

Step 4:

Apply the created access control policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>. The following example assigns access policy **MatchAll** to the Ethernet 0/1 interface:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#access-policy MatchAll
```


ip access-list standard <listname> [permit | deny] <ip address>

Use the **ip access-list standard** command to create an empty access list and enter the standard access-list. Use the **no** form of this command to delete an access list and all the entries contained in it.

The following lists the complete syntax for the **ip access-list standard** commands:

```
ip access-list standard <listname> [permit | deny] any [permit | deny] host <ip address>
[permit | deny] <ip address> <wildcard>
```

Syntax Description

<listname>	Identifies the configured access list using an alphanumeric descriptor. All access list descriptors are case-sensitive.
[permit deny]	Permits or denies entry to the routing system for specified packets.
<ip address>	Specifies the source IP address used for packet matching.

IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Default Values

By default, all AOS security features are disabled and there are no configured access lists.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 9000 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Access control lists are used as packet selectors by access policies (ACPs); by themselves they do nothing. ACLs are composed of an ordered list of entries with an implicit **deny all** at the end of each list. An ACL entry contains two parts: an action (permit or deny) and a packet pattern. A permit ACL is used to allow packets (meeting the specified pattern) to enter the router system. A deny ACL advances the AOS to the next access policy entry. The AOS provides two types of ACLs: standard and extended. Standard ACLs allow source IP address packet patterns only. Extended ACLs may specify patterns using most fields in the IP header and the TCP or UDP header.

ACLs are performed in order from the top of the list down. Generally the most specific entries should be at the top and the most general at the bottom.

The following commands are contained in the **access-list standard**:

remark

Associates a descriptive tag (up to 80 alphanumeric characters enclosed in quotation marks) to the access list. Enter a functional description for the list such as "This list blocks all outbound web traffic."

log

Logs a message (if **debug access-list** is enabled for this access list) when the access list finds a packet match.

permit or deny any

Uses the **any** keyword to match any IP address received by the access list. For example, the following allows all packets through the configured access list:

```
(config)#ip access-list standard MatchAll
(config-std-nacl)#permit any
```

permit or deny host <ip address>

Uses the **host <A.B.C.D>** keyword to specify a single host address. For example, the following allows all traffic from the host with an IP address of 196.173.22.253.

```
(config)#ip access-list standard MatchHost
(config-std-nacl)#permit host 196.173.22.253
```

permit or deny <ip address> <wildcard>

Uses the **<A.B.C.D> <wildcard>** format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, the following denies all traffic from the 192.168.0.0/24 network:

```
(config)#ip access-list standard MatchNetwork
(config-std-nacl)#deny 192.168.0.0 0.0.0.255
```

Usage Examples

The following example creates an access list **UnTrusted** to deny all packets from the 190.72.22.248/30 network:

```
(config)#ip access-list standard UnTrusted
(config-std-nacl)#deny 190.72.22.248 0.0.0.3
```

For more details, refer to the *ADTRAN OS System Documentation* CD or the ADTRAN website (www.adtran.com) for technical support notes regarding access list configuration.

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access policy that uses a configured access list. AOS access policies are used to allow, discard, or manipulate (using NAT) data for each physical interface. Each ACP consists of a selector (access list) and an action (allow, discard, NAT). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list <access list names> **address** <IP address> **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list <access list names> **interface** <interface> **overload** [**policy**]

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network. The **policy** option specifies the destination policy class.

nat destination list <access list names> **address** <IP address>

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.



Before applying an access control policy to an interface, verify your Telnet connection will not be affected by the policy. If a policy is applied to the interface you are connecting through and it does not allow Telnet traffic, your connection will be lost.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>. The following example assigns access policy **MatchAll** to the Ethernet 0/1 interface:

```
(config)#interface ethernet 0/1
```

```
(config-eth 0/1)#access-policy MatchAll
```

ip as-path-list <listname>

Use the **ip as-path-list** command to create IP autonomous system (AS) path lists for route-map use. Use the **no** form of this command to delete the AS path list.

Syntax Description

<listname> Specifies the name of the AS-path list. See *AS Path List Command Set* on page [1381](#) for more information of the available options.

Default Values

By default, no as-path lists are defined.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Functional Notes

AS path lists define a list of AS specifications that once created, may then be referenced in a route map. See the Usage Examples section below.

Usage Examples

The following example creates the AS path list **list5** and enters the IP **as-path-list** command mode:

```
(config)#ip as-path-list list5
(config-as-path-list)#
```

ip classless

Use the **ip classless** command to forward classless packets to the best supernet route available. A classless packet is a packet addressed for delivery to a subnet of a network with no default network route.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the Netvanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

AOS products only function in classless mode. You cannot disable this feature.

Usage Examples

The following example enables the system to forward classless packets:

```
(config)#ip classless
```

ip community-list <listname>

Use the **ip community-list** command to create a community list for BGP route map use. Use the **no** form of this command to delete a community list.

Syntax Description

<listname>	Specifies the name of the AS-path list. See <i>AS Path List Command Set</i> on page 1381 for more information of the available options.
------------	---

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates the community list and enters the **community-list** command mode. :

```
(config)#ip community-list listname
```

ip crypto

Use the **ip crypto** command to enable AOS VPN functionality and allow crypto maps to be added to interfaces. Use the **no** form of this command to disable the VPN functionality.



*Disabling the AOS security features (using the **no ip crypto** command) does not affect VPN configuration settings (with the exception of the removal of all crypto maps from the interfaces). All other configuration parameters will remain intact, and VPN functionality will be disabled.*



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN VPN Configuration Guide** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

No subcommands.

Default Values

By default, all AOS VPN functionality is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Functional Notes

VPN-related settings will not go into effect until you enable VPN functionality using the **ip crypto** command. The AOS allows you to perform all VPN-related configuration prior to enabling **ip crypto**, with the exception of assigning a **crypto map** to an interface. The **no ip crypto** command removes all crypto maps from the interfaces. Enabling **ip crypto** enables the IKE server on UDP Port 500. The **no** form of this command disables the IKE server on UDP Port 500.

Usage Examples

The following example enables VPN functionality:

```
(config)#ip crypto
```


ip default-gateway <ip address>

Use the **ip default-gateway** command to specify a default gateway if (and only if) IP routing is NOT enabled on the unit. Use the **ip route** command to add a default route to the route table when using IP routing functionality. Refer to *ip route <ip address> <subnet mask> <interface or ip address>* [on page 447](#) for more information.

Syntax Description

<i><ip address></i>	Specifies the default gateway IP address in the form of dotted decimal notation (example: 192.22.71.50).
---------------------------	--

Default Values

By default, there is no configured default-gateway.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Only use the **ip default-gateway** when IP routing is disabled on the router. For all other cases, use the **ip route 0.0.0.0 0.0.0.0 <ip address>** command.

Usage Examples

The following example disables IP routing and configures a default gateway for 192.22.71.50:

```
(config)#no ip routing
(config)#ip default-gateway 192.22.71.50
```

ip dhcp-server database local

Use the **ip dhcp-server database local** command to configure a DHCP database agent with local bindings. Use the **no** form of this command to disable this option.

Syntax Description

No subcommands.

Default Values

No default values.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example configures the DHCP database agent with local bindings:

```
(config)#ip dhcp-server database local
```

ip dhcp-server excluded-address <start ip> <end ip>

Use the **ip dhcp-server excluded-address** command to specify IP addresses that cannot be assigned to DHCP clients. Use the **no** form of this command to remove a configured IP address restriction.

Syntax Description

<start ip>	Specifies the lowest IP address (using dotted decimal notation) in the range OR a single IP address to be excluded.
<end ip>	Optional. Specifies the highest IP address (using dotted decimal notation) in the range. This field is not required when specifying a single IP address.

Default Values

By default, there are no excluded IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

The AOS DHCP server (by default) allows all IP addresses for the DHCP pool to be assigned to requesting clients. This command is used to ensure that the specified address is never assigned by the DHCP server. When static addressed hosts are present in the network, it is helpful to exclude the IP addresses of the host from the DHCP IP address pool. This will avoid IP address overlap.

Usage Examples

The following example excludes an IP address of 172.22.5.100 and the range 172.22.5.200 through 172.22.5.250:

```
(config)#ip dhcp-server excluded-address 172.22.5.100
(config)#ip dhcp-server excluded-address 172.22.5.200 172.22.5.250
```

ip dhcp-server ping packets <#packets>

Use the **ip dhcp-server ping packets** command to specify the number of ping packets the DHCP server will transmit before assigning an IP address to a requesting DHCP client. Transmitting ping packets verifies that no other hosts on the network are currently configured with the specified IP address. Use the **no** form of this command to prevent the DHCP server from using ping packets as part of the IP address assignment process.

Syntax Description

<#packets>	Specifies the number of DHCP ping packets sent on the network before assigning the IP address to a requesting DHCP client
------------	---

Default Values

By default, the number of DHCP server ping packets is set at 2 packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Before assigning an IP address to a requesting client, the AOS DHCP server transmits a ping packet on the network to verify there are no other network hosts already configured with the specified address. If the DHCP server receives no reply, the IP address is assigned to the requesting client and added to the DHCP database as an assigned address. Configuring the **ip dhcp-server ping packets** command with a value of **0** prevents the DHCP server from using ping packets as part of the IP address assignment process.

Usage Examples

The following example configures the DHCP server to transmit four ping packets before assigning an address:

```
(config)#ip dhcp-server ping packets 4
```

ip dhcp-server ping timeout <milliseconds>

Use the **ip dhcp-server ping timeout** command to specify the interval (in milliseconds) the DHCP server will wait for a response to a transmitted DHCP ping packet. The DHCP server transmits ping packets before assigning an IP address to a requesting DHCP client. Transmitting ping packets verifies that no other hosts on the network are currently configured with the specified IP address. Use the **no** form of this command to return to the default timeout interval.

Syntax Description

<milliseconds>	Specifies the number of milliseconds (valid range: 1 to 1000) the DHCP server will wait for a response to a transmitted DHCP ping packet.
----------------	---

Default Values

By default, the **ip dhcp-server ping timeout** is set to 500 milliseconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Before assigning an IP address to a requesting client, the AOS DHCP server transmits a ping packet on the network to verify there are no other network hosts already configured with the specified address. If the DHCP server receives no reply, the IP address is assigned to the requesting client and added to the DHCP database as an assigned address.

Usage Examples

The following example configures the DHCP server to wait 900 milliseconds for a response to a transmitted DHCP ping packet before considering the ping a failure:

```
(config)#ip dhcp-server ping timeout 900
```

ip dhcp-server pool <name>

Use the **ip dhcp-server pool** command to create a DHCP address pool and enter the DHCP pool. Use the **no** form of this command to remove a configured DHCP address pool. Refer to the section *DHCP Pool Command Set* on page 548 for more information.

Syntax Description

<name>	Identifies the configured DHCP server address pool using an alphanumeric string (up to 32 characters in length).
--------	--

Default Values

By default, there are no configured DHCP address pools.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip dhcp-server pool** to create multiple DHCP server address pools for various segments of the network. Multiple address pools can be created to service different segments of the network with tailored configurations.

Usage Examples

The following example creates a DHCP server address pool (labeled **SALES**) and enters the DHCP server pool mode:

```
(config)#ip dhcp-server pool SALES
(config-dhcp)#
```

ip domain-lookup

Use the **ip domain-lookup** command to enable the IP domain naming system (DNS), allowing DNS-based host translation (name-to-address). Use the **no** form of this command to disable DNS.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip domain-lookup** command to enable the DNS client in the router. This will allow the user to input web addresses instead of IP addresses for applications such as ping, Telnet, and traceroute.

Usage Examples

The following example enables DNS:

```
(config)#ip domain-lookup
```

ip domain-name <name>

Use the **ip domain-name** command to define a default IP domain name to be used by the AOS to resolve host names. Use the **no** form of this command to disable this function.

Syntax Description

<name>	Specifies the default IP domain name used to resolve unqualified host names. Do not include the initial period that separates the unresolved name from the default domain name.
--------	---

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip domain-name** command to set a default name which will be used to complete any IP host name that is invalid (i.e., any name that is not recognized by the name server). When this command is enabled, any IP host name that is not initially recognized will have the **ip domain-name** appended to it and the request will be resent.

Usage Examples

The following example defines **adtran** as the default domain name:

```
(config)#ip domain-name adtran
```


ip domain-proxy

Use the **ip domain-proxy** command to enable DNS proxy for the router. This enables the router to act as a proxy for other units on the network.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this command is enabled, incoming DNS requests will be handled by the router. It will first search its host table for the query, and if it is not found there the request will be forwarded to the servers configured with the **ip name-server** command.

Usage Examples

The following example enables DNS proxy:

```
(config)#ip domain-proxy
```

ip firewall

Use the **ip firewall** command to enable AOS security features including access control policies and lists, Network Address Translation (NAT), and the stateful inspection firewall. Use the **no** form of this command to disable the security functionality.



*Disabling the AOS security features (using the **no ip firewall** command) does not affect security configuration. All configuration parameters will remain intact, but no security data processing will be attempted.*



*For information regarding the use of OSPF with **ip firewall** enabled, refer to the **Functional Note** for router ospf [on page 499](#).*

*Regarding the use of IKE negotiation for VPN with **ip firewall** enabled, there can be up to six channel groups with 2 to 8 interfaces per group. Dynamic protocols are not yet supported (only static). A physical interface can be a member of only one channel group.*

Syntax Description

No subcommands.

Default Values

By default, all AOS security features are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

This command enables firewall processing for all interfaces with a configured policy class. Firewall processing consists of the following functions:

Attack Protection: Detects and discards traffic that matches profiles of known networking exploits or attacks.

Session Initiation Control: Allows only sessions that match traffic patterns permitted by access-control policies to be initiated through the router.

Ongoing Session Monitoring and Processing: Each session that has been allowed through the router is monitored for any irregularities that match patterns of known attacks or exploits. This traffic will be dropped. Also, if NAT is configured, the firewall modifies all traffic associated with the session according to the translation rules defined in NAT access policies. Finally, if sessions are inactive for a user-specified amount of time, the session will be closed by the firewall.

Application Specific Processing: Certain applications need special handling to work correctly in the presence of a firewall. AOS uses application-level gateways (ALGs) for these applications.

The AOS includes several security features to provide controlled access to your network. The following features are available when security is enabled (using the **ip firewall** command):

1. Stateful Inspection Firewall

The AOS (and your unit) act as an ALG and employ a stateful inspection firewall that protects an organization's network from common cyber attacks including TCP syn-flooding, IP spoofing, ICMP redirect, land attacks, ping-of-death, and IP reassembly problems. In addition, further security is added with use of Network Address Translation (NAT) and Port Address Translation (PAT) capability.

2. Access Policies

AOS access control policies (ACPs) are used to allow, discard, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded.

3. Access Lists

Access control lists (ACLs) are used as packet selectors by ACPs; by themselves they do nothing. ACLs are composed of an ordered list of entries. Each entry contains two parts: an action (**permit** or **deny**) and a packet pattern. A permit ACL is used to permit packets (meeting the specified pattern) to enter the router system. A deny ACL advances the AOS to the next access policy entry. The AOS provides two types of ACLs: **standard** and **extended**. Standard ACLs allow source IP address packet patterns only. Extended ACLs may specify patterns using most fields in the IP header and the TCP or UDP header.

Usage Examples

The following example enables the AOS security features:

```
(config)#ip firewall
```

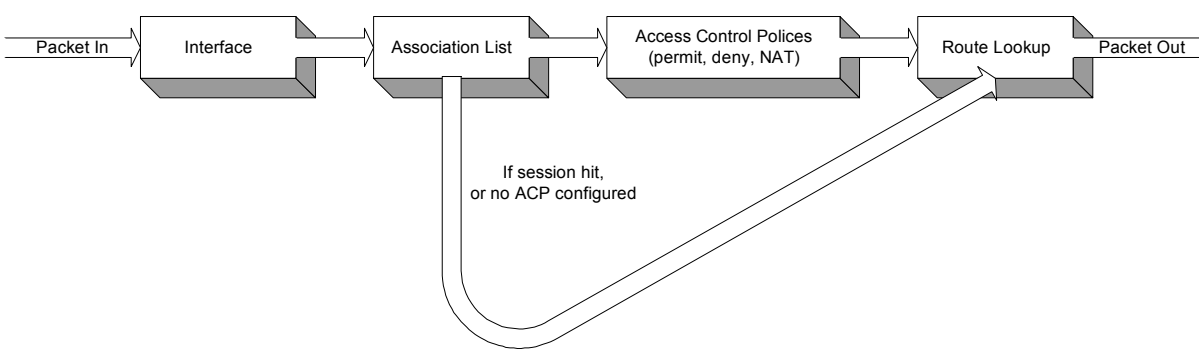
Technology Review

Concepts:

Access control using the AOS firewall has two fundamental parts: Access Control Lists (ACLs) and Access Policy Classes (ACPs). ACLs are used as packet selectors by other AOS systems; by themselves they do nothing. ACPs consist of a selector (ACL) and an action (allow, discard, NAT). ACPs integrate both allow and discard policies with NAT. ACPs have no effect until they are assigned to a network interface.

Both ACLs and ACPs are order dependent. When a packet is evaluated, the matching engine begins with the first entry in the list and progresses through the entries until it finds a match. The first entry that matches is executed.

Packet Flow:



Case 1: Packets from interfaces with a configured policy class to any other interface

ACPs are applied when packets are received on an interface. If an interface has not been assigned a policy class, by default it will allow all received traffic to pass through. If an interface has been assigned a policy class but the firewall has not been enabled with the **ip firewall** command, traffic will flow normally from this interface with no firewall processing.

Case 2: Packets that travel in and out a single interface with a configured policy class

These packets are processed through the ACPs as if they are destined for another interface (identical to Case 1).

Case 3: Packets from interfaces without a configured policy class to interfaces with one

These packets are routed normally and are not processed by the firewall. The **ip firewall** command has no effect on this traffic.

Case 4: Packets from interfaces without a configured policy class to other interfaces without a configured policy class

This traffic is routed normally. The **ip firewall** command has no effect on this traffic.

Attack Protection:

When the **ip firewall** command is enabled, firewall attack protection is enabled. The AOS blocks traffic (matching patterns of known networking exploits) from traveling through the device. For some of these attacks, the user may manually disable checking/blocking while other attack checks are always on anytime the firewall is enabled.

The table (on the following pages) outlines the types of traffic discarded by the firewall attack protection engine. Many attacks use similar invalid traffic patterns; therefore attacks other than the examples listed below may also be blocked by the firewall. To determine if a specific attack is blocked by the AOS firewall, please contact ADTRAN technical support.

Invalid Traffic Pattern	Manually Enabled?	AOS Firewall Response	Common Attacks
Larger than allowed packets	No	Any packets that are longer than those defined by standards will be dropped.	Ping of Death
Fragmented IP packets that produce errors when attempting to reassemble	No	The firewall intercepts all fragments for an IP packet and attempts to reassemble them before forwarding to destination. If any problems or errors are found during reassembly, the fragments are dropped.	SynDrop, TearDrop, OpenTear, Nestea, Targa, Newtear, Bonk, Boink
Smurf Attack	No	The firewall will drop any ping responses that are not part of an active session.	Smurf Attack
IP Spoofing	No	The firewall will drop any packets with a source IP address that appears to be spoofed. The IP route table is used to determine if a path to the source address is known (out of the interface from which the packet was received). For example, if a packet with a source IP address of 10.10.10.1 is received on interface fr 1.16 and no route to 10.10.10.1 (through interface fr 1.16) exists in the route table, the packet is dropped.	IP Spoofing
ICMP Control Message Floods and Attacks	No	The following types of ICMP packets are allowed through the firewall: echo, echo-reply, TTL expired, dest. Unreachable, and quench. These ICMP messages are only allowed if they appear to be in response to a valid session. All others are discarded.	Twinge

Invalid Traffic Pattern	Manually Enabled?	AOS Firewall Response	Common Attacks
Attacks that send TCP URG packets	Yes	Any TCP packets that have the URG flag set are discarded by the firewall.	Winnuke, TCP XMAS Scan
Falsified IP Header Attacks	No	The firewall verifies that the packet's actual length matches the length indicated in the IP header. If it does not, the packet is dropped.	Jolt/Jolt2
Echo	No	All UDP echo packets are discarded by the firewall.	Char Gen
Land Attack	No	Any packets with the same source and destination IP addresses are discarded.	Land Attack
Broadcast Source IP	No	Packets with a broadcast source IP address are discarded.	
Invalid TCP Initiation Requests	No	TCP SYN packets that have ack, urg rst, or fin flags set are discarded.	
Invalid TCP Segment Number	No	The sequence numbers for every active TCP session are maintained in the firewall session database. If the firewall received a segment with an unexpected (or invalid) sequence number, the packet is dropped.	
IP Source Route Option	No	All IP packets containing the IP source route option are dropped.	

Application Specific Processing:

The following applications and protocols require special processing to operate concurrently with NAT/firewall functionality. The AOS firewall includes ALGs for handling these applications and protocols:

AOL Instant Messenger (AIM®)
VPN ALGS: ESP and IKE
FTP
H.323: H.245 Q.931 ASN1 PER decoding and Encoding
ICQ®
IRC
Microsoft® Games
Net2Phone
PPTP
Quake®
Real-Time Streaming Protocol
SMTP
HTTP
CUseeme
SIP
L2TP
PcAnywhere™
SQL
Microsoft Gaming Zone

To determine if a specific application requires special processing, contact technical support. ADTRAN at www.adtran.com.

ip firewall alg [ftp | h323 | pptp]

Use the **ip firewall alg** command to enable the application-level gateway (ALG) for a particular application. Use the **no** form of this command to disable ALG for the application.

Syntax Description

ftp	Enables the FTP ALG.
h323	Enables the H323 ALG.
pptp	Enables the PPTP ALG.

Default Values

By default, the ALG for FTP, H323, and PPTP are enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	H323 was added.

Functional Notes

Enabling the Application Layer Gateway (ALG) for a specific protocol gives the firewall additional information about that complex protocol and causes the firewall to perform additional processing for packets of that protocol. When the ALG is disabled, the firewall treats the complex protocol as any other simple protocol. The firewall needs no special knowledge to work well with simple protocols.

WARNING

Disabling the IP firewall ALG may cause the firewall to block some of the traffic for the specified protocol.

Usage Examples

The following example disables ALG for FTP:

```
(config)#no ip firewall alg ftp
```


ip firewall attack-log threshold <value>

Use the **ip firewall attack-log threshold** command to specify the number of attack mounting attempts the AOS will identify before generating a log message. Use the **no** form of this command to return to the default threshold.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

<value> Specifies the number of attack mounting attempts the AOS will identify before generating a log message (valid range: 0 to 4,294,967,295).

Default Values

By default, the **ip firewall attack-log threshold** is set at 100.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Usage Examples

The following example specifies a threshold of 25 attacks before generating a log message:

```
(config)#ip firewall attack-log threshold 25
```

ip firewall check reflexive-traffic

Use the **ip firewall check reflexive-traffic** command to enable the AOS stateful inspection firewall to process traffic from a primary subnet to a secondary subnet on the same interface through the firewall. Use the **no** form of this command to disable this feature.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

No subcommands.

Default Values

All AOS security features are disabled by default until the **ip firewall** command is issued at the Global Configuration prompt. In addition, the reflexive traffic check is disabled until the **ip firewall check reflexive-traffic** command is issued.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command allows the firewall to process traffic from a primary subnet to a secondary subnet on the same interface through the firewall. If enabled, this traffic will be processed through the access policy on that interface and any actions specified will be executed on the traffic.

Usage Examples

The following example enables the AOS reflexive traffic check:

```
(config)#ip firewall check reflexive-traffic
```

ip firewall check syn-flood

Use the **ip firewall check syn-flood** command to enable the AOS stateful inspection firewall to filter out phony TCP service requests and allow only legitimate requests to pass through. Use the **no** form of this command to disable this feature.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

No subcommands.

Default Values

All AOS security features are disabled by default until the **ip firewall** command is issued at the the Global Configuration prompt. In addition, the SYN-flood check is disabled until the **ip firewall check syn-flood** command is issued.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

SYN flooding is a well-known denial of service attack on TCP-based services. TCP requires a three-way handshake before actual communications begin between two hosts. A server must allocate resources to process new connection requests that are received. A potential intruder is capable of transmitting large amounts of service requests (in a very short period of time), causing servers to allocate all resources to process the phony incoming requests. Using the **ip firewall check syn-flood** command configures the AOS stateful inspection firewall to filter out phony service requests and allow only legitimate requests to pass through.

Usage Examples

The following example enables the AOS SYN-flood check:

```
(config)#ip firewall check syn-flood
```

ip firewall check winnuke

Use the **ip firewall check winnuke** command to enable the AOS stateful inspection firewall to discard all out of band (OOB) data (to protect against WinNuke attacks). Use the **no** form of this command to disable this feature.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

No subcommands.

Default Values

All AOS security features are disabled by default until the **ip firewall** command is issued at the the Global Configuration prompt. Issuing the **ip firewall** command enables the WinNuke check.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

WinNuke attack is a well-known denial of service attack on hosts running Microsoft Windows[®] operating systems. An intruder sends out of band (OOB) data over an established connection to a Windows user. Windows cannot properly handle the OOB data and the host reacts unpredictably. Normal shut-down of the hosts will generally return all functionality. Using the **ip firewall check winnuke** command configures the AOS stateful inspection firewall to filter all OOB data to prevent network problems.

Usage Examples

The following example enables the firewall to filter all OOB data:

```
(config)#ip firewall check winnuke
```

ip firewall fast-nat-fallover

Use the **ip firewall fast-nat-fallover** command to delete associations on default route policy-class changes. Use the **no** form of this command to disable this option.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

No subcommands.

Default Values

All AOS security features are disabled by default until the **ip firewall** command is issued at the the Global Configuration prompt. In addition, the fast NAT fallover is disabled until the **ip firewall fast-nat-fallover** command is issued.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables **fast-nat-fallover**:

```
(config)#ip firewall fast-nat-fallover
```

ip firewall policy-log threshold <value>

Use the **ip firewall policy-log threshold** command to specify the number of connections required by an access control policy before the AOS will generate a log message. Use the **no** form of this command to return to the default threshold.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

Syntax	Description
<value>	Specifies the number of access policy connections the AOS will identify before generating a log message (valid range: 0 to 4,294,967,295).

Default Values

By default, the **ip firewall policy-log threshold** is set to 100.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release	Description
Release 2.1	Command was introduced.

Usage Examples

The following example specifies a threshold of 15 connections before generating a log message:

```
(config)#ip firewall policy-log threshold 15
```

ip firewall stealth

Use the **ip firewall stealth** command to disable TCP reset for denied firewall associations. The stealth setting allows the route to be invisible as a route hop to associated devices. Use the **no** form of this command to return to the default threshold.



*The AOS security features must be enabled (using the **ip firewall** command) for the stateful inspection firewall to be activated.*

Syntax Description

No subcommands.

Default Values

All AOS security features are disabled by default until the **ip firewall** command is issued at the the Global Configuration prompt. In addition, the stealth option is disabled until the **ip firewall stealth** command is issued.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the **stealth** option:

```
(config)#ip firewall stealth
```

ip forward-protocol udp <port number>

Use the **ip forward-protocol udp** command to specify the protocols and ports the AOS allows when forwarding broadcast packets. Use the **no** form of this command to disable a specified protocol or port from being forwarded.



The **ip helper** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. Refer to **ip helper-address <address>** on page 783

Syntax Description

<port number> Specifies the UDP traffic type (using source port)

The following is the list of UDP port numbers that may be identified using the text name:

biff (Port 512)	pim-auto-rp (Port 496)
bootps (Port 67)	rip (Port 520)
discard (Port 9)	snmp (Port 161)
dnsix (Port 195)	snmptrap (Port 162)
domain (Port 53)	sunrpc (Port 111)
echo (Port 7)	syslog (Port 514)
isakmp (Port 500)	tacacs (Port 49)
mobileip (Port 434)	talk (Port 517)
nameserver (Port 42)	tftp (Port 69)
netbios-dgm (Port 138)	time (Port 37)
netbios-ns (Port 137)	who (Port 513)
netbios-ss (Port 139)	xdmcp (Port 177)
ntp (Port 123)	

Alternately, the <port number> may be specified using the following syntax: <0-65535>. Specifies the port number used by UDP to pass information to upper layers. All ports below 1024 are considered well-known ports and are controlled by the Internet Assigned Numbers Authority (IANA). All ports above 1024 are dynamically assigned ports that include registered ports for vendor-specific applications.

Default Values

By default, the AOS forwards broadcast packets for all protocols and ports.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

Use this command to configure the AOS to forward UDP packets across the WAN link to allow remote devices to connect to a UDP service on the other side of the WAN link.

Usage Examples

The following example forwards all Domain Name Server (DNS) broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface eth 0/1  
(config-eth 0/1)#ip helper-address 192.33.5.99
```

ip ftp access-class <polycyname> in

Use the **ip ftp access-class in** command to assign an access policy to all self-bound File Transfer Protocol (FTP) sessions.

Syntax Description

<polycyname> Specifies the configured access policy (ACP) to apply to inbound FTP traffic.

Default Values

By default, all FTP access is allowed.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Usage Examples

The following example applies the configured ACP (labeled **Inbound_FTP**) to inbound FTP traffic:

```
(config)#ip ftp access-class Inbound_FTP in
```

ip ftp agent

Use the **ip ftp agent** command to enable the file transfer protocol (FTP) agent.

Syntax Description

No subcommands.

Default Values

By default, the FTP agent is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the IP FTP agent:

```
(config)#ip ftp agent
```

ip ftp source-interface <interface>

Use the **ip ftp source-interface** command to use the specified interface's IP address as the source IP address for FTP traffic transmitted by the unit. Use the **no** form of this command if you do not wish to override the normal source IP address.

Syntax Description

<interface>	Specifies the interface to be used as the source IP address for FTP traffic. Type ip ftp source-interface? for a complete list of valid interfaces.
-------------	--

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
Release 9.1	Command expanded to include HDLC interface.

Functional Notes

This command allows you to override the *sender* field in the IP packet. If you have multiple interfaces in your unit, changing the *sender* tells the receiver where to send replies. This functionality can also be used to allow packets to get through firewalls that would normally block the flow.

Usage Examples

The following example configures the unit to use the **loopback 1** interface as the source IP for FTP traffic:

```
(config)#ip ftp source-interface loopback 1
```

ip host <name> <address1>

Use the **ip host** command to define an IP host name. This allows you to statically map host names and addresses in the host cache. Use the **no** form of this command to remove defined maps.

Syntax Description

<name>	Defines the name of the host.
<address1>	Specifies IP address associated with this IP host.

Default Values

By default, the host table is empty.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The name may be any combination of numbers and letters as long as it is not a valid IP address or does not exceed 256 characters.

Usage Examples

The following example defines two static mappings:

```
(config)#ip host mac 10.2.0.2
(config)#ip host dal 172.38.7.12
```

**ip http [access-class <listname> in | authentication <listname> |
secure-access-class <listname> in | secure-server | server |
session-limit | session-timeout]**

Use the **ip http** command to enable web access to the unit.

Syntax Description

access-class	Enables HTTP for all incoming connections associated with a specific access list.
<listname>	Specifies the access list name.
in	Applies to all incoming connections.
authentication	Assigns the specified AAA list to HTTP authentication.
secure-access-class	Applies to all self-bound HTTPS connections.
secure-server	Enables the SSL server.
server	Enables the HTTP server connection.
session-limit	Sets the maximum number of sessions allowed. Valid range is 0 to 100 with 100 as the default.
session-timeout	Sets the session timeout. Valid range is 10 to 86,400 seconds. The default is 600.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables web access to the router:

```
(config)#ip http server
```

ip igmp join <group-address>

Use the **ip igmp join** command to instruct the router stack to join a specific group. The stack may join multiple groups.

Syntax Description

<group-address> Specifies the IP address of a multicast group.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1 Command was introduced.

Functional Notes

This command aids in debugging, allowing the router's IP stack to connect to and respond on a multicast group. The local stack operates as an IGMP host on the attached segment. In multicast stub applications, the global helper address takes care of forwarding IGMP joins/responses on the upstream interface. The router may respond to ICMP echo requests for the joined groups.

Usage Examples

The following example configures the unit to join with the specified multicast group:

```
(config)#ip igmp join 172.0.1.50
```

ip load-sharing [per-destination | per-packet]

Use the **ip load-sharing** command to configure whether parallel routes in the route table are used to load-share forwarded packets. If this command is disabled, the route table uses a single "best" route for a given subnet. If this command is enabled, the route table can use multiple "best" routes and alternate between them.

Syntax Description

per-destination	Specifies that the route used for forwarding a packet be based on a hash of the source and destination IP address in the packet.
per-packet	Specifies that each forwarding route lookup rotates through all the parallel "best" routes. (Parallel routes are defined as routes to the same subnet with the same metrics that only differ by their next hop address.)

Default Values

By default, ip load-sharing is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example turns on load-sharing per destination:

```
(config)# ip load-sharing per-destination
```

The following example disables load-sharing :

```
(config)# no ip load-sharing
```


ip mcast-stub helper-address <ip address>

Use the **ip mcast-stub helper-address** command to specify an IP address toward which IGMP host reports and leave messages are forwarded. This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub downstream** and **ip mcast-stub upstream** commands. Use the **no** form of this command to return to default.

Syntax Description

<ip address>	Specifies the address to which the IGMP host reports and leave messages are forwarded.
--------------	--

Default Values

By default, no helper-address is configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

The helper address is configured globally and applies to all multicast-stub downstream interfaces. The address specified may be the next upstream hop or any upstream address on the distribution tree for the multicast source, up to and including the multicast source. The router selects, from the list of multicast-stub upstream interfaces, the interface on the shortest path to the specified address. The router then proxies, on the selected upstream interface (using an IGMP host function), any host joins/leaves received on the downstream interface(s). The router retransmits these reports with addresses set as if the report originated from the selected upstream interface.

For example, if the router receives multiple joins for a group, it will not send any extra joins out the upstream interface. Also, if it receives a leave, it will not send a leave until it is certain that there are no more subscribers on any downstream interface.

Usage Examples

The following example specifies 172.45.6.99 as the helper address:

```
(config)#ip mcast-stub helper-address 172.45.6.99
```

ip multicast-routing

Use the **ip multicast-routing** command to enable the multicast router process. The command does not affect other multicast-related configurations. Use the **no** form of this command to disable. Disabling this command prevents multicast forwarding but does not remove other multicast commands and processes.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables multicast functionality:

```
(config)#ip multicast-routing
```

ip name-server <server-address1-6>

Use the **ip name-server** command to designate one or more name servers to use for name-to-address resolution. Use the **no** form of this command to remove any addresses previously specified.

Syntax Description

<server-address1-6> Specifies up to six name-server addresses.

Default Values

By default, no name servers are specified.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following example specifies host 172.34.1.111 as the primary name server and host 172.34.1.2 as the secondary server:

```
(config)#ip name-server 172.34.1.111 172.34.1.2
```

This command will be reflected in the configuration file as follows:

```
ip name-server 172.34.1.111 172.34.1.2
```

ip policy-class <policyname> max-sessions <number>

Use the **ip policy-class** command to create an access control policy and enter the access control policy. Use the **no** form of this command to delete an access policy and all the entries contained in it.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*



Before applying an access control policy to an interface, verify your Telnet connection will not be affected by the policy. If a policy is applied to the interface you are connecting through and it does not allow Telnet traffic, your connection will be lost.

Syntax Description

<policyname>	Identifies the configured access policy using an alphanumeric descriptor (maximum of 255 characters). All access policy descriptors are case-sensitive.
max-sessions <number>	Optional. Configures a maximum number of allowed policy sessions. This number must be within the appropriate range limits. The limits are either 1 to 4000 or 1 to 30,000 (depending on the type of AOS device you are using).

Default Values

By default, all AOS security features are disabled and there are no configured access lists.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

AOS access control policies are used to allow, discard, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded.

The following commands are contained in the **policy-class**:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list <access list names> **address** <IP address> **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list <access list names> **interface** <interface> **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list <access list names> **address** <IP address>

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Usage Examples

Refer to the *Technology Review* (which follows) for command syntax examples.

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access policy that uses a configured access list. AOS access policies are used to allow, discard, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list <access list names> **address** <IP address> **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the Ethernet 0/1 interface:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#access-policy MatchAll
```

ip policy-timeout <protocol> <range> <port> <seconds>

Use multiple **ip policy-timeout** commands to customize timeout intervals for protocols (TCP, UDP, ICMP) or specific services (by listing the particular port number). Use the **no** form of this command to return to the default timeout values.

Syntax Description

<protocol>	Specifies the data protocol such as ICMP, TCP, or UDP.
<range>	Optional. Customizes timeout intervals for a range of TCP or UDP ports.
<port>	Specifies the service port to apply the timeout value to; valid only for specifying TCP and UDP services (not allowed for ICMP).

The following is the list of UDP port numbers that may be identified using the text name (in **bold**):

all-ports	ntp (Port 123)
biff (Port 512)	pim-auto-rp (Port 496)
bootpc (Port 68)	rip (Port 520)
bootps (Port 67)	snmp (Port 161)
discard (Port 9)	snmptrap (Port 162)
dnsix (Port 195)	sunrpc (Port 111)
domain (Port 53)	syslog (Port 514)
echo (Port 7)	tacacs (Port 49)
isakmp (Port 500)	talk (Port 517)
mobile-ip (Port 434)	tftp (Port 69)
nameserver (Port 42)	time (Port 37)
netbios-dgm (Port 138)	who (Port 513)
netbios-ns (Port 137)	xdmcp (Port 177)
netbios-ss (Port 139)	

The following is the list of TCP port numbers that may be identified using the text name (in **bold**):

all_ports	login (Port 513)
bgp (Port 179)	lpd (Port 515)
chargen (Port 19)	nntp (Port 119)
cmd (Port 514)	pim-auto-rp (Port 496)
daytime (Port 13)	pop2 (Port 109)
discard (Port 9)	pop3 (Port 110)
domain (Port 53)	smtp (Port 25)
echo (Port 7)	sunrpc (Port 111)
exec (Port 512)	syslog (Port 514)

Syntax Description (Continued)

	finger (Port 79)	tacacs (Port 49)
	ftp (Port 21)	talk (Port 517)
<i><port></i>	Optional. ftp-data (Port 20)	telnet (Port 23)
	gopher (Port 70)	time (Port 37)
	hostname (Port 101)	uucp (Port 540)
	ident (Port 113)	whois (Port 43)
	irc (Port 194)	www (Port 80)
	klogin (Port 543)	
	kshell (Port 544)	
<i><seconds></i>	Wait interval (in seconds) before an active session is closed (valid range: 0 to 4294967295 seconds).	

Default Values

<i><seconds></i>	The following default policy timeout intervals apply: tcp (600 seconds; 10 minutes) udp (60 seconds; 1 minute) icmp (60 seconds; 1 minute)
------------------------	--

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates customized policy timeouts for the following:

Internet traffic (TCP Port 80) timeout 24 hours (86400 seconds)

Telnet (TCP Port 23) timeout 20 minutes (1200 seconds)

FTP (21) timeout 5 minutes (300 seconds)

All other TCP services timeout 8 minutes (480 seconds)

```
(config)#ip policy-timeout tcp www 86400
```

```
(config)#ip policy-timeout tcp telnet 1200
```

```
(config)#ip policy-timeout tcp ftp 300
```

```
(config)#ip policy-timeout tcp all_ports 480
```

The following example creates customized policy timeouts for UDP netbios ports 137 to 139 of 200 seconds and UDP ports 6000 to 7000 of 300 seconds:

```
(config)#ip policy-timeout udp range netbios-ns netbios-ss 200
```

```
(config)#ip policy-timeout udp 6000 7000 300
```

ip prefix-list <listname> description <"text">

Use the **ip prefix-list description** command to create and name prefix lists.

Syntax Description

<listname>	Specifies a particular prefix list.
description <"text">	Assigns text (set apart by quotation marks) used as a description for the prefix list. Maximum length is 80 characters.

Default Values

No default values are necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command adds a string of up to 80 characters as a description for a prefix list. It also creates the prefix list if a prefix list of that name does not already exist.

Usage Examples

The following example adds a description to the prefix-list **test**:

```
(config)#ip prefix-list test description "An example prefix list"
```

**ip prefix-list <listname> seq <sequence#> [permit | deny] <network/len>
[le <le-value> | ge <ge-value>]**

Use the **ip prefix-list seq** command to specify a prefix to be matched or a range of mask lengths.

Syntax Description

<listname>	Specifies a particular prefix list.
<sequence#>	Specifies the entry's unique sequence number which determines the processing order. Lower-numbered entries are processed first. Range: 1 to 4,294,967,294.
permit	Permits access to matching entries.
deny	Denies access to matching entries.
<network/len>	Specifies the network number and network mask length.
le <le-value>	Specifies the upper end of the range. Range: 0 to 32.
ge <ge-value>	Specifies the lower end of the range. Range: 0 to 32.

Default Values

If no ge or le parameters are specified, an exact match is assumed. If only ge is specified, the range is assumed to be from ge-value to 32. If only le is specified, the range is assumed to be from len to le-value.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command specifies a prefix to be matched. Optionally, it may specify a range of mask lengths. The following rule must be followed: $len < ge\text{-value} \leq le\text{-value}$. A prefix list with no entries allows all routes. A route that does not match any entries in a prefix list is dropped. As soon as a route is permitted or denied, there is no further processing of the rule in the prefix list. A route that is denied at the beginning entry of a prefix list will not be allowed, even if it matches a permitting entry further down the list.

Usage Examples

The following example creates a prefix list entry in the prefix list **test** matching only the 10.0.0.0/8 network:

```
(config)#ip prefix-list test seq 5 deny 10.0.0.0/8
```

The following example creates a prefix list entry in the prefix list **test** matching any network of length 24 or less:

```
(config)#ip prefix-list test seq 10 permit 0.0.0.0/0 le 24
```

ip radius source-interface <interface>

Use the **ip radius source-interface** command to specify the network-attached storage (NAS) IP address attribute passed with the RADIUS authentication request packet.

Syntax Description

<interface> Specifies the source interface (in the format **type slot/port**). Type **ip radius source-interface ?** for a complete list of interfaces.

Default Values

By default, no source interface is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

If this value is not defined, the address of the source network interface is used.

Usage Examples

The following example configures the Ethernet 0/1 port to be the source interface:

```
(config)#ip radius source-interface ethernet 0/1
```

ip route *<ip address> <subnet mask> <interface or ip address>*

Use the **ip route** command to add a static route to the route table. This command can be used to add a default route by entering **ip route 0.0.0.0 0.0.0.0** and specifying the interface or IP address. Use the **no** form of this command to remove a configured static route.

Syntax Description

<i><ip address></i>	Specifies the network address (in dotted decimal notation) to add to the route table.
<i><subnet mask></i>	Specifies the subnet mask (in dotted decimal notation) associated with the listed network IP address.
<i><interface or ip address></i>	Specifies the gateway peer IP address (in dotted decimal notation) or a configured interface in the unit. Use the ? command to display a complete list of interfaces.

Default Values

By default, there are no configured routes in route table.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 9.1	Tunnel added as a supported interface.

Usage Examples

The following example adds a static route to the **10.220.0.0/16** network through the next-hop router **192.22.45.254** and a default route to **175.44.2.10**:

```
(config)#ip route 10.220.0.0 255.255.0.0 192.22.45.254
(config)#ip route 0.0.0.0 0.0.0.0 175.44.2.10
```

ip routing

Use the **ip routing** command to enable the AOS IP routing functionality. Use the **no** form of this command to disable IP routing.

Syntax Description

No subcommands.

Default Values

By default, IP routing is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the AOS IP routing functionality:

```
(config)#ip routing
```


ip rtp firewall-traversal [policy-timeout <seconds>]

Use the **ip rtp firewall-traversal** command to enable dynamic firewall traversal capability for RTP-based traffic, allowing deep packet inspection of SDP packets to occur so RTP will correctly traverse NAT in the firewall. This will open the proper ports dynamically for the RTP traffic.

Syntax Description

policy-timeout <seconds> Optional. Specifies timeout period allowed for inactive RTP sessions to remain in the firewall. Range is 1 to 4,294,967,295.

Default Values

By default, the policy timeout period is 45 seconds.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Functional Notes

If this value is not defined, the address of the source network interface is used.

Usage Examples

The following example enables dynamic firewall traversal and sets the policy timeout period at **60** seconds:

```
(config)#ip rtp firewall-traversal policy-timeout 60
```

ip rtp udp <port>

Use the **ip rtp udp** command to configure a global starting User Datagram Protocol (UDP) port for Rapid Transport Protocol (RTP).

Syntax Description

<port> Specifies the value of the starting UDP port. Valid range: 1026 to 60,000.

Default Values

No default values.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example configures **2000** as the starting value of the UDP port:

```
(config)#ip rtp udp 2000
```

ip scp server

Use the **ip scp server** to enable the secure copy (SCP) server. SCP is a more secure form of the older Berkley r-tool RCP or remote copy. It allows an SCP client to send or receive files to/from the unit. SCP relies on Secure Shell (SSH) for authentication and encryption of the data transfer.

Syntax Description

No subcommands.

Default Values

By default, the secure copy server is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables the secure copy server:

```
(config)#ip scp server
```

ip sip qos dscp <dscp value>

Use the **ip sip qos dscp** command to configure the differentiated services code-point (DSCP) value to mark IP SIP packets with. This marking can then be used by the Quality of Service (QoS) mechanisms to give priority for this type of traffic in the unit.

Syntax Description

<dscp value> Specifies the DSCP value. Valid range is 0 to 63.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example sets the DSCP value to 63:

```
(config)#ip sip qos dscp 63
```

ip snmp agent

Use the **ip snmp agent** command to enable the Simple Network Management Protocol (SNMP) agent.

Syntax Description

No subcommands.

Default Values

By default, the SNMP agent is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Allows a MIB browser to access standard MIBs within the product. This also allows the product to send traps to a trap management station.

Usage Examples

The following example enables the IP SNMP agent:

```
(config)#ip snmp agent
```

ip sntp source-interface <interface>

The **ip sntp source-interface** command to use the specified interface's IP address as the source IP address for SNTP traffic transmitted by the unit. Use the **no** form of this command if you do not wish to override the normal source IP address.

Syntax Description

<interface>	Specifies the interface to be used as the source IP address for SNTP traffic. Type ip sntp source-interface? for a complete list of valid interfaces.
-------------	--

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command allows you to override the *sender* field in the IP packet. If you have multiple interfaces in your unit, changing the *sender* tells the receiver where to send replies. This functionality can also be used to allow packets to get through firewalls that would normally block the flow.

Usage Examples

The following example configures the unit to use the **loopback 1** interface as the source IP for SNTP traffic:

```
(config)#ip sntp source-interface loopback
```

ip subnet-zero

The **ip subnet-zero** command is the default operation and cannot be disabled. This command signifies the router's ability to route to subnet-zero subnets.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example **subnet-zero** is enabled:

```
(config)#ip subnet-zero
```

ip tftp server [access-class <access-class> in]

Use the **ip tftp server** to enable the TFTP server. Use the **no** form of this command to disable the TFTP server.

Syntax Description

access-class <access-class> in	Specifies that all self-bound TFTP incoming connections are activated. Enter the name of the access class.
---	--

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the TFTP server:

```
(config)#ip tftp server
```

The following example enables the TFTP server as well as self-bound TFTP incoming connections. In this example, **classname** is the name of the access-class.

```
(config)#ip tftp server access-class classname in
```


ip tftp source-interface <interface>

Use the **ip tftp source-interface** command to use the specified interface's IP address as the source IP address for TFTP traffic transmitted by the unit. Use the **no** form of this command if you do not wish to override the normal source IP address.

Syntax Description

<interface>	Specifies the interface to be used as the source IP address for TFTP traffic.
-------------	---

Default Values

No default value is necessary for this command.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command allows you to override the *sender* field in the IP packet. If you have multiple interfaces in your unit, changing the *sender* tells the receiver where to send replies. This functionality can also be used to allow packets to get through firewalls that would normally block the flow.

Usage Examples

The following example configures the unit to use the **loopback 1** interface as the source IP for TFTP traffic:

```
(config)#ip tftp source-interface loopback 1
```

line [console | telnet] <line-number> <ending number>

Use the **line** command to enter the line configuration for the specified console or Telnet session. Refer to the sections *Line (Console) Interface Config Command Set* on page 1304 and *Line (Telnet) Interface Config Command Set* on page 1315 for information on the subcommands.

Syntax Description

console	Specifies the DB-9 (female) CONSOLE port located on the rear panel of the unit. Refer to the sections <i>Line (Console) Interface Config Command Set</i> on page 1304 for information on the subcommands found in this.
telnet	Specifies a Telnet session(s) to configure for remote access. Refer to the section <i>Line (Telnet) Interface Config Command Set</i> on page 1315 for information on the subcommands found in this.
<line-number>	Specifies the starting Telnet or console session to configure for remote access (valid range for console: 0; valid range for Telnet: 0 to 4). If configuring a single Telnet session, enter the Telnet session number and leave the <ending number> field blank.
<ending number>	Optional. Specifies the last Telnet session to configure for remote access (valid range: 0 to 4). To configure all available Telnet sessions, enter line telnet 0 4 .

Default Values

By default, the AOS line console parameters are configured as follows:

- Data Rate: 9600
- Data bits: 8
- Stop bits: 1
- Parity Bits: 0
- No flow control

By default, there are no configured Telnet sessions.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example begins the configuration for the **CONSOLE** port located on the rear of the unit:

```
(config)#line console 0  
(config-con0)#
```

The following example begins the configuration for all available Telnet sessions:

```
(config)#line telnet 0 4  
(config-telnet0-4)#
```

lldp [minimum-transmit-interval | reinitialization-delay | transmit-interval | ttl-multiplier] <numeric value>

Use the **lldp** command to configure global settings that control the way LLDP functions.

Syntax Description

minimum-transmit-interval	Defines the minimum amount of time between transmission of LLDP frames (in seconds).
reinitialization-delay	Defines the minimum amount of time to delay after LLDP is disabled on a port before allowing transmission of additional LLDP frames on that port (in seconds).
transmit-interval	Defines the delay between LLDP frame transmission attempts during normal operation (in seconds).
ttl-multiplier	Defines the multiplier to be applied to the transmit interval to compute the time-to-live for data sent in an LLDP frame.
<numeric value>	Specifies the interval, delay, or multiplier.

Default Values

By default, **minimum-transmit-interval** = 2 seconds (valid range: 1 through 8192); **reinitialization-delay** = 2 seconds (valid range 1 through 10); **transmit-interval** = 30 seconds (valid range 5 through 32,768); and **ttl-multiplier** = 4 (valid range 2 through 10).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Once a device receives data from a neighboring device in an LLDP frame, it will retain that data for a limited amount of time. This amount of time is called time-to-live, and it is part of the data in the LLDP frame. The time-to-live transmitted in the LLDP frame is equal to the transmit interval multiplied by the TTL multiplier.

Usage Examples

The following example sets the LLDP minimum transmit interval to 10 seconds:

```
(config)#lldp minimum-transmit-interval 10
```

The following example sets the LLDP reinitialization delay to 5 seconds:

```
(config)#lldp reinitialization-delay 5
```

The following example sets the LLDP transmit interval to 15 seconds:

```
(config)#lldp transmit-interval 15
```

The following example sets the LLDP TTL multiplier to 2 and the time-to-live for all LLDP frames transmitted from this unit to 30 seconds;

```
(config)#lldp transmit-interval 15
```

```
(config)#lldp ttl-multiplier 2
```

logging console

Use the **logging console** command to enable the AOS to log events to all consoles. Use the **no** form of this command to disable console logging.

Syntax Description

No subcommands.

Default Values

By default, logging console is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the AOS to log events to all consoles:

```
(config)#logging console
```

logging email address-list <email address> ; <email address>

Use the **logging email address-list** command to specify one or more email addresses that will receive notification when an event matching the criteria configured using the **logging email priority-level** command is logged by the AOS. Refer to *logging email priority-level [error | fatal | info | notice | warning]* on page 465 for more information. Use the **no** form of this command to remove a listed address.

Syntax Description

<email address> Specifies the complete email address to use when sending logged messages. (This field allows up to 256 characters.)

Enter as many email addresses as desired, placing a semi-colon (;) between addresses.

Default Values

By default, there are no configured logging email addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies three email addresses to use when sending logged messages:

```
(config)#logging email address-list  
admin@adtranemail.com;ntwk@adtranemail.com;support@adtranemail.com
```

logging email on

Use the **logging email on** command to enable the AOS email event notification feature. Use the **logging email address-list** command to specify email address(es) that will receive notification when an event matching the criteria configured using the **logging email priority-level** command is logged by the AOS . Refer to *logging email priority-level [error | fatal | info | notice | warning]* [on page 465](#) for more information. Use the **no** form of this command to disable the email notification feature.

Syntax Description

No subcommands.

Default Values

By default, email event notification is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The domain name is appended to the sender name when sending event notifications. Refer to the command *ip domain-name <name>* [on page 408](#) for related information.

Usage Examples

The following example enables the AOS email event notification feature:

```
(config)#logging email on
```


logging email priority-level [error | fatal | info | notice | warning]

Use the **logging email priority-level** command to set the threshold for events sent to the addresses specified using the **logging email address-list** command. All events with the specified priority or higher will be sent to all addresses in the list. The logging email on command must be enabled. Refer to *logging email priority-level [error | fatal | info | notice | warning]* on page 465 and *logging email on* on page 464 for related information. Use the **no** form of this command to return to the default priority.

Syntax Description

Sets the minimum priority threshold for sending messages to email addresses specified using the **logging email address-list** command.

The following priorities are available (ranking from lowest to highest):

error	Logs events with error and fatal priorities.
fatal	Logs only events with a fatal priority.
info	Logs all events.
notice	Logs events with notice , warning , error , and fatal priorities.
warning	Logs events with warning , error , and fatal priorities.

Default Values

By default, the **logging email priority-level** is set to **warning**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends all messages with **warning** level or greater to the email addresses listed using the **logging email address-list** command:

```
(config)#logging email priority-level warning
```

logging email receiver-ip <ip address>

Use the **logging email receiver-ip** command to specify the IP address of the email server to use when sending notification that an event matched the criteria configured using the **logging email priority-level** command. Refer to *logging email priority-level [error | fatal | info | notice | warning]* on page 465 for related information. Use the **no** form of this command to remove a configured address.

Syntax Description

<ip address>	Specifies the IP address (in dotted decimal notation) of the mail server to use when sending logged messages.
--------------	---

Default Values

By default, there are no configured email server addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies an email server (with address 172.5.67.99) to use when sending logged messages:

```
(config)#logging email receiver-ip 172.5.67.99
```

logging email sender

Use the **logging email sender** command to specify the sender in an outgoing email message. This name will appear in the **From** field of the receiver's inbox. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets a sender for outgoing messages:

```
(config)#logging email sender myUnit@myNetwork.com
```

logging email source-interface <interface>

Use the **logging email source-interface** command to use the specified interface's IP address as the source IP address for email messages transmitted by the unit. Use the **no** form of this command if you do not wish to override the normal source IP address.

Syntax Description

<interface> Specifies the interface to be used as the source IP address for email messages.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Functional Notes

This command allows you to override the *sender* field in the IP packet. If you have multiple interfaces in your unit, changing the *sender* tells the receiver where to send replies. This functionality can also be used to allow packets to get through firewalls that would normally block the flow.

Usage Examples

The following example configures the unit to use the **loopback 1** interface as the source IP for email messages:

```
(config)#logging email source-interface loopback 1
```

logging facility <facility type>

Use the **logging facility** command to specify a syslog facility type for the syslog server. Error messages meeting specified criteria are sent to the syslog server. For this service to be active, you must enable log forwarding. Refer to *logging forwarding on on page 471* for related information. Facility types are described under *Functional Notes* below. Use the **no** form of this command to return it to its default setting.

Syntax Description

<facility type> Specifies the syslog facility type (refer to *Functional Notes* below).

Default Values

The default value is local7.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

The following is a list of all the valid facility types:

auth	Authorization system
cron	Cron facility
daemon	System daemon
kern	Kernel
local0 - local7	Reserved for locally-defined messages
lpr	Line printer system
mail	Mail system
news	USENET news
sys9 - sys14	System use
syslog	System log
user	User process
uucp	UNIX-to-UNIX copy system

Usage Examples

The following example configures the syslog facility to the cron facility type:

```
(config)#logging facility cron
```

logging forwarding on

Use the **logging forwarding on** command to enable the AOS syslog event feature. Use the **logging forwarding priority-level** command to specify the event matching the criteria used by the AOS to determine whether a message should be forwarded to the syslog server. Refer to *logging forwarding priority-level [error | fatal | info | notice | warning]* on [page 472](#) for related information. Use the **no** form of this command to disable the syslog event feature.

Syntax Description

No subcommands.

Default Values

By default, syslog event notification is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the AOS syslog event feature:

```
(config)#logging forwarding on
```

logging forwarding priority-level [error | fatal | info | notice | warning]

Use the **logging forwarding priority-level** command to set the threshold for events sent to the configured syslog server specified using the **logging forwarding receiver-ip** command. All events with the specified priority or higher will be sent to all configured syslog servers. Refer to *logging email priority-level [error | fatal | info | notice | warning]* on page 465 for more information. Use the **no** form of this command to return to the default priority.

Syntax Description

Sets the minimum priority threshold for sending messages to the syslog server specified using the **logging forwarding receiver-ip** command.

The following priorities are available (ranking from lowest to highest):

error	Logs events with error and fatal priorities.
fatal	Logs only events with a fatal priority.
info	Logs all events.
notice	Logs events with notice , warning , error , and fatal priorities.
warning	Logs events with warning , error , and fatal priorities.

Default Values

By default the **logging forwarding priority-level** is set to **warning**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends all messages with **warning** level or greater to the syslog server listed using the **logging forwarding receiver-ip** command.

```
(config)#logging forwarding priority-level warning
```


logging forwarding receiver-ip <ip address>

Use this **logging forwarding receiver-ip** command to specify the IP address of the syslog server to use when logging events that match the criteria configured using the **logging forwarding priority-level** command. Enter multiple **logging forwarding receiver-ip** commands to develop a list of syslog servers to use. Refer to *logging forwarding priority-level [error | fatal | info | notice | warning]* on page 472 for related information. Use the **no** form of this command to remove a configured address.

Syntax Description

<ip address>	Specifies the IP address (in dotted decimal notation) of the syslog server to use when logging messages.
--------------	--

Default Values

By default, there are no configured syslog server addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a syslog server (with address **172.5.67.99**) to use when logging messages:

```
(config)#logging forwarding receiver-ip 172.5.67.99
```

logging forwarding source-interface <interface>

Use the **logging forwarding source-interface** command to configure the specified interface's IP address as the source IP address for the syslog server to use when logging events. Use the **no** form of this command if you do not wish to override the normal source IP address.

Syntax Description

<interface>	Specifies the interface to be used as the source IP address for event log traffic. Type loggin forwarding source-interface? for a complete list of valid interfaces.
-------------	---

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command allows you to override the *sender* field in the IP packet. If you have multiple interfaces in your unit, changing the *sender* tells the receiver where to send replies. This functionality can also be used to allow packets to get through firewalls that would normally block the flow.

Usage Examples

configures the unit to use the **loopback 1** interface as the source IP for event log traffic:

```
(config)#logging forwarding source-interface loopback 1
```

mac address-table aging-time <aging time>

Use the **mac address-table aging-time** command to set the length of time dynamic MAC addresses remain in the switch or bridge forwarding table. Use the **no** form of this command to reset this length to its default.

Syntax Description

<aging time>	Set an aging time (in seconds) from 10 to 1,000,000. Set to 0 to disable the timeout.
--------------	---

Default Values

By default, the aging time is 300 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the aging time to 10 minutes:

```
(config)#mac address-table aging-time 600
```

mac address-table static <mac address> bridge <bridge id> interface <interface>

Use the **mac address-table static** command to insert a static MAC address entry into the bridge forwarding table. Use the **no** form of this command to remove an entry from the table.

Syntax Description

<mac address>	Specifies a valid 48-bit MAC address.
<bridge>	Specifies a valid bridge interface ID.
interface	Specifies the interface. Type mac address-table static bridge interface ? for a complete list of valid interfaces.
<interface>	Specifies a valid slot/port interface ID.

Default Values

By default, there are no static entries configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example adds a static MAC address to PPP 1 on bridge 4:

```
(config)#mac address-table static 00:A0:C8:00:00:01 bridge 4 interface ppp 1
```

mac address-table static <mac address> vlan <vlan id> interface <interface>

Use the **mac address-table static** command to insert a static MAC address entry into the MAC address table. Use the **no** form of this command to remove an entry from the table.

Syntax Description

<mac address>	Specifies a valid 48-bit MAC address.
<vlan id>	Specifies a valid VLAN interface ID (1 to 4094).
interface	Specifies the interface. Type mac address-table static vlan interface ? for a complete list of valid interfaces..
<interface>	Specifies a valid slot/port interface ID (e.g., eth 0/1).

Default Values

By default, there are no static entries configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example adds a static MAC address to Ethernet 0/1 on VLAN 4:

```
(config)#mac address-table static 00:A0:C8:00:00:01 00:12:79:00:00:01 vlan 4 interface ethernet 0/1
```

modem countrycode [*<countrycode>*]

Use the **modem countrycode** command to specify the modem configuration for the applicable country.

Syntax Description

<countrycode> Specifies the modem configuration for the applicable country.

Default Values

By default, **modem countrycode** is set to **USA/Canada**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 10.1 Command was introduced.

Functional Notes

The following country codes are available for modem configuration:

Algeria	- Algeria Modem configuration
Argentina	- Argentina Modem configuration
Australia	- Australia Modem configuration
Austria	- Austria Modem configuration
Bahrain	- Bahrain Modem configuration
Belgium	- Belgium Modem configuration
Bolivia	- Bolivia Modem configuration
Brazil	- Brazil Modem configuration
Chile	- Chile Modem configuration
China	- China Modem configuration
Colombia	- Colombia Modem configuration
Costa_Rica	- Costa_Rica Modem configuration
Cyprus	- Cyprus Modem configuration
Czechoslovakia	- Czechoslovakia Modem configuration
Denmark	- Denmark Modem configuration
Ecuador	- Ecuador Modem configuration
Egypt	- Egypt Modem configuration
Finland	- Finland Modem configuration
France	- France Modem configuration
Germany	- Germany Modem configuration
Greece	- Greece Modem configuration

Guatemala	- Guatemala Modem configuration
Hong_Kong	- Hong_Kong Modem configuration
Hungary	- Hungary Modem configuration
India	- India Modem configuration
Indonesia	- Indonesia Modem configuration
Ireland	- Ireland Modem configuration
Israel	- Israel Modem configuration
Italy	- Italy Modem configuration
Japan	- Japan Modem configuration
Jordan	- Jordan Modem configuration
Korea	- Korea Modem configuration
Kuwait	- Kuwait Modem configuration
Lebanon	- Lebanon Modem configuration
Malaysia	- Malaysia Modem configuration
Mexico	- Mexico Modem configuration
Morocco	- Morocco Modem configuration
Netherlands	- Netherlands Modem configuration
New_Zealand	- New_Zealand Modem configuration
Norway	- Norway Modem configuration
Oman	- Oman Modem configuration
Panama	- Panama Modem configuration
Peru	- Peru Modem configuration
Philippines	- Philippines Modem configuration
Poland	- Poland Modem configuration
Portugal	- Portugal Modem configuration
Puerto_Rico	- Puerto_Rico Modem configuration
Qatar	- Qatar Modem configuration
Russia	- Russia Modem configuration
Saudi_Arabia	- Saudi_Arabia Modem configuration
Singapore	- Singapore Modem configuration
Slovakia	- Slovakia Modem configuration
Slovenia	- Slovenia Modem configuration
South_Africa	- South_Africa Modem configuration
Spain	- Spain Modem configuration
Sweden	- Sweden Modem configuration
Switzerland	- Switzerland Modem configuration
Syria	- Syria Modem configuration
Taiwan	- Taiwan Modem configuration
Thailand	- Thailand Modem configuration
Trinidad	- Trinidad Modem configuration
Tunisia	- Tunisia Modem configuration
Turkey	- Turkey Modem configuration
UAE	- UAE Modem configuration
UK	- UK Modem configuration

USA/Canada	- USA/Canada Modem configuration
Uruguay	- Uruguay Modem configuration
Venezuela	- Venezuela Modem configuration
Yemen	- Yemen Modem configuration

Usage Example

The following example specifies to use the **USA/Canada** modem configuration.

```
(config)#modem countrycode USA/Canada
```

monitor session <session number> [**destination interface** <interface id> | **source interface** <interface id> | **no tag**] [**both** | **rx** | **tx**]

Use the **monitor session** command to configure a port mirroring session. Use the **no** form of this command to remove a port mirroring session or to remove a source or destination interface.

Syntax Description

<session number>	Selects the monitor session number (only one is allowed).
destination interface <interface id>	Selects the destination interface.
source interface <interface id>	Selects the source interface(s). A range of interfaces is allowed.
no tag	Removes the VLAN tag that is normally appended to mirrored traffic.
both rx tx	Optional. Sets the direction of traffic on the source interface (transmit and receive, receive only, or transmit only).

Default Values

Direction of traffic defaults to both.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets Ethernet 0/1 as the destination and adds Ethernet 0/2, Ethernet 0/3, and Ethernet 0/5 as source ports:

```
(config)#monitor session 1 destination interface eth 0/1
(config)#monitor session 1 source interface eth 0/2-3, eth 0/5
```

port-auth default

Use the **port-auth default** command to set all global port-authentication settings to their default states.

Syntax Description

No subcommands.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example sets all global port-authentication settings to their default states:

```
(config)#port-auth default
```

port-auth max-req <number>

Use the **port-auth max-req** command to specify the maximum number of identity requests the authenticator will transmit before restarting the authentication process.

Syntax Description

<number> Specifies the maximum number of authentication requests.

Default Values

By default, the maximum number of authentication requests is set at 2.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example sets the maximum number of authentication requests at 4:

```
(config)#port-auth max-req 4
```

port-auth re-authentication

Use the **port-auth re-authentication** command to enable re-authentication.

Syntax Description

No subcommands necessary.

Default Values

By default, re-authentication is disabled.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables re-authentication:

```
(config)#port-auth reauthentication
```

port-auth timeout [quiet-period <seconds> | re-authperiod <seconds> | tx-period <seconds>]

Use the **port-auth timeout** command to configure various port authentication timers.

Syntax Description

quiet-period <seconds>	Specifies the amount of time the system will wait before attempting another authentication once a failure has occurred. Range is 1 to 65,535.
re-authperiod <seconds>	Specifies the amount of time between scheduled re-authentication attempts. Range is 1 to 4,294,967,295.
tx-period <seconds>	Specifies the amount of time the authenticator will wait between identity requests. Range is 1 to 65,535.

Default Values

By default, **quiet-period** is set to 60 seconds, **re-authperiod** is set to 3600 seconds (1 hour), and **tx-period** is set to 30 seconds.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example sets the quiet-period to **10** seconds:

```
(config)#port-auth timeout quiet-period 10
```

port-channel load-balance [dst-mac | src-mac]

Use the **port-channel load-balance** command to configure port aggregation load distribution. Use the **no** form of this command to reset distribution to its default.

Syntax Description

dst-mac	Specifies the destination MAC address.
src-mac	Specifies the source MAC address.

Default Values

By default, load balance is set to **src-mac**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

During port aggregation, the port channel interface must determine on which physical port to transmit packets. With the source-address configuration, the source MAC address of the received packets is used to determine this allocation. Packets coming from a specific host always use the same physical port. Likewise, when the destination address configuration is used, packets are forwarded based on the MAC address of the destination. Packets destined for a specific host always use the same physical port.

Usage Examples

The following example sets the load distribution to use the destination MAC address:

```
(config)# port-channel load-balance dst-mac
```

power-supply shutdown automatic

Use the **power-supply shutdown automatic** command to enable the power supplies to automatically shut down when the unit temperature exceeds the maximum operating temperature. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the power supplies to shut down automatically if the temperature gets too high:

```
(config)#power-supply shutdown automatic
```

qos cos-map *<cos queue id>* *<cos value 0>* *<cos value 1>...<cos val 7>*

Use the **qos cos-map** command to associate cost of service (CoS) values with each queue.

Syntax Description

<i><cos queue id></i>	Specifies the queue number to which you are assigning CoS value(s).
<i><cos val 0></i>	Associates listed CoS values with a particular priority queue.
<i><cos val 1-7></i>	Optional. Associates up to eight CoS values with the queue.

Default Values

By default, CoS 0 and 1 are mapped to queue 1; CoS 2 and 3 are mapped to queue 2; CoS 4 and 5 are mapped to queue 3; CoS 6 and 7 are mapped to queue 4.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example maps CoS values 4 and 5 to queue 1:

```
(config)#qos cos-map 1 4 5
```


qos dscp-cos [*<dscp-list>* to *<cos-priority-list>* | default]

Use the **qos dscp-cos** command to set the Differentiated Services Codepoint (DSCP) to Class of Service (CoS) map and enable the mapping process. Use the **no** form of this command to disable mapping.

Syntax Description

<i><dscp-list></i>	Specifies DSCP values (separating multiple values with a space).
<i><cos-priority-list></i>	Specifies CoS values (separating multiple values with a space).
default	Sets the map to the following default values:
DSCP	0 16 24 32 40 48 56
CoS	1 2 3 4 5 6 7

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

When one of the specified DSCP values is detected in an incoming packet, the CoS priority is altered based on the corresponding map value. By configuring the list, the mapping functionality is enabled.

Usage Examples

The following example enables the mapping of DSCP values 24 and 48 to CoS values 1 and 2:

```
(config)#qos dscp-cos 24 48 to 1 2
```

The following example disables DSCP-to-CoS mapping:

```
(config)#no qos dscp-cos
```

qos map <mapname> <sequence number>

Use the **qos map** command to activate the QoS Map Command Set (which allows you to create and/or edit a QoS map). For details on specific commands, refer to the section *Quality of Service (QoS) Map Commands* on page 1345. Use the **no** form of this command to delete a map entry.

Syntax Description

<mapname>	Specifies the QoS map name.
<sequence number>	Specifies a number (valid range: 0 to 65,535) to differentiate this QoS map and to assign match order.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

A QoS policy is defined using a QoS map. The QoS map is a named list with sequenced entries. An entry contains a single match reference and one or more actions (**priority**, **set**, or **both**). Multiple map entries for the same QoS map are differentiated by a sequence number. The sequence number is used to assign match order.

Once created, a QoS map must be applied to an interface (using the **qos-policy out** <map-name> command) in order to actively process traffic. Any traffic for the interface that is not sent to the priority queue is sent using the default queuing method for the interface (such as weighted fair queuing). Refer to *qos-policy out* <mapname> on page 978 for more information.

Usage Examples

The following example demonstrates basic settings for a QoS map and assigns a map to the Frame Relay interface:

```
>enable
#config terminal
(config)#qos map VOICEMAP 10
(config-qos-map)#match precedence 5
(config-qos-map)#priority 512
(config-qos-map)#exit
(config)#interface fr 1
(config-fr 1)#qos-policy out VOICEMAP
```

qos queue-type strict-priority

Use the **qos queue-type strict-priority** command to enable queuing based strictly on the priority of each queue.

Syntax Description

No subcommands.

Default Values

By default, the queue type is weighted round robin (WRR).

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables strict-priority queuing:

```
(config)#qos queue-type strict-priority
```

qos queue-type wrr <weight1> <weight2> <weight3>
[<weight4> | **expedite**]

Use the **qos queue-type wrr** command to set weights for up to four queues. Use the **no** form of this command to set all queues to be weighted round robin (WRR).

Syntax Description

<weight1-4>	Sets the weight of each queue (up to four). All queue weights must be greater than zero except for the weight for the last queue (queue 4). The range for queues 1 to 3 is 1 to 255. The range for queue 4 is 0 to 255.
expedite	The queue 4 entry can be replaced by the expedite command. If set to expedite , then it becomes a high-priority queue. All outbound traffic is transmitted on an expedite queue prior to any other traffic in other queues.

Default Values

By default, all four weights are set to 25.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The actual weight is a calculated value based on the sum of all entered weights. It is the ratio of the individual weight over the sum of all weights.

For example:

If the user enters 10, 20, 30, and 40 as the weight values, the first queue will have a ratio of 1/10. This is derived from the formula $10/(10+20+30+40)$. Therefore, this queue will transmit 1 packet out of every 10 opportunities.

Usage Examples

The following example configures weights for all four queues:

```
(config)#qos queue-type wrr 10 20 30 40
```

radius-server

Use the **radius-server** command to configure several global RADIUS parameters. Most of these global defaults can be overridden on a per-server basis.

Variations of this command include the following:

radius-server challenge-noecho

radius-server deadtime <minutes>

radius-server enable-username <name>

radius-server key <key>

radius-server retry <attempts>

radius-server timeout <seconds>

Syntax Description

challenge-noecho	Turns off echoing of user challenge-entry. When echo is turned on, users see the text of the challenge as they type responses. Enabling this option hides the text as it is being entered.
deadtime <minutes>	Specifies how long a RADIUS server is considered dead once a timeout occurs. The server will not be tried again until after the deadtime expires.
enable-username <name>	Specifies a username to be used for enable authentication.
key <key>	Specifies the shared key to use with a RADIUS server.
retry <attempts>	Specifies how many attempts to make on a RADIUS server before marking it dead.
timeout <seconds>	Specifies how long to wait for a RADIUS server to respond to a request.

Default Values

challenge-noecho	By default, echo is turned on.
deadtime	1 minute
key	No default
retry	3 attempts
timeout	5 seconds
enable-username	\$enab15\$

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
Release 7.1	Added enable-username selection.

Functional Notes

RADIUS servers (as defined with the **radius-server** command) may have many optional parameters. However, they are uniquely identified by their addresses and ports. Port values default to 1812 and 1813 for authorization and accounting, respectively. If a server is added to a named group but is not defined by a **radius-server** command, the server is simply ignored when accessed. Empty server lists are not allowed. When the last server is removed from a list, the list is automatically deleted.

Usage Examples

The following example shows a typical configuration of these parameters:

```
(config)#radius-server challenge-noecho
(config)#radius-server deadtime 10
(config)#radius-server timeout 2
(config)#radius-server retry 4
(config)#radius-server key my secret key
```

radius-server host

Use the **radius-server host** to specify the parameters for a remote RADIUS server. At a minimum, the address (IP or DNS name) of the server must be given. The other parameters are also allowed and (if not specified) will take default values or fall back on the global RADIUS server's default settings.

Syntax Description

acct-port <port#>	Sends accounting requests to this remote port.
auth-port <port#>	Sends authentication requests to this remote port.
retry <attempts>	Retries server after timeout this number of times (uses RADIUS global setting if not given).
timeout <seconds>	Waits for a response this number of seconds (uses RADIUS global setting if not given).
key <key>	Defines the shared key with the RADIUS server (uses RADIUS global setting if not given). Note that the key must appear last on the input line since it reads the rest of the line beyond the key keyword.

Default Values

By default, **acct-port** is set to 1813 and **auth-port** is set to 1812.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows a typical configuration of these parameters:

```
(config)#radius-server host 1.2.3.4
(config)#radius-server host 3.3.1.2 acct-port 1646 key my key
```

route-map <map-name> [permit | deny] <sequence number>

Use the **route-map** command to create a route map and enter the Route Map Configuration command set. A route map is a type of filter that matches various attributes and then performs actions on the way the route is redistributed. Use the **no** form of this command to return to default settings.

Syntax Description

<map-name>	Specifies a name for the route map.
permit	Redistributes routes matching the route map attributes.
deny	Specifies not to redistribute routes matching the route map attributes.
<sequence number>	Specifies a sequence number of this route entry. Range is 1 to 4,294,967,295.

Default Values

By default, no route maps are defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

Route maps can be assigned to a neighbor using the **route-map** command in the BGP Neighbor command set. See *route-map* <map-name> [in | out] on page 1131 for more information.

Usage Examples

The following example creates the route map, specifies that routes matching its criteria will be denied, and assigns a sequence number of 100:

```
(config)#route-map MyMap deny 100
(config-route-map)#
```

You can then define the attributes of the route map from the Route Map Configuration Command set. Enter a ? at the **(config-route-map)#** prompt to explore the available options.

router bgp

Use the **router bgp** command to enter the BGP Configuration mode. Refer to the BGP Configuration Command section for more information.

Syntax Description

No subcommands.

Default Values

No default values necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example uses the **router bgp** command to enter the BGP Configuration mode:

```
(config)#router bgp
(config-bgp)#
```

Technology Review

The following AOS BGP-related guidelines may help guide decisions made during basic BGP implementation.

Ignore route if next hop is unreachable.

Prefer route with largest weight (only used in the local router, set by applying route maps to set this value on desired inbound updates).

Prefer route with largest local preference.

Prefer route injected by this router via network command.

Prefer route with shortest AS_PATH.

Prefer route with lowest origin type. Routes originally injected by the network command or aggregation (IGP) have a lower origin type than those originally injected by redistribution into BGP.

Prefer routes with lowest MED value.

Before the route is installed into the route table (forwarding table), a check is made of other sources that may have information about the same subnet (static routes, IGP, etc.) The route with the lowest administrative distance is installed.

router ospf

Use the **router ospf** command to activate OSPF in the router and to enter the OSPF Configuration mode. Refer to the section *Router (OSPF) Configuration Command Set* on page 1331 for more information. Use the **no** form of this command to disable OSPF routing.

Syntax Description

No subcommands.

Default Values

By default, OSPF is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The AOS can be configured to use OSPF with the firewall enabled (using the **ip firewall** command). To do this, configure the OSPF networks as usual, specifying which networks the system will listen for and broadcast OSPF packets to. Refer to *ip firewall* on page 410 for more information.

To apply stateful inspection to packets coming into the system, create a policy class that describes the type of action desired and then associate that policy class to the particular interface (refer to *ip policy-class <policyname> max-sessions <number>* on page 436). The firewall is intelligent and will only allow OSPF packets that were received on an OSPF configured interface. No modification to the policy class is required to allow OSPF packets into the system.

Usage Examples

The following example uses the **router ospf** command to enter the OSPF Configuration mode:

```
(config)#router ospf
```

router rip

Use the **router rip** command to enter the RIP Configuration mode. Refer to the section *Router (RIP) Configuration Command Set* on page 1322 for more information.

Syntax Description

No subcommands.

Default Values

No default values necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example uses the **router rip** command to enter the RIP Configuration mode:

```
(config)#router rip
(config-rip)#
```

Technology Review

The RIP protocol is based on the Bellman-Ford (distance-vector) algorithm. This algorithm provides that a network will converge to the correct set of shortest routes in a finite amount of time, provided that:

- Gateways continuously update their estimates of routes.
- Updates are not overly delayed and are made on a regular basis.
- The radius of the network is not excessive.
- No further topology changes take place.

RIP is described in RFC 1058 (Version 1) and updated in RFCs 1721, 1722, and 1723 for Version 2. Version 2 includes components that ease compatibility in networks operating with RIP V1.

All advertisements occur on regular intervals (every 30 seconds). Normally, a route that is not updated for 180 seconds is considered dead. If no other update occurs in the next 60 seconds for a new and better route, the route is flushed after 240 seconds. Consider a connected route (one on a local interface). If the interface fails, an update is immediately triggered for that route only (advertised with a metric of 16).

Now consider a route that was learned and does not receive an update for 180 seconds. The route is marked for deletion, and even if it was learned on an interface, a poisoned (metric =16) route should be sent by itself immediately and during the next two update cycles with the remaining normal split horizon update routes. Following actual deletion, the poison reverse update ceases. If an update for a learned route is not received for 180 seconds, the route is marked for deletion. At that point, a 120-second garbage collection (GC) timer is started. During the GC timer period, expiration updates are sent with the metric for the timed-out route set to 16.

If an attached interface goes down, the associated route is immediately (within the same random five-second interval) triggered. The next regular update excludes the failed interface. This is the so-called first hand knowledge rule. If a gateway has first hand knowledge of a route failure (connected interfaces) or reestablishment, the same action is taken. A triggered update occurs, advertising the route as failed (metric = 16) or up (normal metric) followed by the normal scheduled update.

The assumption here is that if a gateway missed the triggered update, it will eventually learn from another gateway in the standard convergence process. This conserves bandwidth.

RIP-Related Definitions:

Route	A description of the path and its cost to a network.
Gateway	A device that implements all or part of RIP (a router).
Hop	A metric that provides the integer distance (number of intervening gateways) to a destination network gateway.
Advertisement	A broadcast or multicast packet to port 520 that indicates the route for a given destination network.
Update	An advertisement sent on a regular 30-second interval including all routes exclusive of those learned on an interface.

snmp-server chassis-id *<id string>*

Use the **snmp-server chassis-id** command to specify an identifier for the Simple Network Management Protocol (SNMP) server. Use the **no** form of this command to return to the default value.

Syntax Description

<id string> Identifies the product using an alphanumeric string (up to 32 characters in length).

Default Values

By default, the **snmp-server chassis-id** is set to **Chassis ID**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example configures a chassis ID of **A432692**:

```
(config)#snmp-server chassis-id A432692
```

snmp-server community <community> **view** <viewname> [**ro** | **rw**] <listname>

Use the **snmp-server community** command to specify a community string to control access to the Simple Network Management Protocol (SNMP) information. Use the **no** form of this command to remove a specified community.

Syntax Description

<community>	Specifies the community string (a password to grant SNMP access).
view <viewname>	Optional. Specifies a previously defined view. Views define objects available to the community. For information on creating a new view, see <i>snmp-server view</i> <viewname> <oidtree> [<i>excluded</i> <i>included</i>] on page 513 .
ro	Optional. Keyword to grant read-only access, allowing retrieval of MIB objects.
rw	Optional. Keyword to grant read-write access, allowing retrieval and modification of MIB objects.
<listname>	Optional. Specifies an access-control list name used to limit access. Refer to <i>ip access-list extended</i> <listname> on page 387 and <i>ip access-list standard</i> <listname> [<i>permit</i> <i>deny</i>] <ip address> on page 393 for more information on creating access-control lists.

Default Values

By default, there are no configured SNMP communities.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 9.1	view <viewname> option added.

Usage Examples

The following example specifies a community named **MyCommunity**, specifies a previously defined view named **blockinterfaces**, and assigns read-write access:

```
(config)#snmp-server community MyCommunity view blockinterfaces rw
```

snmp-server contact [email | pager | phone] <number>

Use the **snmp-server contact** command to specify the email address, pager number, or phone number. Use the **no** form of this command to remove a configured contact.

Syntax Description

email	Specifies email address for the SNMP server contact.
pager	Specifies pager number for the SNMP server contact.
phone	Specifies phone number for the SNMP server contact.
<number>	Identifies the contact (up to 32 characters in length).

Default Values

No default values necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example specifies **6536999** for the pager number:

```
(config)#snmp-server contact pager 6536999
```


snmp-server contact <“string”>

Use the **snmp-server contact** command to specify the SNMP sysContact string. Use the **no** form of this command to remove a configured contact.

Syntax Description

<“string”>	Populates the sysContact string using an alphanumeric string enclosed in quotation marks (up to 32 characters in length).
------------	---

Default Values

By default, the **snmp-server contact** is set to **Customer Service**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies **Network Administrator x4000** for the sysContact string:

```
(config)#snmp-server contact “Network Administrator x4000”
```

snmp-server enable traps <trap type> [snmp]

Use the **snmp-server enable traps** command to enable all Simple Network Management Protocol (SNMP) traps available on your system or specified using the <trap type> option. Use multiple **snmp-server enable traps** to enable multiple trap types. Use the **no** form of this command to disable traps (or the specified traps).

Syntax Description

<trap type>	Specifies the type of notification trap to enable. Leaving this option blank enables ALL system traps.
snmp	Optional. Enables a subset of traps specified in RFC1157. The following traps are supported: coldStart warmStart linkUp linkDown authenticationFailure

Default Values

By default, there are no enabled traps.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the SNMP traps:

```
(config)#snmp-server enable traps snmp
```

snmp-server host <address> traps <community> <trap type> [snmp]

Use the **snmp-server host traps** command to specify traps sent to an identified host. Use multiple **snmp-server host traps** commands to specify all desired hosts. Use the **no** form of this command to return to the default value.

Syntax Description

<address>	Specifies the IP address of the SNMP host that receives the traps.
<community>	Specifies the community string (used as a password) for authorized agents to obtain access to SNMP information.
<trap type>	Specifies the type of notification trap to enable. Leaving this option blank enables ALL system traps.
snmp	Optional. Enables a subset of traps specified in RFC1157. The following traps are supported: coldStart warmStart linkUp linkDown authenticationFailure

Default Values

By default, there are no hosts or traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends all SNMP traps to the host at address **190.3.44.69** and community string **My Community**:

```
(config)#snmp-server host 190.3.44.69 traps My Community snmp
```

snmp-server host <address> traps version <version> <community> <trap type> [snmp]

Use the **snmp-server host traps version** command to specify traps sent to an identified host. Use multiple **snmp-server host traps version** commands to specify all desired hosts. Use the **no** form of this command to return to the default value.

Syntax Description

<address>	Specifies the IP address of the SNMP host that receives the traps.
<version>	Specifies the SNMP version as one of the following: 1 - SNMPv1 2C - SNMPv2C
<community>	Specifies the community string (used as a password) for authorized agents to obtain access to SNMP information.
<trap type>	Specifies the type of notification trap to enable. Leaving this option blank enables ALL system traps.
snmp	Optional. Enables a subset of traps specified in RFC1157. The following traps are supported: coldStart warmStart linkUp linkDown authenticationFailure

Default Values

By default, there are no hosts or traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends all SNMP traps to the host at address **190.3.44.69** and community string **My Community** using SNMPv2C:

```
(config)#snmp-server host 190.3.44.69 traps version 2c My Community snmp
```

snmp-server location <*string*>

Use the **snmp-server location** command to specify the Simple Network Management Protocol (SNMP) system location string. Use the **no** form of this command to return to the default value.

Syntax Description

<*string*> Populates the system location string using an alphanumeric string enclosed in quotation marks (up to 32 characters in length).

Default Values

By default, the **snmp-server location** is set to **ADTRAN**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example specifies a location of **5th Floor Network Room**:

```
(config)#snmp-server location "5th Floor Network Room"
```

snmp-server management-url <URL>

Use the **snmp-server management-url** command to specify the URL for the device's management software. Use the **no** form of this command to remove the management URL.

Syntax Description

<URL> Specifies the URL for the management software.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example specifies the URL `http://www.mywatch.com` as the device's management software:

```
(config)#snmp-server management-url http://www.mywatch.com
```

snmp-server management-url-label <label>

Use the **snmp-server management-url-label** command to specify a label for the URL of the device's management software. Use the **no** form of this command to remove the label.

Syntax Description

<label>	Specifies a label for the URL of the management software (maximum length 255 characters).
---------	---

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies the label **watch** for the management software:

```
(config)#snmp-server management-url-label watch
```

snmp-server source-interface <interface>

Use the **snmp-server source-interface** command to tell the AOS the interface type from which to expect the SNMP traps to originate. All SNMP originated packets (including traps and get/set requests) will use the designated interface's IP address. Use the **no** form of this command to remove specified interfaces.

Syntax Description

<interface> Specifies the physical interface that should originate SNMP traps. Enter **snmp-server trap-source ?** for a complete list of valid interfaces.

Default Values

By default, there are no trap-source interfaces defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1 Command was introduced.

Usage Examples

The following example specifies that the Ethernet interface (**ethernet 0/1**) should be the source for all SNMP traps and get/set requests:

```
(config)#snmp-server source-interface ethernet 0/1
```


snmp-server view <viewname> <oidtree> [excluded | included]

Use the **snmp-server view** command to create or modify a Simple Network Management Protocol (SNMP) view entry. Use the **no** form of this command to remove an entry.

Syntax Description

<viewname>	Specifies a label for the view record being created. The name is a record reference.
<oidtree>	Specifies the object identifier (oid) to include or exclude from the view. To identify the subtree, specify a string using numbers, such as 1.4.2.6.8. Replace a single subidentifier with the asterisk (*) to specify a subtree family.
excluded	Specifies an excluded view.
included	Specifies an included view.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The **snmp-server view** command can include or exclude a group of OIDs. The following example shows how to create a view (named **blockInterfaces**) to exclude the OID subtree family 1.3.3.1.2.1.2:

```
(config)#snmp-server view blockInterfaces 1.3.6.1.2.1.2.* excluded
```

The following example shows how to create a view (named **block**) to include a specific OID:

```
(config)#snmp-server view block 1.3.6.1.2.1.2. included
```

sntp retry-timeout <time>

Use the **sntp retry-timeout** command to set the amount of time to wait for a response before allowing a new request.

Syntax Description

<time>	Specifies time (in seconds) to wait for a response before retrying. The range is from 3 to 4,294,967,294.
--------	---

Default Values

By default, the retry timeout is set to 5 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the SNTP retry timeout to 10 seconds:

```
(config)#sntp retry-time 10
```

sntp server *<address or hostname>* **version** *<1-3>*

Use the **sntp server** command to set the hostname of the SNTP server as well as the version of SNTP to use. The Simple Network Time Protocol (SNTP) is an abbreviated version of the Network Time Protocol (NTP). SNTP is used to set the time of the AOS product over a network. The SNTP server usually serves the time to many devices within a network.

Syntax Description

<address or hostname> Specifies the IP address or hostname of the SNTP server.

version *<1-3>* Specifies which NTP version is used (1 to 3).

Default Values

By default, NTP version is set to 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following example sets the SNTP server to **time.nist.gov** using SNTP version 1 (the default version):

```
(config)#sntp server time.nist.gov
```

The following example sets the SNTP server as **time.nist.gov**. All requests for time use version 2 of the SNTP:

```
(config)#sntp server time.nist.gov version 2
```

sntp wait-time <*time*>

Use the **sntp wait-time** command to set the time between updates from the time server.

Syntax Description

< <i>time</i> >	Specifies time (in seconds) between updates. The range is from 10 to 4,294,967,294.
-----------------	---

Default Values

By default, the wait time is set to 86400 seconds (1 day).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the SNTP wait time to two days:

```
(config)#sntp wait-time 172800
```

spanning-tree edgeport bpdufilter default

Use the **spanning-tree edgeport bpdufilter default** command to enable the BPDU filter on all ports by default. Use the **no** form of this command to disable the setting.

Syntax Description

No subcommands.

Default Values

Disabled by default.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The BPDU filter blocks any BPDUs from being transmitted and received on an interface. This can be overridden on an individual port.

Usage Examples

The following example enables the bpdufilter on all ports by default:

```
(config)#spanning-tree edgeport bpdufilter default
```

To disable the BPDU filter on a specific interface, issue the appropriate commands for the given interface using the following commands as an example:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#spanning-tree bpdufilter disable
```

spanning-tree edgeport bpduguard default

Use the **spanning-tree edgeport bpduguard default** command to enable the BPDU guard on all ports by default. Use the **no** form of this command to disable the setting.

Syntax Description

No subcommands.

Default Values

Disabled by default.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The bpduguard blocks any BPDUs from being received on an interface. This can be overridden on an individual port.

Usage Examples

The following example enables the BPDU guard on all ports by default.

```
(config)#spanning-tree bpduguard default
```

To disable the BPDU guard on a specific interface, issue the appropriate commands for the given interface using the following commands as an example:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#spanning-tree bpduguard disable
```

spanning-tree edgeport default

Use the **spanning-tree edgeport default** command to configure all ports to be edgeports by default. Use the **no** form of this command to disable the setting.

Syntax Description

No subcommands.

Default Values

Disabled by default.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures all interfaces running spanning tree to be edgeports by default:

```
(config)#spanning-tree edgeport default
```

An individual interface can be configured to not be considered an edgeport. For example:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#spanning-tree edgeport disable
```

or

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#no spanning-tree edgeport
```

spanning-tree forward-time <seconds>

Use the **spanning-tree forward-time** command to specify the delay interval (in seconds) when forwarding spanning-tree packets. Use the **no** form of this command to return to the default interval.

Syntax Description

<seconds> Specifies the forwarding delay interval in seconds (Range: 4 to 30).

Default Values

By default, the forwarding delay is set to 15 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets the forwarding time to 18 seconds:

```
(config)#spanning-tree forward-time 18
```


spanning-tree hello-time <seconds>

Use the **spanning-tree hello-time** command to specify the delay interval (in seconds) between hello bridge protocol data units (BPDUs). To return to the default interval, use the **no** form of this command.

Syntax Description

<seconds> Specifies the delay interval (in seconds) between hello BPDUs.
Range: 0 to 1,000,000.

Default Values

By default, the delay is set to 2 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example configures a **spanning-tree hello-time** interval of 10,000 seconds:

```
(config)#spanning-tree hello-time 10000
```

spanning-tree max-age <seconds>

Use the **spanning-tree max-age** command to specify the interval (in seconds) the spanning tree will wait to receive Bridge Protocol Data Units (BPDUs) from the root bridge before assuming the network has changed (thus re-evaluating the spanning-tree topology). Use the **no** form of this command to return to the default interval.

Syntax Description

<seconds>	Specifies the wait interval (in seconds) between received BPDUs (from the root bridge). Range: 6 to 40.
-----------	---

Default Values

By default, the wait interval is set at 20 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures a wait interval of 45 seconds:

```
(config)#spanning-tree max-age 45
```

spanning-tree mode [rstp | stp]

Use the **spanning-tree mode** command to choose a spanning-tree mode of operation.

Syntax Description

rstp	Enables rapid spanning-tree protocol.
stp	Enables spanning-tree protocol.

Default Values

By default, **spanning-tree mode** is set to **rstp**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the spanning-tree mode to rapid spanning-tree protocol:

```
(config)#spanning-tree mode rstp
```

spanning-tree pathcost method [short | long]

Use the **spanning-tree pathcost** command to select a short or long pathcost method used by the spanning-tree protocol.

Syntax Description

short	Specifies a short pathcost method.
long	Specifies a long pathcost method.

Default Values

By default, **spanning-tree pathcost** is set to **short**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that the spanning-tree protocol use a long pathcost method:

```
(config)#spanning-tree pathcost method long
```

spanning-tree priority <value>

Use the **spanning-tree priority** command to set the priority for spanning-tree interfaces. The lower the priority value, the higher the likelihood the configured spanning-tree interface will be the root for the bridge group. To return to the default bridge priority value, use the **no** version of this command.

Syntax Description

<value> Sets a priority value for the bridge interface. Configuring this value to a low number increases the interface's chance of being the root. Therefore, the maximum priority level would be 0. Range: 0 to 65,535.

Default Values

By default, the priority level is set to 32768.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets **spanning-tree priority** to the maximum level:

```
(config)#spanning-tree priority 0
```

stack [master | member | vlan] <master> <member> <vlan>

Use the **stack** command to configure switch-stacking options.

Syntax Description

master	Specifies that the unit will be the master of the stack.
<vlan>	Configures the private IP network the stack will use for communication.
<IP network>	Configures the network mask of the private IP network.
<IP mask>	Configures the VLAN over which the private IP network will operate. (2386 is the default).
member	Adds a switch to the stack.
<MAC address>	Specifies the MAC address of the unit being added.
<unit id>	Specifies the unit ID of the switch being added.
vlan	Specifies the management VLAN of the stack of which you are a member.
<vlan>	Setting this value puts you in stack member mode, as opposed to stack master mode.

Default Values

By default, stack vlan is 2386, and the stack IP network is 169.254.0.0/24.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following are variations of the **stack** command:

This example configures the unit to be the stack master and use the default stack VLAN and IP network.

```
(config)#stack master 2000
```

This example configures the unit to be the stack master and use VLAN 2000 as the management VLAN and 192.168.1.0/24 as the management network.

```
(config)#stack master 2000 192.168.1.0 255.255.255.0
```

This example adds the switch with the CPU MAC address 00:A0:C8:00:8C:20 to the stack; also assigns the number 2 as the new stack member's unit ID.

```
(config)#stack member 00:A0:C8:00:8C:20 2
```

This example specifies that this unit is in the stack using VLAN 2000 as its management VLAN; also specifies that this unit is in stack member mode (not a stack-master).

```
(config)#stack vlan 2000
```

username <username> **password** <password>

Use this command to configure the username and password to use for all protocols requiring a username-based authentication system including FTP server authentication, line (login local-user list), and HTTP access.

Syntax Description

<username>	Specifies a username using an alphanumerical string up to 30 characters in length (the username is case-sensitive).
<password>	Specifies a password using an alphanumerical string up to 30 characters in length (the password is case-sensitive).

Default Values

By default, there is no established username and password.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

All users defined using the **username/password** command are valid for access to the unit using the **login local-userlist** command.

Usage Examples

The following example creates a username of **ADTRAN** with password **ADTRAN**:

```
(config)#username ADTRAN password ADTRAN
```


voice ani match <match number> **substitute** <substitute number>

Use the **voice ani match** command to configure the inbound automatic number identification (ANI) substitution parameters. Use the **no** form of this command to delete substitution parameters.

Syntax Description

<match number>	Specifies the match template for ANI substitution.
<substitute number>	Specifies number to substitute for the match number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Functional Notes

The following rules apply to Match Numbers:

- 1) All “,” characters are ignored.
- 2) All “[” and “]” brackets must match and contain numbers only.
- 3) If using a “\$” wildcard, it is the only character allowed.
- 4) “X” matches [0 to 9], “N” matches [2 to 9].

The following rules apply to Substitute Numbers:

- 1) All “,” characters are ignored.
- 2) All “[” and “]” brackets must match and contain numbers only.
- 3) If using a “\$” wildcard, it must be at the end of the number.
- 4) “X” matches [0 to 9], “N” matches [2 to 9].
- 5) All wildcard positions must have same position as MATCH number.

The following examples show possible Match and Substitute numbers:

MATCH #	SUBST #
1) 256-555-XXXX	9-555-XXXX
2) NXX-NXX-XXXX	9-1-NXX-NXX-XXXX
3) \$	9\$

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example will substitute the number 256-555-6000 for all matches of 256-555-8000:

```
(config)#voice ani match 256555800 substitute 2565556000
```

voice class-of-service <rule set>

Use the **voice** command to create a voice class of service rule set and to enter the voice Class of Service command set. Use the **no** form of this command to delete a configured class of service rule set.

Syntax Description

<rule set> Specifies the name of the class of service rule set.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example creates a new class of service rule set called **set1**:

```
(config)#voice class-of-service set1  
Configuring New Level "set1".  
(config-cos-set1)#
```

voice codec-list <name>

Use the **voice codec-list** command to create a named CODEC list for call negotiation and to enter the CODEC List command set. See *Codec List Command Set* on page 1384 for details. Use the **no** form of this command to delete a configured CODEC list.

Syntax Description

<name> Specifies the CODEC list name.

Default Values

By default, there are no configured voice CODEC lists.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example creates a new CODEC list named **list 1**:

```
(config)#voice codec-list list 1  
Configuring New Codec List "list 1".  
(config-codec)
```

voice current-mode [day | holiday | lunch | night | weekend]

Use the **voice current-mode** command to set the current voice service mode.

Syntax Description

day	Specifies day mode.
holiday	Specifies holiday mode.
lunch	Specifies lunch mode.
night	Specifies night mode.
weekend	Specifies weekend mode.

Default Values

By default, the voice current mode is set to **day**.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the voice current service mode to **day**:

```
(config)#voice current-mode day
```

voice dial-plan *<pattern id>* [**900-number** | **always-permitted** | **extensions** | **internal-operator** | **international** | **local** | **long-distance** | **operator-assisted** | **specify-carrier** | **toll-free** | **user pattern**] *<pattern>*

Use the **voice dial-plan** command to add a global number complete pattern. Use the **no** form of this command to delete configured dial plans.

Syntax Description

<i><pattern id></i>	Specifies dial pattern identification. Valid range is 1 to 255.
900-number	Adds a pattern to the 900 number group.
always-permitted	Adds a pattern to the always permitted group.
extensions	Adds a pattern to the internal group.
internal-operator	Adds a pattern to the internal operator group.
international	Adds a pattern to the international group.
local	Adds a pattern to the local group.
long-distance	Adds a pattern to the long distance group.
operator-assisted	Adds a pattern to the operator assisted group.
specify-carrier	Adds a pattern to the specify carrier group.
toll-free	Adds a pattern to the toll free group.
user1	Adds a pattern to the user 1 group.
user2	Adds a pattern to the user 2 group.
user3	Adds a pattern to the user 3 group.
<i><pattern></i>	Specifies a pattern (Wildcards: N=2 to 9, M=1 to 8, X=0 to 9, []).

Default Values

By default, no dial plans are configured.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example adds the pattern **8000** to the local group:

```
(config)#voice dial-plan 1 local 8000
```

voice did <*did number*> **extension** <*extension*>

Use the **voice did** command to add a Direct Inward Dial (DID) number. Use the **no** form of this command to delete a configured translation.

Syntax Description

< <i>did number</i> >	Specifies the direct inward dial lookup number.
< <i>extension</i> >	Specifies the target account of the DID translation.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example directs DID number **5558123** to extension **8123**:

```
(config)#voice did 5558123 extension 8123
```

voice feature-mode [local | network]

Use the **voice feature-mode** command to configure control of the voice features.

Syntax Description

local	Allows voice features to be handled by local unit.
network	Allows voice features to be handled by the network.

Default Values

By default, the voice feature mode is set to network.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the control of the voice features to the local unit:

```
(config)#voice voice feature-mode local
```

voice flashhook mode [interpreted | transparent]

Use the **voice flashhook mode** command to determine if flashhook events will be interpreted locally or will be forwarded to the far end.

Syntax Description

interpreted	Allows the local unit to interpret flashhook events.
transparent	Specifies flashhook events to be transparent to the provider.

Default Values

By default, the voice flashhook mode is set to **interpreted**.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the flashhook mode to allow the local unit to interpret flashhook events:

```
(config)#voice flashhook interpreted
```


voice flashhook threshold <min time> <max time>

Use the **voice flashhook threshold** command to configure the minimum and maximum time the switchhook must be held to be interpreted as a flash.

Syntax Description

<min time>	Specifies minimum flashhook time. Valid range is from 300 to 1000.
<max time>	Specifies maximum flashhook time. Valid range is from 300 to 1000.

Default Values

By default, the flashhook threshold times are 300 (minimum) and 1000 (maximum).

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the flashhook thresholds at a minimum of **400** to a maximum of **900**:

```
(config)#voice flashhook threshold 400 900
```

voice grouped-trunk <trunk id>

Use the **voice grouped-trunk** command to create a grouped trunk and to enter the Grouped Trunk command set. See *Voice Trunk Group Command Set* on [page 1391](#) for details. Use the **no** form of this command to delete a configured grouped trunk.

Syntax Description

<trunk id>	Specifies the name of the trunk group.
------------	--

Default Values

By default, there are no configured grouped trunks.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates the trunk group **trunk3**:

```
(config)#voice grouped-trunk trunk3
(config-TRUNK3)#
```

voice hold-reminder <time>

Use the **voice hold-reminder** command to configure the time for the hold reminder.

Syntax Description

<time> Specifies the number of seconds until the phone rings back. The valid range is from 15 to 360 seconds.

Default Values

By default, the voice hold reminder is set to 30 seconds.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets the number of seconds until the phone rings back to **15**:

```
(config)#voice hold-reminder 15
```

voice park-return <time>

Use the **voice park-return** command to configure the time until a parked call returns.

Syntax Description

<time>	Specifies time in seconds until a call returns from park if not retrieved. The valid range is from 15 to 360 seconds.
--------	---

Default Values

By default, the voice park return time is set to 60 seconds.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the time a call returns from park to **30** seconds:

```
(config)#voice park-return 30
```

voice ring-group <extension>

Use the **voice ring-group** command to create or modify ring group parameters. Use the **no** form of this command to delete a configured ring group.

Syntax Description

<extension> Specifies the ring group's four digit extension.

Default Values

By default, no ring groups are configured.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example creates a new ring group with extension **5678**:

```
(config)#voice ring-group 5678
```

```
Configuring New Group "5678".
```

```
(config-5678)#
```

voice service-mode [**day** <day> <time> | **lunch** <day> <time> | **night** <day> <time> | **weekend** <day> <time>]

Use the **voice current-mode** command to add a service mode transition.

Syntax Description

day	Specifies a transition to day mode.
lunch	Specifies a transition to lunch mode.
night	Specifies a transition to night mode.
weekend	Specifies a transition to weekend mode.
<day>	Specifies day of week transition occurs.
<time>	Specifies the time for transition to occur (24 hour format - HH:MM).

Default Values

By default, the voice service mode is set to **day**.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the voice service mode to **day** with a transition day of Monday and a transition time of 8:00 A.M.:

```
(config)#voice service-mode day monday 08:00
```

voice spre <id> <pattern>

Use the **voice spre** command to add a global Special PREFIX (SPRE) complete pattern. This command allows a user to enter a custom SPRE code. Use the **no** form of this command to delete a configured SPRE pattern.

Syntax Description

<id>	Specifies the SPRE pattern ID. Valid range is 1 to 255.
<pattern>	Specifies complete pattern. Patterns begin with * or # (Wildcards: N=2 to 9, M=1 to 8, X=0 to 9, []). A trailing "&" allows the use of the dial-plan number complete pattern.

Default Values

No defaults are necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Functional Notes

This command allows the user to enter a SPRE code pattern. If the pattern is followed by an "&", then the dial-plan templates are used to determine when the unit has enough digits to dial the number (for example, 67&). However, if a dial plan does not exist for a particular code that is needed, then a SPRE code may be entered followed by an independent dial-plan number complete template (for example, *67NXX-XXXX).

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following sets the complete pattern for SPRE 1:

```
(config)#voice spre 1 *67NXX-XXXX
```

voice timeouts interdigit <time>

Use the **voice timeouts interdigit** command to configure time allowed between dialed digets.

Syntax Description

<time> Specifies time in seconds allowed between dialed digits. The valid range is 1 to 16.

Default Values

By default, the voice interdigit timeout is set to 16 seconds.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets the time allowed between dialed digits to **10** seconds:

```
(config)#voice timeouts interdigit 10
```


voice trunk <trunk id> type [sip | t1-rbs]

Use the **voice trunk type** command to create a new trunk and to enter the Voice Trunk command set. See *Voice User Command Set* on page 1351 for details. Use the **no** form of this command to delete a configured voice trunk.

Variations of this command include the following:

voice trunk <trunk id> type sip

voice trunk <trunk id> type t1-rbs supervision <wink> role <network>

voice trunk <trunk id> type t1-rbs <wink>

voice trunk <trunk id> type t1-rbs role

voice trunk <trunk id> type t1-rbs <network>



Refer to the *SIP Trunk Configuration Guide (61210916L1-29.1A)* and the *Total Access 900 Series ISDN PRI Quick Configuration Guide (61210916L1-42.5A)* for more information on voice trunks.

Syntax Description

<trunk id>	Specifies trunk's 2-digit identifier in the format Txx (for example, T01).
type	Specifies the trunk type.
sip	Configures this trunk for use with SIP.
t1-rbs	Configures this trunk for use with T1-RBS interfaces.
t1-rbs supervision	Configures supervision for the T1-RBS interface.
<wink>	Specifies E&M Wink supervision for the T1-RBS interface.
t1-rbs role	Configures the trunk role for the T1-RBS interface.
<network>	Terminates a line from CPE.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
Release 10.1	Ability to specify role was added for T1-RBS trunks.

Usage Examples

The following example creates the a new trunk T12 for use with SIP:

```
(config)#voice trunk t12 type sip
```

voice user <extension>

Use the **voice user** command to create a new user extension and to enter the Voice User command set. See *Voice User Command Set* on [page 1351](#) for details. Use the **no** form of this command to delete a configured extension or modify an existing extension's parameters.

Syntax Description

<extension>	Specifies user's extension.
-------------	-----------------------------

Default Values

By default, there are no configured voice users.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates a new user with extension **9876**:

```
(config)#voice user 9876
```

```
Configuring New User "9876".
```

```
(config-9876)#
```

vlan <vlan id>

Use the **vlan** command to enter the VLAN configuration mode. Refer to the section *VLAN Configuration Command Set* on [page 682](#) for more information.

Syntax Description

<vlan id> Specifies a valid VLAN ID (1 to 4094).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example enters the VLAN configuration mode for VLAN 1:

```
(config)#vlan 1
(config-vlan 1)#
```

DHCP POOL COMMAND SET

To activate the DHCP Pool mode, enter the **ip dhcp-server pool** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#ip dhcp-server pool MyPool
(config-dhcp)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
 [on page 1461](#)
do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)
shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

client-identifier <identifier> [on page 549](#)
client-name <name> [on page 551](#)
default-router <address> <secondary> [on page 552](#)
dns-server <address> <secondary> [on page 553](#)
domain-name <domain> [on page 554](#)
hardware-address <hardware-address> <type> [on page 555](#)
host <address> [<subnet mask> or <prefix length>] [on page 557](#)
lease <days> <hours> <minutes> [on page 558](#)
netbios-name-server <address> <secondary> [on page 559](#)
netbios-node-type <type> [on page 560](#)
network <address> [<subnet mask> or <prefix length>] [on page 561](#)
ntp-server <ip address> [on page 562](#)
option <option value> [ascii | hex | ip] <value> [on page 563](#)
tftp-server <server> [on page 564](#)
timezone-offset <offset> [on page 565](#)

client-identifier <identifier>

Use the **client-identifier** command to specify a unique identifier (in dotted hexadecimal notation) for a Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove a configured client identifier.

Syntax Description

<identifier> Specifies a custom client identifier using a text string (that is converted to a hexadecimal equivalent) or 7 to 28 hexadecimal numbers (with colon delimiters).

OR

Specifies the hexadecimal Media Access Control (MAC) address including a hexadecimal number added to the front of the MAC address to identify the media type.

For example, specifying the **client-identifier** for a MAC address of d217.0491.1150 defines the client identifier as **01:d2:17:04:91:11:50** (where 01 defines the media type as Ethernet).

For example, a custom client identifier of **0f:ff:ff:ff:51:04:99:a1** may be entered using the <identifier> option.

Default Values

client-id By default, the client identifier is populated using the following formula:

TYPE: INTERFACE SPECIFIC INFO : MAC ADDRESS

Where TYPE specifies the media type in the form of one hexadecimal byte (refer to *hardware-address* <hardware-address> <type> [on page 555](#) for a detailed listing of media types) and MAC ADDRESS is the MAC address assigned to the first Ethernet interface in the unit in the form of six hexadecimal bytes. (For units with a single Ethernet interface, the MAC ADDRESS assigned to Ethernet 0/1 is used in this field).

INTERFACE SPECIFIC INFO is only used for Frame Relay interfaces and can be determined using the following:

FR_PORT# : Q.922 ADDRESS

Where the FR_PORT# specifies the label assigned to the virtual Frame Relay interface using four hexadecimal bytes. For example, a virtual Frame Relay interface labeled 1 would have a FR_PORT# of 00:00:00:01.

The Q.922 ADDRESS field is populated using the following:

8	7	6	5	4	3	2	1
DLCI (high order)						C/R	EA
DLCI (lower)		FECN	BECN	DE	EA		

Where the FECN, BECN, C/R, DE, and high order EA bits are assumed to be 0, and the lower order extended address (EA) bit is set to 1.

The following list provides a few example DLCIs and associated Q.922 addresses:

DLCI (decimal) / Q.922 address (hex)

16 / 0x0401

50 / 0x0C21

60 / 0x0CC1

70 / 0x1061

80 / 0x1401

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

DHCP clients use client identifiers in place of hardware addresses. To create the client-identifier, begin with the two-digit numerical code representing the media type and append the client's MAC address. For example, a Microsoft client with an Ethernet (01) MAC address d2:17:04:91:11:50 uses a client identifier of 01:d2:17:04:91:11:50.

Usage Examples

The following example specifies the client identifier for a Microsoft client with an Ethernet MAC address of **d217.0491.1150**:

```
(config)#ip dhcp-server pool Microsoft_Clients
(config-dhcp)#client-identifier 01:d2:17:04:91:11:50
```

client-name <name>

Use the **client-name** command to specify the name of a Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove the configured client name.

Syntax Description

<name>	Identifies the DHCP client (example is client1) using an alphanumeric string (up to 32 characters in length).
--------	---



The specified client name should not contain the domain name.

Default Values

By default, there are no specified client names.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a client name of **myclient**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#client-name myclient
```

default-router <address> <secondary>

Use the **default-router** command to specify the default primary and secondary routers to use for the Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove the configured router.

Syntax Description

<address>	Specifies the address (in dotted decimal notation) of the preferred router on the client's subnet (example: 192.22.4.254).
<secondary>	Optional. Specifies the address (in dotted decimal notation) of the second preferred router on the client's subnet (example: 192.22.4.253).

Default Values

By default, there are no specified default routers.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

When specifying a router to use as the primary/secondary preferred router, verify that the listed router is on the same subnet as the DHCP client. The AOS allows a designation for two routers, listed in order of precedence.

Usage Examples

The following example configures a default router with address **192.22.4.253** and a secondary router with address **192.22.4.254**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#default-router 192.22.4.253 192.22.4.254
```

dns-server <address> <secondary>

Use the **dns-server** command to specify the default primary and secondary Domain Name System (DNS) servers to use for the Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove the configured DNS server.

Syntax Description

<address>	Specifies the address (in dotted decimal notation) of the preferred DNS server on the network (example: 192.72.4.254).
<secondary>	Optional. Specifies the address (in dotted decimal notation) of the second preferred DNS server on the network (example: 192.100.4.253).

Default Values

By default, there are no specified default DNS servers.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a default DNS server with address **192.72.3.254** and a secondary DNS server with address **192.100.4.253**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#dns-server 192.72.3.254 192.100.4.253
```

domain-name <domain>

Use the **domain-name** command to specify the domain name for the Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove the configured domain name.

Syntax Description

<name>	Identifies the DHCP client (e.g., adtran.com) using an alphanumeric string (up to 32 characters in length).
--------	---

Default Values

By default, there are no specified domain names.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a domain name of **adtran.com**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#domain-name adtran.com
```

hardware-address <hardware-address> <type>

Use the **hardware-address** command to specify the name of a Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove the configured client name.

Syntax Description

<hardware-address>	Specifies the hardware address (in hexadecimal notation with colon delimiters) of the preferred router on the client's subnet (example d2:17:04:91:11:50).
<type>	Optional. Specifies the hardware protocol of the DHCP client.

The hardware type field can be entered as follows:

ethernet	Specifies standard Ethernet networks.
ieee802	Specifies IEEE 802 standard networks.
<1-21>	Enter one of the hardware types listed in RFC1700.

The valid hardware types are as follows:

1	10 Mb Ethernet
2	Experimental 3 Mb Ethernet
3	Amateur Radio AX.25
4	Proteon ProNET Token Ring
5	Chaos
6	IEEE 802 Networks
7	ARCNET
8	Hyperchannel
9	Lanstar
10	Autonet Short Address
11	LocalTalk
12	LocalNet (IBM PCNet or SYTEK LocalNet)
13	Ultra link
14	SMDS
15	Frame Relay
16	Asynchronous Transmission Mode (ATM)
17	HDLC
18	Fibre Channel
19	Asynchronous Transmission Mode (ATM)
20	Serial Line
21	Asynchronous Transmission Mode (ATM)

Default Values

By default, the hardware address type is set to 10 Mbps Ethernet.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Usage Examples

The following example specifies an Ethernet client with a MAC address of **ae:11:54:60:99:10**:

```
(config)#ip dhcp-server pool MyPool  
(config-dhcp)#hardware-address ae:11:54:60:99:10 Ethernet
```

host <address> [*<subnet mask>* or *<prefix length>*]

Use the **host** command to specify the IP address and subnet mask for a manual binding to a Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to remove the configured client address.

Syntax Description

<address>	Specifies the IP address (in dotted decimal notation) for a manual binding to a DHCP client.
<subnet mask>	Optional. Specifies the network mask (subnet) for a manual binding to a DHCP client. If the subnet mask is left unspecified, the DHCP server examines its address pools to obtain an appropriate mask. If no valid mask is found in the address pools, the DHCP server uses the Class A, B, or C natural mask.
<prefix length>	Optional. Alternately, the prefix length may be used to specify the number of bits that comprise the network address. The prefix length must be preceded by a forward slash (/). For example, to specify an IP address with a subnet mask of 255.255.0.0, enter /16 after the address.

Default Values

By default, there are no specified host addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following examples show two different ways to specify a client with IP address **12.200.5.99** and a 21-bit subnet mask:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#host 12.200.5.99 255.255.248.0
```

or

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#host 12.200.5.99/21
```

lease <days> <hours> <minutes>

Use the **lease** command to specify the duration of the lease for an IP address assigned to a Dynamic Host Configuration Protocol (DHCP) client. Use the **no** form of this command to return to the default lease value.

Syntax Description

<days>	Specifies the duration of the IP address lease in days.
<hours>	Optional. Specifies the number of hours in a lease. You may only enter a value in the hours field if the days field is specified.
<minutes>	Optional. Specifies the number of minutes in a lease. You may only enter a value in the minutes field if the days and hours fields are specified.

Default Values

By default, an IP address lease is one day.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a lease of **2 days**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#lease 2
```

The following example specifies a lease of **1 hour**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#lease 0 1
```

The following example specifies a lease of **30 minutes**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#lease 0 0 30
```

netbios-name-server <address> <secondary>

Use the **netbios-name-server** command to specify the primary and secondary NetBIOS Windows Internet Naming Service (WINS) name servers available for use by the Dynamic Host Configuration Protocol (DHCP) clients. Use the **no** form of this command to remove a configured NetBIOS name server.

Syntax Description

<address>	Specifies the address (in dotted decimal notation) of the preferred NetBIOS WINS name server on the network (example: 192.72.4.254).
<secondary>	Optional. Specifies the address (in dotted decimal notation) of the second preferred NetBIOS WINS name server on the network (example: 192.100.4.253).

Default Values

By default, there are no configured NetBIOS WINS name servers.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a primary NetBIOS WINS name server with an IP address of **172.45.6.99** and a secondary with an IP address of **172.45.8.15**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#netbios-name-server 172.45.6.99 172.45.8.15
```

netbios-node-type <type>

Use the **netbios-node-type** command to specify the type of NetBIOS node used with Dynamic Host Configuration Protocol (DHCP) clients. Use the **no** form of this command to remove a configured NetBIOS node type.

Syntax Description

<type>	Specifies the NetBIOS node type used with DHCP clients.
--------	---

Valid node types are as follows:

- b-node** (1) - Broadcast node
- p-node** (2) - Peer-to-Peer node
- m-node** (4) - Mixed node
- h-node** (8) - Hybrid node (Recommended)

Alternately, the node type can be specified using the numerical value listed next to the nodes above.

Default Values

By default, the **netbios-node-type** is set to **h-node** (8) - Hybrid node.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a client's NetBIOS node type as **h-node**:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#netbios-node-type h-node
```

Alternately, the following also specifies the client's NetBIOS node type as **h-node**:

```
(config-dhcp)#netbios-node-type 8
```


network <address> [*<subnet mask>* or *<prefix length>*]

Use the **network** command to specify the subnet number and mask for an AOS Dynamic Host Configuration Protocol (DHCP) server address pool. Use the **no** form of this command to remove a configured subnet.

Syntax Description

<i><ip address></i>	Specifies the IP address (in dotted decimal notation) of the DHCP address pool.
<i><subnet mask></i>	Optional. Specifies the network mask (subnet) for the address pool. If the subnet mask is left unspecified, the DHCP server uses the Class A, B, or C natural mask.
<i><prefix length></i>	Optional. Alternately, the prefix length may be used to specify the number of bits that comprise the network address. The prefix length must be preceded by a forward slash (/). For example, to specify an IP address with a subnet mask of 255.255.0.0, enter /16 after the address.

Default Values

By default, there are no configured DHCP address pools.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following examples show two different ways to configure an address pool subnet of **192.34.0.0** with a 16-bit subnet mask:

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#network 192.34.0.0 255.255.0.0
```

or

```
(config)#ip dhcp-server pool MyPool
(config-dhcp)#network 192.34.0.0 /16
```

ntp-server <ip address>

Use the **ntp-server** command to specify the name of the Network Time Protocol (NTP) server published to the client.

Syntax Description

<ip address> Specifies the IP address of the NTP server.

Default Values

By default, no NTP server is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Usage Examples

The following example specifies the IP address of the NTP server:

```
(config)#ip dhcp pool MyPool
(config-dhcp)#ntp-server 192.168.1.1
```

option <option value> [**ascii** | **hex** | **ip**] <value>

Use the **option** command to describe a generic DHCP option to be published to the client. The user may specify any number of generic options to be published to the client.

Syntax Description

<option value>	Specifies the value of the generic DHCP option published to the client. Range: 0 to 255.
ascii	Specifies the DHCP option information in ascii format.
hex	Specifies the DHCP option information in hexadecimal format.
ip	Specifies the DHCP option information in IP format.
<value>	Specifies the ASCII, hexadecimal, or IP value. The value for ascii is simple text. The value for hex is an 8-digit hexadecimal number (32 bit). The value for ip is a standard IP address in the format A.B.C.D.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example publishes DHCP options to the client:

```
(config)#ip dhcp pool MyPool
(config-dhcp)#option 100 ascii ascii_value
(config-dhcp)#option 101 hex AB458E80
(config-dhcp)#option 102 ip 192.168.1.1
```

tftp-server <server>

Use the **tftp-server** command to specify the IP address or DNS name of the TFTP server published to the client.

Syntax Description

<server> Specifies the DNS name or dotted notation IP address of the server.

Default Values

By default, no tftp server is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Usage Examples

The following example specifies the IP address of the TFTP server:

```
(config)#ip dhcp pool MyPool
(config-dhcp)#tftp-server 192.168.1.1
```

The following example specifies the DNS name of the TFTP server:

```
(config)#ip dhcp pool MyPool
(config-dhcp)#tftp-server MyServer.adtran.com
```

timezone-offset <offset>

Use the **timezone-offset** command to specify the timezone adjustment (in hours) published to the client.

Syntax Description

<offset> Specifies the timezone adjustment (in hours) published to the client. Use an integer from -12 to 12.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Usage Examples

The following example sets the timezone adjustment for the client to -3 hours. For example, if the server time is configured for eastern time and the client is configured for Pacific time, you can set the client timezone adjustment to -3 hours:

```
(config)#ip dhcp pool MyPool
(config-dhcp)#timezone-offset -3
```

HDLC COMMAND SET

To activate the HDLC mode, enter the **interface hdcl** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface hdcl 1
(config-hdcl 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <polycyname> [on page 568](#)

alias link<"text"> [on page 571](#)

bandwidth <value> [on page 572](#)

bridge-group <group#> [on page 573](#)

crypto map <mapname> [on page 574](#)

dial-backup commands [on page 576](#)

dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname> <username>
<password> [on page 592](#)

fair-queue <threshold> [on page 594](#)

hold-queue <queue size> out [on page 595](#)

ip commands begin [on page 596](#)

keepalive <seconds> [on page 614](#)

lldp receive [on page 615](#)

lldp send [management-address l port-description l system-capabilities l system-description l
system-name l and-receive] [on page 616](#)

media-gateway ip [*loopback* | *primary* | *secondary* <*ip address*>] [on page 618](#)

mtu <*size*> [on page 619](#)

qos-policy out <*mapname*> [on page 620](#)

snmp trap link-status [on page 621](#)

access-policy <policyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic on an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<policyname> Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the HDLC interface labeled 1:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```


Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access list with the interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access policy that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the HDLC interface:

```
(config)#interface hdlc 1  
(config-hdlc 1)#access-policy MatchAll
```

alias link <“text”>

Each configured HDLC interface (when referenced using SNMP) contains a link (physical port) and a bundle (group of links). RFC1471 (for Link Connection Protocol) provides an interface table to manage lists of bundles and associated links. The **alias link** command provides the management station an identifying description for each link (HDLC physical).

Syntax Description

<“text”>	Describes the interface (for SNMP) by alphanumeric character string (must be encased in quotation marks).
----------	---

Default Values

By default, the HDLC identification string appears as empty quotes. (“ ”)

Applicable Platforms

This command applies to the 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Functional Notes

The **alias link** string should be used to uniquely identify an HDLC link. Enter a string that clearly identifies the link.

Usage Examples

The following example defines a unique character string for the virtual HDLC interface (1):

```
(config)#interface hdlc 1
(config-ppp 1)#alias link "HDLC_link_1"
```

Technology Review

Please refer to RFC1990 for a more detailed discussion on HDLC links and bundles.

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Enter bandwidth in kbps.

Default Values

To view default values use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the HDLC interface to 10 Mbps:

```
(config)#interface hdlc 1  
(config-hdlc 1)#bandwidth 10000
```

bridge-group <group#>

Use the **bridge-group** command to assign an interface to the specified bridge group. Use the **no** form of this command to remove the interface from the bridge group.

Syntax Description

<group#>	Specifies bridge group number (1 to 255) specified using the bridge-group command
----------	--

Default Values

By default, there are no configured bridge groups.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

A bridged network can provide excellent traffic management to reduce collisions and limit the amount of bandwidth wasted with unnecessary transmissions when routing is not necessary. Any two interfaces can be bridged (Ethernet to T1 bridge, Ethernet to Frame Relay sub-interface, etc.).

Usage Examples

The following example assigns the HDLC interface labeled 1 to bridge-group 1:

```
(config)#interface hdlc 1  
(config-hdlc 1)#bridge-group 1
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

<mapname> Enter the crypto map name that you wish to assign to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

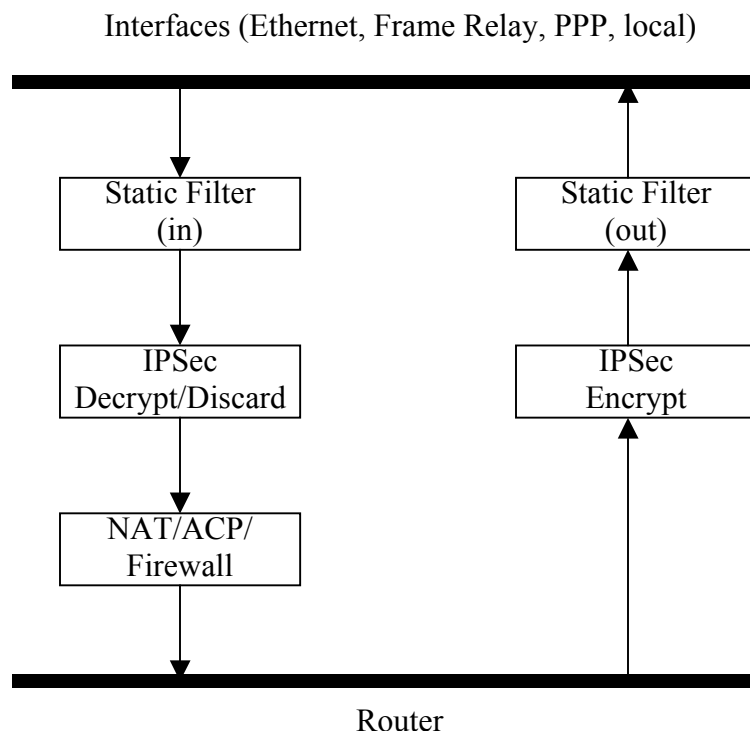
Command History

Release 9.1 Command was introduced.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy-class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the un-encrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access-group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only un-encrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy-class on an interface. When specifying the ACLs for a crypto map, the source information is the private local-side, un-encrypted source of the data. The destination information will be the far-end, un-encrypted destination of the data. However, ACLs for a policy-class work in reverse. The source information for the ACL in a policy-class is the far-end. The destination information is the local-side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the HDLC 1 interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#crypto map MyMap
```

dial-backup auto-backup

Use the **dial-backup auto-backup** command to configure the PPP interface to automatically attempt a dial-backup upon failure. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 579](#).

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically attempt dial-backup upon a failure.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example enables automatic dial-backup on the endpoint:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup auto-backup
```


dial-backup auto-restore

Use the **dial-backup auto-restore** command to configure the interface to automatically discontinue dial-backup when all network conditions are operational. Use the **no** form of this command to disable the auto-restore feature. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically restore the primary connection when the failure condition clears.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to automatically restore the primary connection when the failure condition clears:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup auto-restore
```

dial-backup backup-delay <seconds>

Use the **dial-backup backup-delay** command to configure the amount of time the router will wait after the failure condition is recognized before attempting to backup the link. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

<seconds>	Specifies the delay period (in seconds) a failure must be active before the AOS will enter backup operation on the interface. Range: 10 to 86,400 seconds.
-----------	--

Default Values

By default, the **dial-backup backup-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 60 seconds (on an endpoint with an active alarm condition) before attempting dial-backup operation:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup backup-delay 60
```

dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]

Use the **dial-backup call-mode** command to combine user data with pattern data to ensure data does not mirror standard DDS loop codes (use only on 64 kbps circuits without Frame Relay signaling). Use the **no** form of this command to return to the default value.

Syntax Description

answer	Answers and backs up primary link on failure.
answer-always	Answers and backs up regardless of primary link state.
originate	Originates backup call on primary link failure.
originate-answer	Originates or answers call on primary link failure.
originate-answer-always	Originates on failure; answers and backs up always.

Default Values

By default, the **dial-backup call-mode** is set to **originate-answer**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Functional Notes

The majority of the configuration for PPP dial-backup is configured in the PPP interface's. However, the numbers dialed are configured in the primary interface. Full sample configurations follow:

Sample configuration for remote router (dialing out)

```
hostname "Remote3200"  
enable password adtran  
!  
interface eth 0/1  
 ip address 192.168.1.254 255.255.255.0  
 no shutdown  
!  
interface modem 1/3  
 no shutdown  
!
```

```
interface t1 1/1
coding b8zs
framing esf
clock source line
tdm-group 1 timeslots 1-24
no shutdown
!
interface ppp 1
ip address 10.1.1.2 255.255.255.252
dial-backup call-mode originate
dial-backup number 5551111 analog ppp 2
cross-connect 1 t1 1/1 1 ppp 1
!
interface ppp 2
description connected to corp for dial-backup
ip address 10.10.10.2 255.255.255.252
ppp authentication pap
ppp pap sent-username joe password pswrd
!
ip route 0.0.0.0 0.0.0.0 10.1.1.1
!
line telnet 0 4
password adtran
```

Sample configuration for central router (dialing in)

```
hostname "Central3200"
enable password adtran
!
interface eth 0/1
ip address 192.168.100.254 255.255.255.0
no shutdown
!
interface modem 1/3
no shutdown
!
interface t1 1/1
coding b8zs
framing esf
clock source line
tdm-group 1 timeslots 1-24
no shutdown
!
interface ppp 1
```

```
no shutdown
cross-connect 1 t1 1/1 1 ppp 1
ip address 10.1.1.1 255.255.255.252
dial-backup call-mode answer
dial-backup number 555-8888 analog ppp 2
!
interface ppp 2
description connection for remote 3200 dialin for backup
ip address 10.10.10.1 255.255.255.252
ppp authentication pap
username joe password pswrd
!
line telnet 0 4
password adtran
```

Usage Examples

The following example configures the AOS to answer dial-backup calls on this endpoint but never generate calls:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup call-mode answer-always
```

Technology Review

This technology review provides information regarding specific dial-backup router behavior (i.e., when the router will perform dial-backup, where in the configuration the AOS accesses specific routing information, etc.):

Dialing Out

1. The AOS determines to place an outbound call when either the Layer 1 or Layer 2 has a failure.
2. When placing outbound calls, the AOS matches the number dialed to a PPP interface. This is accomplished with an addition to the **dial-backup number** command (refer to *dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>* [on page 585](#)).
3. When placing the call, the AOS uses the configuration of the related PPP interface for authentication and IP negotiation.
4. If the call fails to connect on the first number dialed, the AOS places a call to the second number if configured. The second number to be dialed references a separate PPP interface.

Dialing In

1. The AOS receives an inbound call on a physical interface.
2. Caller ID is used to match the **dial-backup number** command to the configured PPP interface.
3. If a match is found, the call connects and the AOS pulls down the primary connection if it is not already in a down state.
4. If no match is found from Caller ID, the call is terminated.

dial-backup connect-timeout <seconds>

Use the **dial-backup connect-timeout** command to specify the number of seconds to wait for a connection after a call is attempted before trying to call again or dialing a different number. It is recommended this number be greater than 60. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

<seconds>	Selects the amount of time (in seconds) that the router will wait for a connection before attempting another call (valid range: 10 to 300).
-----------	---

Default Values

By default, the **dial-backup connect-timeout** period is set to 60 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 120 seconds before retrying a failed dial-backup call:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup connect-timeout 120
```

dial-backup force [backup | primary]

Use the **dial-backup force** command to manually override the automatic dial-backup feature. This can be used to force a link into backup to allow maintenance to be performed on the primary link without disrupting data. Use the **no** form of this command to return to the normal dial-backup operation state. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 579.

Syntax Description

backup	Force backup regardless of primary link state.
primary	Force primary link regardless of its state.

Default Values

By default, this feature is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to force this interface into dial-backup:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup force backup
```

dial-backup maximum-retry <attempts>

Use the **dial-backup maximum-retry** command to select the number of calls the router will make when attempting to backup a link. Use the **no** form of this command to return to the default state. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 579.

Syntax Description

<attempts>	Selects the number of call retries that will be made after a link failure (valid range: 0 to 15).
------------	---

Setting this value to 0 will allow unlimited retries during the time the network is failed.

Default Values

By default, **dial-backup maximum-retry** is set to 0 attempts.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to retry a dial-backup call four times before considering backup operation not available:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup maximum-retry 4
```


dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>

Use the **dial-backup number** command to configure the phone number and the call type the router will dial upon network failure. Multiple entries can be made for an interface to allow alternate sites to be dialed. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [answer | answer-always | originate | originate-answer | originate-answer-always] [on page 579](#).

Syntax Description

<digits>	Specifies the phone numbers to call when the backup is initiated.
analog	Indicates number connects to an analog modem.
digital-56k	Indicates number belongs to a digital 56 kbps per DS0 connection.
digital-64k	Indicates number belongs to a digital 64 kbps per DS0 connection.
<isdn min chan>	Specifies the minimum number of DS0s required for a digital 56 or 64 kbps connection (Range: 1 to 24).
<isdn mas chan>	Specifies the maximum number of DS0s desired for a digital 56 or 64 kbps connection (Range: 1 to 24).
<interface>	Specifies the PPP interface (e.g., PPP 3) to use when originating or answering using this number.

Default Values

By default, there are no configured dial-backup numbers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to dial 704-555-1212 (digital 64 kbps connection) to initiate dial-backup operation on this endpoint using interface PPP 3:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup number 7045551212 digital-64k 1 1 ppp 3
```

dial-backup priority <value>

Use the **dial-backup priority** command to select the backup priority for this interface. This allows the user to establish the highest priority backup link and ensure that link will override backups attempted by lower priority links. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 579.

Syntax Description

<value>	Sets the relative priority of this link (valid range: 0 to 100). A value of 100 designates the highest priority.
---------	--

Default Values

By default, **dial-backup priority** is set to 50.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example assigns the highest priority to this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup priority 100
```

dial-backup randomize-timers

Use the **dial-backup randomize-timers** command to randomize the call timers to minimize potential contention for resources. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 579.

Syntax Description

No subcommands.

Default Values

By default, the AOS does not randomize the dial-backup call timers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to randomize the dial-backup timers associated with this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup randomize-timers
```

dial-backup redial-delay <seconds>

Use the **dial-backup redial-delay** command to configure the delay after an unsuccessful call until the call will be re-tried. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 579](#).

Syntax Description

<seconds>	Specifies the delay in seconds between attempting to re-dial a failed backup attempt. Range: 10 to 3600.
-----------	--

Default Values

By default, **dial-backup redial-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures a redial delay of 25 seconds on this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup redial-delay 25
```

dial-backup restore-delay <seconds>

Use the **dial-backup restore-delay** command to configure the amount of time the router will wait after the network is restored before disconnecting the backup link and reverting to the primary. This setting is used to prevent disconnecting the backup link if the primary link is “bouncing” in and out of alarm. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 579.

Syntax Description

<seconds>	Specifies the number of seconds the AOS will wait (after a primary link is restored) before disconnecting dial-backup operation. Range: 10 to 86,400.
-----------	---

Default Values

By default, **dial-backup restore-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 30 seconds before disconnecting dial-backup operation and restoring the primary connection for this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup restore-delay 30
```

dial-backup schedule [day | enable-time | disable-time]

Use the **dial-backup schedule** command to set the time of day that backup will be enabled. Use this command if backup is desired only during normal business hours and on specific days of the week. Use the **no** form of this command to disable dial-backup (as specified). For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [*answer* | *answer-always* | *originate* | *originate-answer* | *originate-answer-always*] on page 579.

Syntax Description

day	Sets the days to allow backup (valid range: Monday through Sunday).
enable-time	Sets the time of day to enable backup. Time is entered in 24-hour format (00:00).
disable-time	Sets the time of day to disable backup.

Default Values

By default, dial-backup is enabled for all days and times if the dial-backup auto-backup command has been issued and the dial-backup schedule has not been entered.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example enables dial-backup Monday through Friday 8:00 am to 7:00 pm:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup schedule enable-time 08:00
(config-ppp 1)#dial-backup schedule disable-time 19:00
(config-ppp 1)#no dial-backup schedule day Saturday
(config-ppp 1)#no dial-backup schedule day Sunday
```

dial-backup shutdown

Use the **dial-backup shutdown** command to deactivate all dial-backup functionality in the unit. Dial-backup configuration parameters are kept intact, but the unit will not initiate (or respond) to dial-backup sequences in the event of a network outage. Use the **no** form of this command to reactivate the dial-backup interface. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

No subcommands.

Default Values

By default, all AOS interfaces are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example deactivates the configured dial-backup interface:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup shutdown
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

See **Functional Notes** below for syntax descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or power users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs, and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service, in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address doesn't change often or at all, but you still want an easy name to remember it by (without having to purchase your own domain name) Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com) you need Custom DNS service which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the dynamic-dns to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface hdlc 1  
(config-hdlc 1)#dynamic-dns dyndns-custom host user pass
```

fair-queue <threshold>

Use the **fair-queue** command to enable weighted fair queuing (WFQ) on an interface. Use the **no** form of this command to disable WFQ and enable FIFO (first-in-first-out) queuing for an interface. WFQ is enabled by default for WAN interfaces.

Syntax Description

<threshold>	Optional. Value that specifies the maximum number of packets that can be present in each conversation sub-queue. Packets received for a conversation after this limit is reached are discarded. Range: 16 to 512.
-------------	---

Default Values

By default, fair-queue is enabled with a threshold of 64 packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables WFQ on the interface with a threshold set at 100 packets:

```
(config)#interface hdlc 1
(config-hdlc 1)#fair-queue 100
```

hold-queue <queue size> out

Use the **hold-queue** command to change the overall size of an interface's WAN output queue.

Syntax Description

<queue size>	The total number of packets the output queue can contain before packets are dropped. Range: 16 to 1000.
--------------	---

Default Values

The default queue size for WFQ is 400. The default queue size for PPP FIFO and Frame Relay round-robin is 200.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the overall output queue size to 700:

```
(config)#interface hdlc 1
(config-hdlc 1)#hold-queue 700
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Assigned IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the unit to only allow Telnet traffic (as defined in the user-configured **TelnetOnly** IP access list) into the HDLC interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#int hdlc 1
(config-hdlc 1)#ip access-group TelnetOnly in
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the optional **secondary** keyword to define a secondary IP address. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Keyword used to configure a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced
-------------	------------------------

Functional Notes

Use secondary IP addresses to allow dual subnets on a single interface (when you need more IP addresses than the primary subnet can provide). When using secondary IP addresses, avoid routing loops by verifying that all devices on the network segment are configured with secondary IP addresses on the secondary subnet.

Usage Examples

The following example configures a secondary IP address of **192.22.72.101/30**:

```
(config)#hdlc 1  
(config-hdlc 1)#ip address 192.22.72.101 255.255.255.252 secondary
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



*The **ip helper** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. See [ip forward-protocol udp <port number>](#) on page 319 for more information.*

Syntax Description

<address>	Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.
-----------	--

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced
-------------	------------------------

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign a helper-address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface hdlc 1  
(config-hdlc 1)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	If only one host (or IGMP snooping switch) is connected to the interface, when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	This command controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer, if no receiver responds, the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65535 ms. Default: 1000 ms.
querier-timeout <seconds>	Number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60-300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface hdlc 1  
(config-hdlc 1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface and place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. See *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub upstream* [on page 604](#) for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 10.1	Command was expanded to include HDLC interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the unit to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#), *ip mcast-stub downstream* [on page 602](#), and *ip mcast-stub upstream* [on page 604](#) for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
config)#interface hdlc 1
(config-hdlc 1)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. See *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 602](#) for more information.

Usage Examples

The following example enables multicast forwarding on the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#ip mcast-stub upstream
```

ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key	Specifies a simple-text authentication password to be used by other routers using <i><password></i> the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte max) keys.
priority <value>	Set the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32767.

Default Values

retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
dead-interval <seconds>	40 seconds

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sets the maximum number of seconds allowed between hello packets to 25,000:

```
(config)#interface hdlc 1  
(config-hdlc 1)#ip ospf dead-interval 25000
```

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Select message-digest authentication type.
null	Optional. Select for no authentication to be used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that no authentication will be used on the HDLC interface:

```
(config)#interface hdlc 1  
(config-hdlc 1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Set the network type for broadcast.
point-to-point	Set the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface hdlc 1  
(config-hdlc 1)#ip ospf network broadcast
```


ip proxy-arp <ip address> <subnet mask>

Use the **ip proxy-arp** command to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<ip address>	Defines the proxy ARP IP address in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy-arp is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

In general, the principle of proxy ARP allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all proxy ARP requests with its specified MAC address and forward packets accordingly.

Enabling proxy ARP on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the HDLC interface:

```
(config)#interface hdlc 1  
(config-hdlc 1)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|---|--|
| 1 | Only accept received RIP version 1 packets on the interface. |
| 2 | Only accept received RIP version 2 packets on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the version command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip receive version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. See *version [1 | 2]* on page 1330 for more information.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the HDLC interface to accept only RIP version 2 packets:

```
(config)#interface hdlc 1
(config-hdlc 1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

1	Only transmits RIP version 1 packets on the interface.
2	Only transmits RIP version 2 packets on the interface.

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip send version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. See *version [1 | 2]* on page 1330 for more information.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the HDLC interface to transmit only RIP version 2 packets:

```
(config)#interface hdlc 1
(config-hdlc 1)#ip rip send version 2
```

ip route-cache

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route-cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast switching on the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#ip route-cache
```

ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface (in the format type slot/port) that contains the IP address to use as the source address for all packets transmitted on this interface.
-------------	---

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced
-------------	------------------------

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered eth 0/1** while in the Frame Relay Sub-Interface Configuration mode configures the Frame Relay sub-interface to use the IP address assigned to the Ethernet interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface.

Usage Examples

The following example configures the HDLC interface to use the IP address assigned to the Ethernet interface (**eth 0/1**):

```
(config)#interface hdlc 1  
(config-hdlc 1)#ip unnumbered eth 0/1
```

keepalive <seconds>

Use the **keepalive** command to enable the transmission of keepalive packets on the interface and specify the time interval in seconds between transmitted packets.

Syntax Description

<seconds>	Defines the time interval (in seconds) between transmitted keepalive packets (valid range: 0 to 32,767 seconds).
-----------	--

Default Values

By default, the time interval between transmitted keepalive packets is 10 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

If three keepalive packets are sent to an interface with no response, the interface is considered down. To detect interface failures quickly, specify a smaller keepalive time.

Usage Examples

The following example specifies a keepalive time of 5 seconds on the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#keepalive 5
```

Ildp receive

Use the **ildp receive** command to allow LLDP packets to be received on this interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are configured to send and receive LLDP packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the HDLC interface to receive LLDP packets:

```
(config)#interface hdlc 1  
(config-hdlc 1)#ildp receive
```

lldp send [management-address | port-description | system-capabilities | system-description | system-name | and-receive]

Use the **lldp send** command to configure this interface to transmit LLDP packets or to control the types of information contained in the LLDP packets transmitted by this interface.

Syntax Description

management-address	Enables transmission of management address information on this interface.
port-description	Enables transmission of port description information on this interface.
system-capabilities	Enables transmission of this device's system capabilities on this interface.
system-description	Enables transmission of this device's system description on this interface.
system-name	Enables transmission of this device's system name on this interface.
and-receive	Configures this interface to both transmit and receive LLDP packets.

Default Values

By default, all interfaces are configured to transmit and receive LLDP packets of all types.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Individual LLDP information can be enabled or disabled using the various forms of the **lldp send** command. For example, use the **lldp send and-receive** command to enable transmit and receive of all LLDP information. Then use the **no lldp send port-description** command to prevent LLDP from transmitting port description information.

Usage Examples

The following example configures the HDLC interface to transmit LLDP packets containing all enabled information types:

```
(config)#interface hdlc 1  
(config-hdlc 1)#lldp send
```

The following example configures the HDLC to transmit and receive LLDP packets containing all information types:

```
(config)#interface hdlc 1  
(config-hdlc 1)#lldp send and-receive
```

media-gateway ip [loopback | primary | secondary <ip address>]

Use the **media-gateway ip** command to associate an IP address source to use for RTP traffic. When configuring VoIP, RTP traffic needs an IP address to be associated with it. However, some interfaces allow "dynamic" configuration of IP addresses, and thus, this value could change periodically.

Syntax Description

loopback	Use an IP address statically defined to a loopback interface. Helpful when using a single IP address across multiple WAN interfaces for RTP traffic.
primary	Use the IP address that is configured as primary on this interface. Applies to static, DHCP, or negotiated addresses.
secondary <ip-address>	Use the statically defined secondary IP address of this interface to be used for RTP traffic.

Default Values

By default, **media-gateway ip** is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example configures the unit to use the primary IP address for RTP traffic:

```
(config)#interface hdlc 1  
(config-hdlc 1)#media-gateway ip primary
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:	
	ATM interfaces	64 to 1520
	Ethernet interfaces	64 to 1500
	FDL interfaces	64 to 256
	HDLC interfaces	64 to 1520
	Loopback interfaces	64 to 1500
	Tunnel interfaces	64 to 18,190
	Virtual Frame Relay sub-interfaces	64 to 1520
	Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:	
	ATM interfaces	1500
	Ethernet interfaces	1500
	FDL interfaces	256
	HDLC interfaces	1500
	Loopback interfaces	1500
	Tunnel interfaces	1500
	Virtual Frame Relay sub-interfaces	1500
	Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#mtu 1200
```

qos-policy out <mapname>

Use the **qos-policy out** command to apply a previously-configured QoS map to an interface. Use the **no** form of this command to remove the map from the interface. The **out** keyword specifies that this policy will be applied to outgoing packets.

Syntax Description

<mapname>	Specifies the name of a previously-created QoS map (see <i>qos map <mapname></i> <sequence number> on page 490 for more information).
-----------	---

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example applies the QoS map **VOICEMAP** to the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#qos-policy out VOICEMAP
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the HDLC interface:

```
(config)#interface hdlc 1  
(config-hdlc 1)#no snmp trap link-status
```

IKE POLICY ATTRIBUTES COMMAND SET

To activate the IKE Policy Attributes mode, enter the **attribute** command at the IKE Policy prompt. For example:

```
>enable
#configure terminal
(config)#crypto ike policy 1
(config-ike)#attribute 10
(config-ike-attribute)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

do on page 1465

end on page 1466

exit on page 1467

All other commands for this command set are described in this section in alphabetical order.

authentication [*dss-sig* | *pre-share* | *rsa-sig*] on page 623

encryption [*aes-xxx-cbc* | *des* | *3des*] on page 624

group [1 | 2] on page 625

hash [*md5* | *sha*] on page 626

lifetime <seconds> on page 627



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation** CD provided with your unit.*

authentication [dss-sig | pre-share | rsa-sig]

Use the **authentication** command to configure this IKE policy's use of pre-shared secrets and signed certificates during IKE negotiation.

Syntax Description

dss-sig	Specifies to use DSS-signed certificates during IKE negotiation to validate the peer.
pre-share	Specifies the use of pre-shared secrets during IKE negotiation to validate the peer.
rsa-sig	Specifies to use RSA-signed certificates during IKE negotiation to validate the peer.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
Release 5.1	Command was expanded to include signed certificates.

Functional Notes

Both sides must share the same pre-shared secret in order for the negotiation to be successful.

Usage Example

The following example enables preshared secrets for this IKE policy:

```
(config-ike)#attribute 10
(config-ike-attribute)#authentication pre-share
```

encryption [aes-xxx-cbc | des | 3des]

Use the **encryption** command to specify which encryption algorithm this IKE policy will use to transmit data over the IKE-generated SA.

Syntax Description

aes-128-cbc	Specifies the AES-128-CBC encryption algorithm.
aes-192-cbc	Specifies the AES-192-CBC encryption algorithm.
aes-256-cbc	Specifies the AES-256-CBC encryption algorithm.
des	Specifies the DES encryption algorithm.
3des	Specifies the 3DES encryption algorithm.

Default Values

By default, encryption is set to DES.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example selects 3DES as the encryption algorithm for this IKE policy:

```
(config-ike)#attribute 10  
(config-ike-attribute)#encryption 3des
```


group [1 | 2]

Use the **group** command to specify the Diffie-Hellman Group (1 or 2) to be used by this IKE policy to generate the keys (which are then used to create the IPsec SA).

Syntax Description

1	Specifies 768-bit mod P.
2	Specifies 1024-bit mod P.

Default Values

By default, group is set to 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

The local IKE policy and the peer IKE policy must have matching group settings in order for negotiation to be successful.

Usage Examples

The following example sets this IKE policy to use Diffie-Hellman Group 2:

```
(config-ike)#attribute 10  
(config-ike-attribute)#group 2
```

hash [md5| sha]

Use the **hash** command to specify the hash algorithm to be used to authenticate the data transmitted over the IKE SA.

Syntax Description

md5	Choose the MD5 hash algorithm.
sha	Choose the SHA hash algorithm.

Default Values

By default, hash is set to **sha**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies **md5** as the hash algorithm:

```
(config-ike)#attribute 10
(config-ike-attribute)#hash md5
```

lifetime <*seconds*>

Use the **lifetime** command to specify how long an IKE SA is valid before expiring.

Syntax Description

<*seconds*> Specify how many seconds an IKE SA will last before expiring.

Default Values

By default, lifetime is set to 28,800 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1 Command was introduced.

Usage Examples

The following example sets a lifetime of two hours:

```
(config-ike)#attribute 10  
(config-ike-attribute)#lifetime 7200
```

IKE POLICY COMMAND SET

To activate the IKE Policy mode, enter the **crypto ike policy** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#crypto ike policy 1
(config-ike)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
 [on page 1461](#)
do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

attribute <polycynumber> [on page 629](#)
client authentication host [on page 630](#)
client authentication host xauth-type [generic | otp | radius] [on page 631](#)
client authentication server list <listname> [on page 632](#)
client configuration pool <poolname> [on page 633](#)
initiate [main | aggressive] [on page 634](#)
local-id [address | asn1-dn | fqdn | user-fqdn] <ipaddress or name> [on page 635](#)
nat-traversal <version> [allow | disable | force] [on page 637](#)
peer [<ip address> | any] [on page 638](#)
respond [main | aggressive | anymode] [on page 640](#)



For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation** CD provided with your unit.

attribute <policynumber>

Use the **attribute** command to define attributes for the associated IKE policy. Multiple attributes can be created for a single IKE policy. Once you enter this command, you are in the IKE Policy Attribute mode. Refer to *IKE Policy Attributes Command Set* on page 622 for more information.

Syntax Description

<policynumber> Assigns a number (range: 1 to 65,535) to the attribute policy. The number is the attribute's priority number and specifies the order in which the resulting VPN proposals get sent to the far end.

This command takes you to the **(config-ike-attribute)#** prompt. From here, you can configure the settings for the attribute as outlined in the section *IKE Policy Attributes Command Set* on page 622.

Default Values

By default, no attribute is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Multiple attributes on an IKE policy are ordered by number (with the lowest number representing the highest priority).

Usage Examples

The following example defines a policy attribute (**10**) and takes you into the IKE Policy Attributes:

```
(config-ike)#attribute 10
(config-ike-attribute)#
```

client authentication host

Use the **client authentication host** command to enable the unit to act as an Xauth host when this IKE policy is negotiated with a peer.

Variations of this command include the following:

client authentication host username <username>

client authentication host username <username> **password** <word>

client authentication host username <username> **password** <word> **passphrase** <phrase>

Syntax Description

username <username> Specifies the value sent via Xauth as the username.

password <word> Specifies the value sent via Xauth as the password.

passphrase <phrase> Optional. Specifies the value sent via Xauth as the passphrase. This is only used with authentication type OTP (one time password).

Default Values

By default, if this command is not present in the IKE policy the unit does not act as an Xauth host.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The specified credentials are programmed into the unit and there is no prompt for entering values real-time. Therefore, schemes requiring real-time input or additional responses (e.g., SecureID) are not supported. The **client authentication host** command and the **client authentication server** commands are mutually exclusive. Refer to *client authentication server list* <listname> [on page 632](#) for more information.

Usage Examples

The following example specifies the login credentials to be sent:

```
(config-ike)#client authentication host username jsmith password password1 passphrase phrase
```

client authentication host xauth-type [generic | otp | radius]

Use the **client authentication host xauth-type** command to allow the user to specify the Xauth authentication type if a type other than **generic** is desired.

Syntax Description

generic	Specifies generic authentication type.
otp	Specifies OTP authentication type.
radius	Specifies RADIUS authentication type.

Default Values

By default, this is set to generic.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used along with the **client authentication host username**. Refer to *client configuration pool <poolname>* on page 633 for more information. When acting as an Xauth host, this command allows the user to specify the Xauth authentication type if a type other than generic is desired.

Usage Examples

The following example sets the Xauth type to **radius**:

```
(config-ike)#client authentication host xauth-type radius
```

client authentication server list <listname>

Use the **client authentication server list** command to enable the unit to act as an Xauth server (edge device).

Syntax Description

<listname>	Specifies the named list created with the aaa authentication login command.
------------	--

Default Values

By default, the router does not act as an Xauth server and extended authentication is not performed.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this IKE policy is negotiated and the peer has indicated Xauth via the IKE authentication method and/or the Xauth vendor ID, this command allows the unit to perform as an Xauth server (edge device). The specified AAA login method is used to identify the location of the user authentication database. The **client authentication host** and the **client authentication server** commands are mutually exclusive. Refer to *client configuration pool <poolname>* [on page 633](#) for more information.

Usage Examples

The following example enables Xauth as an Xauth server and specifies which AAA method list to use in locating the user database:

```
(config-ike)#client authentication server list clientusers
```


client configuration pool <poolname>

Use the **client configuration pool** command to configure the AOS to perform as mode-config server (edge device) when an IKE policy is negotiated.

Variations of this command include the following:

```
client configuration pool <poolname>
client configuration pool <poolname> initiate
client configuration pool <poolname> initiate respond
client configuration pool <poolname> respond
client configuration pool <poolname> respond initiate
```

Syntax Description

<poolname>	The pool from which to obtain parameters to assign to the client.
------------	---

Default Values

By default, if this command is not present in the IKE policy, the ADTRAN device allocates mode-config IP addresses, DNS server addresses, and NetBIOS name server addresses, and mode-config is not performed.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command ties an existing client configuration pool to an IKE policy.

Usage Examples

The following example ties the **ConfigPool1** configuration pool to this IKE policy:
(config-ike)#**client configuration pool ConfigPool**

initiate [main | aggressive]

Use the **initiate** command to allow the IKE policy to initiate negotiation (in main mode or aggressive mode) with peers. Use the **no** form of this command to allow the policy to respond only.

Syntax Description

main	Specifies to initiate using main mode. Main mode requires that each end of the VPN tunnel has a static WAN IP address. Main mode is more secure than aggressive mode because more of the main mode negotiations are encrypted.
aggressive	Specifies to initiate using aggressive mode. Aggressive mode can be used when one end of the VPN tunnel has a dynamically assigned address. The side with the dynamic address must be the initiator of the traffic and tunnel. The side with the static address must be the responder.

Default Values

By default, the **main** initiation mode is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

By using the **initiate** and **respond** commands, you can configure the IKE policy to initiate and respond, initiate only, or respond only. It is an error if you have both **initiate** and **respond** disabled.

Usage Examples

The following example enables the AOS device to initiate IKE negotiation in main mode:

```
(config-ike)#initiate main
```

local-id [address | asn1-dn | fqdn | user-fqdn] <ipaddress or name>

Use the **local-id** command to set the local ID for the IKE policy. This setting overrides the system local ID setting (set in the Global Configuration mode using the **crypto ike local-id address** command).

Syntax Description

address <ipaddress>	Specifies a remote ID of IPv4 type.
asn1-dn <name>	Specifies an Abstract Syntax Notation Distinguished Name as the remote ID (enter this value in LDAP format).
fqdn <name>	Specifies a fully qualified domain name (e.g., adtran.com) as the remote ID.
user-fqdn <name>	Specifies a user fully qualified domain name or email address (e.g., user1@adtran.com) as the remote ID.

Default Values

By default, the local ID is not defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

The local ID for a particular IKE policy can be set in two ways. The first (default) method is done in the Global Configuration mode:

```
(config)#crypto ike local-id address
```

This command, which by default is executed on start-up, makes the local ID of an IKE policy equal to the IPv4 address of the interface on which an IKE negotiation is occurring. This is particularly useful for products that could have multiple public interfaces.

The second method is to use the IKE policy command:

```
(config-ike)#local-id [address | fqdn | user-fqdn] <ipaddress or fqdn>
```

This policy-specific command allows you to manually set the local ID for an IKE policy on a per-policy basis. You can use both methods simultaneously in the product. Several IKE policies can be created, some of which use the default system setting of the IPv4 address of the public interface. Others can be set to override this system setting and manually configure a local ID specific to those policies. When a new IKE policy is created, they default to **no local-id**. This allows the system local ID setting to be applied to the policy.

Usage Examples

The following example sets the local ID of this IKE policy to the IPv4 address 63.97.45.57:

```
(config-ike)#local-id address 63.97.45.57
```

nat-traversal <version> [allow | disable | force]

Use the **nat-traversal** command to allow, force, or disable NAT traversal version 1 and 2 on a specific Ike policy.

Syntax Description

<version>	Specifies v1 or v2 to select the NAT traversal version.
allow	Sets the IKE policy to allow the specified NAT traversal version.
disable	Sets the IKE policy to disable the specified NAT traversal version.
force	Sets the IKE policy to force the specified NAT traversal version.

Default Values

The defaults for this command are **nat-traversal v1 allow** and **nat-traversal v2 allow**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example disables version 2 on Ike policy 1:

```
(config)#crypto ike policy 1
(config-ike)#nat-traversal v2 disable
```

peer [*<ip address>* | any]

Use the **peer** command to enter the IP address of the peer device. Repeat this command for multiple peers. Use the **any** keyword if you want to set up a policy that will initiate or respond to any peer.

Syntax Description

<i><ip address></i>	Specifies a peer IP address.
any	Allows any peer to connect to this IKE policy.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

An IKE policy is incomplete unless one of the peer commands is specified. Only one IKE policy can be configured with **peer any**.

Usage Examples

The following example sets multiple peers on an IKE policy for an initiate-and-respond policy using pre-shared secret, DES, MD5, and Diffie-Hellman Group 1:

```
(config)#crypto ike policy 100
(config-ike)#peer 63.97.45.57
(config-ike)#peer 63.105.15.129
(config-ike)#peer 192.168.1.3
(config-ike)#respond anymode
(config-ike)#initiate main
```

The following example sets up a policy allowing any peer to initiate using preshared secret, DES, MD5, and Diffie-Hellman Group 1.

```
(config)#crypto ike policy 100  
(config-ike)#peer any  
(config-ike)#respond anymode  
(config-ike)#initiate main
```

Technology Review

IKE policies must have a peer address associated with them to allow certain peers to negotiate with the ADTRAN product. This is a problem when you have “roaming” users (those who obtain their IP address using DHCP or some other dynamic means). To allow for “roaming” users, the IKE policy can be set up with **peer any** to allow any peer to negotiate with the ADTRAN product. There can only be one **peer any** policy in the running configuration.

respond [main | aggressive | anymode]

Use the **respond** command to allow the IKE policy to respond to negotiations by a peer. Use the **no** form of this command to allow the policy to only initiate negotiations.

Syntax Description

main	Specifies to respond only to main mode.
aggressive	Specifies to respond only to aggressive mode.
anymode	Specifies to respond to any mode.

Default Values

By default, respond to any mode is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

By using the **initiate** and **respond** commands, you can configure the IKE policy to initiate and respond, initiate only, or respond only. It is an error if you have both **initiate** and **respond** disabled.

Usage Examples

The following example configures the router to initiate and respond to IKE negotiations:

```
(config-ike)#respond anymode  
(config-ike)#initiate main
```


IKE CLIENT COMMAND SET

To activate the IKE Client mode, enter the **crypto ike client** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#crypto ike client configuration pool ConfigPool1
(config-ike-client-pool)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

do on page 1465

end on page 1466

exit on page 1467

All other commands for this command set are described in this section in alphabetical order.

dns-server <address1> <address2> on page 642

ip-range <start ip> <end ip> on page 643

netbios-name-server <address1> <address2> on page 644



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

dns-server <address1> <address2>

Use the **dns-server** command to specify the DNS server address(es) to assign to a client.

Syntax Description

<address1>	Assigns the first DNS server address.
<address2>	Optional. Assigns the second DNS server address.

Default Values

By default, no DNS server address is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines two DNS server addresses for this configuration pool:

```
(config)#crypto ike client configuration pool ConfigPool1
(config-ike-client-pool)#dns-server 172.1.17.1 172.1.17.3
```

ip-range <start ip> <end ip>

Use the **ip-range** command to specify the range of addresses from which the router draws when assigning an IP address to a client.

Syntax Description

<start ip>	Specifies the first IP address in the range for this pool.
<end ip>	Specifies the last IP address in the range for this pool.

Default Values

By default, no IP address range is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines an IP address range for this configuration pool:

```
(config)#crypto ike client configuration pool ConfigPool1
(config-ike-client-pool)#ip-range 172.1.1.1 172.1.1.25
```

netbios-name-server <address1> <address2>

Use the **netbios-name-server** command to specify the NetBIOS Windows Internet Naming Service (WINS) name servers to assign to a client.

Syntax Description

<address1>	Specifies the first WINS server address to assign.
<address2>	Specifies the second WINS server address to assign.

Default Values

By default, no WINS server address is defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines two WINS server addresses for this configuration pool:

```
(config)#crypto ike client configuration pool ConfigPool1
(config-ike-client-pool)#netbios-name-server 172.1.17.1 172.1.17.25
```

CRYPTO MAP IKE COMMAND SET

To activate the Crypto Map IKE mode, enter a valid version of the **crypto map ipsec-ike** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#crypto map Map-Name 10 ipsec-ike
(config-crypto-map)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

description <text> on page 1464

do on page 1465

end on page 1466

exit on page 1467

All other commands for this command set are described in this section in alphabetical order.

antireplay on page 646

ike-policy <policy number> on page 647

match address <listname> on page 648

set peer <address> on page 650

set pfs [group1 | group2] on page 651

set security-association lifetime [kilobytes | seconds] <value> on page 652

set transform-set <setname1 - setname6> on page 653



For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation** CD provided with your unit.

antireplay

Use the **antireplay** command to enable antireplay sequence number checking for all security associations created on this crypto map. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series and units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables antireplay sequence checking on crypto map VPN 100:

```
(config)#crypto map VPN 100 ipsec-ike
(config-crypto-map)#antireplay
```

ike-policy <policy number>

Use the **ike-policy** command to ensure that only a specified IKE policy is used to establish the IPsec tunnel. This prevents any mobile VPN policies from using IPsec policies that are configured for static VPN peer policies.

Syntax Description

<policy number> Specifies the policy number of the policy to assign to this crypto map.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example shows a typical crypto map configuration:

```
(config)#crypto ike policy 100
(config)#crypto map VPN 10 ipsec-ike
(config-crypto-map)#description "Remote Office"
(config-crypto-map)#match address VPN-10-vpn-selectors
(config-crypto-map)#set peer 10.22.17.13
(config-crypto-map)#set transform-set esp-3des-esp-md5-hmac
(config-crypto-map)#ike-policy 100
```

match address <listname>

Use the **match address** command to assign an IP access list to a crypto map definition. The access list designates the IP packets to be encrypted by this crypto map. Refer to *ip access-list extended <listname>* on page 387 for more information on creating access lists.

Syntax Description

<listname> Specifies the name of the access list you wish to assign to this crypto map.

Default Values

By default, no IP access lists are defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Functional Notes

Crypto map entries do not directly contain the selectors used to determine which data to secure. Instead, the crypto map entry refers to an access control list. An access control list (ACL) is assigned to the crypto map using the **match address** command. If no ACL is configured for a crypto map, then the entry is incomplete and will have no effect on the system.

The entries of the ACL used in a crypto map should be created with respect to traffic sent by the ADTRAN product. The source information must be the local ADTRAN product and the destination must be the peer.

Only extended access lists can be used in crypto maps.

Usage Examples

The following example shows setting up an ACL (called **NewList**) and then assigning the new list to a crypto map (called **NewMap**):

```
(config)#ip access-list extended NewList

Configuring New Extended ACL "NewList"
(config-ext-nacl)#exit
(config)#crypto map NewMap 10 ipsec-ike
(config-crypto-map)#match address NewList
```

Technology Review

A crypto map entry is a single policy that describes how certain traffic is to be secured. There are two types of crypto map entries: **ipsec-manual** and **ipsec-ike**. Each entry is given an index, which is used to sort the ordered list.

When a nonsecured packet arrives on an interface, the crypto map set associated with that interface is processed in order. If a crypto map entry matches the nonsecured traffic, the traffic is discarded.

When a packet is to be transmitted on an interface, the crypto map set associated with that interface is processed in order. The first crypto map entry that matches the packet will be used to secure the packet. If a suitable SA exists, that is used for transmission. Otherwise, IKE is used to establish an SA with the peer. If no SA exists, and the crypto map entry is "respond only," the packet is discarded.

When a secured packet arrives on an interface, its SPI is used to look up an SA. If an SA does not exist, or if the packet fails any of the security checks (bad authentication, traffic does not match SA selectors, etc.), it is discarded. If all checks pass, the packet is forwarded normally.

set peer <address>

Use the **set peer** command to set the IP address of the peer device. This must be set for multiple remote peers.

Syntax Description

<address>	Specifies the IP address of the peer device. If this is not configured, it implies responder only to any peer.
-----------	--

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

If no peer IP addresses are configured, the entry will only be used to respond to IPSec requests; it cannot initiate the requests (since it doesn't know which IP address to send the packet to). If a single peer IP address is configured, the crypto map entry can be used to both initiate and respond to SAs.

The peer IP address is the public IP address of the device which will terminate the IPSec tunnel. If the peer IP address is not static, the ADTRAN product cannot initiate the VPN tunnel. By setting no peer IP address, the ADTRAN product can respond to an IPSec tunnel request.

Usage Examples

The following example sets the peer IP address of 10.100.23.64:

```
(config-crypto-map)#set peer 10.100.23.64
```

set pfs [group1 | group2]

Use the **set pfs** command to choose the type of perfect forward secrecy (if any) that will be required during IPsec negotiation of security associations for this crypto map. Use the **no** form of this command to require no PFS.

Syntax Description

group1	Requires IPsec to use Diffie-Hellman Group 1 (768-bit modulus) exchange during IPsec SA key generation.
group2	Requires IPsec to use Diffie-Hellman Group 2 (1024-bit modulus) exchange during IPsec SA key generation.

Default Values

By default, no PFS will be used during IPsec SA key generation.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

If left at the default setting, no perfect forward secrecy (PFS) will be used during IPsec SA key generation. If PFS is specified, then the specified Diffie-Hellman Group exchange will be used for the initial and all subsequent key generation, thus providing no data linkage between prior keys and future keys.

Usage Examples

The following example specifies use of the Diffie-Hellman Group 1 exchange during IPsec SA key generation:

```
(config-crypto-map)#set pfs group 1
```

set security-association lifetime [kilobytes | seconds] <value>

Use the **set security-association lifetime** command to define the lifetime (in kilobytes and/or seconds) of the IPSec SAs created by this crypto map.

Syntax Description

kilobytes <value>	Specifies the SA lifetime limit in kilobytes.
seconds <value>	Specifies the SA lifetime limit in seconds.

Default Values

By default, the **security-association lifetime** is set to 28,800 seconds and there is no default for the kilobytes lifetime.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Values can be entered for this command in both kilobytes and seconds. Whichever limit is reached first will end the security association.

Usage Examples

The following example sets the SA lifetime to 300 kilobytes and 2 hours:

```
(config-crypto-map)#set security-association lifetime kilobytes 300  
(config-crypto-map)#set security-association lifetime seconds 7200
```

set transform-set <setname1 - setname6>

Use the **set transform-set** command to assign up to six transform sets to a crypto map. Refer to *crypto ipsec transform-set <setname> <parameters>* [on page 370](#) for information on defining transform sets.

Syntax Description

<setname>	Assign up to six transform sets to this crypto map by listing the set names, separated by a space.
-----------	--

Default Values

By default, there is no transform set assigned to the crypto map.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Crypto map entries do not directly contain the transform configuration for securing data. Instead, the crypto map is associated with transform sets which contain specific security algorithms (see *crypto ipsec transform-set <setname> <parameters>* [on page 370](#)).

If no transform set is configured for a crypto map, then the entry is incomplete and will have no effect on the system.

Usage Examples

The following example first creates a transform set (**Set1**) consisting of two security algorithms (up to three may be defined), and then assigns the transform set to a crypto map (**Map1**):

```
(config)#crypto ipsec transform-set Set1 esp-3des esp-sha-hmac
(cfg-crypto-trans)#exit
(config)#crypto map Map1 1 ipsec-ike
(config-crypto-map)#set transform-set Set1
```

CRYPTO MAP MANUAL COMMAND SET

To activate the Crypto Map Manual mode, enter a valid version of the **crypto map ipsec-manual** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#crypto map Map-Name 10 ipsec-manual
(config-crypto-map)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

description <text> [on page 1464](#)
cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)
do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

antireplay [on page 655](#)
ike-policy <policy number> [on page 656](#)
match address <listname> [on page 657](#)
set peer <address> [on page 659](#)
set session-key [inbound | outbound] [on page 660](#)
set transform-set <setname> [on page 664](#)



For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.

antireplay

Use the **antireplay** command to enable antireplay sequence number checking for all security associations created on this crypto map. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables antireplay sequence checking on crypto map VPN 100:

```
(config)#crypto map VPN 100 ipsec-manual
(config-crypto-map)#antireplay
```

ike-policy <policy number>

Use the **ike-policy** command to ensure that only a specified IKE policy is used to establish the IPSec tunnel. This prevents any mobile VPN policies from using IPSec policies that are configured for static VPN peer policies.

Syntax Description

<policy number> Specifies the policy number of the policy to assign to this crypto map.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example shows a typical crypto map configuration:

```
(config)#crypto ike policy 100
(config)#crypto map VPN 10 ipsec-manual
(config-crypto-map)#description "Remote Office"
(config-crypto-map)#match address VPN-10-vpn-selectors
(config-crypto-map)#set peer 10.22.17.13
(config-crypto-map)#set transform-set esp-3des-esp-md5-hmac
(config-crypto-map)#ike-policy 100
```


match address <listname>

Use the **match address** command to assign an IP access list to a crypto map definition. The access list designates the IP packets to be encrypted by this crypto map. See *ip access-list extended <listname>* on [page 387](#) for more information on creating access lists.

Syntax Description

<listname>	Specifies the name of the access list you wish to assign to this crypto map.
------------	--

Default Values

By default, no IP access lists are defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Crypto map entries do not directly contain the selectors used to determine which data to secure. Instead, the crypto map entry refers to an access control list. An access control list (ACL) is assigned to the crypto map using the **match address** command (see *crypto map* on [page 372](#)) with the NetVanta 2000 and 3000 Series units. If no ACL is configured for a crypto map, then the entry is incomplete and will have no effect on the system.

The entries of the ACL used in a crypto map should be created with respect to traffic sent by the ADTRAN product. The source information must be the local ADTRAN product, and the destination must be the peer.

Only extended access lists can be used in crypto maps.

Usage Examples

The following example shows setting up an access list (called **NewList**) and then assigning the new list to a crypto map (called **NewMap**):

```
(config)#ip access-list extended NewList
```

Configuring New Extended ACL "NewList"

```
(config-ext-nacl)#exit
```

```
(config)#crypto map NewMap 10 ipsec-manual
```

```
(config-crypto-map)#match address NewList
```

Technology Review

A crypto map entry is a single policy that describes how certain traffic is to be secured. There are two types of crypto map entries: **ipsec-manual** and **ipsec-ike**. Each entry is given an index, which is used to sort the ordered list.

When a nonsecured packet arrives on an interface, the crypto map set associated with that interface is processed in order. If a crypto map entry matches the nonsecured traffic, the traffic is discarded.

When a packet is to be transmitted on an interface, the crypto map set associated with that interface is processed in order. The first crypto map entry that matches the packet will be used to secure the packet. If a suitable SA exists, that is used for transmission. Otherwise, IKE is used to establish an SA with the peer. If no SA exists, and the crypto map entry is "respond only," the packet is discarded.

When a secured packet arrives on an interface, its SPI is used to look up an SA. If an SA does not exist, or if the packet fails any of the security checks (bad authentication, traffic does not match SA selectors, etc.), it is discarded. If all checks pass, the packet is forwarded normally.

set peer <address>

Use the **set peer** command to set the IP address of the peer device.

Syntax Description

<address> Specifies the IP address of the peer device.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1 Command was introduced.

Functional Notes

If no peer IP address is configured, the manual crypto map is not valid and not complete. A peer IP address is required for manual crypto maps. To change the peer IP address, the **no set peer** command must be issued first; then the new peer IP address can be configured.

Usage Examples

The following example sets the peer IP address of 10.100.23.64:

```
(config-crypto-map)#set peer 10.100.23.64
```

set session-key [inbound | outbound]

Use the **set session-key** command to define the encryption and authentication keys for this crypto map.

Variations of this command include the following:

```

set session-key inbound ah <SPI> <keyvalue>
set session-key inbound esp <SPI> authenticator <keyvalue>
set session-key inbound esp <SPI> cipher <keyvalue>
set session-key inbound esp <SPI> cipher <keyvalue> authenticator <keyvalue>
set session-key outbound ah <SPI> <keyvalue>
set session-key outbound esp <SPI> authenticator <keyvalue>
set session-key outbound esp <SPI> cipher <keyvalue>
set session-key outbound esp <SPI> cipher <keyvalue> authenticator <keyvalue>
  
```

Syntax Description

inbound	Defines encryption keys for inbound traffic.
outbound	Defines encryption keys for outbound traffic.
ah <SPI>	Specifies authentication header protocol.
esp <SPI>	Specifies encapsulating security payload protocol.
cipher <keyvalue>	Specifies encryption/decryption key.
authenticator <keyvalue>	Specifies authentication key.

Default Values

There are no default settings for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

The inbound local security parameter index (SPI) must equal the outbound remote SPI. The outbound local SPI must equal the inbound remote SPI. The key values are the hexadecimal representations of the keys. They are not true ASCII strings. Therefore, a key of 3031323334353637 represents "01234567".

See the following table for key length requirements.

Functional Notes (Continued)

Algorithm	Minimum key length required
DES	64-bits in length; 8 hexadecimal bytes
3DES	192-bits in length; 24 hexadecimal bytes
AES-128-CBC	128-bits in length; 16 hexadecimal bytes
AES-192-CBC	192-bits in length; 24 hexadecimal bytes
AES-256-CBC	256-bits in length; 32 hexadecimal bytes
MD5	128-bits in length; 16 hexadecimal bytes
SHA1	160-bits in length; 20 hexadecimal bytes

Technology Review

The following example configures an AOS product for VPN using IPSec manual keys. This example assumes that the AOS product has been configured with a WAN IP Address of 63.97.45.57 on interface **ppp 1** and a LAN IP Address of 10.10.10.254 on interface **ethernet 0/1**. The Peer Private IP Subnet is 10.10.20.0.

For more detailed information on VPN configuration, refer to the technical support note *Configuring VPN* located on the **ADTRAN OS Documentation** CD provided with your unit.

Step 1:

Enter the Global Configuration mode (i.e., config terminal mode).

```
>enable
```

```
#configure terminal
```

Step 2:

Enable VPN support using the **ip crypto** command. This command allows crypto maps to be applied to interfaces, and enables the IKE server to listen for IKE negotiation sessions on UDP port 500.

```
(config)#ip crypto
```

Step 3:

Define the transform set. A transform set defines the encryption and/or authentication algorithms to be used to secure the data transmitted over the VPN tunnel. Multiple transform sets may be defined in a system. Once a transform set is defined, many different crypto maps within the system can reference it. In this example, a transform set named **highly_secure** has been created. This transform set defines ESP with authentication implemented using 3DES encryption and SHA1 authentication.

```
(config)#crypto ipsec transform-set highly_secure esp-3des esp-sha-hmac
```

```
(cfg-crypto-trans)#mode tunnel
```

Step 4:

Define an IP access list. An Extended Access Control List is used to specify which traffic needs to be sent securely over the VPN tunnel. The entries in the list are defined with respect to the local system. The source IP address will be the source of the traffic to be encrypted. The destination IP address will be the receiver of the data on the other side of the VPN tunnel.

```
(config)#ip access-list extended corporate_traffic
(config-ext-nacl)#permit ip 10.10.10.0 0.0.0.255 10.10.20.0 0.0.0.255 log
deny ip any any
```

Step 5:

Create crypto map and define manual keys. A crypto map is used to define a set of encryption schemes to be used for a given interface. A crypto map entry has a unique index within the crypto map set. The crypto map entry will specify whether IKE is used to generate encryption keys or if manually specified keys will be used. The crypto map entry will also specify who will be terminating the VPN tunnel, as well as which transform set or sets will be used to encrypt and/or authenticate the traffic on that VPN tunnel. It also specifies the lifetime of all created IPSec security associations.

The keys for the algorithms defined in the transform set associated with the crypto map will be defined by using the **set session-key** command. A separate key is needed for both inbound and outbound traffic. The key format consists of a string of hexadecimal values without the leading **0x** for each character. For example, a cipher key of **this is my cipher key** would be entered as:

74686973206973206D7920636970686572206B6579.

A unique Security Parameter Index (SPI) is needed for both inbound and outbound traffic. The local system's inbound SPI and keys will be the peer's outbound SPI and keys. The local system's outbound SPI and keys will be the peer's inbound SPI and keys. In this example the following keys and SPIs are used:

Inbound cipher SPI:	300	Inbound cipher key:	"2te\$#g89jnr(j!@4rvnfhg5e"
Outbound cipher SPI:	400	Outbound cipher key:	"8564hgjelrign*&(gnb#1\$d3"
Inbound authenticator key:			"r5%^ughembkdjh34\$x.<"
Outbound authenticator key:			"io78*7gner#4(mgnsd!3"

```
(config)#crypto map corporate_vpn 1 ipsec-ike
(config-crypto-map)#match address corporate_traffic
(config-crypto-map)#set peer 63.105.15.129
(config-crypto-map)#set transform-set highly_secure
(config-crypto-map)#set session-key inbound esp 300 cipher
32746524236738396A6E72286A21403472766E6668673565 authenticator
7235255E756768656D626B64686A333424782E3C
(config-crypto-map)#set session-key outbound esp 400 cipher
3835363468676A656C7269676E2A2628676E622331246433 authenticator
696F37382A37676E65722334286D676E73642133
```

Step 6:

Configure public interface. This process includes configuring the IP address for the interface and applying the appropriate crypto map to the interface. Crypto maps are applied to the interface on which encrypted traffic will be transmitted.

```
(config)#interface ppp 1  
(config-ppp 1)#ip address 63.97.45.57 255.255.255.248  
(config-ppp 1)#crypto map corporate_vpn  
(config-ppp 1)#no shutdown
```

Step 7:

Configure private interface to allow all traffic destined for the VPN tunnel to be routed to the appropriate gateway.

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#ip address 10.10.10.254 255.255.255.0  
(config-eth 0/1)#no shutdown  
(config-eth 0/1)#exit
```

set transform-set <setname>

Use the **set transform-set** command to assign a transform set to a crypto map. See *crypto ipsec transform-set <setname> <parameters>* [on page 370](#) for information on defining transform sets.

Syntax Description

<setname>	Assigns a transform set to this crypto map by entering the set name.
-----------	--

Default Values

By default, no transform set is assigned to the crypto map.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Crypto map entries do not directly contain the transform configuration for securing data. Instead, the crypto map is associated with transform sets which contain specific security algorithms (see *crypto ipsec transform-set <setname> <parameters>* [on page 370](#)).

If no transform set is configured for a crypto map, then the entry is incomplete and will have no effect on the system. For manual key crypto maps, only one transform set can be specified.

Usage Examples

The following example first creates a transform set (**Set1**) consisting of two security algorithms (up to three may be defined), and then assigns the transform set to a crypto map (**Map1**):

```
(config)#crypto ipsec transform-set Set1 esp-3des esp-sha-hmac
(cfg-crypto-trans)#exit
```

```
(config)#crypto map Map1 1 ipsec-manual
(config-crypto-map)#set transform-set Set1
```

RADIUS GROUP COMMAND SET

To activate the Radius Group mode, enter the **aaa group server** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#aaa group server radius myServer
(config-sg-radius)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

server [*acct-port* <port number>| *auth-port* <port number>] [on page 666](#)

server [acct-port <port number>| auth-port <port number>]

Use the **server** command to add a predefined RADIUS server to the current named list of servers. See *radius-server* on page 494 for more information.

Syntax Description

acct-port <port number>	Defines the accounting port value.
auth-port <port number>	Defines the authorization port value.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example adds a server to the **myServers** list:

```
(config)#aaa group server radius myServers
(config-sg-radius)#server 1.2.3.4 acct-port 786 auth-port 1812
(config-sg-radius)#server 4.3.2.1
(config-sg-radius)#exit
(config)#
```

or

```
(config)#aaa group server radius myServers
(config-sg-radius)#server 4.3.2.1
(config-sg-radius)#exit
(config)#
```

CA PROFILE CONFIGURATION COMMAND SET

To activate the Certificate Authority (CA) Profile Configuration mode, enter the **crypto ca profile** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#crypto ca profile MyProfile
Configuring New CA Profile MyProfile
(ca-profile)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

crl optional [on page 668](#)

email address <email address> [on page 669](#)

enrollment retry [count | period] [on page 670](#)

enrollment terminal [on page 671](#)

enrollment url <url> [on page 672](#)

fqdn <fqdn> [on page 673](#)

ip-address <address> [on page 674](#)

password <password> [on page 675](#)

serial-number [on page 676](#)

subject-name <name> [on page 677](#)

crl optional

Use the **crl optional** command to make CRL verification optional.

Syntax Description

No subcommands.

Default Values

By default, CRL optional is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

If enabled, the AOS is able to accept certificates even if no CRL is loaded into the configuration. Currently, this is the only mode supported by the AOS for CRL negotiations.

Usage Examples

The following example sets CRL verification as optional:

```
(ca-profile)#crl optional
```

email address <email address>

Use the **email address** command to specify that an email address should be included in the certificate request.

Syntax Description

<email address> Specifies the complete email address to use when sending certificate requests. This field allows up to 51 characters.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Configuring this setting simplifies the **crypto ca enroll** dialog, allowing you to enter the email address only once rather than every time you go through the enrollment process. Refer to *crypto ca enroll <name>* [on page 357](#).

Usage Examples

The following example specifies **joesmith@company.com** as the email address to be sent in certificate requests:

```
(ca-profile)#email address joesmith@company.com
```

enrollment retry [count | period]

Use the **enrollment retry** command to determine how the AOS handles certificate requests.

Syntax Description

count < <i>count</i> >	Specifies the number of times the AOS re-sends a certificate request when it does not receive a response from the previous request. Range: 1 to 100.
period < <i>minutes</i> >	Specifies the time period between certificate request retries. The default is 1 minute between retries. Range: 1 to 60 minutes.

Default Values

By default, period is set to 5 minutes, and count is set to 12 retries.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to send certificate requests every two minutes, stopping after 50 retries (if no response is received):

```
(ca-profile)#enrollment retry count 50
```

```
(ca-profile)#enrollment retry period 2
```

enrollment terminal

Use the **enrollment terminal** command to specify manual (i.e., cut-and-paste) certificate enrollment.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This mode is overridden if the **enrollment url** command specifies the CA to which automatic certificate requests are to be sent via simple certificate exchange protocol (SCEP). Issuing an **enrollment terminal** command after using the **enrollment url** command deletes the URL and forces the unit to use manual enrollment. Refer to *enrollment url <url>* [on page 672](#) for more information.

Usage Examples

The following example configures the AOS to accept manual certificate enrollment input:

```
(ca-profile)#enrollment terminal
```

enrollment url <url>

Use the **enrollment url** command to specify the URL of the CA to which the AOS should send certificate requests.

Syntax Description

<url>	Specifies the certificate authority's URL (e.g., <code>http://10.10.10.1:400/abcdefg/pkiclient.exe</code>).
-------	--

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

When entering the URL **http://** is required, followed by the IP address or DNS name of the CA. If the port number is something other than 80, include it after the IP address or DNS name separated with a colon (:).

The CA may have other necessary information to include in the CGI path before ending with the actual CGI program. An example template to follow is **http://hostname:port/path/to/program.exe**.

Use the default program **pkiclient.exe** without specifying it, end the URL with a slash (/). Otherwise, you must enter the program name to use. For example, **http://10.10.10.1:400/abcdefg/** will assume **pkiclient.exe** as the program (but not including the terminating slash is a configuration error).

Specifying this command will override the **enrollment terminal** setting as described previously (refer to *enrollment terminal* [on page 671](#)).

Usage Examples

The following example specifies **http://CAserver/certsrv/mscep/mscep.dll** as the URL to which the AOS will send certificate requests:

```
(ca-profile)#enrollment url http://CAserver/certsrv/mscep/mscep.dll
```


fqdn <fqdn>

Use the **fqdn** command to specify a fully-qualified domain name (FQDN) to be included in the certificate requests.

Syntax Description

<fqdn> Specifies the FQDN (e.g., company.com) to be included in requests.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Configuring this setting simplifies the **crypto ca enroll** dialog, allowing you to enter the FQDN only once rather than every time you go through the enrollment process. Refer to *crypto ca enroll* <name> [on page 357](#).

Usage Examples

The following example specifies **company.com** as the FQDN to be sent in certificate requests:

```
(ca-profile)#fqdn company.com
```

ip-address <address>

Use the **ip-address** command to specify an IP address to be included in the certificate requests.

Syntax Description

<address> Defines the IP address in dotted decimal notation (e.g., 192.22.73.101).

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Configuring this setting simplifies the **crypto ca enroll** dialog, allowing you to enter the IP address only once rather than every time you go through the enrollment process. Refer to *crypto ca enroll* <name> [on page 357](#).

Usage Examples

The following example specifies **66.203.52.193** as the IP address to be sent in certificate requests:

```
(ca-profile)#ip-address 66.203.52.193
```

password <password>

Use the **password** command to specify the challenge password for simple certificate exchange protocol (SCEP). Use the **no** form of this command to allow CA requests to be sent automatically (using SCEP) without requiring a password.

Syntax Description

<password> Specifies the SCEP password (up to 80 characters).

Default Values

By default, no password is required.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

There are two places for configuring a SCEP password:

- At the **(ca-profile)#** prompt.
- If it is not configured at the **(ca-profile)#** prompt, you are prompted to enter one when going through the certificate enrollment process.

The password is sent to the CA from which you are requesting a certificate. The CA may then ask for the password later before a certificate can be revoked. Refer to *crypto ca enroll <name>* [on page 357](#).

Usage Examples

The following example sets the SCEP challenge password to **adtran**:

```
(ca-profile)#password adtran
```

serial-number

Use the **serial-number** command to specify that a serial number will be included in the certificate request.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

By default, this command is set to **no serial-number**, which means that the serial number is not included in the certificate requests.

Usage Examples

The following example configures AOS to include a serial number in the certificate request:

```
(ca-profile)#serial-number
```

subject-name <name>

Use the **subject-name** command to specify the subject name used in the certificate request.

Syntax Description

<name>	Specifies a subject name string using up to 256 characters entered in X.500 LDAP format.
--------	--

Default Values

By default, there is no subject name configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Configuring this setting simplifies the **crypto ca enroll** dialog, allowing you to enter the subject name only once rather than every time you go through the enrollment process. Refer to *crypto ca enroll* <name> [on page 357](#).

Usage Examples

The following example assigns a subject name of **Adtran-cert** to certificate requests:

```
(ca-profile)#subject-name Adtran-cert
```

CERTIFICATE CONFIGURATION COMMAND SET

To activate the Certificate Configuration mode, enter the **crypto ca certificate chain** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#crypto ca certificate chain MyProfile
(config-cert-chain)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

certificate <serial-number> [on page 679](#)

certificate ca <serial-number> [on page 680](#)

crl [on page 681](#)

certificate <*serial-number*>

Use the **certificate** command to restore a certificate. Use the **no** form of this command to remove a specific certificate from the certificate chain.

Syntax Description

< <i>serial-number</i> >	Specifies the certificate's serial number (up to 51 characters). This value can be found for existing certificates by using the show run command.
--------------------------	--

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The user typically does not enter this command. It is primarily used to restore certificates from the startup configuration when the product is powered up.

Usage Examples

The following example removes the certificate with the serial number **73f0bfe5ed8391a54d1214390a36cee7**:

```
(config)#crypto ca certificate chain MyProfile
(config-cert-chain)#no certificate 73f0bfe5ed8391a54d1214390a36cee7
```

certificate ca <serial-number>

Use the **certificate ca** command to restore a CA certificate. Use the **no** form of this command to remove a specific certificate from the certificate chain for a CA.

Syntax Description

<serial-number> Specifies the certificate's serial number (up to 51 characters). This value can be found for existing certificates by using the **show run** command.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The user typically does not enter this command. It is primarily used to restore certificates from the startup configuration when the product is powered up.

Usage Examples

The following example removes the CA certificate with the serial number **0712**:

```
(config)#crypto ca certificate chain MyProfile  
(config-cert-chain)#no certificate ca 0712
```


crl

Use the **crl** command to restore a CRL. Use the **no** form of this command to remove the CRL for the specific CA.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The user typically does not enter this command. It is primarily used to restore CRLs from the startup configuration when the product is powered up.

Usage Examples

The following example removes the CRL for the current CA:

```
(config)#crypto ca certificate chain MyProfile  
(config-cert-chain)#no crl
```

VLAN CONFIGURATION COMMAND SET

To activate the VLAN Configuration mode, enter the **vlan** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#vlan 1
(config-vlan 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
 [on page 1461](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

media [ethernet] [on page 683](#)

name <vlan name> [on page 684](#)

state [active | suspend] [on page 685](#)

media [ethernet]

Use the **media** command to set the virtual local area network (VLAN) media type. The only media type currently supported is ethernet. Use the **no** form of this command to reset to default.

Syntax Description

ethernet Sets the VLAN media type to ethernet.

Default Values

By default, media is set to ethernet.

Applicable Platforms

This command applies to the NetVanta 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets the media type to Ethernet for VLAN 2:

```
(config)#vlan 2  
(config-vlan 2)#media ethernet
```

name <vlan name>

Use the **name** command to assign a name to the VLAN. Use the **no** form of this command to remove a name given to a VLAN.

Syntax Description

<vlan name> Assigns a name string to the VLAN.

Default Values

By default, the name is set to VLANxxxx where xxxx represents four numeric digits (including leading zeroes) equal to the VLAN ID number.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The name is limited to 32 characters and must be unique throughout.

Usage Examples

The following example sets the name of VLAN 2 to **Accounting**:

```
(config)#vlan 2
(config-vlan 2)#name Accounting
```

state [active | suspend]

Use the **state** command to change the state of the VLAN.

Syntax Description

active	Changes the VLAN state to active.
suspend	Changes the VLAN state to suspended.

Default Values

The default setting is active (once the VLAN has been created).

Applicable Platforms

This command applies to the NetVanta 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the VLAN **state** to suspended:

```
(config)#vlan 2
(config-vlan 1)#state suspend
```

VLAN DATABASE CONFIGURATION COMMAND SET

To activate the Config VLAN Database mode, enter the **vlan database** command at the Enable security mode prompt. For example:

```
>enable
#vlan database
(vlan)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

abort [on page 687](#)
apply [on page 688](#)
reset [on page 689](#)
show [*changes* <vlan id> | *current* | *proposed*] [on page 690](#)
vlan <vlan id> [on page 691](#)
vlan <vlan id> *media* [*ethernet*] [on page 692](#)
vlan <vlan id> *name* <vlan name> [on page 693](#)
vlan <vlan id> *state* [*active* | *suspend*] [on page 694](#)

abort

Use the **abort** command to exit the VLAN Database without saving any changes made.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this setting.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **abort** command discards all configuration changes made since you entered the VLAN Database Configuration (or since the last time you issued the **apply** command). The system then exits out of this mode, returning to the enable (**#**) command prompt. See the command *apply* [on page 688](#) for more information.

Usage Examples

The following example exits the VLAN Database without saving the changes made:

```
(config)#vlan database
(vlan)#abort
Discarding all changes and exiting.
#
```

apply

Use the **apply** command to apply changes without exiting the VLAN Database.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this setting.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Applies changes to the VLAN Database configuration in the running configuration.

Usage Examples

The following example applies changes made, remaining in the VLAN Database:

```
(config)#vlan database
(vlan)#apply
Changes applied.
(vlan)#
```


reset

Use the **reset** command to discard all changes made and revert to the previous configuration. The prompt remains in the VLAN Database.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this setting.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **reset** command discards all changes to the VLAN configuration. The configuration remains the same as it was prior to entering the VLAN Database Configuration (or since the last time you issued the **apply** command). The VLAN Database reverts to the same state it had upon entry. See the command *apply* on [page 688](#) for more information.

Usage Examples

The following example resets the unit to the previous configuration (i.e., the last configuration saved using the **apply** or the **exit** command):

```
(config)#vlan database
(vlan)#reset
VLAN configuration has been reset.
(vlan)#
```

show [changes <vlan id> | current | proposed]

Use the **show** command to display different aspects of the VLAN configuration.

Syntax Description

changes <vlan id>	Displays the proposed changes to the VLAN configuration. You may specify a VLAN ID to display only information for a specific VLAN. Valid VLAN interface ID range is from 1 to 4094.
current	Displays the current VLAN configuration. You may specify a VLAN ID to display only information for a specific VLAN.
proposed	Displays the proposed VLAN Database. The proposed version is not part of the running configuration until it is applied (using the apply command or the exit command). You may specify a VLAN ID to display only information for a specific VLAN.

Default Values

No defaults necessary.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example shows the proposed VLAN Database configuration which will take effect if an **apply** or **exit** command is issued:

```
(config)#vlan database
(vlan)#show proposed
```

vlan <vlan id>

Use the **vlan** command to create a VLAN within the VLAN database. Use the **no** form of this command to delete a previously-created VLAN from the database.

Syntax Description

<vlan id> Specifies a valid VLAN interface ID (1 to 4094).

Default Values

No defaults necessary for this setting.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example creates VLAN 2 only within the VLAN Database. This VLAN is not added to the running configuration until an **exit** or **apply** command is issued:

```
(vlan)#vlan 2
VLAN 2 created.
Name = VLAN0002
(vlan)#
```

The following example removes VLAN 2 from the VLAN Database. This VLAN is not removed from the running configuration until an **exit** or **apply** command is issued:

```
(config)#vlan database
(vlan)#no vlan 2
```

vlan <vlan id> media [ethernet]

Use the **vlan media** command to set the VLAN media type. Use the **no** form of this command to reset to the default.

Syntax Description

<vlan id>	Specifies a valid VLAN interface ID (1 to 4094).
ethernet	Sets the VLAN media type. The only media type currently supported is Ethernet.

Default Values

By default, **vlan media** is set to ethernet.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the media type of VLAN 2 to ethernet:

```
(config)#vlan database
(vlan)#vlan 2 media ethernet
```

vlan <vlan id> name <vlan name>

Use the **vlan name** command to assign a name to the VLAN. Use the **no** form of this command to remove an assigned name.

Syntax Description

<vlan id>	Specifies a valid VLAN interface ID (1 to 4094).
<vlan name>	Assigns a name to the VLAN (1 to 32 characters).

Default Values

By default, the assigned name is VLANxxxx; where xxxx represents four numeric digits (including leading zeroes) equal to the VLAN ID number.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The name is limited to 32 characters and must be unique throughout the network.

Usage Examples

The following example sets the name of VLAN 2 to **Accounting**:

```
(config)#vlan database
(vlan)#vlan 2 name Accounting
```

vlan <vlan id> state [active | suspend]

Use the **vlan state** command to change the state of the VLAN. Use the **no** form of this command to return to the default setting.

Syntax Description

<vlan id>	Specifies a valid VLAN interface ID (1 to 4094).
active	Changes the VLAN state to active.
suspend	Changes the VLAN state to suspended.

Default Values

The default setting is active (once the VLAN has been created).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the VLAN state to suspended:

```
(config)#vlan database
(vlan)#vlan 2 state suspend
```

VLAN INTERFACE CONFIG COMMAND SET

To activate the VLAN Interface Configuration mode, enter the **interface vlan** command at the Global Configuration mode prompt. For example:

>enable

#configure terminal

(config)#**interface vlan 1**

(config-interface-vlan 1)#

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <policyname> [on page 696](#)

arp arpa [on page 699](#)

bandwidth <value> [on page 700](#)

bridge-group <group#> [on page 701](#)

crypto map <mapname> [on page 702](#)

dynamic-dns [*dyndns* | *dyndns-custom* | *dyndns-static*] <hostname> <username>
<password> [on page 704](#)

ip commands [begin on page 706](#)

mac-address <address> [on page 729](#)

qos-policy out <mapname> [on page 730](#)

snmp trap [on page 731](#)

snmp trap link-status [on page 732](#)

traffic-shape rate <rate> [*<burst>*] [on page 733](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic on an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname> Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R and 2000 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access-policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the VLAN 1 interface:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```


Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access policy with the VLAN 1 interface:

```
(config)#interface vlan 1
(config-vlan 1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an IP policy class that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow, discard, NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the VLAN 1 interface:

```
(config)#interface vlan 1
(config-vlan 1)#access-policy MatchAll
```

arp arpa

Use the **arp arpa** command to enable address resolution protocol (ARP) on the VLAN interface.

Syntax Description

arpa Sets the standard address resolution protocol for this interface.

Default Values

The default for this command is arpa.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
Release 6.1	Command was extended to include NetVanta 2000 Series units.

Usage Examples

The following example enables standard ARP for the VLAN interface:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#arp arpa
```

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

To view default values, use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.
Release 6.1	Command was expanded to include VLAN interfaces.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the VLAN 1 interface to 10 Mbps:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#bandwidth 10000
```

bridge-group <group#>

Use the **bridge-group** command to assign an interface to the specified bridge group. Use the **no** form of this command to remove the interface from the bridge group.

Syntax Description

<group#> Specifies a bridge group number (1 to 255).

Default Values

By default, there are no configured bridge groups.

Applicable Platforms

This command applies to the NetVanta 300 and 1000R Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

A bridged network can provide excellent traffic management to reduce collisions and limit the amount of bandwidth wasted with unnecessary transmissions when routing is not necessary. Any two interfaces can be bridged (e.g., Ethernet to T1 bridge, Ethernet to Frame Relay sub-interface).

Usage Examples

The following example assigns the VLAN interface to bridge group 17:

```
(config)#interface vlan 1
(config-interface-vlan 1)#bridge-group 17
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

<mapname> Specifies the crypto map name that you wish to assign to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

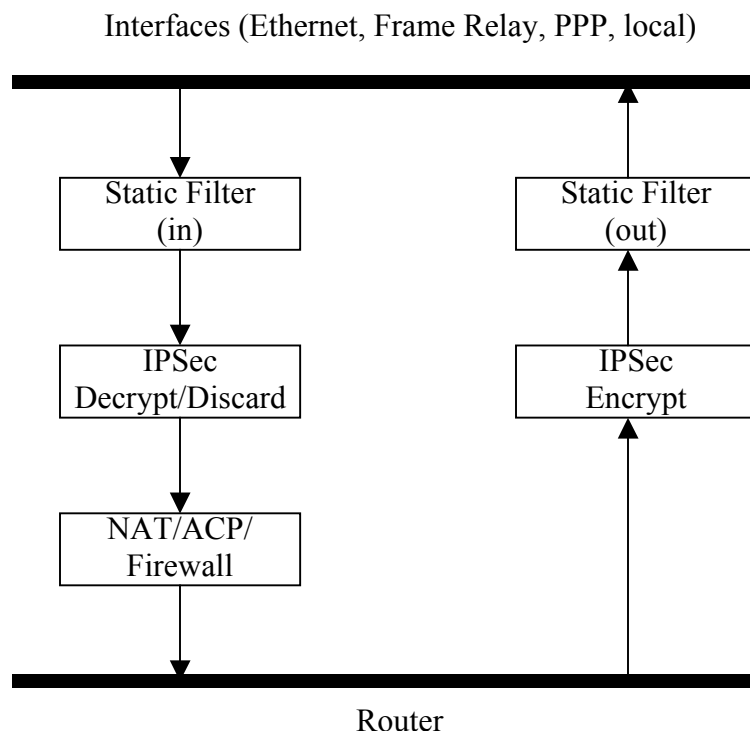
Command History

Release 4.1 Command was introduced.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy-class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access-group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the VLAN interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#crypto map MyMap
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

Refer to *Functional Notes* below for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or advanced users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address does not change often or at all but you still want an easy name to remember it by (without having to purchase your own domain name) Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com), you need Custom DNS service, which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the dynamic-dns to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface vlan 1
```

```
(config-interface-vlan 1)#dynamic-dns dyndns-custom host user pass
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Assigns an IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the router to only allow Telnet traffic (as defined in the user-configured **TelnetOnly** IP access list) into the VLAN interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#interface vlan 1
(config-interface-vlan 1)#ip access-group TelnetOnly in
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Configures a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures an IP address of **192.22.72.101/30**:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip address 192.22.72.101 255.255.255.252
```

ip address dhcp

Use the **ip address dhcp** command to use Dynamic Host Configuration Protocol (DHCP) to obtain an address on the interface. Use the **no** form of this command to remove a configured IP address (using DHCP) and disable DHCP operation on the interface.

ip address dhcp [client-id [*<interface>* | *<identifier>*] hostname *<"string">*]

Syntax Description

client-id	Optional. Specifies the client identifier used when obtaining an IP address from a DHCP server.
<i><interface></i>	Specifying an interface defines the client identifier as the hexadecimal MAC address of the specified interface (including a hexadecimal number added to the front of the MAC address to identify the media type). For example, specifying the client-id ethernet 0/1 (where the Ethernet interface has a MAC address of d217.0491.1150) defines the client identifier as 01:d2:17:04:91:11:50 (where 01 defines the media type as Ethernet). Refer to <i>hardware-address <hardware-address> <type></i> on page 555 for a detailed listing of media types.
<i><identifier></i>	Specifies a custom client-identifier using a text string (that is converted to a hexadecimal equivalent) or 7 to 28 hexadecimal numbers (with colon delimiters). For example, a custom client identifier of 0f:ff:ff:ff:ff:51:04:99:a1 may be entered using the <i><identifier></i> option.
hostname	Optional. Specifies a text string (to override the global router name) to use as the name in the DHCP option 12 field.
<i><"string"></i>	String (enclosed in quotation marks) of up to 35 characters to use as the name of the host for DHCP operation.
no-default-route	Keyword used to specify that the AOS not install the default-route obtained via DHCP.
no-domain-name	Keyword used to specify that the AOS not install the domain-name obtained via DHCP.
no-nameservers	Keyword used to specify that the AOS not install the DNS servers obtained via DHCP.

Default Values

client-id	Optional. By default, the client identifier is populated using the following formula:
------------------	---

TYPE: INTERFACE SPECIFIC INFO : MAC ADDRESS

Where TYPE specifies the media type in the form of one hexadecimal byte (refer to *hardware-address <hardware-address> <type>* on page 555 for a detailed listing of media types), and the MAC ADDRESS is the Media Access Control (MAC) address assigned to the first Ethernet interface in the unit in the form of six hexadecimal bytes. (For units with a single Ethernet interface, the MAC ADDRESS assigned to Ethernet 0/1 is used in this field).

INTERFACE SPECIFIC INFO is only used for Frame Relay interfaces and can be determined using the following:

FR_PORT# : Q.922 ADDRESS

Where the FR_PORT# specifies the label assigned to the virtual Frame Relay interface using four hexadecimal bytes. For example, a virtual Frame Relay interface labeled 1 would have a FR_PORT# of 00:00:00:01.

The Q.922 ADDRESS field is populated using the following:

8	7	6	5	4	3	2	1
DLCI (high order)					C/R	EA	
DLCI (lower)		FECN	BECN	DE	EA		

Where the FECN, BECN, C/R, DE, and high order EA bits are assumed to be 0 and the lower order extended address (EA) bit is set to 1.

The following list provides a few example DLCIs and associated Q.922 address:
DLCI (decimal) / Q.922 address (hex)

16 / 0x0401
50 / 0x0C21
60 / 0x0CC1
70 / 0x1061
80 / 0x1401

hostname Optional. Specifies a text string (to override the global router name) to use as the name in the DHCP option 12 field.

<"string"> By default, the hostname is the name configured using the Global Configuration **hostname** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Functional Notes

DHCP allows interfaces to acquire a dynamically assigned IP address from a configured DHCP server on the network. Many Internet Service Providers (ISPs) require the use of DHCP when connecting to their services. Using DHCP reduces the number of dedicated IP addresses the ISP must obtain. Consult your ISP to determine the proper values for the **client-id** and **hostname** fields.

Usage Examples

The following example enables DHCP operation on the VLAN interface (labeled 1):

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip address dhcp
```

ip dhcp [release | renew]

Use the **ip dhcp** command to release or renew the DHCP IP address. This command is only applicable when using DHCP for IP address assignment.

Syntax Description

release	Releases DHCP IP address.
renew	Renews DHCP IP address.

Default Values

No default values required for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 3.1	Command was introduced
-------------	------------------------

Usage Examples

The following example releases the IP DHCP address for the VLAN interface:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip dhcp release
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



The **ip helper-address** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. Refer to [ip forward-protocol udp <port number>](#) on page 424 for more information.

Syntax Description

<address>	Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.
-----------	--

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign helper address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface vlan 1  
(config-interface-vlan 1)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	If only one host (or IGMP snooping switch) is connected to the interface when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	This command controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer (if no receiver responds) the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65535 ms. Default: 1000 ms.
querier-timeout <seconds>	Number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface, and to place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub upstream* [on page 718](#) for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	Command was expanded to include VLAN interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the unit to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* on page 433, *ip mcast-stub downstream* on page 716, and *ip mcast-stub upstream* on page 718 for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
(config)#interface vlan 1
(config-vlan 1)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. Refer to *ip mcast-stub helper-address <ip address>* on page 433 and *ip mcast-stub downstream* on page 716 for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip mcast-stub upstream
```

ip mtu <mtu size>

Use the **ip mtu** command to set the maximum transmission unit size (in bytes) for the VLAN interface. To reset to the default setting, use the **no** version of this command.

Syntax Description

<mtu size> Specifies the MTU size in bytes. Range: 68 to 1,000,000 bytes.

Default Values

By default, this is set to 1500 bytes.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example configures the IP MTU for 2000 bytes:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip mtu 2000
```

ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key <password>	Assigns a simple-text authentication password to be used by other routers using the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32,767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte max) keys.
priority <value>	Sets the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

dead-interval <seconds>	40 seconds
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sets the maximum number of seconds allowed between hello packets to 25,000:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip ospf dead-interval 25000
```

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Selects message-digest authentication type.
null	Optional. Specifies that no authentication is used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that no authentication will be used on the VLAN interface:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip ospf network broadcast
```

ip proxy-arp <ip address> <subnet mask>

Use the **ip proxy-arp** command to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<ip address>	Defines the proxy ARP IP address in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy ARP is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

In general, the principle of proxy ARP allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all proxy ARP requests with its specified MAC address and forward packets accordingly.

Enabling proxy ARP on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the VLAN interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|---|---|
| 1 | Accepts only received RIP version 1 packets on the interface. |
| 2 | Accepts only received RIP version 2 packets on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the version command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip receive version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. Refer to *version [1 | 2]* [on page 1330](#) for more information.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the VLAN interface to accept only RIP version 2 packets:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|----------|--|
| 1 | Transmits only RIP version 1 packets on the interface. |
| 2 | Transmits only RIP version 2 packets on the interface. |

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip send version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. Refer to *version [1 | 2]* on [page 1330](#) for more information.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the VLAN interface to transmit only RIP version 2 packets:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip rip send version 2
```

ip route-cache

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast switching on the VLAN interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip route-cache
```

ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface (in the format type slot/port) that contains the IP address to use as the source address for all packets transmitted on this interface.
-------------	---

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced
-------------	------------------------

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered eth 0/1** while in the Frame Relay Sub-Interface Configuration mode configures the Frame Relay sub-interface to use the IP address assigned to the Ethernet interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface.

Usage Examples

The following example configures the VLAN interface (labeled **vlan 1**) to use the IP address assigned to the Ethernet interface (**eth 0/1**):

```
(config)#interface vlan 1
(config-interface-vlan 1)#ip unnumbered eth 0/1
```


mac-address <address>

Use the **mac-address** command to specify the Media Access Control (MAC) address of the VLAN interface. Only the last three values of the MAC address can be modified. The first three values contain the ADTRAN reserved number (00:0A:C8) by default. Use the **no** form of this command to return to the default MAC address programmed by ADTRAN.

Syntax Description

<address> MAC address entered in a series of six dual-digit hexadecimal values separated by colons (for example 00:0A:C8:5F:00:D2).

Default Values

A unique default MAC address is programmed in each unit shipped by ADTRAN.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example configures a MAC address of **00:0A:C8:5F:00:D2**:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#mac-address 00:0A:C8:5F:00:D2
```

qos-policy out <mapname>

Use the **qos-policy out** command to apply a previously-configured QoS map to an interface. Use the **no** form of this command to remove the map from the interface. The **out** keyword specifies that this policy will be applied to outgoing packets.

Syntax Description

<mapname> Specifies the name of a previously-created QoS map (refer to *qos map* <mapname> <sequence number> [on page 490](#) for more information).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300 and 2000 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example applies the QoS map **VOICEMAP** to the VLAN interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#qos-policy out VOICEMAP
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.
Release 6.1	Command was expanded to include VLAN interfaces.

Usage Examples

The following example enables SNMP capability on the VLAN interface:

```
(config)#interface vlan 1  
(config-interface-vlan 1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC 2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is set to enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, and 2000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.
Release 6.1	Command was expanded to include VLAN interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC 2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the VLAN interface:

```
(config)#interface vlan 1
(config-interface-vlan 1)#no snmp trap link-status
```

traffic-shape rate <rate> [<burst>]

Use the **traffic-shape rate** command to specify and enforce an output bandwidth for the VLAN interface.

Syntax Description

<rate>	Specifies the rate (in bits per second) at which the interface should be shaped.
<burst>	Optional. Specifies the allowed burst in bytes. By default, the burst is specified as the rate divided by 5 and represents the number of bytes that would flow within 200 ms.

Default Values

By default, **traffic-shape rate** is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, and 2000 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Functional Notes

Traffic shaping can be used to limit the VLAN interface to a particular rate or to specify use of QoS.

Usage Examples

The following example sets the outbound rate of **vlan 1** to 128 kbps and applies a QoS policy that all RTP traffic is given priority over all other traffic:

```
(config)#qos map voip 1
(config-qos-map)#match ip rtp 10000 10500 all
(config-qos-map)#priority unlimited
(config-qos-map)#interface vlan 1
(config-interface-vlan 1)#traffic-shape rate 128000
(config-interface-vlan 1)#qos-policy out voip
```

PORT CHANNEL INTERFACE CONFIG COMMAND SET

To activate the Port Channel Interface Configuration mode, enter the **interface port-channel** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface port-channel 1
(config-p-chan 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

arp arpa [on page 735](#)

lldp receive [on page 736](#)

lldp send [management-address l port-description l system-capabilities l system-description l system-name l and-receive] [on page 737](#)

qos [trust cos | default-cos <cos value>] [on page 739](#)

snmp trap [on page 740](#)

snmp trap link-status [on page 741](#)

spanning tree commands [begin on page 742](#)

storm-control [broadcast level | multicast level | unicast level] <rising level> <falling level> [on page 748](#)

storm-control action [shutdown] [on page 750](#)

switchport commands [begin on page 751](#)

arp arpa

Use the **arp arpa** command to enable address resolution protocol (ARP) on this interface.

Syntax Description

arpa Keyword used to set standard address resolution protocol for this interface.

Default Values

The default for this command is arpa.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example enables standard ARP for the Port Channel interface:

```
(config)#interface port-channel 1  
(config-p-chan 1)#arp arpa
```

lldp receive

Use the **lldp receive** command to allow LLDP packets to be received on this interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are configured to send and receive LLDP packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the port channel interface to receive LLDP packets:

```
(config)#interface port-channel 1  
(config-p-chan 1)#lldp receive
```

Ildp send [management-address | port-description | system-capabilities | system-description | system-name | and-receive]

Use the **ildp send** command to configure this interface to transmit LLDP packets or to control the types of information contained in the LLDP packets transmitted by this interface.

Syntax Description

management-address	Enables transmission of management address information on this interface.
port-description	Enables transmission of port description information on this interface.
system-capabilities	Enables transmission of this device's system capabilities on this interface.
system-description	Enables transmission of this device's system description on this interface.
system-name	Enables transmission of this device's system name on this interface.
and-receive	Configures this interface to both transmit and receive LLDP packets.

Default Values

By default, all interfaces are configured to transmit and receive LLDP packets of all types.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Individual LLDP information can be enabled or disabled using the various forms of the **ildp send** command. For example, use the **ildp send and-receive** command to enable transmit and receive of all LLDP information. Then use the **no ildp send port-description** command to prevent LLDP from transmitting port description information.

Usage Examples

The following example configures the port channel interface to transmit LLDP packets containing all enabled information types:

```
(config)#interface port-channel 1  
(config-p-chan 1)#lldp send
```

The following example configures the port channel interface to transmit and receive LLDP packets containing all information types:

```
(config)#interface port-channel 1  
(config-p-chan 1)#lldp send and-receive
```

qos [trust cos | default-cos <cos value>]

Use the **qos** command to set the interface to the trusted state and to set the default CoS value. To return to defaults, use the **no** version of this command.

Syntax Description

trust cos	Sets the interface to the trusted state.
default-cos <cos value>	Sets the default CoS value for untrusted ports and all untagged packets (0 to 7).

Default Values

By default, the interface is untrusted with a default-cos of 0.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Set the interface to **trust cos** if received 802.1P CoS values are considered valid (i.e., no need to reclassify) and do not need to be tagged with the default value. When set to untrusted, the **default-cos** value for the interface is used.

Usage Examples

The following example sets port channel 1 as a trusted interface and assigns untagged packets a CoS value of 1:

```
(config)#interface port-channel 1  
(config-p-chan 1)#qos trust cos  
(config-p-chan 1)#qos default-cos 1
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables SNMP capability on the port channel interface:

```
(config)#interface port-channel 1  
(config-p-chan 1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.
Release 6.1	Command was expanded to include VLAN and port channel interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the port channel interface:

```
(config)#interface port-channel 1  
(config-p-chan 1)#no snmp trap link-status
```

spanning-tree bpdudfilter [enable | disable]

Use the **spanning-tree bpdudfilter** command to enable or disable the BPDU filter on a specific interface. This setting overrides the related global setting (refer to *spanning-tree edgeport default* [on page 519](#)). Use the **no** version of the command to return to the default setting.

Syntax Description

enable	Enables BPDU filter for this interface.
disable	Disables BPDU filter for this interface.

Default Values

By default, this setting is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The bpdudfilter blocks any BPDUs from being transmitted and received on an interface.

Usage Examples

The following example enables the BPDU filter on the port channel interface:

```
(config)#interface port-channel 3  
(config-p-chan 3)#spanning-tree bpdudfilter enable
```

The BPDU filter can be disabled on port channel 3 by issuing the following commands:

```
(config)#interface port-channel 3  
(config-p-chan 3)#spanning-tree bpdudfilter disable
```

spanning-tree bpduguard [enable | disable]

Use the **spanning-tree bpduguard** command to enable or disable the BPDU guard on a specific interface. This setting overrides the related global setting (refer to *spanning-tree edgeport default* on page 519). Use the **no** version of the command to return to the default setting.

Syntax Description

enable	Enables BPDU guard for this interface.
disable	Disables BPDU guard for this interface.

Default Values

By default, this setting is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The bpduguard blocks any BPDUs from being received on an interface.

Usage Examples

The following example enables the BPDU guard on the port channel interface:

```
(config)#interface port-channel 3  
(config-p-chan 3)#spanning-tree bpduguard enable
```

The BPDU guard can be disabled on port channel 3 by issuing the following commands:

```
(config)#interface port-channel 3  
(config-p-chan 3)#spanning-tree bpduguard disable
```

spanning-tree cost <cost value>

Use the **spanning-tree cost** command to assign a cost to the interface. The cost value is used when computing the spanning-tree root path. Use the **no** version of the command to return to the default setting.

Syntax Description

<cost value> Specifies a cost value of 1 to 200,000,000.

Default Values

By default, the cost value is set to 1000/(link speed in Mbps).

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets the interface to a path cost of 1200:

```
(config)#interface port-channel 3  
(config-p-chan 3)#spanning-tree cost 1200
```


spanning-tree edgeport

Use the **spanning-tree edgeport** command to configure the interface to be an edgeport. This command overrides the Global setting (refer to *spanning-tree edgeport default* on page 519). Use the **no** version of the command to return to the default setting.

Syntax Description

No subcommands.

Default Values

By default, this setting is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Enabling this command configures the interface to go to a forwarding state when the link goes up.

Usage Examples

The following example configures the interface to be an edgeport:

```
(config)#interface port-channel 1  
(config-p-chan 1)#spanning-tree edgeport
```

An individual interface can be configured to not be considered an edgeport. For example:

```
(config)#interface port-channel 1  
(config-p-chan 1)#spanning-tree edgeport disable
```

or

```
(config)#interface port-channel 1  
(config-p-chan 1)#no spanning-tree edgeport
```

spanning-tree link-type [auto | point-to-point | shared]

Use the **spanning-tree link-type** command to configure the spanning tree protocol link type for each interface. Use the **no** version of the command to return to the default setting.

Syntax Description

auto	Link type is determined by the port's duplex settings.
point-to-point	Link type is manually set to point-to-point, regardless of duplex settings.
shared	Link type is manually set to shared, regardless of duplex settings.

Default Values

By default, the interface is set to **auto**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command overrides the default link type setting determined by the duplex of the individual port. By default, a port configured for half-duplex is set to **shared** link type, and a port configured for full-duplex is set to **point-to-point** link type. Setting the link type manually overrides the default and forces the port to use the specified link type. Use the **link-type auto** command to restore the convention of determining link type based on duplex settings.

Usage Examples

The following example forces the link type to **point-to-point**, even if the port is configured to be half-duplex:

```
(config)#interface port-channel 1
(config-p-chan 1)#spanning-tree link-type point-to-point
```

Technology Review

Rapid transitions are possible in RSTP (rapid spanning-tree protocol) by taking advantage of point-to-point links (a port is connected to exactly one other bridge) and edge-port connections (a port is not connected to any additional bridges). Setting the link type to **point-to-point** allows a half-duplex link to act as if it were a point-to-point link.

spanning-tree port-priority <priority level>

Use the **spanning-tree port-priority** command to select the priority level of this interface. To return to the default setting, use the **no** version of this command.

Syntax Description

<priority level> Specifies a value from 0 to 240 (this value must be in increments of 16).

Default Values

By default, this set to 128.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The only time that this priority level is used is when two interfaces with a path to the root have equal cost. At that point, the level set in this command will determine which port the spanning-tree will use. Set the priority value lower to increase the chance the interface will be used.

Usage Examples

The following example sets the interface to a priority of 96:

```
(config)#interface port-channel 4  
(config-p-chan 4)#spanning-tree port-priority 96
```

storm-control [broadcast level | multicast level | unicast level] <rising level> <falling level>

Use the **storm-control** command to configure limits on the rates of broadcast, multicast, and unicast traffic on a port. To disable storm-control, use the **no** version of this command.

Syntax Description

broadcast level	Sets levels for broadcast traffic.
multicast level	Sets levels for multicast traffic.
unicast level	Sets levels for unicast traffic.
<i><rising level></i>	Specifies a rising level which determines the percentage of total bandwidth the port accepts before it begins blocking packets. Range: 0-100 percent.
<i><falling level></i>	Specifies a falling level which determines when the storm is considered over, causing the AOS to no longer block packets. This level must be less than the rising level. Range: 0 to 100 percent.

Default Values

By default, storm-control is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This setting configures the rising and falling suppression values. When the selected rising level (which is a percentage of total bandwidth) is reached, the port begins blocking packets of the specified type (i.e., broadcast, multicast, or unicast). The AOS uses the rising level as its falling level if no falling level is specified.

Usage Examples

The following example sets the rising suppression level to 85 percent for multicast packets:

```
(config)#interface port-channel 1  
(config-p-chan 1)#storm-control multicast level 85
```

The following example sets the rising suppression level to 80 percent for broadcast packets, with a falling level of 50 percent:

```
(config)#interface port-channel 1  
(config-p-chan 1)#storm-control broadcast level 80 50
```

storm-control action [shutdown]

Use the **storm-control action** command to select the action taken when a storm occurs. To disable the option, use the **no** version of this command.

Syntax Description

shutdown Shuts down the interface during a storm.

Default Values

By default, this command is disabled; the interface will only filter traffic.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Enabling this option shuts down the interface if a multicast, unicast, or broadcast storm occurs.

Usage Examples

The following example shuts down the port channel interface if a storm is detected:

```
(config)#interface port-channel 1  
(config-p-chan 1)#storm-control action shutdown
```

switchport access vlan <vlan id>

Use the **switchport access vlan** command to set the port to be a member of the VLAN when in access mode. To reset the port to be a member of the default VLAN, use the **no** version of this command.

Syntax Description

<vlan id> Specifies a valid VLAN interface ID (1 to 4094).

Default Values

By default, this is set to VLAN 1 (the default VLAN).

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

If the port is in the trunk mode, this command will not alter the switchport mode to access. Instead it will save the value to be applied when the port does switch to access mode. Refer to *switchport mode [access | trunk]* on page 753 for more information.

Usage Examples

The following example sets the switchport mode to static-access and makes the port channel 1 port a member of VLAN 2:

```
(config)#interface port-channel 1
(config-p-chan 1)#switchport mode access
(config-p-chan 1)#switchport access vlan 2
```

switchport gvrp

Use the **switchport gvrp** command to enable or disable GVRP on an interface.

Syntax Description

No subcommands.

Default Values

By default, GVRP is disabled on all ports.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Enabling GVRP on any interface enables GVRP globally.

Usage Examples

The following example enables GVRP on port channel 3:

```
(config)#interface port-channel 3  
(config-p-chan 3)#switchport gvrp
```


switchport mode [access | trunk]

Use the **switchport mode** command to configure the VLAN membership mode. To reset membership mode to the default value, use the **no** version of this command.

Syntax Description

access	Sets port to be a single (non-trunked) port that transmits and receives no tagged packets.
trunk	Sets port to transmit and receive packets on all VLANs included within its VLAN allowed list.

Default Values

By default, this is set to access.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the port to be a trunk port:

```
(config)#interface port-channel 1  
(config-p-chan 1)#switchport mode trunk
```

switchport trunk allowed vlan [add | except | remove] <vlan id list> [all]

Use the **switchport trunk allowed vlan** command to allow certain VLANs to transmit and receive traffic on this port when the interface is in trunking mode. To return to defaults, use the **no** version of this command.

Syntax Description

add	Adds the specified VLAN IDs to the VLAN trunking allowed list.
except	Adds all configured VLAN IDs to the VLAN trunking allowed list except those specified in the <vlan id list>.
remove	Removes VLAN IDs from the VLAN trunking allowed list.
<vlan id list>	Specifies a list of valid VLAN interface IDs. Refer to <i>Functional Notes</i> below for additional syntax considerations.
all	Adds all configured VLAN IDs to the VLAN trunking allowed list.

Default Values

By default, all valid VLANs are allowed.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

A VLAN list is a set of VLAN IDs. A valid VLAN ID value must be from 1 to 4094 (inclusive). Each VLAN ID in a list is delimited by commas, yet a range of IDs may be expressed as a single element by using a hyphen between endpoints. For example the VLAN ID range **1,2,3,4,6,7,8,9,500** may be more easily expressed as **1-4,6-9,500**. No spaces are allowed in a valid ID range.

Usage Examples

The following example adds VLANs to the previously existing list of VLANs allowed to transmit and receive on this port:

```
(config)#interface port-channel 1  
(config-p-chan 1)#switchport trunk allowed vlan add 1-4,7-9,500
```

switchport trunk fixed vlan [add | all | except | none | remove] <vlan id list>

Use the **switchport trunk fixed vlan** command to change the configured list of VLANs that remain fixed in use only when GVRP is enabled on the interface. Of these VLANs, VLANs statically or dynamically created will be available for use on the interface.

Syntax Description

add	Adds VLANs to the VLAN GVRP trunking fixed list.
all	Adds all VLANs to the VLAN GVRP trunking fixed list.
except	Adds all VLAN IDs to the VLAN trunking fixed list except those in the command line VLAN ID list.
none	Removes all VLANs from the VLAN GVRP trunking fixed list.
remove	Removes VLAN from the VLAN trunking fixed list.
<vlan id list>	Specifies a list of valid VLAN interface IDs. Refer to <i>Functional Notes</i> below for additional syntax considerations.

Default Values

By default, no VLANs are in the VLAN GVRP trunking fixed list (**switchport trunk fixed vlan none**).

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command has no effect on VLAN membership configuration unless GVRP is enabled on the interface. Refer to [gvrp on page 383](#) for information on enabling GVRP.

A VLAN list is a set of VLAN IDs. A valid VLAN ID value must be from 1 to 4094 (inclusive). Each VLAN ID in a list is delimited by commas, yet a range of IDs may be expressed as a single element by using a hyphen between endpoints. For example the VLAN ID range **1,2,3,4,6,7,8,9,500** may be more easily expressed as **1-4,6-9,500**. No spaces are allowed in a valid ID range.

Usage Examples

The following example changes the configured list of fixed VLANs by adding VLAN 50 to the list:

```
(config-p-chan 1)#switchport trunk fixed vlan add 1-15,25-30,40  
(config-p-chan 1)#  
(config-p-chan 1)#switchport trunk fixed vlan add 50  
(config-p-chan 1)#
```

switchport trunk native vlan <vlan id>

Use the **switchport trunk native vlan** command to set the VLAN native to the interface when the interface is in trunking mode. To return to defaults, use the **no** version of this command.

Syntax Description

<vlan id> Specifies a valid VLAN interface ID (1 to 4094).

Default Values

By default, this is set to VLAN 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Configure which VLAN the interface uses as its native VLAN during trunking. Packets from this VLAN leaving the interface will not be tagged with the VLAN number. Any untagged packets received by the interface are considered a part of the native VLAN ID.

Usage Examples

The following example sets the native VLAN on port channel 1 to VLAN 2:

```
(config)#interface port-channel 1  
(config-p-chan 1)#switchport trunk native vlan 2
```

ETHERNET INTERFACE CONFIGURATION COMMAND SET

There are four types of Ethernet interfaces associated with the AOS:

- Basic Ethernet interfaces (e.g., eth 0/1)
- Gigabit Ethernet interfaces (e.g., giga-eth 0/3)
- Ethernet sub-interfaces associated with a VLAN (e.g., eth 0/1.1)
- Ethernet interface range (e.g., eth 0/1, 0/8)

To activate the basic Ethernet Interface Configuration mode, enter the **interface ethernet** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface ethernet 0/1
(config-eth 0/1)#
```

To activate the Gigabit Ethernet Interface Configuration mode, enter the **interface gigabit-ethernet** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface gigabit-ethernet 0/3
(config-giga-eth 0/3)#
```

To activate the Ethernet Sub-Interface Configuration mode, enter the **interface ethernet** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface ethernet 0/1.1
(config-eth 0/1.1)#
```

To activate the Ethernet Configuration mode for a range of Ethernet interfaces, enter the **interface range** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface range ethernet 0/1, 0/8
(config-eth 0/1, 0/8)#
```

Not all Ethernet commands apply to all Ethernet types. Use the ? command to display a list of valid commands. For example:

>enable

Password:xxxxx

#config term

(config)#int eth 0/1

(config-eth 0/1)#?



access-policy - Assign access control policy for this interface

alias - A text name assigned by an SNMP NMS

arp - Set ARP commands

bandwidth - Set bandwidth informational parameter

bridge-group - Assign the current interface to a bridge group

etc....

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <policyname> [on page 761](#)

arp arpa [on page 764](#)

bandwidth <value> [on page 765](#)

bridge-group <group#> [on page 766](#)

channel-group <group#> mode on [on page 767](#)

crypto map <mapname> [on page 768](#)

dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname> <username> <password> [on page 770](#)

encapsulation 802.1q [on page 772](#)

full-duplex [on page 773](#)

half-duplex [on page 775](#)

ip commands [begin on page 776](#)

lldp receive [on page 798](#)

lldp send [*management-address* | *port-description* | *system-capabilities* | *system-description* | *system-name* | *and-receive*] [on page 799](#)

media-gateway ip [*loopback* | *primary* | *secondary* <*ip address*>] [on page 802](#)

media-gateway ip [*loopback* | *primary* | *secondary* <*ip address*>] [on page 802](#)

mtu <*size*> [on page 803](#)

port-auth auth-mode [*mac-based* | *port-based*] [on page 804](#)

port-auth control-direction [*both* | *in*] [on page 805](#)

port-auth multiple-hosts [on page 806](#)

port-auth port-control [*auto* | *force-authorized* | *force-unauthorized*] [on page 807](#)

power inline [*auto* | *never*] [on page 808](#)

qos-policy out <*mapname*> [on page 809](#)

qos [*trust cos* | *default-cos* <*cos value*>] [on page 810](#)

snmp trap [on page 811](#)

snmp trap link-status [on page 812](#)

spanning-tree commands [begin on page 813](#)

speed [*10* | *100* | *auto* | *nonegotiate*] [on page 820](#)

storm-control [*broadcast level* | *multicast level* | *unicast level*] <*rising level*> <*falling level*>] [on page 821](#)

storm-control action [*shutdown*] [on page 823](#)

switchport commands [begin on page 824](#)

traffic-shape rate <*rate*> <*burstrate*> [on page 838](#)

traffic-shape rate <*rate*> <*burstrate*> [on page 838](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic to an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname> Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.
Release 6.1	Command was expanded to include VLAN interfaces.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the Ethernet 0/1 interface:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```

Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access policy with the Ethernet 0/1 interface:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host <A.B.C.D>** to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the **<A.B.C.D> <wildcard>** format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an IP policy class that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (access list) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list *<access list names>*

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list *<access list names>*

All packets passed by the access list(s) entered will be dropped from the router system.

allow list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the Ethernet 0/1 interface:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#access-policy MatchAll
```

arp arpa

Use the **arp arpa** command to enable address resolution protocol (ARP) on the Ethernet interface.

Syntax Description

arpa	Sets standard address resolution protocol for this interface.
-------------	---

Default Values

The default for this command is arpa.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables standard ARP for the Ethernet interface:

```
(config)#interface eth 0/1  
(config-eth 0/1)#arp arpa
```

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

To view default values, use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the Ethernet 0/1 interface to 10 Mbps:

```
(config)#interface eth 0/1  
(config-eth 0/1)#bandwidth 10000
```

bridge-group <group#>

Use the **bridge-group** command to assign an interface to the specified bridge group. Use the **no** form of this command to remove the interface from the bridge group.

Syntax Description

<group#> Specifies the bridge group number (1 to 255).

Default Values

By default, there are no configured bridge groups.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

A bridged network can provide excellent traffic management to reduce collisions and limit the amount of bandwidth wasted with unnecessary transmissions when routing is not necessary. Any two interfaces can be bridged (e.g., Ethernet to T1 bridge, Ethernet to Frame Relay sub-interface).

Usage Examples

The following example assigns the Ethernet interface to bridge-group 17:

```
(config)#interface eth 0/1  
(config-eth 0/1)#bridge-group 17
```

channel-group <group#> mode on

Use the **channel-group mode on** command to add the interface to a channel-group. To remove an interface from a channel-group, use the **no** version of this command.

Syntax Description

<group#>	Specifies the channel-group number (1 to 6).
mode on	Statically adds the interface to a channel group.

Default Values

By default, the interface is not part of a channel group.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

There can be up to six channel groups with 2-8 interfaces per group. Dynamic protocols are not yet supported (only static). A physical interface can be a member of only one channel group.

Usage Examples

The following example adds the Ethernet 0/1 interface to channel group 1:

```
(config)#interface eth 0/1
(config-eth 0/1)#channel-group 1 mode on
(config-eth 0/1)#
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

<mapname> Specifies the crypto map name that you wish to assign to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

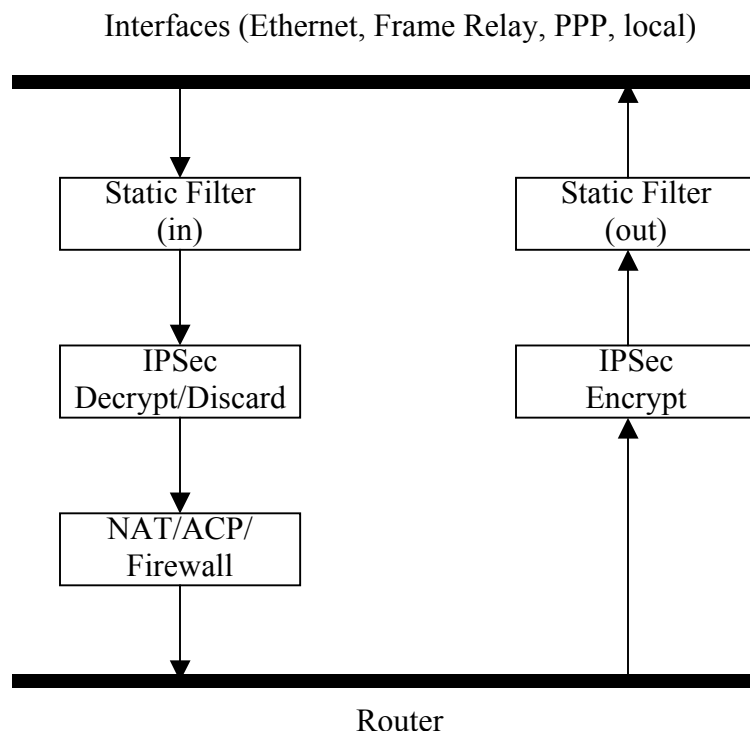
Command History

Release 4.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the Ethernet interface:

```
(config)#interface eth 0/1
(config-eth 0/1)#crypto map MyMap
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

Refer to *Functional Notes* below for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or advanced users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address does not change often or at all but you still want an easy name to remember it by (without having to purchase your own domain name), Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com), you need Custom DNS service which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the dynamic-dns to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface eth 0/1  
(config-eth 0/1)#dynamic-dns dyndns-custom host user pass
```

encapsulation 802.1q

Use the **encapsulation 802.1q** command to put the interface into 802.1q (VLAN) mode.

Syntax Description

No subcommands.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example puts interface **eth 0/1** in 802.1q mode and configures a sub-interface for VLAN usage:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#encapsulation 802.1q
(config-eth 0/1)#interface ethernet 0/1.1
(config-eth 0/1.1)#vlan-id 3
```

full-duplex

Use the **full-duplex** command to configure the Ethernet interface for full-duplex operation. This allows the interface to send and receive simultaneously. Use the **no** form of this command to return to the default **half-duplex** operation.

Syntax Description

No subcommands.

Default Values

By default, all Ethernet interfaces are configured for half-duplex operation.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Full-duplex Ethernet is a variety of Ethernet technology currently being standardized by the IEEE. Because there is no official standard, vendors are free to implement their independent versions of full-duplex operation. Therefore, it is not safe to assume that one vendor's equipment will work with another.

Devices at each end of a full-duplex link have the ability to send and receive data simultaneously over the link. Theoretically, this simultaneous action can provide twice the bandwidth of normal (half-duplex) Ethernet. To deploy full-duplex Ethernet, each end of the link must only connect to a single device (a workstation or a switched hub port). With only two devices on a full-duplex link, there is no need to use the medium access control mechanism (to share the signal channel with multiple stations) and listen for other transmissions or collisions before sending data.



*If the **speed** is manually set to **10** or **100**, the duplex must be manually configured as **full-duplex** or **half-duplex**. Refer to [speed \[10 | 100 | auto | nonegotiate\]](#) on page 820 for more information.*

The 10BaseT, 100BaseTX, and 100BaseFX signalling systems support full-duplex operation (because they have transmit and receive signal paths that can be simultaneously active).

Usage Examples

The following example configures the Ethernet interface for **full-duplex** operation:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#full-duplex
```

half-duplex

Use the **half-duplex** command to configure the Ethernet interface for half-duplex operation. This setting allows the Ethernet interface to either send or receive at any given moment, but not simultaneously. Use the **no** form of this command to disable half-duplex operation.

Syntax Description

No subcommands.

Default Values

By default, all Ethernet interfaces are configured for half-duplex operation.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

Half-duplex Ethernet is the traditional form of Ethernet that employs the Carrier Sense Multiple Access/Collision Detect (CSMA/CD) protocol to allow two or more hosts to share a common transmission medium while providing mechanisms to avoid collisions. A host on a half-duplex link must “listen” on the link and only transmit when there is an idle period. Packets transmitted on the link are broadcast (so it will be “heard” by all hosts on the network). In the event of a collision (two hosts transmitting at once), a message is sent to inform all hosts of the collision and a backoff algorithm is implemented. The backoff algorithm requires the station to remain silent for a random period of time before attempting another transmission. This sequence is repeated until a successful data transmission occurs.



*If the **speed** is manually set to **10** or **100**, the duplex must be manually configured as **full-duplex** or **half-duplex**. Refer to `speed [10 | 100 | auto | nonegotiate]` on page 820 for more information.*

Usage Examples

The following example configures the Ethernet interface for **half-duplex** operation:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#half-duplex
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Assigns IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the router to only allow Telnet traffic (as defined in the user-configured **TelnetOnly** IP access list) into the Ethernet interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#interface eth 0/1
(config-eth 0/1)#ip access-group TelnetOnly in
```


ip address dhcp

Use the **ip address dhcp** command to use Dynamic Host Configuration Protocol (DHCP) to obtain an address on the Ethernet interface. Use the **no** form of this command to remove a configured IP address (using DHCP) and disable DHCP operation on the interface.

ip address dhcp [client-id [*<interface>* | *<identifier>*] hostname <"string">]

Syntax Description

client-id	Optional. Specifies the client identifier used when obtaining an IP address from a DHCP server.
<i><interface></i>	Specifying an interface defines the client identifier as the hexadecimal MAC address of the specified interface (including a hexadecimal number added to the front of the MAC address to identify the media type). For example, specifying the client-id ethernet 0/1 (where the Ethernet interface has a MAC address of d217.0491.1150) defines the client identifier as 01:d2:17:04:91:11:50 (where 01 defines the media type as Ethernet). Refer to <i>hardware-address <hardware-address> <type></i> on page 555 for a detailed listing of media types.
<i><identifier></i>	Specifies a custom client-identifier using a text string (that is converted to a hexadecimal equivalent) or 7 to 28 hexadecimal numbers (with colon delimiters). For example, a custom client identifier of 0f:ff:ff:ff:ff:51:04:99:a1 may be entered using the <i><identifier></i> option.
hostname	Optional. Specifies a text string (to override the global router name) to use as the name in the DHCP option 12 field.
<"string">	String (encased in quotation marks) of up to 35 characters to use as the name of the host for DHCP operation.
no-default-route	Keyword used to specify that the AOS not install the default-route obtained via DHCP.
no-domain-name	Keyword used to specify that the AOS not install the domain-name obtained via DHCP.
no-nameservers	Keyword used to specify that the AOS not install the DNS servers obtained via DHCP.

Default Values

client-id	Optional. By default, the client identifier is populated using the following formula: TYPE: INTERFACE SPECIFIC INFO : MAC ADDRESS Where TYPE specifies the media type in the form of one hexadecimal byte (refer to <i>hardware-address <hardware-address> <type></i> on page 555 for a detailed listing of media types) and the MAC ADDRESS is the Media Access Control (MAC) address assigned to the first Ethernet interface in the unit in the form of six hexadecimal bytes. (For units with a single Ethernet interface, the MAC ADDRESS assigned to Ethernet interface 0/1 is used in this field).
------------------	---

INTERFACE SPECIFIC INFO is only used for Frame Relay interfaces and can be determined using the following:

FR_PORT#: Q.922 ADDRESS

Where the FR_PORT# specifies the label assigned to the virtual Frame Relay interface using four hexadecimal bytes. For example, a virtual Frame Relay interface labeled 1 would have a FR_PORT# of 00:00:00:01.

The Q.922 ADDRESS field is populated using the following:

8	7	6	5	4	3	2	1
DLCI (high order)					C/R	EA	
DLCI (lower)		FECN	BECN	DE	EA		

Where the FECN, BECN, C/R, DE, and high order EA bits are assumed to be 0 and the lower order extended address (EA) bit is set to 1.

The following list provides a few example DLCIs and associated Q.922 address:
DLCI (decimal) / Q.922 address (hex):

16 / 0x0401
50 / 0x0C21
60 / 0x0CC1
70 / 0x1061
80 / 0x1401

hostname Optional. Specifies a text string (to override the global router name) to use as the name in the DHCP option 12 field.
<"string"> By default, the hostname is the name configured using the Global Configuration **hostname** command.

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Dynamic Host Configuration Protocol (DHCP) allows interfaces to acquire a dynamically assigned IP address from a configured DHCP server on the network. Many Internet Service Providers (ISPs) require the use of DHCP when connecting to their services. Using DHCP reduces the number of dedicated IP addresses the ISP must obtain. Consult your ISP to determine the proper values for the **client-id** and **host-name** fields.

Usage Examples

The following example enables DHCP operation on Ethernet interface 0/1:

```
(config)#interface eth 0/1  
(config-eth 0/1)#ip address dhcp
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface (only one primary address is allowed). Use the optional **secondary** keyword to define a secondary IP address. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Keyword used to configure secondary IP addresses for the specified interface. Multiple secondary IP addresses may be assigned (no limit).

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

Use secondary IP addresses to allow dual subnets on a single interface (when you need more IP addresses than the primary subnet can provide). When using secondary IP addresses, avoid routing loops by verifying that all devices on the network segment are configured with secondary IP addresses on the secondary subnet.

Usage Examples

The following example configures a secondary IP address of **192.22.72.101/30**:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#ip address 192.22.72.101 255.255.255.252 secondary
```

ip dhcp release

Use the **ip dhcp release** command to transmit a message to the DHCP server requesting termination of the IP address lease on that interface.

WARNING

*If you are currently connected to the unit using a Telnet session through the Ethernet interface, using the **ip dhcp release** command will terminate your Telnet session and render your Telnet capability inoperable until a new IP address is assigned by the DHCP server.*

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

Dynamic Host Configuration Protocol (DHCP) allows interfaces to acquire a dynamically-assigned IP address from a configured DHCP server on the network. Many Internet Service Providers (ISPs) require the use of DHCP when connecting to their services. Using DHCP reduces the number of dedicated IP addresses the ISP must obtain.

Usage Examples

The following example releases the IP address assigned (by DHCP) on the Ethernet interface (**eth 0/1**):

```
(config)#int eth 0/1
(config-eth 0/1)#ip dhcp release
```

ip dhcp renew

Use the **ip dhcp renew** command to transmit a message to the DHCP server requesting renewal of the IP address lease on that interface.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Dynamic Host Configuration Protocol (DHCP) allows interfaces to acquire a dynamically assigned IP address from a configured DHCP server on the network. Many Internet Service Providers (ISPs) require the use of DHCP when connecting to their services. Using DHCP reduces the number of dedicated IP addresses the ISP must obtain.

Usage Examples

The following example renews the IP address assigned (by DHCP) on the Ethernet interface (**eth 0/1**):

```
(config)#int eth 0/1
(config-eth 0/1)#ip dhcp renew
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



*The **ip helper-address** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets.*

Syntax Description

<address>	Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets
-----------	---

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign helper address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address **192.33.5.99**:

```
(config)#ip forward-protocol udp domain  
(config)#interface eth 0/1  
(config-eth 0/1)#ip helper-address 192.33.5.99
```


ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	If only one host (or IGMP snooping switch) is connected to the interface when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	This command controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer (if no receiver responds) the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65,535 ms. Default: 1000 ms.
querier-timeout <seconds>	Number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65,535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface eth 0/1  
(config-eth 0/1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface, and to place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub upstream* [on page 789](#) for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface eth 0/1
(config-eth 0/1)#ip mcast-stub downstream
```

ip mcast-stub helper-address *<ip address>*

Use the **ip mcast-stub helper-address** command to specify an IP address toward which IGMP host reports and leave messages are forwarded. This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub downstream** and **ip mcast-stub upstream** commands. Use the **no** form of this command to return to default.

Syntax Description

<i><ip address></i>	Specifies the address to which the IGMP host reports and leave messages are forwarded.
---------------------------	--

Default Values

By default, no helper-address is configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

The helper address is configured globally and applies to all multicast-stub downstream interfaces. The address specified may be the next upstream hop or any upstream address on the distribution tree for the multicast source, up to and including the multicast source. The router selects, from the list of multicast-stub upstream interfaces, the interface on the shortest path to the specified address. The router then proxies, on the selected upstream interface (using an IGMP host function), any host joins/leaves received on the downstream interface(s). The router retransmits these reports with addresses set as if the report originated from the selected upstream interface.

For example, if the router receives multiple joins for a group, it will not send any extra joins out the upstream interface. Also, if it receives a leave, it will not send a leave until it is certain that there are no more subscribers on any downstream interface.

Usage Examples

The following example specifies 172.45.6.99 as the helper address:

```
(config)#ip mcast-stub helper-address 172.45.6.99
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 787](#) for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface eth 0/1
(config-eth 0/1)#ip mcast-stub upstream
```

ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key <password>	Assigns a simple-text authentication password to be used by other routers using the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, the neighboring device is assumed to be down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32,767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte max) keys.
priority <value>	Sets the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

dead-interval <seconds>	40 seconds
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Selects message-digest authentication type.
null	Optional. Specifies that no authentication is used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Usage Examples

The following example specifies that no authentication will be used on the Ethernet interface:

```
(config)#interface eth 0/1  
(config-eth 0/1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface eth 0/1  
(config-eth 0/1)#ip ospf network broadcast
```


ip proxy-arp <address> <subnet mask>

Use the **ip proxy-arp** command to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy ARP is enabled.

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

In general, the principle of proxy-arp allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all arp requests with its specified MAC address and forward packets accordingly.

Enabling proxy-arp on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the Ethernet interface:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface.

Syntax Description

- | | |
|----------|---|
| 1 | Accepts only RIP version 1 packets received on the interface. |
| 2 | Accepts only RIP version 2 packets received on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

- | | |
|-------------|--|
| Release 1.1 | Command was introduced. |
| Release 5.1 | Command was expanded to include Ethernet sub-interfaces. |

Functional Notes

Use the **ip rip receive version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. Refer to *version [1 | 2]* [on page 1330](#) for more information.

The AOS only accepts one version (either **1** or **2**) on a given interface.

Usage Examples

The following example configures the Ethernet interface to accept only RIP version 2 packets:

```
(config)#interface eth 0/1
(config-eth 0/1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface.

Syntax Description

1	Transmits only RIP version 1 packets on the interface.
2	Transmits only RIP version 2 packets on the interface.

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

Use the **ip rip send version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. Refer to *version [1 | 2]* on [page 1330](#) for more information.

The AOS only transmits one version (either **1** or **2**) on a given interface.

Usage Examples

The following example configures the Ethernet interface to transmit only RIP version 2 packets:

```
(config)#interface eth 0/1  
(config-eth 0/1)#ip rip send version 2
```

ip route-cache

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route-cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast switching on the Ethernet interface:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#ip route-cache
```

ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface (in the format type slot/port) that contains the IP address to be used as the source address for all packets transmitted on this interface
-------------	--

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.
Release 6.1	Command was expanded to include VLAN interfaces.

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered ppp 1** while in the Ethernet Interface Configuration mode configures the Ethernet interface to use the IP address assigned to the PPP interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface.

Usage Examples

The following example configures the Ethernet interface (labeled **eth 0/1**) to use the IP address assigned to the PPP interface (**ppp 1**):

```
(config)#interface eth 0/1
(config-eth 0/1)#ip unnumbered ppp 1
```

Ildp receive

Use the **ildp receive** command to allow LLDP packets to be received on this interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are configured to send and receive LLDP packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures Ethernet interface 0/1 to receive LLDP packets:

```
(config)#interface eth 0/1  
(config-eth 0/1)#ildp receive
```

lldp send [management-address | port-description | system-capabilities | system-description | system-name | and-receive]

Use the **lldp send** command to configure this interface to transmit LLDP packets or to control the types of information contained in the LLDP packets transmitted by this interface.

Syntax Description

management-address	Enables transmission of management address information on this interface.
port-description	Enables transmission of port description information on this interface.
system-capabilities	Enables transmission of this device's system capabilities on this interface.
system-description	Enables transmission of this device's system description on this interface.
system-name	Enables transmission of this device's system name on this interface.
and-receive	Configures this interface to both transmit and receive LLDP packets.

Default Values

By default, all interfaces are configured to transmit and receive LLDP packets of all types.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Individual LLDP information can be enabled or disabled using the various forms of the **lldp send** command. For example, use the **lldp send and-receive** command to enable transmit and receive of all LLDP information. Then use the **no lldp send port-description** command to prevent LLDP from transmitting port description information.

Usage Examples

The following example configures Ethernet interface 0/1 to transmit LLDP packets containing all enabled information types:

```
(config)#interface eth 0/1  
(config-eth 0/1)#lldp send
```

The following example configures Ethernet interface 0/1 to transmit and receive LLDP packets containing all information types:

```
(config)#interface eth 0/1  
(config-eth 0/1)#lldp send-and-receive
```


mac-address <address>

Use the **mac-address** command to specify the Media Access Control (MAC) address of the unit. Only the last three values of the MAC address can be modified. The first three values contain the ADTRAN reserved number (00:0A:C8) by default. Use the **no** form of this command to return to the default MAC address programmed by ADTRAN.

Syntax Description

<address> Specifies a MAC address entered in a series of six dual-digit hexadecimal values separated by colons (for example 00:0A:C8:5F:00:D2).

Default Values

A unique default MAC address is programmed in each unit shipped by ADTRAN.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include Gigabit Ethernet interfaces.

Usage Examples

The following example configures a MAC address of **00:0A:C8:5F:00:D2**:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#mac-address 00:0A:C8:5F:00:D2
```

media-gateway ip [loopback | primary | secondary <ip address>]

Use the **media-gateway ip** command to associate an IP address source to use for RTP traffic. When configuring VoIP, RTP traffic needs an IP address to be associated with it. However, some interfaces allow "dynamic" configuration of IP addresses, and thus, this value could change periodically.

Syntax Description

loopback	Use an IP address statically defined to a loopback interface. Helpful when using a single IP address across multiple WAN interfaces for RTP traffic.
primary	Use the IP address that is configured as primary on this interface. Applies to static, DHCP, or negotiated addresses.
secondary <ip-address>	Use the statically defined secondary IP address of this interface to be used for RTP traffic.

Default Values

By default, **media-gateway ip** is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example configures the unit to use the primary IP address for RTP traffic:

```
(config)#interface eth 0/1
(config)#media-gateway ip primary
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:	
	ATM interfaces	64 to 1520
	Ethernet interfaces	64 to 1500
	HDLC interfaces	64 to 1520
	Loopback interfaces	64 to 1500
	Tunnel interfaces	64 to 18,190
	Virtual Frame Relay sub-interfaces	64 to 1520
	Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:	
	ATM interfaces	1500
	Ethernet interfaces	1500
	HDLC interfaces	1500
	Loopback interfaces	1500
	Tunnel interfaces	1500
	Virtual Frame Relay sub-interfaces	1500
	Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the Ethernet interface:

```
(config)#interface eth 0/1
(config-eth 0/1)#mtu 1200
```

port-auth auth-mode [mac-based | port-based]

Use the **port-auth auth-mode** command to configure the authentication mode. Use the **no** form of this command to return to the default settings.

Syntax Description

mac-based	Specifies a MAC-based authentication mode. Each host must authenticate separately.
port-based	Specifies a port-based authentication mode. Only a single host can participate in the authentication process.

Default Values

By default, the authentication mode is port-based.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example configures the unit for MAC-based authentication mode:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#port-auth auth-mode mac-based
```

port-auth control-direction [both | in]

Use the **port-auth control direction** command to configure the direction in which traffic is blocked. This command is only applicable when authentication is port-based. Use the **no** form of this command to return to the default settings.

Syntax Description

both	Blocks traffic in both directions when the port becomes unauthorized.
in	Blocks only incoming traffic when the port becomes unauthorized.

Default Values

By default, traffic is blocked in both directions.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example causes traffic to be blocked in both directions when the port becomes unauthorized:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#port-auth control-direction both
```

port-auth multiple-hosts

Use the **port auth multiple-hosts** command to allow multiple hosts to access an authorized port without going through the authentication process. This command is only applicable when authentication is port-based. Use the **no** form of this command to return to the default settings.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables multiple hosts to access an authorized port:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#port-auth multiple-hosts
```

port-auth port-control [auto | force-authorized | force-unauthorized]

Use the **port-auth port-control** command to configure the port-authorization state. Use the **no** form of this command to return to the default settings.

Syntax Description

auto	Enables the port-authentication process.
force-authorized	Forces the port into an authorized state.
force-unauthorized	Forces the port into an unauthorized state.

Default Values

By default, all ports are forced to an authorized state.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example forces Ethernet port 0/1 into an unauthorized state:

```
(config)#interface ethernet 0/1  
(config-eth 0/1)#port-auth port-control force unauthorized
```

power inline [auto | never]

Use the **power inline** command to detect attached Powered Devices (PDs) and deliver 48 VDC, compliant with the IEEE 802.3af power-over-Ethernet standard, to the PD via existing CAT5 cabling. To disable power detection and supply, use the **power inline never** command.

Syntax Description

auto	Enables power detection and supply to Powered Devices.
never	Disables power detection and supply to Powered Devices.

Default Values

By default, PWR switches discover and provide power to IEEE compliant PDs.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Power over Ethernet Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the ethernet interface to detect and supply power to Powered Devices:

```
(config)#interface ethernet 0/3  
(config-eth 0/3)#power inline auto
```


qos-policy out <mapname>

Use the **qos-policy out** command to apply a previously-configured QoS map to an interface. Use the **no** form of this command to remove the map from the interface. The **out** keyword specifies that this policy will be applied to outgoing packets.

Syntax Description

<mapname> Specifies the name of a previously-created QoS map (see *qos map <mapname>* <sequence number> [on page 490](#) for more information).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 2000, 3000, 4000, and 5000 Series units.

Command History

Release 9.1 Command was introduced.

Usage Examples

The following example applies the QoS map **VOICEMAP** to the HDLC interface:

```
(config)#interface hdlc 1
(config-hdlc 1)#qos-policy out VOICEMAP
```

qos [trust cos | default-cos <cos value>]

Use the **qos** (quality of service) command to set the interface to the trusted state and to set the default cost of service (CoS) value. To return to defaults, use the **no** version of this command.

Syntax Description

trust cos	Sets the interface to the trusted state.
default-cos <cos value>	Sets the default CoS value for untrusted ports and all untagged packets (0 to 7).

Default Values

By default, the interface is untrusted with a default CoS of 0.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Set the interface to **trust cos** if received 802.1P CoS values are considered valid (i.e., no need to reclassify) and do not need to be tagged with the default value. When set to untrusted, the **default-cos** value for the interface is used.

Usage Examples

The following example sets **eth 0/1** as a trusted interface and assigns untagged packets a CoS value of 1:

```
(config)#interface eth 0/1
(config-eth 0/1)#qos trust cos
(config-eth 0/1)#qos default-cos 1
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables SNMP capability on the Ethernet interface:

```
(config)#interface eth 0/1  
(config-eth 0/1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the SNMP variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the interface:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#no snmp trap link-status
```

spanning-tree bpdudfilter [enable | disable]

Use the **spanning-tree bpdudfilter** command to enable or disable the BPDU filter on a specific interface. This setting overrides the related global setting (refer to *spanning-tree edgeport default* on page 519). Use the **no** version of the command to return to the default setting.

Syntax Description

enable	Enables BPDU filter for this interface.
disable	Disables BPDU filter for this interface.

Default Values

By default, this setting is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The bpdudfilter blocks any BPDUs from being transmitted and received on an interface.

Usage Examples

The following example enables the BPDU filter on the interface **eth 0/3**:

```
(config)#interface eth 0/3
(config-eth 0/3)#spanning-tree bpdudfilter enable
```

The BPDU filter can be disabled on the **eth 0/3** by issuing the following commands:

```
(config)#interface eth 0/3
(config-eth 0/3)#spanning-tree bpdudfilter disable
```

spanning-tree bpduguard [enable | disable]

Use the **spanning-tree bpduguard** command to enable or disable the BPDU guard on a specific interface. This setting overrides the related global setting (refer to *spanning-tree forward-time <seconds>* on page 520). Use the **no** version of the command to return to the default setting.

Syntax Description

enable	Enables BPDU guard for this interface.
disable	Disables BPDU guard for this interface.

Default Values

By default, this setting is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The bpduguard blocks any BPDUs from being received on an interface.

Usage Examples

The following example enables the BPDU guard on the interface **eth 0/3**:

```
(config)#interface eth 0/3
(config-eth 0/3)#spanning-tree bpduguard enable
```

The BPDU guard can be disabled on the **eth 0/3** by issuing the following commands:

```
(config)#interface eth 0/3
(config-eth 0/3)#spanning-tree bpduguard disable
```

spanning-tree cost <cost value>

Use the **spanning-tree cost** command to assign a cost to the interface. The cost value is used when computing the spanning-tree root path. Use the **no** version of the command to return to the default setting.

Syntax Description

<cost value> Specifies a cost value of 1 to 200,000,000.

Default Values

By default, the cost value is set to 1000/(link speed in Mbps).

Applicable Platforms

This command applies to the NetVanta 300 and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets the interface to a path cost of 1200:

```
(config)#interface eth 0/3  
(config-eth 0/3)#spanning-tree cost 1200
```

spanning-tree edgeport

Use the **spanning-tree edgeport** command to configure the interface to be an edgeport. This command overrides the related Global setting (refer to *spanning-tree edgeport default* on page 519). Use the **no** version of the command to return to the default setting.

Syntax Description

No subcommands.

Default Values

By default, this setting is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Enabling this command configures the interface to go to a forwarding state when the link becomes active. When not enabled, an interface must go through the listening and learning states before going to the forwarding state.

Usage Examples

The following example configures the interface to be an edgeport:

```
(config)#interface eth 0/1
(config-eth 0/1)#spanning-tree edgeport
```

An individual interface can be configured to not be considered an edgeport. For example:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#no spanning-tree edgeport
```


spanning-tree link-type [auto | point-to-point | shared]

Use the **spanning-tree link-type** command to configure the spanning tree protocol link type for each interface. Use the **no** version of the command to return to the default setting.

Syntax Description

auto	Determines link type by the port's duplex settings.
point-to-point	Manually sets link type to point-to-point , regardless of duplex settings.
shared	Manually sets link type to shared , regardless of duplex settings.

Default Values

By default, the interface is set to **auto**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command overrides the default link type setting determined by the duplex of the individual port. By default, a port configured for half-duplex is set to **shared** link type, and a port configured for full-duplex is set to **point-to-point** link type. Setting the link type manually overrides the default and forces the port to use the specified link type. Use the **link-type auto** command to restore the convention of determining link type based on duplex settings.

Technology Review

Rapid transitions are possible in rapid spanning-tree protocol (RSTP) by taking advantage of point-to-point links (a port is connected to exactly one other bridge) and edge-port connections (a port is not connected to any additional bridges). Setting the link-type to **auto** allows the spanning-tree to automatically configure the link type based on the duplex of the link. Setting the link type to **point-to-point** allows a half-duplex link to act as if it were a point-to-point link.

Usage Examples

The following example forces the link type to **point-to-point**, even if the port is configured to be half-duplex:

```
(config)#interface eth 0/3
(config-eth 0/3)#spanning-tree link-type point-to-point
```

spanning-tree pathcost method [short | long]

Use the **spanning-tree pathcost** command to select a short or long method used by the spanning-tree protocol.

Syntax Description

short	Specifies 16-bit values when calculating pathcosts.
long	Specifies 32-bit values when calculating pathcosts.

Default Values

By default, **spanning-tree pathcost** is set to **short**.

Applicable Platforms

This command applies to the NetVanta 1000, 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that the spanning tree protocol use a long pathcost method:

```
(config)#spanning-tree pathcost method long
```

spanning-tree port-priority <priority level>

Use the **spanning-tree port-priority** command to select the priority level of this interface. To return to the default setting, use the **no** version of this command.

Syntax Description

<priority level>	Specifies a value from 0 to 255.
------------------	----------------------------------

Default Values

By default, this set to 128.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The only time that this priority level is used is when two interfaces with a path to the root have equal cost. At that point, the level set in this command will determine which port the spanning tree will use. Set the priority value lower to increase the chance the interface will be used.

Usage Examples

The following example sets the interface to a priority of 100:

```
(config)#interface eth 0/3  
(config-eth 0/3)#spanning-tree port-priority 100
```

speed [10 | 100 | auto | nonegotiate]

Use the **speed** command to configure the speed of an Ethernet interface. Use the **no** form of this command to return to the default value.

Syntax Description

10	Specifies 10 Mbps Ethernet.
100	Specifies 100 Mbps Ethernet.
auto	Automatically detects 10 or 100 Mbps Ethernet and negotiates the duplex setting.
nonegotiate	Disables auto negotiation and forces the speed to 1 Gbps. This only applies to Gigabit Ethernet interfaces.



*If the **speed** is manually set to **10** or **100**, the duplex must be manually configured as **full-duplex** or **half-duplex**.*

Default Values

By default, speed is set to auto.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example configures the Ethernet port for 100 Mb operation:

```
(config)#interface ethernet 0/1
(config-eth 0/1)#speed 100
```

**storm-control [broadcast level | multicast level | unicast level]
<rising level> <falling level>]**

Use the **storm-control** command to configure limits on the rates of broadcast, multicast, and unicast traffic on a port. To disable **storm-control**, use the **no** version of this command.

Syntax Description

broadcast level	Sets levels for broadcast traffic.
multicast level	Sets levels for multicast traffic.
unicast level	Sets levels for unicast traffic.
<i><rising level></i>	Specifies a rising level which determines the percentage of total bandwidth the port accepts before it begins blocking packets. Range: 0 to 100 percent.
<i><falling level></i>	Optional. Specifies a falling level which determines when the storm is considered over, causing the AOS to no longer block packets. This level must be less than the rising level. Range: 0 to 100 percent.

Default Values

By default, **storm-control** is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This setting configures the rising and falling suppression values. When the selected rising level (which is a percentage of total bandwidth) is reached, the port begins blocking packets of the specified type (i.e., broadcast, multicast, or unicast). The AOS uses the rising level as its falling level if no falling level is specified.

Usage Examples

The following example sets the rising suppression level to 85 percent for multicast packets:

```
(config)#interface eth 0/1  
(config-eth 0/1)#storm-control multicast level 85
```

The following example sets the rising suppression level to 80 percent for broadcast packets, with a falling level of 50 percent:

```
(config)#interface eth 0/1  
(config-eth 0/1)#storm-control broadcast level 80 50
```

storm-control action [shutdown]

Use the **storm-control action** command to select the action taken when a storm occurs. To disable the option, use the **no** version of this command.

Syntax Description

shutdown Shuts down the interface during a storm.

Default Values

By default, this command is disabled; the interface will only filter traffic.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Enabling this option shuts down the interface if a multicast, unicast, or broadcast storm occurs.

Usage Examples

The following example shuts down Ethernet interface 0/1 if a storm is detected:

```
(config)#interface eth 0/1  
(config-eth 0/1)#storm-control action shutdown
```

switchport access vlan <vlan id>

Use the **switchport access vlan** command to set the port to be a member of the VLAN when in access mode. To reset the port to be a member of the default VLAN, use the **no** version of this command.

Syntax Description

<vlan id>	Specifies a valid VLAN interface ID (1 to 4094).
-----------	--

Default Values

By default, this is set to VLAN 1 (the default VLAN).

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

If the port is in the trunk mode, this command will not alter the switchport mode to access. Instead it will save the value to be applied when the port does switch to access mode. Refer to *switchport mode [access | stack | trunk]* on [page 826](#) for more information.

Usage Examples

The following example sets the switchport mode to static access and makes the Ethernet interface 0/1 port a member of VLAN 2:

```
(config)#interface eth 0/1
(config-eth 0/1)#switchport mode access
(config-eth 0/1)#switchport access vlan 2
```


switchport gvrp

Use the **switchport gvrp** command to enable or disable GVRP on an interface.

Syntax Description

No subcommands.

Default Values

By default, GVRP is disabled on all ports.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

Enabling GVRP on any interface enables GVRP globally.

Usage Examples

The following example enables GVRP on Ethernet interface 0/24:

```
(config)#interface eth 0/24  
(config-eth 0/24)#switchport gvrp
```

switchport mode [access | stack | trunk]

Use the **switchport mode** command to configure the VLAN membership mode. To reset membership mode to the default value, use the **no** version of this command.

Syntax Description

access	Sets port to be a single (non-trunked) port that transmits and receives no tagged packets.
stack	Sets the port to allow it to communicate with a switch stack.
trunk	Sets port to transmit and receive packets on all VLANs included within its VLAN allowed list.

Default Values

By default, **switchport mode** is set to **access**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

Configuring the interface for stack mode (using the **switchport mode stack** command) enables the switch to communicate with other switches that it is stacking capable.

- If the switch is configured as the stack master (using the (config)#stack master command), it will begin advertising itself as a stack master.
- If the switch is configured as the stack member (using the (config)#stack member command), it will begin advertising other stack masters that it knows about.

Stack mode also allows the port to transmit and receive packets on all VLANs that are included in the VLAN allowed list. See *stack [master | member | vlan] <master> <member> <vlan>* [on page 526](#) for more information.

Usage Examples

The following example sets the port to be a trunk port:

```
(config)#interface eth 0/1
(config-eth 0/1)#switchport mode trunk
```

switchport protected

Use the **switchport protected** command to prevent the port from transmitting traffic to all other protected ports. A protected port can only send traffic to unprotected ports. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

This command is disabled by default.

Applicable Platforms

This command applies to the NetVanta 1000 and 1000R Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Example

In the example below, all three of the ports are on VLAN 3, and eth 0/1 and eth 0/2 are designated as protected ports. Eth 0/3 is unprotected. Eth 0/1 and eth 0/2 will be allowed to send traffic to eth 0/3, but traffic traveling between eth 0/1 and eth 0/2 will be blocked.

#configure terminal

```
(config)#interface eth 0/1
(config-eth 0/1)#switchport access vlan 3
(config-eth 0/1)#switchport protected
(config-eth 0/1)#exit
```

```
(config)#interface eth 0/2
(config-eth 0/2)#switchport access vlan 32
(config-eth 0/2)#switchport protected
(config-eth 0/2)#exit
```

```
(config)#interface eth 0/3
(config-eth 0/3)#switchport access vlan 3
```

switchport port-security

Use the **switchport port-security** command to enable port security functionality on the interface. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

This command is disabled by default.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

You cannot enable port security on a port that is already configured as the following:

- Monitor session destination
- Member of a port channel interface
- Dynamic or trunk port (i.e., the port must be configured as static access)

Usage Examples

The following example enables port security on the Ethernet interface 0/1 interface:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport port-security
```

switchport port-security aging [static | time <time> | type absolute]

Use the **switchport port-security aging** command to enable and configure secure MAC address aging on a particular interface.

Syntax Description

static	Configures the interface to age static as well as dynamic entries in the secure MAC address table.
time <time>	Enables port security aging for dynamic entries in the secure MAC address table by configuring a time (in minutes). Disable aging by setting the time to 0.
type absolute	Configures the address to be removed after the specified time, regardless of activity.

Default Values

By default, dynamic and static aging are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the aging time of secure MAC addresses to 10 minutes:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport port-security aging time 10
```

switchport port-security expire [time <time> | type absolute]

Use the **switchport port-security expire** command to disable an interface after a specified amount of time.

Syntax Description

time <time>	Enables port expiration by configuring a time (in minutes). Disable by setting time to 0.
type absolute	Configures the interface to shut down after the specified time, regardless of activity.

Default Values

By default, this command is disabled and set to type absolute.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example disables Ethernet interface 0/1 after 10 minutes:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport port-security expire time 10
```

switchport port-security mac-address

Use the **switchport port-security mac-address** command to add a static secure MAC address or sticky secure MAC address associated with the interface and to enable sticky address learning. Variations of this command include the following:

switchport port-security mac-address sticky

switchport port-security mac-address sticky <mac address>

switchport port-security mac-address <mac address>

Syntax Description

sticky	Adds a sticky secure MAC address associated with this interface. Enables sticky address learning if a MAC address is not specified.
---------------	---

Default Values

By default, sticky learning is disabled and there are no configured MAC addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example adds a single static address and enables sticky address learning on interface Ethernet interface 0/1:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport port-security mac-address 00:A0:C8:02:D0:30  
(config-eth 0/1)#switchport port-security mac-address sticky
```

switchport port-security maximum <max value>

Use the **switchport port-security maximum** command to configure the maximum number of secure MAC addresses associated with the interface.

Syntax Description

<max value> Specifies the maximum number of secure MAC addresses to be associated with the interface. Range: 1 to 132.

Default Values

The default value for this command is 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1 Command was introduced.

Usage Examples

The following example sets the maximum supported MAC addresses for Ethernet interface 0/1 to 2:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport port-security maximum 2
```

switchport port-security violation [protect | restrict | shutdown]

Use the **switchport port-security violation** command to configure the action to be taken once a security violation is encountered. Use the **no** form of this command to return to the default setting.

Syntax Description

protect	Determines that the unit will not learn any new secure addresses (nor allow these new sources to pass traffic) until the number of currently active secure addresses drops below the maximum setting.
restrict	Determines that the security violation counter increments and an SNMP trap is sent once a violation is detected. The new address is not learned and data from that address is not allowed to pass.
shutdown	Determines that the interface is disabled once a violation is detected. A no shutdown command is required to re-enable the interface.

Default Values

The default for this command is shutdown.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the interface to react to security violations by not learning the addresses of and not accepting data from the violation source:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport port-security violation restrict
```

switchport trunk allowed vlan [add | all | none | except | remove] <vlan id list> [all]

Use the **switchport trunk allowed vlan** command to allow certain VLANs to transmit and receive traffic on this port when the interface is in trunking mode. To return to defaults, use the **no** version of this command.

Syntax Description

add	Adds the specified VLAN IDs to the VLAN trunking allowed list.
all	Adds all configured VLAN IDs to the VLAN trunking allowed list.
none	Adds no VLAN IDs to the VLAN trunking allowed list.
except	Adds all configured VLAN IDs to the VLAN trunking allowed list except those specified in the <vlan id list>.
remove	Removes VLAN IDs from the VLAN trunking allowed list.
<vlan id list>	Specifies a list of valid VLAN interface IDs. Refer to <i>Functional Notes</i> , below.

Default Values

By default, all valid VLANs are allowed.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

A VLAN list is a set of VLAN IDs. A valid VLAN ID value must be from 1 to 4094 (inclusive). Each VLAN ID in a list is delimited by commas, yet a range of IDs may be expressed as a single element by using a hyphen between endpoints. For example the VLAN ID range **1,2,3,4,6,7,8,9,500** may be more easily expressed as **1-4,6-9,500**. No spaces are allowed in a valid ID range.

Usage Examples

The following example adds VLANs to the previously existing list of VLANs allowed to transmit and receive on this port:

```
(config)#interface eth 0/1
(config-eth 0/1)#switchport trunk allowed vlan add 1-4,7-9,500
```

switchport trunk fixed vlan [add | all | except | none | remove] <vlan id>

Use the **switchport trunk fixed vlan** command to change the configured list of VLANs that remain fixed in use only when GVRP is enabled on the interface. Of these VLANs, VLANs statically created will be available for use on the interface.

Syntax Description

add	Adds VLANs to the VLAN GVRP trunking fixed list.
all	Adds all VLANs to the VLAN GVRP trunking fixed list.
except	Adds all VLAN IDs to the VLAN trunking fixed list except those in the command line VLAN ID list.
none	Removes all VLANs from the VLAN GVRP trunking fixed list.
remove	Removes VLAN from the VLAN trunking fixed list.
<vlan id>	Specifies a valid VLAN interface ID (1 to 4094).

Default Values

By default, no VLANs are in the VLAN GVRP trunking fixed list (**switchport trunk fixed vlan none**).

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command has no effect on VLAN membership configuration unless GVRP is enabled on the interface.

Usage Examples

The following example changes the configured list of fixed VLANs by adding VLAN 50 to the list.

```
(config-eth 0/20)#switchport trunk fixed vlan add 1-15,25-30,40  
(config-eth 0/20)#switchport trunk fixed vlan add 50
```

The following example changes the configured list of fixed VLANs by removing VLANs 10-100 from the list:

```
(config-eth 0/20)#switchport trunk fixed vlan remove 10-100
```

The following example changes the configured list of fixed VLANs to include only VLANs 1 to 1000:

```
(config-eth 0/20)#switchport trunk fixed vlan 1-1000
```

The following example changes the configured list of fixed VLANs to include no VLANs (except those VLANs that are native):

```
(config-eth 0/20)#switchport trunk fixed vlan none
```

switchport trunk native vlan <vlan id>

Use the **switchport trunk native vlan** command to set the VLAN native to the interface when the interface is in trunking mode. To return to defaults, use the **no** version of this command.

Syntax Description

<vlan id> Specifies a valid VLAN interface ID (1 to 4094).

Default Values

By default, this is set to VLAN 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000, and 1000R Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

Configure which VLAN the interface uses as its native VLAN during trunking. Packets from this VLAN leaving the interface will not be tagged with the VLAN number. Any untagged packets received by the interface are considered a part of the native VLAN ID.

Usage Examples

The following example sets the native VLAN on Ethernet interface 0/1 to VLAN 2:

```
(config)#interface eth 0/1  
(config-eth 0/1)#switchport trunk native vlan 2
```

traffic-shape rate <rate> <burstrate>

Use the **traffic-shape rate** command to specify and enforce an output bandwidth for Ethernet and VLAN interfaces.

Syntax Description

<rate>	Specifies the rate (in bits per second) at which the interface should be shaped.
<burstrate>	Optional. Specifies the allowed burst in bytes. By default, this is specified to the rate divided by 5 to represent the number of bytes that would flow within 200 ms.

Default Values

By default, traffic-shaping rate is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Functional Notes

Traffic shaping can be used to limit an Ethernet segment to a particular rate or to specify use of QoS on Ethernet or VLAN interfaces.

Usage Examples

The following example sets the outbound rate of **eth 0/1** to 128 kbps and applies a QoS policy that all RTP traffic is given priority over all other traffic:

```
(config)#qos map voip 1
(config-qos-map)#match ip rtp 10000 10500 all
(config-qos-map)#priority unlimited
(config-qos-map)#interface eth 0/1
(config-eth)#traffic-shape rate 128000
(config-eth)#qos-policy out voip
```

vlan-id <*vlan id*> [**native**]

Use the **vlan-id** command to set a VLAN ID for the Ethernet interface. Use the **no** form of this command to remove an entry.

Syntax Description

< <i>vlan id</i> >	Specifies a valid VLAN interface ID number (1 to 4095).
native	Optional. Specifies that data for that VLAN ID goes out untagged. If native is not specified, data for that VLAN ID goes out tagged.

Default Values

By default, no VLAN ID is set.

Applicable Platforms

This command applies to the NetVanta 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures a native VLAN of 5 for the Ethernet interface 0/1:

```
(config)#interface eth 0/1  
(config-eth 0/1)#vlan-id 5 native
```

DDS INTERFACE CONFIGURATION COMMAND SET

To activate the DDS Interface Configuration mode, enter the **interface dds** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface dds 1/1
(config-dds 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

clock rate [*auto* | *bps56k* | *bps64k*] [on page 841](#)

clock source [*line* | *internal*] [on page 842](#)

data-coding scrambled [on page 843](#)

loopback [*dte* | *line* | *remote*] [on page 844](#)

remote-loopback [on page 845](#)

snmp trap [on page 846](#)

snmp trap link-status [on page 847](#)

clock rate [auto | bps56k | bps64k]

Use the **clock rate** command to configure the data rate used as the operating speed for the interface. This rate should match the rate required by the DDS service provider. Use the **no** form of this command to return to the default value.

Syntax Description

auto	Automatically detects the clock rate and sets to match.
bps56k	Sets the clock rate to 56 kbps.
bps64k	Sets the clock rate to 64 kbps.

Default Values

By default, the rate is set to **auto**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When operating at 64 kbps (clear channel operation), the DTE data sequences may mimic network loop maintenance functions and erroneously cause other network elements to activate loopbacks. Use the **data-coding scrambled** command to prevent such occurrences. See *data-coding scrambled* [on page 843](#) for related information.

Usage Examples

The following example configures the clock rate for 56 kbps operation:

```
(config)#interface dds 1/1
(config-dds 1/1)#clock rate bps56k
```

clock source [line | internal]

Use the **clock source** command to configure the source timing used for the interface. The clock specified using the **clock source** command is also the system master clock. Use the **no** form of this command to return to the default value.

Syntax Description

internal	Configures the unit to provide clocking using the internal oscillator.
line	Configures the unit to recover clocking from the DDS circuit.

Default Values

By default, the clock source is set to **line**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When operating on a DDS network, the clock source should be **line**. On a point-to-point private network, one unit must be **line** and the other **internal**.

Usage Examples

The following example configures the unit to recover clocking from the circuit:

```
(config)#interface dds 1/1
(config-dds 1/1)#clock source line
```

data-coding scrambled

Use the **data-coding scrambled** command to enable the DDS OS scrambler to combine user data with pattern data to ensure user data does not mirror standard DDS loop codes. The scrambler may only be used on 64 kbps circuits without Frame Relay signaling (clear channel).

Syntax Description

No subcommands.

Default Values

By default, the scrambler is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When operating at 64 kbps (clear channel operation), there is a possibility the DTE data sequences may mimic network loop maintenance functions and erroneously cause other network elements to activate loopbacks. Use the **data-coding scrambled** command to prevent such occurrences. Do not use this command if using Frame Relay or if using PPP to another device other than an AOS product also running scrambled.

Usage Examples

The following example enables the DDS OS scrambler:

```
(config)#interface dds 1/1
(config-dds 1/1)#data-coding scrambled
```

loopback [dte | line | remote]

Use the **loopback** command to initiate a specified loopback on the interface. Use the **no** form of this command to deactivate the loop.

Syntax Description

dte	Initiates a loop to connect the transmit and receive path through the unit.
line	Initiates a loop of the DDS circuit toward the network by connecting the transmit path to the receive path.
remote	Transmits a DDS loop code over the circuit to the remote unit. In response, the remote unit should initiate a line loopback.

Default Values

No default values necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates a line loopback on the DDS interface:

```
(config)#interface dds 1/1  
(config-dds 1/1)#loopback line
```

remote-loopback

Use the **remote-loopback** command to configure the interface to respond to loopbacks initiated by a remote unit (or the service provider). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, all interfaces respond to remote loopbacks.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables remote loopbacks on the DDS interface:

```
(config)#interface dds 1/1  
(config-dds 1/1)#remote-loopback
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables SNMP capability on the DDS interface:

```
(config)#interface dds 1/1  
(config-dds 1/1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all supported interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the DDS interface:

```
(config)#interface dds 1/1
(config-dds 1/1)#no snmp trap link-status
```

HSSI INTERFACE CONFIGURATION COMMAND SET

To activate the HSSI Interface Configuration mode, enter the **interface hssi** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface hssi 1/1
(config-hssi 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

external-loopback-request [on page 849](#)

loopback [*dce* | *dte* | *line* | *remote* | *none*] [on page 850](#)

snmp trap link-status [on page 851](#)

external-loopback-request

Use the **external-loopback-request** command to enable LC (loopback circuit C) input to control loopbacks toward the network. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the unit to accept external loopback requests:

```
(config)#interface hssi 1/1  
(config-hssi 1/1)#external-loopback-request
```

loopback [dce | dte | line | remote | none]

Use the **loopback** command to initiate or remove a loopback.

Syntax Description

dce	Initiates a loopback on the DCE.
dte	Initiates a loopback on the DTE.
line	Initiates a local line loopback.
remote	Initiates a remote line loopback.
none	Removes an active loopback.

Default Values

By default, no loopbacks are active.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example initiates a local line loopback on the HSSI interface:

```
(config)#interface hssi 1/1  
(config-hssi 1/1)#loopback line
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap..

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.
Release 7.1	Command was extended to include the HSSI interface.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the interface:

```
(config)#interface hssi 1/1  
(config-hssi 1/1)#no snmp trap link-status
```

SERIAL INTERFACE CONFIGURATION COMMAND SET

To activate the Serial Interface Configuration mode, enter the **interface serial** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface serial 1/1
(config-ser 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> </from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

et-clock-source [*rxclock* | *txclock*] [on page 853](#)

ignore dcd [on page 854](#)

invert etclock [on page 855](#)

invert rxclock [on page 856](#)

invert txclock [on page 857](#)

serial-mode [*eia530* | *v35* | *x21*] [on page 858](#)

snmp trap [on page 859](#)

snmp trap link-status [on page 860](#)

et-clock-source [rxclock | txclock]

Use the **et-clock-source** command to configure the clock source used when creating the external transmit reference clock (et-clock). Use the **no** form of this command to return to the default value.

Syntax Description

rxclock	Uses the clock recovered from the receive signal to generate et-clock.
txclock	Uses the clock recovered from the transmit signal to generate et-clock.

Default Values

By default, the clock recovered from the transmit signal is used to generate the et-clock.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The external transmit clock (et-clock) is an interface timing signal (provided by the DTE device) used to synchronize the transfer of transmit data.

Usage Examples

The following example configures the serial interface to recover the clock signal from the received signal and use it to generate et-clock:

```
(config)#interface serial 1/1
(config-ser 1/1)#et-clock-source rxclock
```

ignore dcd

Use the **ignore dcd** command to specify the behavior of the serial interface when the Data Carrier Detect (DCD) signal is lost. Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, the serial interface does not ignore a change in status of the DCD signal.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When configured to follow DCD (default condition), the serial interface will not attempt to establish a connection when DCD is not present. When configured to ignore DCD, the serial interface will continue to attempt to establish a connection even when DCD is not present.

Usage Examples

The following example configures the serial interface to ignore a loss of the DCD signal:

```
(config)#interface serial 1/1
(config-ser 1/1)#ignore dcd
```

invert etclock

Use the **invert etclock** command to configure the serial interface to invert the external transmit reference clock (et-clock) in the data stream before transmitting. Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, the serial interface does not invert et-clock.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If the serial interface cable is long, causing a phase shift in the data, the et-clock can be inverted using the **invert etclock** command. This switches the phase of the clock, which compensates for a long cable.

Usage Examples

The following example configures the serial interface to invert et-clock:

```
(config)#interface serial 1/1  
(config-ser 1/1)#invert etclock
```

invert rxclock

Use the **invert rxclock** command to configure the serial interface to expect an inverted receive clock (found in the received data stream). Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, the serial interface does not expect an inverted receive clock (**rxclock**).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If the serial interface cable is long, causing a phase shift in the data, the transmit clock can be inverted using the **invert txclock** command (see [invert txclock on page 857](#)). This switches the phase of the clock, which compensates for a long cable. If the transmit clock of the connected device is inverted, use the **invert rxclock** command to configure the receiving interface appropriately.

Usage Examples

The following example configures the serial interface to invert receive clock:

```
(config)#interface serial 1/1
(config-ser 1/1)#invert rxclock
```


invert txclock

Use the **invert txclock** command to configure the serial interface to invert the transmit clock (found in the transmitted data stream) before sending the signal. Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, the serial interface does not invert transmit clock (**txclock**).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If the serial interface cable is long, causing a phase shift in the data, the transmit clock can be inverted (using the **invert txclock** command). This switches the phase of the clock, which compensates for a long cable. If the transmit clock of the connected device is inverted, use the **invert rxclock** command to configure the receiving interface appropriately.

Usage Examples

The following example configures the serial interface to invert the transmit clock:

```
(config)#interface serial 1/1
(config-ser 1/1)#invert txclock
```

serial-mode [eia530 | v35 | x21]

Use the **serial-mode** command to specify the electrical mode for the interface. Use the **no** form of this command to return to the default value.

Syntax Description

eia530	Configures the interface for use with the EIA 530 adapter cable (P/N 1200883L1).
v35	Configures the interface for use with the V.35 adapter cable (P/N 1200873L1).
x21	Configures the interface for use with the X.21 adapter cable (P/N 1200874L1).

Default Values

By default, the serial interface is configured for a V.35 adapter cable.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The pinouts for each of the available interfaces can be found in the *Hardware Configuration Guide* located on the **ADTRAN OS Documentation** CD (provided in shipment).

Usage Examples

The following example configures the serial interface to work with the X.21 adapter cable:

```
(config)#interface serial 1/1
(config-ser 1/1)#serial-mode X21
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables SNMP on the serial interface:

```
(config)#interface serial 1/1  
(config-ser 1/1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC 2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the serial interface:

```
(config)#interface serial 1/1
(config-ser 1/1)#no snmp trap link-status
```

T1 INTERFACE CONFIGURATION COMMAND SET

To activate the T1 Interface Configuration mode, enter the **interface t1** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface t1 1/1
(config-t1 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

clock source [*internal* | *line* | *through*] [on page 862](#)

coding [*ami* | *b8zs*] [on page 863](#)

fdl [*ansi* | *att* | *none*] [on page 864](#)

framing [*d4* | *esf*] [on page 865](#)

lbo [*long* <-22.5, -15, -7.5, 0> | *short* <0-655>] [on page 866](#)

loopback commands [begin on page 867](#)

remote-alarm [*rai*] [on page 870](#)

remote-loopback [on page 871](#)

show test-pattern [on page 872](#)

snmp trap link-status [on page 873](#)

tdm-group <group number> *timeslots* <1-24> *speed* [*56* | *64*] [on page 874](#)

test-pattern [*clear* | *insert* | *ones* | *p215* | *p220* | *p511* | *qrss* | *zeros*] [on page 875](#)

clock source [internal | line | through]

Use the **clock source** command to configure the source timing used for the interface. Use the **no** form of this command to return to the default value.

Syntax Description

internal	Configures the unit to provide clocking using the internal oscillator.
line	Configures the unit to recover clocking from the T1 circuit.
through	Configures the unit to recover clocking from the circuit connected to the DSX-1 interface.

Default Values

By default, the **clock source** is set to **line**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When operating on a circuit that is providing timing, setting the **clock source** to **line** can avoid errors such as Clock Slip Seconds (CSS).

Usage Examples

The following example configures the unit to recover clocking from the primary circuit:

```
(config)#interface t1 1/1
(config-t1 1/1)#clock source line
```

coding [ami | b8zs]

Use the **coding** command to configure the line coding for a T1 physical interface. This setting must match the line coding supplied on the circuit by the service provider.

Syntax Description

ami	Configures the line coding for alternate mark inversion (AMI).
b8zs	Configures the line coding for bipolar eight zero substitution (B8ZS).

Default Values

By default, all T1 interfaces are configured with B8ZS line coding.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The line coding configured in the unit must match the line coding of the T1 circuit. A mismatch will result in line errors (e.g., BPVs).

Usage Examples

The following example configures the T1 interface for AMI line coding:

```
(config)#interface t1 1/1  
(config-t1 1/1)#coding ami
```

fdl [ansi | att | none]

Use the **fdl** command to configure the format for the facility data link (FDL) channel on the T1 circuit. FDL channels are only available on point-to-point circuits. Use the **no** form of this command to return to the default value.

Syntax Description

ansi	Configures the FDL for ANSI T1.403 standard.
att	Configures the FDL for AT&T TR 54016 standard.
none	Disables FDL on this circuit.

Default Values

By default, the FDL is configured for **ansi**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

T1 circuits using ESF framing format (specified using the **framing** command) reserve 12 bits as a data link communication channel, referred to as the FDL, between the equipment on either end of the circuit. The FDL allows the transmission of trouble flags such as the Yellow Alarm signal. Refer to *framing [d4 | esf]* on [page 865](#) for related information.

Usage Examples

The following example disables the FDL channel for the T1 circuit:

```
(config)#interface t1 1/1
(config-t1 1/1)#fdl none
```


framing [d4 | esf]

Use the **framing** command to configure the framing format for the T1 interface. This parameter should match the framing format supplied by your network provider. Use the **no** form of this command to return to the default value.

Syntax Description

d4	Specifies D4 superframe (SF) format.
esf	Specifies extended superframe (ESF) format.

Default Values

By default, the framing format is set to **esf**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

A frame is comprised of a single byte from each of the T1's timeslots; there are 24 timeslots on a single T1 circuit. Framing bits are used to separate the frames and indicate the order of information arriving at the receiving equipment. D4 and ESF are two methods of collecting and organizing frames over the circuit.

Usage Examples

The following example configures the T1 interface for D4 framing:

```
(config)#interface t1 1/1  
(config-t1 1/1)#framing d4
```

lbo [long <-22.5, -15, -7.5, 0> | short <0-655>]

Use the **lbo** command to configure the line build out (LBO) for the T1 interface. Use the **no** form of this command to return to the default value.

Syntax Description

long <-22.5, -15, -7.5, 0> Configures the LBO (in dB) for T1 interfaces with cable lengths greater than 655 feet. Choices are -22.5, -15, -7.5, and 0 dB.

short <0-655> Configures the LBO (in feet) for T1 interfaces with cable lengths less than 655 feet. Range is 0 to 655 feet.

Default Values

By default, the build out is set to 0 dB.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Line build out (LBO) is artificial attenuation of a T1 output signal to simulate a degraded signal. This is useful to avoid overdriving a receiver's circuits. The shorter the distance between T1 equipment (measured in cable length), the greater the attenuation value. For example, two units in close proximity should be configured for the maximum attenuation (-22.5 dB).

Usage Examples

The following example configures the T1 interface LBO for -22.5 dB:

```
(config)#interface t1 1/1
(config-t1 1/1)#lbo -22.5
```

loopback network [line | payload]

Use the **loopback network** command to initiate a loopback on the interface toward the network. Use the **no** form of this command to deactivate the loopback.

Syntax Description

line	Initiates a metallic loopback of the physical T1 network interface.
payload	Initiates a loopback of the T1 framer (CSU portion) of the T1 network interface.

Default Values

No default necessary for this command.

Applicable Platforms

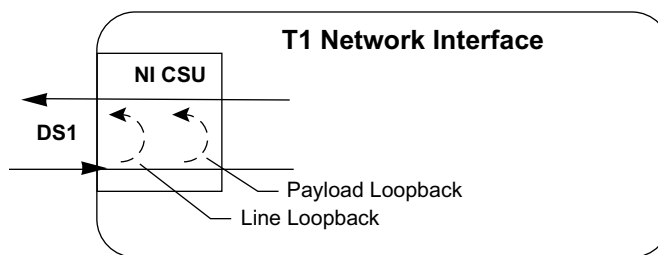
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The following diagram depicts the difference between a line and payload loopback.



Usage Examples

The following example initiates a payload loopback of the T1 interface:

```
(config)#interface t1 1/1
(config-t1 1/1)#loopback network payload
```

loopback remote line [fdl | inband]

Use the **loopback remote line** command to send a loopback code to the remote unit to initiate a line loopback. Use the **no** form of this command to send a loopdown code to the remote unit to deactivate the loopback.

Syntax Description

fdl	Uses the facility data link (FDL) to initiate a full 1.544 Mbps physical (metallic) loopback of the signal received by the remote unit from the network.
inband	Uses the inband channel to initiate a full 1.544 Mbps physical (metallic) loopback of the signal received by the remote unit from the network.

Default Values

No defaults necessary for this command.

Applicable Platforms

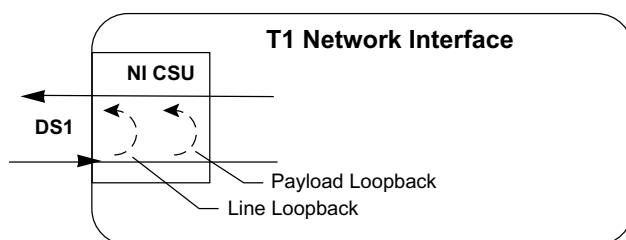
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The following diagram depicts the difference between a line and payload loopback.



Usage Examples

The following example initiates a remote line loopback using the FDL:

```
(config)#interface t1 1/1
(config-t1 1/1)#loopback remote line fdl
```

loopback remote payload

Use the **loopback remote payload** command to send a loopback code to the remote unit to initiate a payload loopback. A payload loopback is a 1.536 Mbps loopback of the payload data received from the network maintaining bit-sequence integrity for the information bits by synchronizing (regenerating) the timing. Use the **no** form of this command to send a loopdown code to the remote unit to deactivate the loopback.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

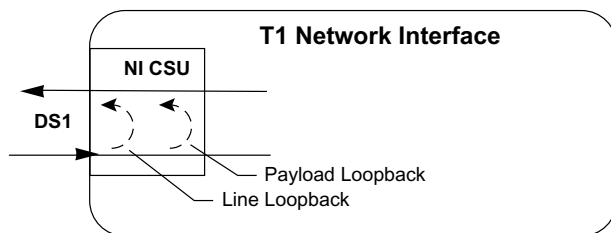
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The following diagram depicts the difference between a line and payload loopback.



Usage Examples

The following example initiates a remote payload loopback:

```
(config)#interface t1 1/1
(config-t1 1/1)#loopback remote payload
```

remote-alarm [rai]

The **remote-alarm** command selects the alarm signaling type to be sent when a loss of frame is detected on the T1 receive signal. Use the **no** form of this command to disable all transmitted alarms.

Syntax Description

rai	Specifies sending a remote alarm indication (RAI) in response to a loss of frame. Also prevents a received RAI from causing a change in interface operational status.
------------	---

Default Values

The default for this command is **rai**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was expanded to include the T1 interface.
-------------	---

Usage Examples

The following example enables transmission of RAI in response to a loss of frame:

```
(config)#interface t1 1/1  
(config-t1 1/1)#remote-alarm rai
```

remote-loopback

Use the **remote-loopback** command to configure the interface to respond to loopbacks initiated by a remote unit (or the service provider). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, all interfaces respond to remote loopbacks.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables remote loopbacks on the T1 interface:

```
(config)#interface t1 1/1  
(config-t1 1/1)#remote-loopback
```

show test-pattern

Use the **show test-pattern** command to display results from test patterns inserted using the **test-pattern** command (refer to *test-pattern [clear | insert | ones | p215 | p220 | p511 | qrss | zeros]* on [page 875](#) for more information).

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from this command:

```
(config)#interface t1 1/1
(config-t1 1/1)#show test-pattern
QRSS Errored Seconds: 6
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the T1 interface:

```
(config)#interface t1 1/1
(config-t1 1/1)#no snmp trap link-status
```

tdm-group <group number> **timeslots** <1-24> **speed** [56 | 64]

Use the **tdm-group** command to create a group of contiguous DS0s on this interface to be used during the **cross-connect** process. Refer to *crypto map* <mapname> [on page 1202](#) for related information.



*Changing **tdm-group** settings could result in service interruption.*

Syntax Description

<group number>	Identifies the created TDM group (valid range: 1 to 255).
timeslots <1-24>	Specifies the DS0s to be used in the TDM group. This can be entered as a single number representing one of the 24 T1 channel timeslots or as a contiguous group of DS0s. (For example, 1-10 specifies the first 10 channels of the T1.)
speed [56 64]	Optional. Specifies the individual DS0 rate on the T1 interface to be 64 kbps. Only the T1 + DSX-1 Network Interface Module supports the 56 kbps DS0 rate. The default speed is 64 kbps.

Default Values

By default, there are no configured TDM groups.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates a TDM group (labeled **5**) of 10 DS0s at 64 kbps each:

```
(config)#interface t1 1/1
(config-t1 1/1)#tdm-group 5 timeslots 1-10 speed 64
```

test-pattern [clear | insert | ones | p215 | p220 | p511 | qrss | zeros]

Use the **test-pattern** command to activate the built-in pattern generator and begin sending the specified test pattern. This pattern generation can be used to verify a data path when used in conjunction with an active loopback. Use the **no** form of this command to cease pattern generation.

Syntax Description

clear	Clears the test pattern error count.
insert	Inserts an error into the currently active test pattern. Display the injected error result using the show test pattern command.
ones	Generates a test pattern of continuous ones.
p215	Generates a pseudorandom test pattern sequence based on a 15-bit shift register.
p220	Generates a pseudorandom test pattern sequence based on a 20-bit shift register.
p511	Generates a test pattern of repeating ones and zeros.
qrss	Generates a test pattern of random ones and zeros.
zeros	Generates a test pattern of continuous zeros.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the pattern generator for a stream of continuous ones:

```
(config)#interface t1 1/1  
(config-t1 1/1)#test-pattern ones
```

DSX-1 INTERFACE CONFIGURATION COMMAND SET

To activate the DSX-1 Interface Configuration mode, enter the **interface t1** command (and specify the DSX-1 port) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface t1 1/2
(config-t1 1/2)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

coding [ami | b8zs] [on page 877](#)

framing [d4 | esf] [on page 878](#)

line-length <value> [on page 879](#)

loopback network [line | payload] [on page 880](#)

loopback remote line [inband] [on page 881](#)

remote-loopback [on page 882](#)

signaling-mode [message-oriented | none | robbed-bit] [on page 883](#)

snmp trap link-status [on page 884](#)

test-pattern [ones | zeros] [on page 885](#)

coding [ami | b8zs]

Use the **coding** command to configure the line coding for a DSX-1 physical interface. This setting must match the line coding supplied on the circuit by the PBX.

Syntax Description

ami	Configures the line coding for alternate mark inversion (AMI).
b8zs	Configures the line coding for bipolar eight zero substitution (B8ZS).

Default Values

By default, all DSX-1 interfaces are configured with B8ZS line coding.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The line coding configured in the unit must match the line coding of the DSX-1 circuit. A mismatch will result in line errors (e.g., BPVs).

Usage Examples

The following example configures the DSX-1 interface for AMI line coding:

```
(config)#interface t1 1/2
(config-t1 1/2)#coding ami
```

framing [d4 | esf]

Use the **framing** command to configure the framing format for the DSX-1 interface. This parameter should match the framing format set on the external device. Use the **no** form of this command to return to the default value.

Syntax Description

d4	Specifies D4 superframe (SF) format.
esf	Specifies extended superframe (ESF) format.

Default Values

By default, the framing format is set to **esf**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

A frame is comprised of a single byte from each of the T1's timeslots; there are 24 timeslots on a single T1 circuit. Framing bits are used to separate the frames and indicate the order of information arriving at the receiving equipment. D4 and ESF are two methods of collecting and organizing frames over the circuit.

Usage Examples

The following example configures the DSX-1 interface for D4 framing:

```
(config)#interface t1 1/2
(config-t1 1/2)#framing d4
```

line-length <value>

Use the **line-length** command to set the line build out (in feet or dB) for the DSX-1 interface. Use the **no** form of this command to return to the default value.

Syntax Description

<value> Configures the line build out for the DSX-1 interface. Valid options include: -7.5 dB or 0 to 655 feet. Use the -7.5 dB option for maximum attenuation.

Default Values

By default, the line build out is set to 0 feet.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The **line-length** value represents the physical distance between DSX equipment (measured in cable length). Based on this setting, the AOS device increases signal strength to compensate for the distance the signal must travel. Valid distance ranges are listed below:

- 0 to 133 feet
- 134 to 265 feet
- 266 to 399 feet
- 400 to 533 feet
- 534 to 655 feet

Usage Examples

The following example configures the DSX-1 interface **line-length** for 300 feet:

```
(config)#interface t1 1/2
(config-t1 1/2)#line-length 300
```

loopback network [line | payload]

Use the **loopback network** command to initiate a loopback on the interface toward the network. Use the **no** form of this command to deactivate the loopback.

Syntax Description

line	Initiates a metallic loopback of the physical DSX-1 network interface.
payload	Initiates a loopback of the T1 framer (CSU portion) of the DSX-1 network interface.

Default Values

No default necessary for this command.

Applicable Platforms

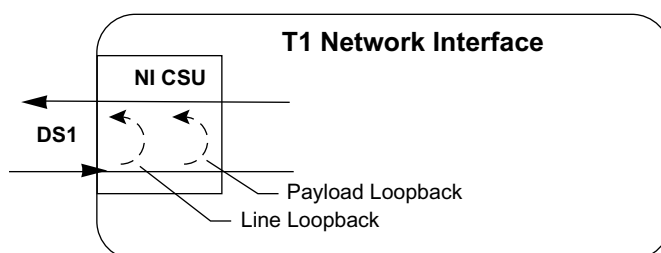
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The following diagram depicts the difference between a line and payload loopback.



Usage Examples

The following example initiates a payload loopback of the DSX-1 interface:

```
(config)#interface t1 1/2
(config-t1 1/2)#loopback network payload
```


loopback remote line [inband]

Use the **loopback remote line inband** command to send a loopback code to the remote unit to initiate a line loopback. Use the **no** form of this command to send a loopdown code to the remote unit to deactivate the loopback.

Syntax Description

inband	Uses the inband channel to initiate a full 1.544 Mbps physical (metallic) loopback of the signal received by the remote unit from the network.
---------------	--

Default Values

No defaults necessary for this command.

Applicable Platforms

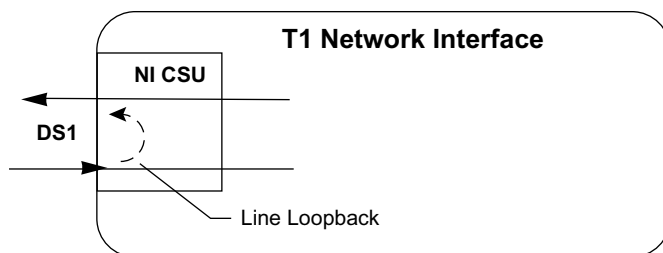
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

A remote loopback can only be issued if a cross-connect does not exist on the interface and if the signaling mode is set to **none**. The following diagram depicts the difference between a line and payload loopback.



Usage Examples

The following example initiates a remote line loopback using the inband channel:

```
(config)#interface t1 1/2
(config-t1 1/2)#loopback remote line inband
```

remote-loopback

Use the **remote-loopback** command to configure the interface to respond to loopbacks initiated by a remote unit (or the service provider). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, all interfaces respond to remote loopbacks.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables remote loopbacks on the DSX-1 interface:

```
(config)#interface t1 1/2  
(config-t1 1/2)#remote-loopback
```

signaling-mode [message-oriented | none | robbed-bit]

Use the **signaling-mode** command to configure the signaling type (robbed-bit for voice or clear channel for data) for the DS0s mapped to the DSX-1 port.

Syntax Description

message-oriented	Specifies clear channel signaling on Channel 24 only. Use this signaling type with QSIG installations.
none	Specifies clear channel signaling on all 24 DS0s. Use this signaling type with data-only or PRI DSX-1 installations.
robbed-bit	Specifies robbed bit signaling on all DS0s. Use this signaling type for voice-only DSX-1 applications.

Default Values

By default, the signaling mode is set to robbed-bit.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the DSX-1 port for PRI compatibility:

```
(config)#interface t1 1/2  
(config-t1 1/2)#signaling-mode none
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit-Ethernet, port-channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the DSX-1 interface:

```
(config)#interface t1 1/2
(config-t1 1/2)#no snmp trap link-status
```

test-pattern [ones | zeros]

Use the **test-pattern** command to activate the built-in pattern generator and begin sending the specified test pattern. This pattern generation can be used to verify a data path when used in conjunction with an active loopback. Use the **no** form of this command to cease pattern generation.

Syntax Description

ones	Generates a test pattern of continuous ones.
zeros	Generates a test pattern of continuous zeros.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the pattern generator for a stream of continuous ones:

```
(config)#interface t1 1/2
(config-t1 1/2)#test-pattern ones
```

E1 INTERFACE CONFIGURATION COMMAND SET

To activate the E1 Interface Configuration mode, enter the **interface e1** command (and specify the E1 port) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface e1 1/1
(config-e1 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

clock source [*internal* | *line* | *through*] [on page 887](#)

coding [*ami* | *hdb3*] [on page 888](#)

framing [*crc4*] [on page 889](#)

loop-alarm-detect [on page 890](#)

loopback network [*line* | *payload*] [on page 891](#)

loopback remote v54 [on page 892](#)

remote-alarm [*rai* | *ais*] [on page 893](#)

remote-loopback [on page 894](#)

sa4tx-bit [*0* | *1*] [on page 895](#)

show test-pattern [on page 896](#)

snmp trap link-status [on page 897](#)

tdm-group <group number> *timeslots* <1-31> *speed* [*56* | *64*] [on page 898](#)

test-pattern [*clear* | *insert* | *ones* | *p215* | *p220* | *p511* | *qrss* | *zeros*] [on page 899](#)

ts16 [on page 900](#)

clock source [internal | line | through]

Use the **clock source** command to configure the source timing used for the interface. Use the **no** form of this command to return to the default value.

Syntax Description

internal	Configures the unit to provide clocking using the internal oscillator.
line	Configures the unit to recover clocking from the E1 circuit.
through	Configures the unit to recover clocking from the circuit connected to the G.703 interface.

Default Values

By default, the unit is configured to recover clocking from the primary circuit.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

When operating on a circuit that is providing timing, setting the **clock source** to **line** can avoid errors such as Clock Slip Seconds (CSS).

Usage Examples

The following example configures the unit to recover clocking from the primary circuit:

```
(config)#interface e1 1/1
(config-e1 1/1)#clock source line
```

coding [ami | hdb3]

Use the **coding** command to configure the line coding for the E1 physical interface. This setting must match the line coding supplied on the circuit by the service provider.

Syntax Description

ami	Configures the line coding for alternate mark inversion (AMI).
hdb3	Configures the line coding for high-density bipolar 3 (HDB3).

Default Values

By default, all E1 interfaces are configured with HDB3 line coding.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The line coding configured in the unit must match the line coding of the E1 circuit. A mismatch will result in line errors (e.g., BPVs).

Usage Examples

The following example configures the E1 interface for AMI line coding:

```
(config)#interface e1 1/1
(config-e1 1/1)#coding ami
```


framing [crc4]

Use the **framing** command to configure the framing format for the E1 interface. This parameter should match the framing format provided by the service provider or external device. Use the **no** form of this command to return to the default value.

Syntax Description

crc4 Enables CRC-4 bits to be transmitted in the outgoing data stream. Also, the received signal is checked for CRC-4 errors.

Default Values

By default, CRC-4 is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The framing value must match the configuration of the E1 circuit. A mismatch will result in a loss of frame alarm.

Usage Examples

The following example configures the E1 interface for CRC-4 framing:

```
(config)#interface e1 1/1  
(config-e1 1/1)#framing crc4
```

loop-alarm-detect

The **loop-alarm-detect** command enables detection of a loop alarm on the E1 interface. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command enables the detection of a loopback alarm. This alarm works in conjunction with the **sa4tx-bit** command setting. The loopback condition is detected by comparing the transmitted **sa4tx-bit** value to the received Sa4 bit value. If the bits match, a loopback is assumed. This detection method only works with a network in which the far end is transmitting the opposite value for Sa4.

Usage Examples

The following example enables detection of a loop alarm on the E1 interface:

```
(config)#config e1 1/1  
(config-e1 1/1)#loop-alarm-detect
```

loopback network [line | payload]

Use the **loopback network** command to initiate a loopback on the interface toward the network. Use the **no** form of this command to deactivate the loopback.

Syntax Description

line	Initiates a metallic loopback of the physical E1 network interface.
payload	Initiates a loopback of the E1 framer (CSU) portion of the E1 network interface.

Default Values

No default necessary for this command.

Applicable Platforms

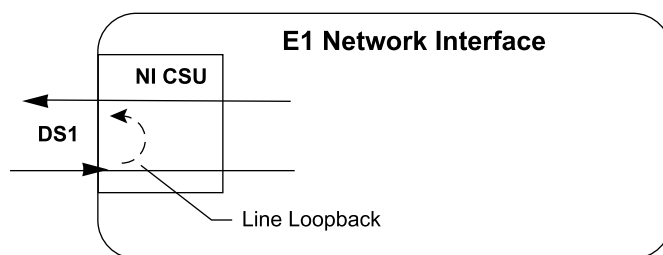
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The following diagram depicts a line loopback.



Usage Examples

The following example initiates a line loopback of the E1 interface:

```
(config)#interface e1 1/1
(config-e1 1/1)#loopback network line
```

loopback remote v54

The **loopback remote v54** command initiates an E1 remote loopback test (with a V.54 loopback pattern). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command causes a V.54 inband loop code to be sent in the payload towards the far end.

Usage Examples

The following example sends a V.54 inband loop code to the far end:

```
(config)#interface e1 1/1  
(config-e1 1/1)#loopback remote v54
```

remote-alarm [rai | ais]

The **remote-alarm** command selects the alarm signaling type to be sent when a loss of frame is detected on the E1 receive signal. Use the **no** form of this command to disable all transmitted alarms.

Syntax Description

rai	Specifies sending a remote alarm indication (RAI) in response to a loss of frame. Also prevents a received RAI from causing a change in interface operational status.
ais	Sends an alarm indication signal (AIS) as an unframed all-ones signal.

Default Values

The default for this command is **rai**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

An E1 will respond to a loss of frame on the receive signal by transmitting a remote alarm to the far end to indicate the error condition. TS0 of an E1 contains the Frame Alignment Signal (FAS) in the even-numbered frames. The odd-numbered frames are not used for frame alignment, and some of those bits are labeled as spare bits (Sa bits) in bit positions 4 through 8.

Usage Examples

The following example enables transmission of AIS in response to a loss of frame:

```
config)#interface e1 1/1  
(config-e1 1/1)#remote alarm ais
```

remote-loopback

Use the **remote-loopback** command to configure the interface to respond to loopbacks initiated by a remote unit (or the service provider). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, all interfaces respond to remote loopbacks.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

This controls the acceptance of any remote loopback requests. When enabled, remote loopbacks are detected and cause a loopback to be applied. When disabled, remote loopbacks are ignored.

Usage Examples

The following example enables remote loopbacks on the E1 interface:

```
(config)#interface e1 1/1  
(config-e1 1/1)#remote-loopback
```

sa4tx-bit [0 | 1]

The **sa4tx-bit** command selects the Tx value of Sa4 in this E1 interface. Use the **no** form of this command to return to the default value of 1.

Syntax Description

No subcommands.

Default Values

The default value for this command is 1.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 6.1 Command was introduced.

Functional Notes

This command assigns a value to the Tx spare bit in position 4. The odd-numbered frames of TS0 are not used for frame alignment. Bits in position 4 through 8 are called spare bits. Values of 0 or 1 are accepted.

TS0 odd frame

Bit position	1	2	3	4	5	6	7	8
Bit use	0	1	RAI = 1	S	S	S	S	S

Usage Examples

The following example sets the Tx value of Sa4 to 0:

```
(config)#interface e1 1/1
(config-e1 1/1)#sa4tx-bit 0
```

show test-pattern

Use the **show test-pattern** command to display results from test patterns inserted using the **test-pattern** command (see *test-pattern [clear | insert | ones | p215 | p220 | p511 | qrss | zeros]* [on page 899](#) for more information).

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following is sample output from this command:

```
(config)#interface e1 1/1  
(config-e1 1/1)#show test-pattern  
QRSS Errored Seconds: 6
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC 2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the E1 interface:

```
(config)#interface e1 1/1
(config-e1 1/1)#no snmp trap link-status
```

tdm-group <group number> **timeslots** <1-31> **speed** [56 | 64]

Use the **tdm-group** command to create a group of contiguous channels on this interface to be used during the **cross-connect** process. See *crypto map* <mapname> [on page 1202](#) for related information.



*Changing **tdm-group** settings could result in service interruption.*

Syntax Description

<group number>	Identifies the created TDM group (valid range: 1 to 255).
timeslots <1-31>	Specifies the channels to be used in the TDM group. This can be entered as a single number representing one of the 31 E1 channel timeslots or as a contiguous group of channels. (For example, 1-10 specifies the first 10 channels of the E1.)
speed [56 64]	Optional. Specifies the individual channel rate on the E1 interface to be 56 kbps or 64 kbps. The default speed is 64 kbps.

Default Values

By default, there are no configured TDM groups.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example creates a TDM group (labeled **5**) of 10 DS0s at 64 kbps each:

```
(config)#interface e1 1/1
(config-e1 1/1)#tdm-group 5 timeslots 1-10 speed 64
```

test-pattern [clear | insert | ones| p215 | p220 | p511 | qrss | zeros]

Use the **test-pattern** command to activate the built-in pattern generator and begin sending the specified test pattern. This pattern generation can be used to verify a data path when used in conjunction with an active loopback. Use the **no** form of this command to cease pattern generation.

Syntax Description

clear	Clears the test pattern error count.
insert	Inserts an error into the currently active test pattern. Display the injected error result using the show test-pattern command.
ones	Generates test pattern of continuous ones.
p215	Generates a pseudorandom test pattern sequence based on a 15-bit shift register.
p220	Generates a pseudorandom test pattern sequence based on a 20-bit shift register.
p511	Generates a test pattern of repeating ones and zeros.
qrss	Generates a test pattern of random ones and zeros.
zeros	Generates test pattern of continuous zeros.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the pattern generator for a stream of continuous ones:

```
(config)#interface e1 1/1
(config-e1 1/1)#test-pattern ones
```

ts16

Use the **ts16** command to enable timeslot 16 multiframe to be checked on the receive signal. Use the **no** form of this command to disable timeslot 16.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables timeslot 16 multiframing:

```
(config)#interface e1 1/1  
(config-e1 1/1)#ts16
```

G.703 INTERFACE CONFIGURATION COMMAND SET

To activate the G.703 Interface Configuration mode, enter the **interface e1** command (and specify the G.703 port) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface e1 1/2
(config-e1 1/2)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

coding [*ami* | *hdb3*] [on page 902](#)

framing [*crc4*] [on page 903](#)

loopback network [*line* | *payload*] [on page 904](#)

snmp trap link-status [on page 905](#)

test-pattern [*ones* | *zeros*] [on page 906](#)

ts16 [on page 907](#)

coding [ami | hdb3]

Use the **coding** command to configure the line coding for the G.703 physical interface. This setting must match the line coding supplied on the circuit by the PBX.

Syntax Description

ami	Configures the line coding for alternate mark inversion (AMI).
hdb3	Configures the line coding for high-density bipolar 3 (HDB3).

Default Values

By default, all E1 interfaces are configured with HDB3 line coding.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The line coding configured in the unit must match the line coding of the E1 circuit. A mismatch will result in line errors (e.g., BPVs).

Usage Examples

The following example configures the G.703 interface for AMI line coding:

```
(config)#interface e1 1/2  
(config-e1 1/2)#coding ami
```

framing [crc4]

Use the **framing** command to configure the framing format for the G.703 interface. This parameter should match the framing format set on the external device. Use the **no** form of this command to return to the default value.

Syntax Description

crc4 Enables CRC4 bits to be transmitted in the outgoing data stream. Also, the received signal is checked for CRC4 errors.

Default Values

By default, CRC4 is enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

The framing value must match the configuration of the E1 circuit. A mismatch will result in a loss of frame alarm.

Usage Examples

The following example configures the G.703 interface for CRC4 framing:

```
(config)#interface e1 1/2  
(config-e1 1/2)#framing crc4
```

loopback network [line | payload]

Use the **loopback network** command to initiate a loopback on the interface toward the network. Use the **no** form of this command to deactivate the loopback.

Syntax Description

line	Initiates a metallic loopback of the physical E1 network interface.
payload	Initiates a loopback of the E1 framer (CSU portion) of the E1 network interface.

Default Values

No default necessary for this command.

Applicable Platforms

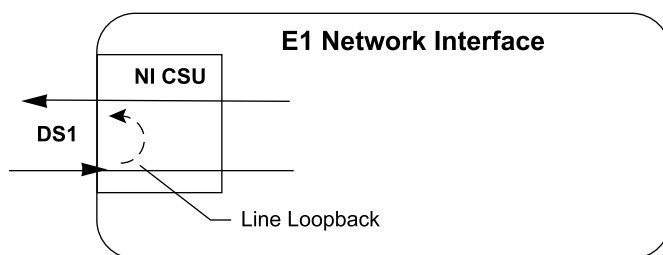
This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The following diagram depicts a line loopback.



Usage Examples

The following example initiates a line loopback of the G.703 interface:

```
(config)#interface e1 1/2
(config-e1 1/2)#loopback network line
```


snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC 2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the G.703 interface:

```
(config)#interface e1 1/2
(config-e1 1/2)#no snmp trap link-status
```

test-pattern [ones | zeros]

Use the **test-pattern** command to activate the built-in pattern generator and begin sending the specified test pattern. This pattern generation can be used to verify a data path when used in conjunction with an active loopback. Use the **no** form of this command to cease pattern generation.

Syntax Description

ones	Generates a test pattern of continuous ones.
zeros	Generates a test pattern of continuous zeros.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
Release 6.1	Command was expanded to include E1 and G.703 interfaces.

Usage Examples

The following example activates the pattern generator for a stream of continuous ones:

```
(config)#interface e1 1/2  
(config-e1 1/2)#test-pattern ones
```

ts16

Use the **ts16** command to enable timeslot 16 multiframe to be checked on the receive signal. Use the **no** form of this command to disable timeslot 16.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables timeslot 16 multiframe:

```
(config)#interface e1 1/2  
(config-e1 1/2)#ts16
```

FXS INTERFACE CONFIGURATION COMMAND SET

To activate the FXS Interface Configuration mode, enter the **interface fxs** command and specify the FXS port at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface fxs 2/1
(config-fxs 2/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

impedance [600c | 600r | 900c | 900r] [on page 909](#)

loopback [analog | digital] [on page 910](#)

rx-gain [-12.0 to 6.0] [on page 911](#)

test commands [begin on page 912](#)

tx-gain [-12.0 to 6.0] [on page 917](#)

impedance [600c | 600r | 900c | 900r]

The **impedance** command configures the AC impedance of the 2-wire interface. Use the **no** form of this command to return to the default value.

Syntax Description

600c	Specifies an impedance of 600 Ω + 2.16 μ F.
600r	Specifies an impedance of 600 Ω real.
900c	Specifies an impedance of 900 Ω + 2.16 μ F.
900r	Specifies an impedance of 900 Ω real.

Default Value

The default for this command is 600r.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sets the impedance to 600 Ω + 2.16 μ F:

```
(config)#interface fxs 2/1
(config-fxs 2/1)#impedance 600c
```

loopback [analog | digital]

The **loopback** command activates a loopback toward the T1 network side on the FXS module. Use the **no** form of this command to deactivate the loopback.

Syntax Description

analog	Initiates a loopback toward the T1 network side of the connection after passing through analog filters in the voice codec.
digital	Initiates the same loopback before passing through analog filters in the voice codec.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example activates a loopback toward the T1 network side of the connection after passing through analog filters in the voice codec:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#loopback analog
```

rx-gain [-12.0 to 6.0]

The **rx-gain** command defines the receive gain characteristics on the FXS interface. Receive gain determines the amplification of the received signal before transmitting out the FXS interface. Use the **no** form of this command to return to the default.

Syntax Description

-12.0 to 6.0 Configured in 0.1 dB increments.

Default Values

By default, this command is set to -3.0 dB.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Functional Notes

When increasing this value, the signal being received on this port sounds louder. When decreasing this value, the signal being received on this port sounds softer.

Usage Example

The following example defines the receive gain as -6.4 dB:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#rx-gain -6.4
```

test battery

The **test battery** command provides battery on the 2-wire FXS interface. This is helpful when troubleshooting wiring problems with the FXS equipment. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Example

The following example provides battery on the 2-wire FXS interface:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#test battery
```


test reverse-battery

The **test reverse-battery** command provides reverse battery polarity on the FXS interface. This is helpful when troubleshooting wiring problems with the FXS equipment. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example provides reverse battery polarity on the FXS interface:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#test reverse-battery
```

test ringing

The **test ringing** command activates ringing voltage on the 2-wire FXS interface (using a 2-seconds-on/4-seconds-off cadence). The **no** version of this command removes the ringing voltage from the interface.

Syntax Description

No subcommands.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example activates ringing voltage on the 2-wire FXS interface:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#test ringing
```

test tip-open

The **test tip-open** command provides battery on ring and a high impedance on tip. This is helpful when troubleshooting problems with ground-start interfaces. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example provides battery on ring and a high impedance on tip on the FXS interface:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#test tip-open
```

test tone [near | far]

The **test tone** command activates the 1 kHz test tone. Use the **no** form of this command to deactivate the test tone.

Syntax Description

near	Sends the test tone toward the FXS interface.
far	Sends the test tone out the T1 network interface to the remote end.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sends the test tone toward the FXS interface:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#test tone near
```

tx-gain [-12.0 to 6.0]

The **tx-gain** command, configured in 0.1 dB increments, defines the transmit gain characteristics on the FXS interface. Transmit gain determines the amplification of the received signal before transmitting from the FXS interface toward the network. Use the **no** form of this command to return to the default.

Syntax Description

12.0 to 6.0 Configured in 0.1 dB increments.

Default Value

By default, this command is set to -6.0 dB.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Functional Notes

When increasing this value, the signal being transmitted to the far end will sound louder. When decreasing this value, the signal being transmitted to the far end sounds softer.

Usage Example

The following example defines the transmit gain as -6.4 dB on the FXS interface:

```
(config)#interface fxs 2/1  
(config-fxs 2/1)#tx-gain -6.4
```

FXO INTERFACE CONFIGURATION COMMAND SET

To activate the FXO Interface Configuration mode, enter the **interface fxo** command and specify the FXO port at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface fxo 2/1
(config-fxo 2/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)
description <text> [on page 1464](#)
do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)
shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

answer-supervision [on page 919](#)
impedance [600c | 900c] [on page 920](#)
loopback [analog | digital] [on page 921](#)
rx-gain <-6.0 to 10.0 db> [on page 922](#)
signal [dpt | loop-start | ground-start] [on page 923](#)
test loop [closed | open] [on page 924](#)
test ring-ground [on page 925](#)
test signaling-bits [0000 | 0101 | 1010 | 1111] [on page 926](#)
test tone [near | far] [on page 927](#)
tx-gain <-6.0 to 10.0 db> [on page 928](#)

answer-supervision

The **answer-supervision** command enables answer supervision for the appropriate voice port(s). Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Value

This command is disabled by default.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

Answer supervision (when the far end answers the call) is indicated by using reverse battery polarity. Enabling this option will cause the FXO interface to interpret reverse battery polarity on the 2-wire interface as LSAS (Line Side Answer Supervision) and transmit the appropriate signaling bits on the T1. The LSAS signaling is defined as 0100 (for ESF) or 01/00 (for D4). The carrier must configure the network T1 for LSAS (if this is not a point-to-point T1).

Usage Example

The following example enables answer supervision:

```
(config)#interface fxo 2/1  
(config-fxo 2/1)#answer-supervision enable
```

impedance [600c | 900c]

The **impedance** command configures the AC impedance of the FXO interface. Use the **no** form of this command to return to the default value.

Syntax Description

600c	Specifies an impedance of 600 Ω + 2.16 μ F.
900c	Specifies an impedance of 900 Ω + 2.16 μ F.

Default Value

The default for this command is **600c**.

Applicable Platforms

This command applies to the NetVanta 950 and 7000 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sets the impedance to 600 Ω + 2.16 μ F:

```
(config)#interface fxo 2/1
(config-fxo 2/1)#impedance 600c
```


loopback [analog | digital]

The **loopback** command activates a loopback on the FXO Module. Use the **no** form of this command to deactivate the loopback.

Syntax Description

analog	Initiates a loopback toward the T1 network side of the connection after passing through analog filters in the voice codec.
digital	Initiates the same loopback before passing through analog filters in the voice codec.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example activates a loopback toward the T1 network side of the connection after passing through analog filters in the voice codec:

```
(config)#interface fxo 2/1  
(config-fxo 2/1)#loopback analog
```

rx-gain <-6.0 to 10.0 db>

The **rx-gain** command defines the receive gain characteristics on the FXO interface. Receive gain determines the amplification of the received signal before transmitting out the FXO interface. Use the **no** form of this command to return to the default.

Syntax Description

<-6.0 to 10.0 db> Defines the receive gain characteristics in 0.1 dB increments.

Default Values

By default, this command is set to 0 dB.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1 Command was introduced.

Functional Notes

When increasing this value, the signal being received on this port sounds louder. When decreasing this value, the signal being received on this port sounds softer.

Usage Example

The following example defines the receive gain as -5.4 dB:

```
(config)#interface fxo 2/1
(config-fxo 2/1)#rx-gain -5.4
```

signal [dpt | loop-start | ground-start]

The **signal** command configures the signaling mode for the FXO interface. Use the **no** form of this command to return to the default.

Syntax Description

dpt	Sets signaling mode to dial pulse terminate (DPT). Used when connecting the FXO interface to analog DPO (dial pulse originate) ports on the CPE.
loop-start	Bridges the tip and ring to indicate an off-hook (seizing the line) condition.
ground-start	Applies resistance to the tip conductor of the circuit to indicate an off-hook condition.

Default Value

By default, this command is set to **loop-start**.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This signaling mode must match the configuration of the network.

Usage Example

The following example sets the signaling mode to **loop-start**:

```
(config)#interface fxo 2/1
(config-fxo 2/1)#signal loop-start
```

test loop [closed | open]

The **test loop** command provides manual control of the FXO interface's hook switch. This is helpful when troubleshooting problems with the FXO equipment. Use the **no** form of this command to disable this feature.

Syntax Description

closed	Closes the hook switch, allowing DC current to flow through the interface.
open	Opens the hook switch, preventing DC current from flowing through the interface.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example opens the interface's hook switch:

```
(config)#interface fxo 2/1  
(config-fxo 2/1)#test loop open
```

test ring-ground

The **test ring-ground** command forces the ring conductor to ground potential and provides battery on tip for detection of tip ground. This is helpful when troubleshooting problems with ground start circuits.

Syntax Description

No subcommands.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example forces a ring-ground test of the FXO interface:

```
(config)#interface fxo 2/1  
(config-fxo 2/1)#test ring-ground
```

test signaling-bits [0000 | 0101 | 1010 | 1111]

The **test signaling-bits** command sends the specified signaling bits towards the T1. This is helpful when troubleshooting from the far end. Set the signal bits using this command; then view the status of the line from the remote equipment to verify that the proper signaling bits are received. Use the **no** form of this command to discontinue transmission.

Syntax Description

0000	Transmits 0000 toward the T1 network.
0101	Transmits 0101 toward the T1 network.
1010	Transmits 1010 toward the T1 network.
1111	Transmits 1111 toward the T1 network.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sends the specified signaling bits toward the T1:

```
(config)#interface fxo 2/1  
(config-fxo 2/1)#test signaling-bits 1010
```

test tone [near | far]

The **test tone** command activates the 1 kHz test tone. Use the **no** form of this command to deactivate the test tone.

Syntax Description

near	Sends the test tone toward the FXO interface.
far	Sends the test tone out the T1 network interface to the remote end.

Default Value

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sends the test tone toward the FXO interface:

```
(config)#interface fxo 2/1  
(config-fxo 2/1)#test tone near
```

tx-gain <-6.0 to 10.0 db>

The **tx-gain** command, configured in 0.1 dB increments, defines the transmit gain characteristics on the FXO interface. Transmit gain determines the amplification of the transmitted signal before transmitting from the FXO interface toward the network. Use the **no** form of this command to return to the default.

Syntax Description

<-6.0 to 10.0 db> Defines the transmit gain characteristics in 0.1 dB increments.

Default Value

By default, this command is set to 0 dB.

Applicable Platforms

This command applies to the NetVanta 950.

Command History

Release 7.1 Command was introduced.

Functional Notes

When increasing this value, the signal being transmitted to the far end sounds louder. When decreasing this value, the signal being transmitted to the far end sounds softer.

Usage Example

The following example defines the transmit gain as -5.4 dB on the FXO interface:

```
(config)#interface fxo 2/1
(config-fxo 2/1)#tx-gain -5.4
```

FDL INTERFACE CONFIGURATION COMMAND SET

FDL Interface Configuration mode is used for establishing a Telnet session over the FDL (facility datalink). To activate, enter the **interface fdl** command and specify the associated slot/port number (of the T1 interface used) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface fdl 1/1
(config-fdl 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

ip address <address> <mask> [on page 930](#)

ip learn-address [on page 931](#)

mtu <size> [on page 932](#)

peer default ip address <address> [on page 933](#)

ip address <address> <mask>

Use the **ip address** command to define an IP address on the specified interface. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 7.1	Command was introduced for the FDL interface.
-------------	---

Usage Examples

The following example configures an IP address of **192.22.72.101/30**:

```
(config)#interface fdl 1/1
(config-fdl 1/1)#ip address 192.22.72.101 255.255.255.252
```

ip learn-address

Use the **ip learn-address** command to automatically learn the IP address of the remote unit. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the FDL to automatically learn the remote unit's IP address:

```
(config)#interface fdl 1/1  
(config-fdl 1/1)#ip learn-address
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:	
	ATM interfaces	64 to 1520
	Ethernet interfaces	64 to 1500
	FDL interfaces	64 to 256
	HDLC interfaces	64 to 1520
	Loopback interfaces	64 to 1500
	Tunnel interfaces	64 to 18,190
	Virtual Frame Relay sub-interfaces	64 to 1520
	Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:	
	ATM interfaces	1500
	Ethernet interfaces	1500
	FDL interfaces	256
	HDLC interfaces	1500
	Loopback interfaces	1500
	Tunnel interfaces	1500
	Virtual Frame Relay sub-interfaces	1500
	Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 7.1	Command expanded to support FDL.

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 128 on the FDL interface:

```
(config)#interface fdl 1/1
(config-fdl 1/1)#mtu 128
```

peer default ip address <address>

Use the **peer default ip address** command to specify the default IP address of the remote end of this interface.

Syntax Description

<address> Specifies the default IP address for the remote end (A.B.C.D).

Default Values

By default, there is no assigned peer default IP address.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 7.1	Command was expanded to include FDL.

Functional Notes

This command is useful if the peer does not send the IP address option during PPP negotiations.

Usage Examples

The following example sets the default peer IP address to 192.22.71.50:

```
(config)#interface fdl 1/1  
(config-fdl 1/1)#peer default ip address 192.22.71.50
```

SHDSL INTERFACE CONFIGURATION COMMAND SET

To activate the SHDSL Interface Configuration mode, enter the **interface shdsl** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config#)interface shdsl 1/1
(config-shdsl 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

alarm-threshold [*loop-attenuation* | *snr-margin*] <value> [on page 935](#)

boot alternate-image [on page 936](#)

equipment-type [*co* | *cpe*] [on page 937](#)

inband-detection [on page 938](#)

inband-protocol [*pn127* | *v54*] [on page 939](#)

linerate <value> [on page 940](#)

loopback network [on page 941](#)

loopback remote [on page 942](#)

loopback remote inband [on page 943](#)

outage-retrain [on page 944](#)

test-pattern [*clear* | *insert* | *p215* | *show*] [on page 945](#)

alarm-threshold [loop-attenuation | snr-margin] <value>

Use the **alarm-threshold** command to set thresholds for specific alarm conditions. Use the **no** form of this command to disable threshold settings.

Syntax Description

loop-attenuation <value>	Specifies a loop-attenuation threshold value from 1 to 127 dB. If signal energy loss on the loop exceeds the configured value, the router issues an alarm.
snr-margin <value>	Specifies a value for signal-to-noise ratio (SNR) margin from 1 to 15 dB. If the difference in amplitude between the baseband signal and the noise exceeds the configured value, the router issues an alarm.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the loop attenuation threshold at 45 dB:

```
(config)#interface shdsl 1/1
(config-shdsl 1/1)#alarm-threshold loop-attenuation 45
```

boot alternate-image

Use the **boot alternate-image** command to execute new code after a firmware upgrade.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The current SHDSL NIM card (1200867L1) supports two code images commonly referred to as the “active” image and the “inactive” image. When a firmware upgrade is performed on the card (through the **copy <filename> interface shdsl x/y** Enable mode command), the new firmware is placed in the “inactive” image space. This new code will not be executed until the **boot alternate-image** command is issued. When the user does this, the NIM will reboot (taking the current line down) with the new code. At this point, the old code becomes the “inactive” image and the new recently updated code becomes the “active” image.

Usage Examples

The following example causes the firmware upgrade to take effect:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#boot alternate-image
```


equipment-type [co | cpe]

Use the **equipment-type** command to determine the operating mode for the SHDSL interface.

Syntax Description

co	Use this option only in a campus environment when operating two SHDSL network interface modules (NIMs) back-to-back. In this setup, configure the master NIM to CO and the slave NIM to CPE.
cpe	Use this option when interfacing directly with your service provider or when acting as the slave NIM in a campus environment.

Default Values

The default for this command is **cpe**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example changes the operating mode of the SHDSL interface to CO:

```
(config)#interface shdsl 1/1
(config-shdsl 1/1)#equipment-type co
```

inband-detection

Use the **inband-detection** command to enable inband loopback pattern detection on the SHDSL interface. Use the **no** form of this command to disable **inband-detection**.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example disables inband loopback pattern detection:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#no inband-detection
```

inband-protocol [pn127 | v54]

Use the **inband-protocol** command to designate the inband loopback pattern to send/detect on the SHDSL interface. Use the **no** form of this command to return to default.

Syntax Description

pn127	Selects PN127 as the inband loopback pattern to send/detect.
v54	Selects V.54 as the inband loopback pattern to send/detect.

Default Values

By default, the **inband-protocol** is set to **v54**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

Inband loopbacks are specific patterns that are sent in place of user data to trigger a loopback. Both PN127 and V.54 are industry-standard loopback patterns used to allow remote loopbacks.

Usage Examples

The following example sets the inband loopback pattern for PN127:

```
(config)#interface shdsl 1/1
(config-shdsl 1/1)#inband-protocol pn127
```

linerate <value>

Use the **linerate** command to define the line rate for the SHDSL interface (the value includes 8 kbps of framing overhead). This command is functional only in CO operating mode (see the section *equipment-type [co | cpe]* [on page 937](#)). The first two selections listed in the CLI (72 and 136 kbps) are not supported by the SHDSL NIM (1200867L1).

Syntax Description

<value> Specifies the line rate in kbps. Range: 200 to 2312 kbps in 64k increments.

Default Values

The default for this command is 2056 kbps.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following example changes the line rate of the SHDSL interface to 264 kbps:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#linerate 264
```

loopback network

Use the **loopback network** command to initiate a loopback test on the SHDSL interface, looping the data toward the network. Use the **no** form of this command to deactivate the loopback.

Syntax Description

No subcommands.

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example initiates a loopback on the SHDSL interface:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#loopback network
```

loopback remote

Use the **loopback remote** command to send a loopback request to the remote unit. This command is functional only in CO operating mode (see the section *equipment-type [co | cpe]* on page 937). Use the **no** form of this command to send a loopdown code to the remote unit to deactivate the loopback.

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example initiates a remote line loopback:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#loopback remote
```

loopback remote inband

Use the **loopback remote inband** command to inject the selected inband loop-up pattern into the data stream to cause a loopback at the far end. Use the **no** form of this command to inject a loop-down pattern into the data stream to cause an existing inband loopback at the far end to cease.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example injects a loop-down pattern into the datastream, causing existing loopbacks at the far end to stop:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#no loopback remote inband
```

outage-retrain

Use the **outage-retrain** command to cause the SHDSL interface to force the SHDSL retrain sequence (which takes the line down temporarily) if the interface detects more than ten consecutive errored seconds. A retrain is forced in hopes that the newly retrained line will achieve better performance than the previous training state. Use the **no** version of the command to disable this feature.

Syntax Description

No subcommands.

Default Values

By default, this feature is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example forces a retrain sequence on the SHDSL interface:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#outage-retrain
```


test-pattern [clear | insert | p215 | show]

Use the **test-pattern** command to activate the built-in pattern generator and begin sending the selected test pattern toward the network. This pattern generation can be used to verify a data path when used in conjunction with an active loopback. Use the **no** form of this command to cease pattern generation.

Syntax Description

clear	Clears the test pattern error count.
insert	Inserts an error into the currently active test pattern.
p215	Generates a pseudorandom test pattern sequence based on a 15-bit shift register.
show	Displays the injected error result.

Default Values

No defaults necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends a 2¹⁵ test pattern:

```
(config)#interface shdsl 1/1  
(config-shdsl 1/1)#test-pattern 2^15
```

MODEM INTERFACE CONFIGURATION COMMAND SET

To activate the Modem Interface Configuration mode, enter the **interface modem** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface modem 1/2
(config-modem 1/2)#
```



*The modem interface number in the example above is shown as **modem 1/2**. This number is based on the interface's location (slot/port) and could vary depending on the unit's configuration. Use the **do show interfaces** command to determine the appropriate interface number.*

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

caller-id override [*always* <number> | *if-no-cid* <number>] [on page 947](#)

dialin [on page 948](#)

init-string <string> [on page 949](#)

caller-id override [always <number> | if-no-cid <number>]

Use the **caller-id override** command to configure the unit to replace caller ID information with a user-specified number. Use the **no** form of this command to disable any caller ID overrides.

Syntax Description

always <number>	Always forces replacement of the incoming caller ID number with the number given.
if-no-cid <number>	Replaces the incoming caller ID number with the number given only if there is no caller ID information available for the incoming call.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command forces a replacement of the incoming caller ID number with the number given. The received caller ID, if any, is discarded, and the given override number is used to connect the incoming call to a circuit of the same number.

Usage Examples

The following example configures the unit to always provide the given number as the caller ID number:

```
(config)#interface modem 1/2  
(config-modem 1/2)#caller-id override always 5555555
```

dialin

Use the **dialin** command to enable the modem for remote console dial-in, disabling the use of the modem for dial-backup.

Syntax Description

No subcommands.

Default Values

By default, **dialin** is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables remote console dial-in:

```
(config)#interface modem 1/2  
(config-modem 1/2)#dialin
```

init-string <string>

Use the **init-string** command to specify an initialization string for the modem using standard AT commands. Use the **no** form of this command to return to the default initialization string.

Syntax Description

<string>	Specifies an initialization string using standard AT commands. This string must start with AT and cannot contain spaces.
----------	--

Default Values

<string>	ate0q0v1x4\n0
at	All initialization strings must begin with AT.
e0	Disables command echo.
q0	Response messages on.
v1	Formats result codes in long word form.
x4	Specifies extended response set, dial tone, and busy signal detection for result codes following modem operations.
\n0	Selects standard buffered connection only.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the modem to perform a hang-up at each initialization (to verify that the line is free) and maintains the default initialization:

```
(config)#interface modem 1/2  
(config-modem 1/2)#init-string ate0h0q0v1x4\n0
```

BRI INTERFACE CONFIGURATION COMMAND SET

To activate the BRI Interface Configuration mode, enter the **interface bri** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface bri 1/2
(config-bri 1/2)#
```



The BRI interface number in the example above is shown as **bri 1/2**. This number is based on the interface's location (slot/port) and could vary depending on the unit's configuration. Use the **do show interfaces** command to determine the appropriate interface number.

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

bonding commands [begin on page 951](#)

caller-id override [*always* <number> | *if-no-cid* <number>] [on page 957](#)

isdn spid1 <spid> <ldn> [on page 958](#)

isdn spid2 <spid> <ldn> [on page 959](#)

isdn switch-type [*basic-5ess* | *basic-dms* | *basic-net3* | *basic-ni*] [on page 960](#)

bonding txadd-timer <seconds>

Use the **bonding txadd-timer** command to specify the value (in seconds) for the aggregate call connect timeout. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds>	Specifies the number of seconds the endpoint will wait for additional channels (to add to the bonded aggregate) before considering the bonding negotiation a failure.
-----------	---

Default Values

By default, the **bonding txadd-timer** value is 50 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Specifies the length of time both endpoints wait for additional calls to be connected at the end of negotiation before deciding that the bonding call has failed. The factory default setting is sufficient for most calls to connect, although when dialing overseas it may be necessary to lengthen this timer to allow for slower call routing.

Usage Examples

The following example defines a **bonding txadd-timer** value of 95 seconds:

```
(config)#interface bri 1/2
(config-bri 1/2)#bonding txadd-timer 95
```

bonding txcid-timer <seconds>

Use the **bonding txcid-timer** command to specify the value (in seconds) for the bearer channel (B-channel) negotiation timeout. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds> Specifies the number of seconds the endpoint allots for negotiating data rates and channel capacities before considering the bonding negotiation a failure.

Default Values

By default, the **bonding txcid-timer** value is 5 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

Specifies the length of time both endpoints attempt to negotiate an agreeable value for bearer channels and channel capacities before deciding the bonding call has failed.

Usage Examples

The following example defines a **bonding txcid-timer** value of 8 seconds:

```
(config)#interface bri 1/2  
(config-bri 1/2)#bonding txcid-timer 8
```


bonding txdeq-timer <seconds>

Use the **bonding txdeq-timer** command to specify the value (in seconds) for the network delay equalization timeout. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds>	Specifies the number of seconds the endpoint allots for attempting to equalize the network delay between bearer channels before considering the bonding negotiation a failure.
-----------	--

Default Values

By default, the **bonding txdeq-timer** value is 50 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Specifies the length of time both endpoints allot to attempt to equalize the network delay between the bearer channels before deciding the bonding call has failed.

Usage Examples

The following example defines a **bonding txdeq-timer** value of 80 seconds:

```
(config)#interface bri 1/2  
(config-bri 1/2)#bonding txdeq-timer 80
```

bonding txf timer <seconds>

Use the **bonding txf timer** command to specify the value (in seconds) for the frame pattern detection timeout. Use the **no** form of this command to return to the default value.

Syntax Description

<code><seconds></code>	Specifies the number of seconds the endpoint allots for attempting to detect the bonding frame pattern (when a call is connected) before considering the bonding negotiation a failure.
------------------------------	---

Default Values

By default, the **bonding txf timer** value is 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Specifies the length of time both endpoints attempt to detect the bonding frame pattern when a call is connected before deciding the bonding call has failed. When operating with other manufacturers' bonding equipment, it may be necessary to change this time so that it matches TXADD01.

Usage Examples

The following example defines a **bonding txf timer** value of 15 seconds:

```
(config)#interface bri 1/2  
(config-bri 1/2)#bonding txf timer 15
```

bonding txinit-timer <seconds>

Use the **bonding txinit-timer** command to specify the value (in seconds) for the originating endpoint negotiation timeout. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds>	Specifies the number of seconds the endpoint waits to detect the bonding negotiation frame pattern from the remote endpoint (when a call is connected) before considering the bonding negotiation a failure.
-----------	--

Default Values

By default, the **bonding txinit-timer** value is 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Specifies the length of time the originating endpoint attempts to detect the bonding negotiation pattern from the answering endpoint before deciding the bonding call has failed.

Usage Examples

The following example defines a **bonding txinit-timer** value of 15 seconds:

```
(config)#interface bri 1/2  
(config-bri 1/2)#bonding txinit-timer 15
```

bonding txnull-timer <seconds>

Use the **bonding txnull-timer** command to specify the value (in seconds) for the answering endpoint negotiation timeout. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds>	Specifies the number of seconds the endpoint waits to detect the bonding negotiation frame pattern from the originating endpoint (after answering a call) before considering the bonding negotiation a failure.
-----------	---

Default Values

By default, the **bonding txnull-timer** value is 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Specifies the length of time the answering endpoint attempts to detect the bonding negotiation pattern from the originating endpoint before deciding the bonding call has failed. It may be necessary to shorten this timer if the DTE equipment using the bonding module also has timer constraints for completing non-bonding parameter negotiation.

Usage Examples

The following example defines a **bonding txnull-timer** value of 8 seconds:

```
(config)#interface bri 1/2
(config-bri 1/2)#bonding txnull-timer 8
```

caller-id override [**always** <number> | **if-no-cid** <number>]

Use the **caller-id override** command to configure the unit to replace caller ID information with a user-specified number. Use the **no** form of this command to disable any caller ID overrides.

Syntax Description

always <number>	Always forces replacement of the incoming caller ID number with the number given.
if-no-cid <number>	Replaces the incoming caller ID number with the number given only if there is no caller ID information available for the incoming call.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command forces a replacement of the incoming caller ID number with the number given. The received caller ID, if any, is discarded, and the given override number is used to connect the incoming call to a circuit of the same number.

Usage Examples

The following example configures the unit to always provide the given number as the caller ID number:

```
(config)#interface bri 1/2  
(config-bri 1/2)#caller-id override always 5551000
```

isdn spid1 <spid> <ldn>

Use the **isdn spid1** command to specify the Service Profile Identifiers (SPIDs). Use the **no** form of this command to remove a configured SPID.



*The BRI module requires all incoming calls to be directed to the Local Directory Number (LDN) associated with the SPID programmed using the **isdn spid1** command. All calls to the LDN associated with SPID 2 will be rejected (unless part of a bonding call).*

Syntax Description

<spid>	Specifies the 8 to 14 digit number identifying your Basic Rate ISDN (BRI) line in the central office switch. A SPID is generally created using the area code and phone number associated with the line and a four-digit suffix. For example, the following SPIDs may be provided on a BRI line with phone numbers 555-1111 and 555-1112: SPID1: 701 555 1111 0101 SPID2: 701 555 1112 0101
<ldn>	Optional. Specifies the LDN assigned to the circuit by the service provider. The LDN is the number used by remote callers to dial into the ISDN circuit. If the <ldn> field is left blank, the AOS will not accept inbound dial-backup calls to the BRI module.

Default Values

By default, there are no configured SPIDs.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The AOS does not support “SPID-less” 5ESS signaling. SPIDs are required for all configured BRI endpoints.

Usage Examples

The following example defines a SPID of 704 555 1111 0101 with an LDN of 555-1111:

```
(config)#interface bri 1/2
(config-bri 1/2)#isdn spid1 70455511110101 5551111
```

isdn spid2 <spid> <ldn>

Use the **isdn spid2** command to specify the Service Profile Identifiers (SPIDs). Use the **no** form of this command to remove a configured SPID.



*The BRI module requires all incoming calls to be directed to the Local Directory Number (LDN) associated with the SPID programmed using the **isdn spid1** command. All calls to the LDN associated with SPID 2 will be rejected (unless part of a bonding call).*

Syntax Description

<spid>	Specifies the 8 to 14 digit number identifying your Basic Rate ISDN (BRI) line in the central office switch. A SPID is generally created using the area code and phone number associated with the line and a four-digit suffix. For example, the following SPIDs may be provided on a BRI line with phone numbers 555-1111 and 555-1112: SPID1: 701 555 1111 0101 SPID2: 701 555 1112 0101
<ldn>	Optional. Specifies the LDN assigned to the circuit by the service provider. The LDN is the number used by remote callers to dial into the ISDN circuit. If the <ldn> field is left blank, the AOS will not accept inbound dial-backup calls to the BRI module.

Default Values

By default, there are no configured SPIDs

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The AOS does not support "SPID-less" 5ESS signaling. SPIDs are required for all configured BRI endpoints.

Usage Examples

The following example defines a SPID of 704 555 1111 0101 with and LDN of 555-1111:

```
(config)#interface bri 1/2
(config-bri 1/2)#isdn spid2 70455511110101 5551111
```

isdn switch-type [basic-5ess | basic-dms | basic-net3 | basic-ni]

Use the **isdn switch-type** command to specify the ISDN signaling type configured on the Basic Rate ISDN (BRI) interface. The type of ISDN signaling implemented on the BRI interface does not always match the manufacturer of the Central Office switch. Use the **no** form of this command to return to the default value.

Syntax Description

basic-5ess	Specifies Lucent/AT&T 5ESS signaling.
basic-dms	Specifies Nortel DMS-100 custom signaling. The basic-dms signaling type is not compatible with proprietary SL-1 DMS signaling.
basic-net3	Specifies Net3 Euro-ISDN signaling.
basic-ni	Specifies National ISDN-1 signaling.

Default Values

By default, the ISDN signaling is set to National ISDN-1.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **isdn switch-type** command specifies the type of ISDN signaling implemented on the BRI interface, not the manufacturer of the Central Office switch. It is quite possible to have a Lucent Central Office switch providing National ISDN signaling on the BRI interface.

Usage Examples

The following example configures a BRI interface for a circuit with Lucent 5ESS (custom) signaling:

```
(config)#interface bri 1/2
(config-bri 1/2)#isdn switch-type basic-5ess
```

FRAME RELAY INTERFACE CONFIG COMMAND SET

To activate the Frame Relay Interface Configuration mode, enter the **interface frame-relay** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface frame-relay 1
(config-fr 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

bandwidth <value> [on page 962](#)

encapsulation frame-relay ietf [on page 963](#)

fair-queue <threshold> [on page 964](#)

frame-relay commands begin [on page 965](#)

hold-queue <queue size> *out* [on page 977](#)

qos-policy out <mapname> [on page 978](#)

snmp trap [on page 979](#)

snmp trap link-status [on page 980](#)

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the Frame Relay interface to 10 Mbps:

```
(config)#interface frame-relay 1  
(config-fr 1)#bandwidth 10000
```

encapsulation frame-relay ietf

Use the **encapsulation frame-relay ietf** command to configure the encapsulation on a virtual Frame Relay interface as IETF (RFC1490). Currently, this is the only encapsulation setting. Settings for this option must match the far-end router's settings in order for the Frame Relay interface to become active.

Syntax Description

No subcommands.

Default Values

By default, all Frame Relay interfaces use IETF encapsulation.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the endpoint for IETF encapsulation:

```
(config)#interface frame-relay 1  
(config-fr 1)#encapsulation frame-relay ietf
```

fair-queue <threshold>

Use the **fair-queue** command to enable weighted fair queuing (WFQ) on an interface. Use the **no** form of this command to disable WFQ and enable first-in-first-out (FIFO) queuing for an interface. WFQ is enabled by default for WAN interfaces.

Syntax Description

<threshold> Optional. Specifies the maximum number of packets that can be present in each conversation sub-queue. Packets received for a conversation after this limit is reached are discarded. Range: 16 to 512.

Default Values

By default, **fair-queue** is enabled with a threshold of 64 packets.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example enables WFQ on the interface with a threshold set at 100 packets:

```
(config)#interface frame-relay 1  
(config-fr 1)#fair-queue 100
```

frame-relay intf-type [dce | dte | nni]

Use the **frame-relay intf-type** command to define the Frame Relay signaling role needed for the endpoint. Use the **no** form of this command to return to the default value.

Syntax Description

dce	Specifies DCE or network-signaling role. Use this interface type when you need the unit to emulate the frame switch.
dte	Specifies DTE or user-signaling role. Use this interface type when connecting to a Frame Relay switch (or piece of equipment emulating a frame switch).
nni	Configures the interface to support both network and user signaling (DTE or DCE) when necessary.

Default Values

By default, **frame-relay intf-type** is set to **dte**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the Frame Relay endpoint for DCE signaling:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay intf-type dce
```

frame-relay lmi-n391dce <polls>

Use the **frame-relay lmi-n391dce** command to set the N391 full status polling counter for the DCE endpoint. Typical applications should leave the default value for this timer. Use the **no** form of this command to return to the default value.

Syntax Description

<polls> Sets the counter value (valid range: 1 to 255).

Default Values

By default, the polling counter for the DCE endpoint is set to six polls.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The N391 counter determines how many link integrity polls occur in between full status polls. The number of link integrity polls between full status polls is $n - 1$, where n represents the full status poll. n can be set to any number between 1 and 255, but the default is used for most applications.

Usage Examples

The following example sets the N391 counter for three polls:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-n391dce 3
```

frame-relay lmi-n391dte <polls>

Use the **frame-relay lmi-n391dte** command to set the N391 full status polling counter for the DTE endpoint. Typical applications should leave the default value for this timer. Use the **no** form of this command to return to the default value.

Syntax Description

<polls> Sets the counter value (valid range: 1 to 255).

Default Values

By default, the polling counter for the DTE endpoint is set to six polls.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The N391 counter determines how many link integrity polls occur in between full status polls. The number of link integrity polls between full status polls is $n - 1$, where n represents the full status poll. n can be set to any number between 1 and 255, but the default is used for most applications.

Usage Examples

The following example sets the N391 counter for three polls:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-n391dte 3
```

frame-relay lmi-n392dce <threshold>

Use the **frame-relay lmi-n392dce** command to set the N392 error threshold for the DCE endpoint. Typical applications should leave the default value for this setting. Use the **no** form of this command to return to the default value.

Syntax Description

<code><threshold></code>	Sets the threshold value (valid range: 1 to 10).
--------------------------------	--

Default Values

By default, the error threshold for the DCE endpoint is set to three errors.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If the error threshold is met, the signaling state status is changed to down, indicating a service-affecting condition. This condition is cleared once N393 consecutive error-free events are received. N392 defines the number of errors required in a given event window, while N393 defines the number of polling events in each window.

For example:

If N392 = 3 and N393 = 4, then if three errors occur within any four events, the interface is determined inactive.

Usage Examples

The following example sets the N392 threshold for 5 seconds:

```
(config)#interface frame-relay 1
(config-fr 1)#frame-relay lmi-n392dce 5
```


frame-relay lmi-n392dte <threshold>

Use the **frame-relay lmi-n392dte** command to set the N392 error threshold for the DTE endpoint. Typical applications should leave the default value for this setting. Use the **no** form of this command to return to the default value.

Syntax Description

<threshold> Sets the threshold value (valid range: 1 to 10).

Default Values

By default, the error threshold for the DTE endpoint is set to three errors.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

If the error threshold is met, the signaling state status is changed to down, indicating a service-affecting condition. This condition is cleared once N393 consecutive error-free events are received. N392 defines the number of errors required in a given event window, while N393 defines the number of polling events in each window.

For example:

If N392 = 3 and N393 = 4, then if three errors occur within any four events, the interface is determined inactive.

Usage Examples

The following example sets the N392 threshold for five errors:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-n392dte 5
```

frame-relay lmi-n393dce <counter>

Use the **frame-relay lmi-n393dce** to set the N393 LMI monitored event counter for the DCE endpoint. Typical applications should leave the default value for this counter. Use the **no** form of this command to return to the default value.

Syntax Description

<counter> Sets the counter value (valid range: 1 to 10).

Default Values

By default, the LMI monitored event counter for the DCE endpoint is set to four events.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example sets the N393 threshold for five events:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-n393dce 5
```

frame-relay lmi-n393dte <counter>

Use the **frame-relay lmi-n393dte** command to set the N393 LMI monitored event counter for the DTE endpoint. Typical applications should leave the default value for this counter. Use the **no** form of this command to return to the default value.

Syntax Description

<counter> Sets the counter value (valid range: 1 to 10).

Default Values

By default, the LMI monitored event counter for the DTE endpoint is set to four events.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example sets the N393 threshold for five events:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-n393dte 5
```

frame-relay lmi-t391dte <seconds>

Use the **frame-relay lmi-t391dte** command to set the T391 signal polling timer for the DTE endpoint. Typical applications should leave the default value for this timer. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds> Sets the timer value in seconds (valid range: 5 to 30).

Default Values

By default, the signal polling timer for the DTE endpoint is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The T391 timer sets the time (in seconds) between polls to the Frame Relay network.

Usage Examples

The following example sets the T391 timer for 15 seconds:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-t391dte 15
```

frame-relay lmi-t392dce <seconds>

Use the **frame-relay lmi-t392dce** command to set the T392 polling verification timer for the DCE endpoint. Typical applications should leave the default value for this timer. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds> Sets the timer value in seconds (valid range: 5 to 30).

Default Values

By default, the polling verification timer for the DCE endpoint is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

The T392 sets the timeout (in seconds) between polling intervals. This parameter needs to be a few seconds longer than the T391 setting of the attached Frame Relay device.

Usage Examples

The following example sets the T392 timer for 15 seconds:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-t392dce 15
```

frame-relay lmi-type [ansi | auto | cisco | none | q933a]

Use the **frame-relay lmi-type** command to define the Frame Relay signaling (LMI) type. Use the **no** form of the command to return to the default value.

Syntax Description

ansi	Specifies Annex D signaling method.
auto	Automatically determines signaling type by messages received on the frame circuit.
cisco	Specifies Group of 4 signaling method.
none	Turns off signaling on the endpoint. This is used for dial-backup connections to ADTRAN IQ and Express series products.
q933a	Specifies Annex A signaling method.

Default Values

By default, the Frame Relay signaling type is set to **ansi**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 2.1	Added signaling type none to provide support for dial-backup to ADTRAN IQ and Express series products.

Usage Examples

The following example sets the signaling method for the endpoint to **cisco**:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay lmi-type cisco
```

frame-relay multilink [ack <seconds> | bandwidth-class <class> <threshold> | hello <seconds> | retry <number>]

Use the **frame-relay multilink** command to enable the Frame Relay multilink interface. When the **no** form of this command is issued, all configuration options associated with this command and cross-connects made to this interface are removed.

Syntax Description

ack <seconds>	Optional. Specifies a wait for acknowledgement time (in seconds) for every bundle link in the bundle. Range: 1 to 180 seconds.
bandwidth-class	Optional. Specifies the class of operation, placing a minimum limit on the acceptable amount of bandwidth required for a bundle to up.
<class>	Optional. Specifies the class of operation. Range is A to C: Class A A single active link is sufficient for the bundle to be up. Class B All defined bundle links must be active for the bundle to be up. Class C A minimum threshold of links must be active for the bundle to be up.
<threshold>	Optional. Specifies the minimum number of active bundle links required for a class C bundle to be in the up state. This option will not be available unless Class C is specified. Range: 1 to 65,535 links.
hello <seconds>	Optional. Specifies the time (in seconds) between hello messages for every bundle link in the bundle. Range: 1 to 180 seconds.
retry <number>	Optional. Specifies the number of times a bundle link will retransmit a message while waiting for acknowledgement. Range: 1 to 5 times.

Default Values

The default **ack** value is 4 seconds. The default **hello** value is 10 seconds. The default <class> value is a. The default **retry** value is 2.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Note

This command is different from **ppp multilink**. In **ppp multilink**, if multiple cross-connects are configured for the PPP interface without multilink PPP being enabled, the first link to bring up LCP will be the only link actually cross-connected. In Frame Relay multilink, since there is no protocol corresponding to LCP, all cross-connects will be removed and the user will be free to re-issue any cross-connect.

Usage Examples

The following example enables the Frame Relay multilink interface and sets the time between **hello** messages to 45 seconds:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay multilink hello 45
```

The following example specifies Class B operation:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay multilink bandwidth-class b
```

The following example specifies Class C operation with a threshold of 5:

```
(config)#interface frame-relay 1  
(config-fr 1)#frame-relay multilink bandwidth-class c 5
```


hold-queue <queue size> out

Use the **hold-queue out** command to change the overall size of an interface's WAN output queue.

Syntax Description

<queue size> Specifies the total number of packets the output queue can contain before packets are dropped. Range: 16 to 1000.

Default Values

The default queue size for WFQ is 400. The default queue size for PPP FIFO and Frame Relay round robin is 200.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets the overall output queue size to 700:

```
(config)#interface frame-relay 1  
(config-fr 1)#hold-queue 700 out
```

qos-policy out <mapname>

Use the **qos-policy out** command to apply a previously-configured QoS map to an interface. Use the **no** form of this command to remove the map from the interface. The **out** keyword specifies that this policy will be applied to outgoing packets.

Syntax Description

<mapname> Specifies the name of a previously-created QoS map (refer to *qos map* <mapname> <sequence number> [on page 490](#) for more information).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example applies the QoS map **VOICEMAP** to the Frame Relay interface:

```
(config)#interface frame-relay 1
(config-fr 1)#qos-policy out VOICEMAP
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables SNMP on the virtual Frame Relay interface:

```
(config)#interface frame-relay 1  
(config-fr 1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the Frame Relay interface:

```
(config)#interface frame-relay 1
(config-fr 1)#no snmp trap link-status
```

FRAME RELAY SUB-INTERFACE CONFIG COMMAND SET

To activate the Frame Relay Sub-Interface Configuration mode, enter the **interface frame-relay** command (and specify a sub-interface) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface frame-relay 1.16
(config-fr 1.16)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

description <text> [on page 1464](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <polycyname> [on page 982](#)

bandwidth <value> [on page 985](#)

bridge-group <group#> [on page 986](#)

crypto map <mapname> [on page 987](#)

dial-backup commands [begin on page 989](#)

dynamic-dns [*dyndns* | *dyndns-custom* | *dyndns-static*] <hostname> <username> <password> [on page 1005](#)

frame-relay commands [begin on page 1007](#)

ip commands [begin on page 1011](#)

lldp receive [on page 1032](#)

lldp send [*management-address* | *port-description* | *system-capabilities* | *system-description* | *system-name* | *and-receive*] [on page 1033](#)

mtu <size> [on page 1035](#)

spanning-tree commands [begin on page 1036](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic on an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname> Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 6.1	Command was expanded to 1000 and 2000 Series units.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access-policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the Frame Relay sub-interface labeled 1.16:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```

Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted  
(config-policy-class)#allow list InWeb
```

Associate the access list with the Frame Relay sub-interface labeled 1:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host <A.B.C.D>** to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the **<A.B.C.D> <wildcard>** format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access policy that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow, discard, NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> policy <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the Frame Relay sub-interface labeled 1:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#access-policy MatchAll
```


bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

To view default values use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the Frame Relay interface to 10 Mbps:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#bandwidth 10000
```

bridge-group <group#>

Use the **bridge-group** command to assign an interface to the specified bridge group. This command is supported on all Ethernet interfaces, PPP virtual interfaces, and Frame Relay virtual sub-interfaces. Use the **no** form of this command to remove the interface from the bridge group.

Syntax Description

<group#> Specifies the bridge group number (1 to 255).

Default Values

By default, there are no configured bridge groups.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

A bridged network can provide excellent traffic management to reduce collisions and limit the amount of bandwidth wasted with unnecessary transmissions when routing is not necessary. Any two interfaces can be bridged (Ethernet to T1 bridge, Ethernet to Frame Relay sub-interface).

Usage Examples

The following example assigns the Frame Relay sub-interface labeled 1.16 to bridge group 1:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#bridge-group 1
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

<mapname> Specifies the crypto map name that you wish to assign to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

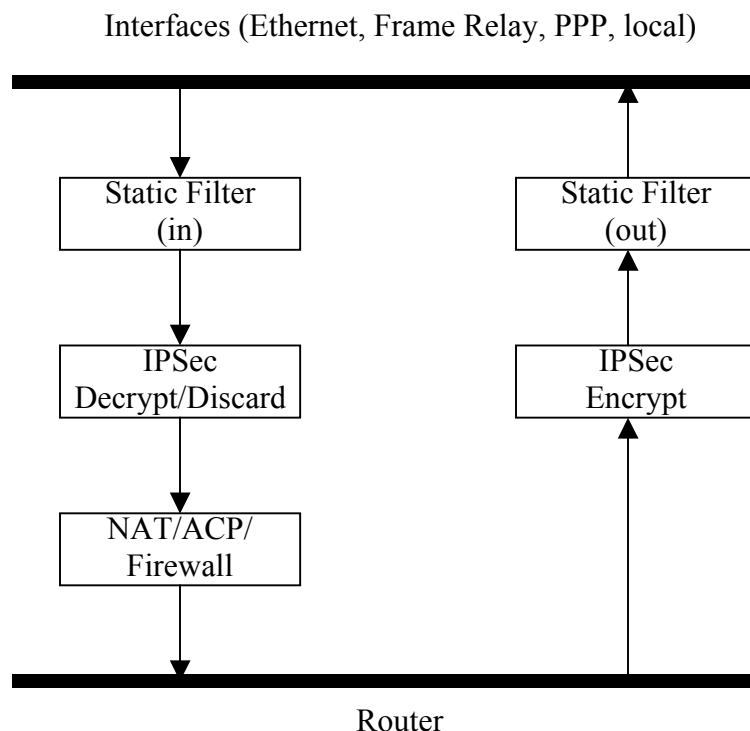
Command History

Release 4.1 Command was introduced.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy-class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the Frame Relay interface:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#crypto map MyMap
```

dial-backup auto-backup

Use the **dial-backup auto-backup** command to configure the Frame Relay sub-interface to automatically attempt a dial-backup upon failure. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 992](#).

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically attempt dial-backup upon a failure.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables automatic dial-backup on the endpoint:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#dial-backup auto-backup
```

dial-backup auto-restore

Use the **dial-backup auto-restore** command to configure the interface to automatically discontinue dial-backup when all network conditions are operational. Use the **no** form of this command to disable the auto-restore feature. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on [page 992](#).

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically restore the primary connection when the failure condition clears.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to automatically restore the primary connection when the failure condition clears:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#dial-backup auto-restore
```

dial-backup backup-delay <seconds>

Use the **dial-backup backup-delay** command to configure the amount of time the router will wait after the failure condition is recognized before attempting to backup the link. Use the **no** form of this command to return to the default value. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on [page 992](#).

Syntax Description

<seconds>	Specifies the delay period (in seconds) a failure must be active before the AOS will enter backup operation on the interface. Range: 10 to 86,400 seconds.
-----------	--

Default Values

By default, the **dial-backup backup-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to wait 60 seconds (on an endpoint with an active alarm condition) before attempting dial-backup operation:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup backup-delay 60
```

dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]

Use the **dial-backup call-mode** command to combine user data with pattern data to ensure data does not mirror standard DDS loop codes (use only on 64 kbps circuits without Frame Relay signaling). Use the **no** form of this command to return to the default value.

Syntax Description

answer	Answers and backs up primary link on failure.
answer-always	Answers and backs up regardless of primary link state.
originate	Originates backup call on primary link failure.
originate-answer	Originates or answers call on primary link failure.
originate-answer-always	Originates on failure; answers and backs up always.

Default Values

By default, the **dial-backup call-mode** is set to **originate-answer**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The majority of the configuration for Frame Relay dial-backup is configured in the Frame Relay sub-interface. However, the numbers dialed are configured in the primary interface. Full sample configurations follow:

Sample configuration for remote router (dialing out)

```
hostname "Remote3200"  
enable password adtran  
!  
interface eth 0/1  
  ip address 192.168.1.254 255.255.255.0  
  no shutdown  
!  
interface modem 1/3  
  no shutdown  
!
```



```
interface t1 1/1
  coding b8zs
  framing esf
  clock source line
  tdm-group 1 timeslots 1-24
  no shutdown
!
interface fr 1 point-to-point
  frame-relay lmi-type ansi
  no shutdown
  cross-connect 1 t1 1/1 1 fr 1
!
interface fr 1.16 point-to-point
  frame-relay interface-dlci 16
  ip address 10.1.1.2 255.255.255.252
  dial-backup call-mode originate
  dial-backup number 5551111 analog
  dial-backup number 5552222 analog
!
ip route 0.0.0.0 0.0.0.0 10.1.1.1
!
line telnet 0 4
  password adtran
Sample config for central router (dialing in)
hostname "Central3200"
enable password adtran
!
interface eth 0/1
  ip address 192.168.100.254 255.255.255.0
  no shutdown
!
interface modem 1/3
  no shutdown
!
interface t1 1/1
  coding b8zs
  framing esf
  clock source line
  tdm-group 1 timeslots 1-24
  no shutdown
!
interface fr 1 point-to-point
  frame-relay lmi-type ansi
  no shutdown
  cross-connect 1 t1 1/1 1 fr 1
```

```
!  
interface fr 1.100 point-to-point  
  frame-relay interface-dlci 100  
  ip address 10.1.1.1 255.255.255.252  
  dial-backup call-mode answer  
  dial-backup number 555-8888 analog  
!  
line telnet 0 4  
  password adtran
```

Usage Examples

The following example configures the AOS to answer dial-backup calls on this endpoint but never generate calls:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#dial-backup call-mode answer-always
```

Technology Review

This technology review provides information regarding specific dial-backup router behavior (i.e., when the router will perform dial-backup, where in the configuration the AOS accesses specific routing information, etc.):

Dialing Out

1. The AOS determines to place an outbound call when either the Layer 1 or Layer 2 has a failure.
2. When placing outbound calls, the AOS matches the number dialed to a Frame Relay sub-interface. This is accomplished with an addition to the **dial-backup number** command (refer to *dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>* [on page 998](#)).
3. When placing the call, the AOS uses the configuration of the related Frame Relay sub-interface for authentication and IP negotiation.
4. If the call fails to connect on the first number dialed, the AOS places a call to the second number if configured. The second number to be dialed references a separate Frame Relay sub-interface.

Dialing In

1. The AOS receives an inbound call on a physical interface.
2. Caller ID is used to match the **dial-backup number** command to the configured Frame Relay sub-interface.
3. If a match is found, the call connects and the AOS pulls down the primary connection if it is not already in a down state.
4. If no match is found from Caller ID, the call is terminated.

dial-backup connect-timeout <seconds>

Use the **dial-backup connect-timeout** command to specify the number of seconds to wait for a connection after a call is attempted before trying to call again or dialing a different number. It is recommended this number be greater than 60. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on [page 992](#).

Syntax Description

<seconds>	Selects the amount of time (in seconds) that the router will wait for a connection before attempting another call (valid range: 10 to 300).
-----------	---

Default Values

By default, the **dial-backup connect-timeout** period is set to 60 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to wait 120 seconds before retrying a failed dial-backup call:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#dial-backup connect-timeout 120
```

dial-backup force [backup | primary]

Use the **dial-backup force** command to manually override the automatic dial-backup feature. This can be used to force a link into backup to allow maintenance to be performed on the primary link without disrupting data. Use the **no** form of this command to return to the normal dial-backup operation state. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 992](#).

Syntax Description

backup	Force backup regardless of primary link state.
primary	Force primary link regardless of its state.

Default Values

By default, this feature is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to force this interface into dial-backup:

```
(config)#interface frame-relay 1.16  
(config-fr 1.161)#dial-backup force backup
```

dial-backup maximum-retry <attempts>

Use the **dial-backup maximum-retry** command to select the number of calls the router will make when attempting to backup a link. Use the **no** form of this command to return to the default state. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 992.

Syntax Description

<attempts>	Selects the number of call retries that will be made after a link failure (valid range: 0 to 15). Setting this value to 0 will allow unlimited retries during the time the network is failed.
------------	--

Default Values

By default, **dial-backup maximum-retry** is set to 0 attempts.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to retry a dial-backup call four times before considering backup operation not available:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup maximum-retry 4
```

dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>

Use the **dial-backup number** command to configure the phone number and the call type the router will dial upon network failure. Multiple entries can be made for an interface to allow alternate sites to be dialed. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [answer | answer-always | originate | originate-answer | originate-answer-always] [on page 992](#).

Syntax Description

<digits>	Specifies the phone numbers to call when the backup is initiated.
analog	Indicates number connects to an analog modem.
digital-56k	Indicates number belongs to a digital 56 kbps per DS0 connection.
digital-64k	Indicates number belongs to a digital 64 kbps per DS0 connection.
<isdn min chan>	Specifies the minimum number of DS0s required for a digital 56 or 64 kbps connection (Range: 1 to 24).
<isdn max chan>	Specifies the maximum number of DS0s desired for a digital 56 or 64 kbps connection (Range: 1 to 24).
<interface>	Specifies the Frame Relay sub-interface (e.g., fr 3.1) to use when originating or answering using this number.

Default Values

By default, there are no configured dial-backup numbers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to dial 704-555-1212 (digital 64 kbps connection) to initiate dial-backup operation on this endpoint using sub-interface Frame Relay 3.1:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup number 7045551212 digital-64k 1 1 fr 3.1
```

dial-backup priority <value>

Use the **dial-backup priority** command to select the backup priority for this interface. This command allows the user to establish the highest priority backup link and ensure that link will override backups attempted by lower priority links. Use the **no** form of this command to return to the default value. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 992](#).

Syntax Description

<value>	Sets the relative priority of this link (valid range: 0 to 100). A value of 100 designates the highest priority.
---------	--

Default Values

By default, **dial-backup priority** is set to 50.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example assigns the highest priority to this endpoint:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup priority 100
```

dial-backup randomize-timers

Use the **dial-backup randomize-timers** command to randomize the call timers to minimize potential contention for resources. Use the **no** form of this command to return to the default value. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes and Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 992](#).

Syntax Description

No subcommands.

Default Values

By default, the AOS does not randomize the dial-backup call timers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to randomize the dial-backup timers associated with this endpoint:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#dial-backup randomize-timers
```


dial-backup redial-delay <seconds>

Use the **dial-backup redial-delay** command to configure the delay after an unsuccessful call until the call will be re-tried. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 992](#).

Syntax Description

<seconds>	Specifies the delay in seconds between attempting to re-dial a failed backup attempt. Range: 10 to 3600.
-----------	--

Default Values

By default, **dial-backup redial-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures a redial delay of 25 seconds on this endpoint:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup redial-delay 25
```

dial-backup restore-delay <seconds>

Use the **dial-backup restore-delay** command to configure the amount of time the router will wait after the network is restored before disconnecting the backup link and reverting to the primary. This setting is used to prevent disconnecting the backup link if the primary link is “bouncing” in and out of alarm. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 992](#).

Syntax Description

<seconds>	Specifies the number of seconds the AOS will wait (after a primary link is restored) before disconnecting dial-backup operation. Range: 10 to 86,400.
-----------	---

Default Values

By default, **dial-backup restore-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the AOS to wait 30 seconds before disconnecting dial-backup operation and restoring the primary connection for this endpoint:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup restore-delay 30
```

dial-backup schedule [day | enable-time | disable-time]

Use the **dial-backup schedule** command to set the time of day that backup will be enabled. Use this command if backup is desired only during normal business hours and on specific days of the week. Use the **no** form of this command to disable dial-backup (as specified). For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 992.

Syntax Description

day	Sets the days to allow backup (valid range: Monday through Sunday).
enable-time	Sets the time of day to enable backup. Time is entered in 24-hour format (00:00).
disable-time	Sets the time of day to disable backup.

Default Values

By default, dial-backup is enabled for all days and times if the dial-backup auto-backup command has been issued and the dial-backup schedule has not been entered.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables dial-backup Monday through Friday 8:00 am to 7:00 pm:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#dial-backup schedule enable-time 08:00
(config-fr 1.16)#dial-backup schedule disable-time 19:00
(config-fr 1.16)#no dial-backup schedule day Saturday
(config-fr 1.16)#no dial-backup schedule day Sunday
```

dial-backup shutdown

Use the **dial-backup shutdown** command to deactivate all dial-backup functionality in the unit. Dial-backup configuration parameters are kept intact, but the unit will not initiate (or respond) to dial-backup sequences in the event of a network outage. Use the **no** form of this command to reactivate the dial-backup interface. For more detailed information on Frame Relay dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 992.

Syntax Description

No subcommands.

Default Values

By default, all AOS interfaces are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example deactivates the configured dial-backup interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#dial-backup shutdown
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

Refer to *Functional Notes* below for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or power users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs, and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service, in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address doesn't change often or at all, but you still want an easy name to remember it by (without having to purchase your own domain name) Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com) you need Custom DNS service which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the Dynamic DNS to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface frame-relay 1.16
```

```
(config-fr 1.16)#dynamic-dns dyndns-custom host user pass
```

frame-relay bc <committed burst value>

Use the **frame-relay bc** command to set the b_c (committed burst) value for a Frame Relay sublink. The value is in bits. Use the **no** form of this command to return to default.

Syntax Description

<committed burst value> Specifies the committed burst value (in bits) for the sublink.

Default Values

By default, the committed burst value is set to 0 (no limit).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Functional Notes

The time interval is always one second, so this can also be considered bits per second. Shaping is performed on a sliding one-second window to make maximum use of configured bandwidth. Note that when both b_c and b_e are non-zero, shaping is performed on the virtual circuit. The circuit is limited to the sum of b_c and b_e , and it is recommended that the sum always be greater than 8000.

Usage Examples

The following example configures the Frame Relay sublink with a committed burst value of 128,000 bits:

```
(config)#interface frame-relay 1.1
(config-fr 1.16)#frame-relay bc 128000
```

frame-relay be <excessive burst value>

Use the **frame-relay be** command to set the b_e (excessive burst) value for a Frame Relay sublink. The value is in bits. Use the **no** form of this command to return to default.

Syntax Description

<excessive burst value> Specifies the excessive burst value (in bits) for the sublink.

Default Values

By default, the excessive burst value is set to 0 (no limit).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 4.1 Command was introduced.

Functional Notes

The time interval is always one second, so this can also be considered bits per second. Shaping is performed on a sliding one-second window to make maximum use of configured bandwidth. Note that when both b_c and b_e are non-zero, shaping is performed on the virtual circuit. The circuit is limited to the sum of b_c and b_e , and it is recommended that the sum always be greater than 8000.

Usage Examples

The following example configures the Frame Relay sublink with an excessive burst value of 64,000 bits:

```
(config)#interface frame-relay 1.1  
(config-fr 1.16)#frame-relay be 64000
```


frame-relay fragment <threshold>

Use the **frame-relay fragment** command to set the FRF.12 fragmentation threshold. Use the **no** form of this command to erase the configured threshold.

Syntax Description

<threshold> Specifies the fragmentation threshold. Valid fragmentation thresholds are greater than or equal to 64 and less than or equal to 1600.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Functional Notes

For Frame Relay fragmentation to take effect, rate-limiting must be enabled by setting the committed burst rate and excessive burst rate. Refer to *frame-relay bc <committed burst value>* [on page 1007](#) and *frame-relay be <excessive burst value>* [on page 1008](#) for more information.

Usage Examples

The following example enables FRF.12 fragmentation on a sublink:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#frame-relay bc 64000
(config-fr 1.16)#frame-relay be 16
(config-fr 1.16)#frame-relay fragmentation 100
```

The following example disables FRF.12 fragmentation on a sublink:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#no frame-relay fragment
```

frame-relay interface-dlci <dlci>

Use the **frame-relay interface-dlci** command to configure the Data Link Connection Identifier (DLCI) for the Frame Relay sub-interface. This setting should match the DLCI supplied by your Frame Relay service provider. Use the **no** form of this command to remove the configured DLCI.

Syntax Description

<dlci> Specifies numeric value supplied by your provider.

Default Values

By default, the DLCI is populated with the sub-interface identifier. For example, if configuring the virtual Frame Relay sub-interface labeled **fr 1.20**, the default DLCI is **20**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example configures a DLCI of 72 for this Frame Relay endpoint:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#frame-relay interface-dlci 72
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Specifies the IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the router to only allow Telnet traffic into the Frame Relay sub-interface:

```
(config)#interface frame-relay 1.16
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#int frame-relay 1.16
(config-fr 1.16)#ip access-group TelnetOnly in
```

ip address dhcp

Use the **ip address dhcp** command to use Dynamic Host Configuration Protocol (DHCP) to obtain an address on the interface. Use the **no** form of this command to remove a configured IP address (using DHCP) and disable DHCP operation on the interface.

ip address dhcp [**client-id** [*<interface>* | *<identifier>*] **hostname** <"string">]

Syntax Description

client-id	Optional. Specifies the client identifier used when obtaining an IP address from a DHCP server.
<i><interface></i>	Specifies an interface, thus defining the client identifier as the hexadecimal MAC address of the specified interface (including a hexadecimal number added to the front of the MAC address to identify the media type). For example, specifying the client-id ethernet 0/1 (where the Ethernet interface has a MAC address of d217.0491.1150) defines the client identifier as 01:d2:17:04:91:11:50 (where 01 defines the media type as Ethernet). Refer to <i>hardware-address <hardware-address> <type></i> on page 555 for a detailed listing of media types.
<i><identifier></i>	Specifies a custom client-identifier using a text string (that is converted to a hexadecimal equivalent) or 7 to 28 hexadecimal numbers (with colon delimiters). For example, a custom client identifier of 0f:ff:ff:ff:51:04:99:a1 may be entered using the <i><identifier></i> option.
host name	Optional. Specifies a text string (to override the global router name) to use as the name in the DHCP option 12 field.
<"string">	String (encased in quotation marks) of up to 35 characters to use as the name of the host for DHCP operation.
no-default-route	Specifies that the AOS not install the default route obtained via DHCP.
no-domain-name	Specifies that the AOS not install the domain name obtained via DHCP.
no-nameservers	Specifies that the AOS not install the DNS servers obtained via DHCP.

Default Values

client-id	Optional. By default, the client identifier is populated using the following formula: TYPE: INTERFACE SPECIFIC INFO : MAC ADDRESS Where TYPE specifies the media type in the form of one hexadecimal byte (refer to <i>hardware-address <hardware-address> <type></i> on page 283 for a detailed listing of media types), and the MAC ADDRESS is the Media Access Control (MAC) address assigned to the first Ethernet interface in the unit in the form of six hexadecimal bytes. (For units with a single Ethernet interface, the MAC ADDRESS assigned to Ethernet 0/1 is used in this field).
------------------	--

INTERFACE SPECIFIC INFO is only used for Frame Relay interfaces and can be determined using the following:

FR_PORT#: Q.922 ADDRESS

Where the FR_PORT# specifies the label assigned to the virtual Frame Relay interface using four hexadecimal bytes. For example, a virtual Frame Relay interface labeled 1 would have a FR_PORT# of 00:00:00:01.

The Q.922 ADDRESS field is populated using the following:

8	7	6	5	4	3	2	1
DLCI (high order)					C/R	EA	
DLCI (lower)		FECN	BECN	DE	EA		

Where the FECN, BECN, C/R, DE, and high order extended address (EA) bits are assumed to be 0 and the lower order EA bit is set to 1.

The following list provides a few example DLCIs and associated Q.922 address:
DLCI (decimal) / Q.922 address (hex)

16 / 0x0401
50 / 0x0C21
60 / 0x0CC1
70 / 0x1061
80 / 0x1401

hostname Optional. By default, the host name is the name configured using the Global Configuration **hostname** command.

<"string"> By default, the host name is the name configured using the Global Configuration **hostname** command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

DHCP allows interfaces to acquire a dynamically assigned IP address from a configured DHCP server on the network. Many Internet Service Providers (ISPs) require the use of DHCP when connecting to their services. Using DHCP reduces the number of dedicated IP addresses the ISP must obtain. Consult your ISP to determine the proper values for the **client-id** and **hostname** fields.

Usage Examples

The following example enables DHCP operation on the virtual Frame Relay interface (labeled 1.16):

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip address dhcp
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the optional **secondary** keyword to define a secondary IP address. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Keyword used to configure a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use secondary IP addresses to allow dual subnets on a single interface (when you need more IP addresses than the primary subnet can provide). When using secondary IP addresses, avoid routing loops by verifying that all devices on the network segment are configured with secondary IP addresses on the secondary subnet.

Usage Examples

The following example configures a secondary IP address of **192.22.72.101/30**:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip address 192.22.72.101 255.255.255.252 secondary
```

ip dhcp [release | renew]

Use the **ip dhcp** command to release or renew the DHCP IP address. This command is only applicable when using DHCP for IP address assignment.

Syntax Description

release	Releases DHCP IP address.
renew	Renews DHCP IP address.

Default Values

No default values required for this command.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example releases the IP DHCP address for the virtual interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip dhcp release
```


ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



*The **ip helper** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. Refer to [ip forward-protocol udp <port number>](#) on page 424 for more information.*

Syntax Description

<address> Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign a helper-address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address **192.33.5.99**:

```
(config)#interface frame-relay 1.16  
(config)#ip forward-protocol udp domain  
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	If only one host (or IGMP snooping switch) is connected to the interface, when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	Controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer, if no receiver responds, the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65535 ms. Default: 1000 ms.
querier-timeout <seconds>	Specifies the number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Specifies the interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65,535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Specifies the maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface and place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and [y](#) for more information.

Usage Examples (Continued)

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	Command was expanded to include Frame Relay sub-interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the unit to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#), *ip mcast-stub downstream* [on page 1021](#), and *ip mcast-stub upstream* [on page 1023](#) for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
(config)#interface frame relay 1.16
(config-fr 1.16)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 1021](#) for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#ip mcast-stub upstream
```

ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key <password>	Assigns a simple-text authentication password to be used by other routers using the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32,767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte maximum) keys.
priority <value>	Sets the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0-255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
dead-interval <seconds>	40 seconds

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Selects message-digest authentication type.
null	Optional. Specifies that no authentication be used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that no authentication will be used on the Frame Relay interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip ospf network broadcast
```

ip proxy-arp <address> <subnet mask>

Use the **ip proxy-arp** to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy ARP is enabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

In general, the principle of proxy ARP allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all proxy ARP requests with its specified MAC address and forward packets accordingly.

Enabling proxy ARP on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the Frame Relay sub-interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|----------|---|
| 1 | Accepts only received RIP version 1 packets on the interface. |
| 2 | Accepts only received RIP version 2 packets on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip receive version** command to specify a RIP version that will override the **version** (in the Router RIP) configuration.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures a Frame Relay sub-interface to accept only RIP version 2 packets:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|---|--|
| 1 | Transmits only RIP version 1 packets on the interface. |
| 2 | Transmits only RIP version 2 packets on the interface. |

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip send version** to specify a RIP version that will override the **version** (in the Router RIP) configuration.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures a Frame Relay sub-interface to transmit only RIP version 2 packets:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip rip send version 2
```

ip route-cache <address>

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast-cache switching on a Frame Relay sub-interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#ip route-cache
```

ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface (in the format type slot/port) that contains the IP address to use as the source address for all packets transmitted on this interface.
-------------	---

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered eth 0/1** while in the Frame Relay Sub-Interface Configuration mode configures the Frame Relay sub-interface to use the IP address assigned to the Ethernet interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface.

Usage Examples

The following example configures the Frame Relay interface (labeled **frame-relay 1.16**) to use the IP address assigned to the Ethernet interface (**eth 0/1**):

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#ip unnumbered eth 0/1
```

lldp receive

Use the **lldp receive** command to allow LLDP packets to be received on this interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are configured to send and receive LLDP packets.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the Frame Relay sub-interface to receive LLDP packets:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#lldp receive
```

Ildp send [management-address | port-description | system-capabilities | system-description | system-name | and-receive]

Use the **lldp send** command to configure this interface to transmit LLDP packets or to control the types of information contained in the LLDP packets transmitted by this interface.

Syntax Description

management-address	Enables transmission of management address information on this interface.
port-description	Enables transmission of port description information on this interface.
system-capabilities	Enables transmission of this device's system capabilities on this interface.
system-description	Enables transmission of this device's system description on this interface.
system-name	Enables transmission of this device's system name on this interface.
and-receive	Configures this interface to both transmit and receive LLDP packets.

Default Values

By default, all interfaces are configured to transmit and receive LLDP packets of all types.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Individual LLDP information can be enabled or disabled using the various forms of the **lldp send** command. For example, use the **lldp send and-receive** command to enable transmit and receive of all LLDP information. Then use the **no lldp send port-description** command to prevent LLDP from transmitting port description information.

Usage Examples

The following example configures the Frame Relay sub-interface to transmit LLDP packets containing all enabled information types:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#lldp send
```

The following example configures the Frame Relay sub-interface to transmit and receive LLDP packets containing all information types:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#lldp send and-receive
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:
ATM interfaces	64 to 1520
Ethernet interfaces	64 to 1500
FDL interfaces	64 to 256
HDLC interfaces	64 to 1520
Loopback interfaces	64 to 1500
Tunnel interfaces	64 to 18,190
Virtual Frame Relay sub-interfaces	64 to 1520
Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:
ATM interfaces	1500
Ethernet interfaces	1500
FDL interfaces	256
HDLC interfaces	1500
Loopback interfaces	1500
Tunnel interfaces	1500
Virtual Frame Relay sub-interfaces	1500
Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the Frame Relay interface:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#mtu 1200
```

spanning-tree bpdudfilter [enable | disable]

Use the **spanning-tree bpdudfilter** command to block BPDUs from being transmitted and received on this interface. To return to the default value, use the **no** form of this command.

Syntax Description

enable	Enables the BPDU filter.
disable	Disables the BPDU filter.

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The purpose of this command is to remove a port from participation in the spanning tree. This might be beneficial while debugging a network setup. It normally should not be used in a live network.

Usage Examples

The following example enables the BPDU filter on the interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#spanning-tree bpdudfilter enable
```

spanning-tree bpduguard [enable | disable]

Use the **spanning-tree bpduguard** command to block BPDUs from being received on this interface. To return to the default value, use the **no** form of this command.

Syntax Description

enable	Enables the BPDU block.
disable	Disables the BPDU block.

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the BPDU guard on the interface:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#spanning-tree bpduguard enable
```

spanning-tree edgeport

Use the **spanning-tree edgeport** command to set this interface to be an edgeport. This command overrides the Global setting (refer to *spanning-tree edgeport default* [on page 519](#)). Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the interface to be an edgeport:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#spanning-tree edgeport
```

An individual interface can be configured to not be considered an edgeport. For example:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#spanning-tree edgeport disable  
or  
(config)#interface frame-relay 1.16  
(config-fr 1.16)#no spanning-tree edgeport
```

spanning-tree link-type [auto | point-to-point | shared]

Use the **spanning-tree link-type** command to configure the spanning-tree protocol link type for an interface. To return to the default value, use the **no** form of this command.

Syntax Description

auto	Determines link type by the port's duplex settings.
point-to-point	Manually sets link type to point-to-point, regardless of duplex settings.
shared	Manually sets link type to shared, regardless of duplex settings.

Default Values

By default, a port is set to auto.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command overrides the default link-type setting determined by the duplex of the individual port. By default a port configured for half-duplex is set to **shared** link type, and a port configured for full-duplex is set to **point-to-point** link type. Setting the link type manually overrides the default and forces the port to use the specified link type. Using the **link-type auto** command, restores the convention of determining link-type based on duplex settings.

Usage Examples

The following example forces the link type to point-to-point, even if the port is configured to be half-duplex:

```
(config)#bridge 1 protocol ieee  
(config)#interface frame-relay 1.16  
(config-fr 1.16)#spanning-tree link-type point-to-point
```

Technology Review

Rapid transitions are possible in rapid spanning-tree protocol (RSTP) by taking advantage of point-to-point links (a port is connected to exactly one other bridge) and edge-port connections (a port is not connected to any additional bridges). Setting the link type to **auto** allows the spanning tree to automatically configure the link type based on the duplex of the link. Setting the link type to **point-to-point** allows a half-duplex link to act as if it were a point-to-point link.

spanning-tree path-cost <value>

Use the **spanning tree path-cost** command to assign a cost to a bridge group that is used when computing the spanning-tree root path. To return to the default path-cost value, use the **no** form of this command.

Syntax Description

<value>	Assigns a path cost value for spanning calculations to the bridge interface (valid range: 0 to 65,535).
---------	---

Default Values

By default, the path-cost value is set at 19.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The specified value is inversely proportional to the likelihood the bridge interface will be chosen as the root path. Set the path-cost value lower to increase the chance the interface will be the root. To obtain the most accurate spanning-tree calculations, develop a system for determining path costs for links and apply it to all bridged interfaces.

Usage Examples

The following example assigns a path cost of 100 for bridge group 17 on a Frame Relay sub-interface:

```
(config)#interface frame-relay 1.16
(config-fr 1.16)#spanning-tree path-cost 100
```

Technology Review

Spanning-tree protocol provides a way to prevent loopback or parallel paths in bridged networks. Using the priority values and path costs assigned to each bridging interface, the spanning-tree protocol determines the root path and identifies whether to block or allow other paths.

spanning-tree priority <value>

Use the **spanning-tree priority** command to select the priority level of a port associated with a bridge. To return to the default bridge-group priority value, use the **no** version of this command.

Syntax Description

<value>	Priority value for the bridge group; the lower the value, the higher the priority (valid range: 0 to 255).
---------	--

Default Values

By default, the bridge-group priority value is set at 28.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The only time that this priority level is used is when two interfaces with a path to the root have equal cost. At that point, the level set in this command will determine which port the bridge will use. Set the priority value lower to increase the chance the interface will be used.

Usage Examples

The following example sets the maximum priority on the Frame Relay sub-interface labeled 1.16 in bridge group 17:

```
(config)#interface frame-relay 1.16  
(config-fr 1.16)#spanning-tree priority 0
```

ATM INTERFACE CONFIG COMMAND SET

To activate the ATM Interface Configuration mode, enter the **interface atm** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface atm 1
(config-atm 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

snmp trap [on page 1043](#)

snmp trap link-status [on page 1044](#)

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.
Release 8.1	Command was expanded to include ATM interfaces.

Usage Examples

The following example enables SNMP on the ATM interface:

```
(config)#interface atm 1  
(config-atm 1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit-Ethernet, port-channel, VLAN, E1, and G.703 interfaces.
Release 8.1	Command was expanded to include ATM interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the ATM interface:

```
(config)#interface atm 1  
(config-atm 1)#no snmp trap link-status
```

ATM SUB-INTERFACE CONFIG COMMAND SET

To activate the ATM Interface Configuration mode, enter the **interface atm** command (and specify a sub-interface) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface atm 1.1
(config-atm 1.1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

description <text> on page 1464

do on page 1465

end on page 1466

exit on page 1467

shutdown on page 1468

All other commands for this command set are described in this section in alphabetical order.

access-policy <policyname> on page 1047

atm routed-bridged ip on page 1050

bandwidth <value> on page 1051

bridge-group <group#> on page 1052

crypto map <mapname> on page 1053

dial-backup commands begin on page 1055

dynamic-dns [*dyndns* | *dyndns-custom* | *dyndns-static*] <hostname> <username>
<password> on page 1071

encapsulation [*aal5mux* | *aal5snap*] on page 1073

fair-queue <threshold> on page 1074

hold-queue <queue size> out on page 1075

ip commands begin on page 1076

mtu <size> on page 1098

oam retry <up-count> <down-count> <retry-frequency> on page 1099

oam-pvc managed <frequency> on page 1100

pvc <VPI/VCI> on page 1101

qos-policy out <mapname> on page 1102

spanning-tree commands [begin on page 1103](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic on an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname>	Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).
--------------	--

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 2.1	Command was introduced.
Release 6.1	Command was expanded to 1000 and 2000 Series units.
Release 8.1	ATM sub-interface was added.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the ATM sub-interface labeled 1.1:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```

Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access list with the ATM 1.1 interface:

```
(config)#interface atm 1.1
(config-atm 1.1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access policy that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the ATM sub-interface:

```
(config)#interface atm 1.1  
(config-atm 1.1)#access-policy MatchAll
```

atm routed-bridged ip

Use the **atm routed-bridged ip** command to enable IP routed bridge encapsulation (RBE) on an interface. Use the **no** form of this command to disable RBE operation.

Syntax Description>

No subcommands.

Default Values

By default, routed bridge encapsulation is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables routed bridge encapsulation:

```
(config)#interface atm 1.1  
(config-atm 1.1)#atm routed-bridged ip
```

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

To view default values use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the ATM sub-interface to 10 Mbps:

```
(config)#interface atm 1.1  
(config-atm 1.1)#bandwidth 10000
```

bridge-group <group#>

Use the **bridge-group** command to assign an interface to the specified bridge group. Use the **no** form of this command to remove the interface from the bridge group.

Syntax Description

<group#> Assigns a bridge group number to the interface (range is 1 to 255).

Default Values

By default, there are no configured bridge groups.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

A bridged network can provide excellent traffic management to reduce collisions and limit the amount of bandwidth wasted with unnecessary transmissions when routing is not necessary. Any two interfaces can be bridged (Ethernet to T1 bridge, Ethernet to Frame Relay sub-interface).

Usage Examples

The following example assigns the ATM sub-interface labeled 1.1 to bridge group 1:

```
(config)#interface atm 1.1  
(config-atm 1.1)#bridge-group 1
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation** CD provided with your unit.*

Syntax Description

<mapname> Specifies the crypto map name that you wish to assign to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

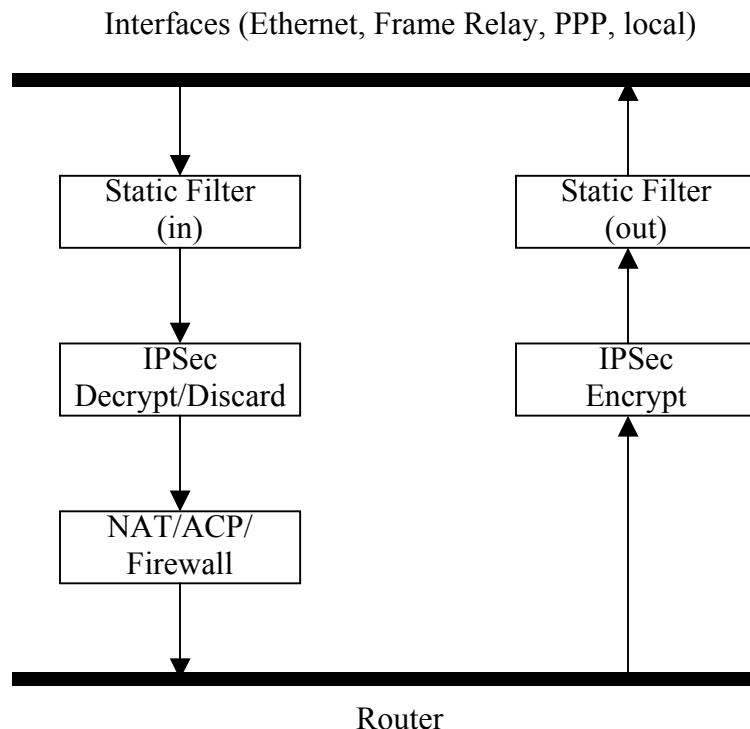
Command History

Release 4.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the ATM sub-interface:

```
(config)#interface atm 1.1
(config-atm 1.1)#crypto map MyMap
```

dial-backup auto-backup

Use the **dial-backup auto-backup** command to configure the sub-interface to automatically attempt a dial-backup upon failure.

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically attempt dial-backup upon a failure.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example enables automatic dial-backup on the endpoint:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup auto-backup
```

dial-backup auto-restore

Use the **dial-backup auto-restore** command to configure the sub-interface to automatically discontinue dial backup when all network conditions are operational. Use the **no** form of this command to disable the auto-restore feature.

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically restore the primary connection when the failure condition clears.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following configures the AOS to automatically restore the primary connection when the failure condition clears:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup auto-restore
```


dial-backup backup-delay <seconds>

Use the **dial-backup backup-delay** command to configure the amount of time the router will wait after the failure condition is recognized before attempting to backup the link. Use the **no** form of this command to return to the default value.

Syntax Description

<seconds>	Specifies the delay period (in seconds) a failure must be active before the AOS will enter backup operation on the interface (valid range: 10 to 86,400 seconds).
-----------	---

Default Values

By default, the **dial-backup backup-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to wait 60 seconds (on an endpoint with an active alarm condition) before attempting dial-backup operation:

```
(config)#interface atm 1.1
(config-atm 1.1)#dial-backup backup-delay 60
```

dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]

Use the **dial-backup call-mode** command to combine user data with pattern data to ensure data does not mirror standard DDS loop codes (use only on 64 kbps circuits without Frame Relay signaling). Use the **no** form of this command to return to the default value.

Syntax Description

answer	Answers and backs up primary link on failure.
answer-always	Answers and backs up regardless of primary link state.
originate	Originates backup call on primary link failure.
originate-answer	Originates or answers call on primary link failure.
originate-answer-always	Originates on failure; answers and backs up always.

Default Values

By default, the **dial-backup call-mode** role is set to **originate-answer**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

The majority of the configuration for Frame Relay dial-backup is configured in the Frame Relay Interface mode. However, the numbers dialed are configured in the primary interface. Full sample configurations follow:

Sample configuration for remote router (dialing out)

```
hostname "Remote3200"
enable password adtran
!
interface eth 0/1
 ip address 192.168.1.254 255.255.255.0
 no shutdown
!
interface modem 1/3
 no shutdown
!
```

```
interface t1 1/1
  coding b8zs
  framing esf
  clock source line
  tdm-group 1 timeslots 1-24
  no shutdown
!
interface fr 1 point-to-point
  frame-relay lmi-type ansi
  no shutdown
  cross-connect 1 t1 1/1 1 fr 1
!
interface fr 1.16 point-to-point
  frame-relay interface-dlci 16
  ip address 10.1.1.2 255.255.255.252
  dial-backup call-mode originate
  dial-backup number 5551111 analog
  dial-backup number 5552222 analog
!
ip route 0.0.0.0 0.0.0.0 10.1.1.1
!
line telnet 0 4
  password adtran
```

Sample configuration for central router (dialing in)

```
hostname "Central3200"
enable password adtran
!
interface eth 0/1
  ip address 192.168.100.254 255.255.255.0
  no shutdown
!
interface modem 1/3
  no shutdown
!
interface t1 1/1
  coding b8zs
  framing esf
  clock source line
  tdm-group 1 timeslots 1-24
  no shutdown
!
interface fr 1 point-to-point
```

```
frame-relay lmi-type ansi
no shutdown
cross-connect 1 t1 1/1 1 fr 1
!
interface fr 1.100 point-to-point
frame-relay interface-dlci 100
ip address 10.1.1.1 255.255.255.252
dial-backup call-mode answer
dial-backup number 555-8888 analog
!
line telnet 0 4
password adtran
```

Usage Examples

The following example configures the AOS to answer dial-backup calls on this endpoint but never generate calls:

```
(config)#interface atm 1.1
(config-atm 1.1)#dial-backup call-mode answer-always
```

Technology Review

This technology review provides information regarding specific dial-backup router behavior (i.e., when the router will perform dial-backup, where in the configuration the AOS accesses specific routing information, etc.):

Dialing Out

1. The AOS determines to place an outbound call when either the Layer 1 or Layer 2 has a failure.
2. When placing outbound calls, the AOS matches the number dialed to a ATM sub-interface. This is accomplished with an addition to the **dial-backup number** command (refer to *dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>* [on page 1064](#)).
3. When placing the call, the AOS uses the configuration of the related ATM sub-interface for authentication and IP negotiation.
4. If the call fails to connect on the first number dialed, the AOS places a call to the second number if configured. The second number to be dialed references a separate ATM sub-interface.

Dialing In

1. The AOS receives an inbound call on a physical interface.
2. Caller ID is used to match the **dial-backup number** command to the configured ATM sub-interface.
3. If a match is found, the call connects and the AOS pulls down the primary connection if it is not already in a down state.
4. If no match is found from Caller ID, the call is terminated.

dial-backup connect-timeout <seconds>

Use the **dial-backup connect-timeout** command to specify the number of seconds to wait for a connection after a call is attempted before trying to call again or dialing a different number. It is recommended this number be greater than 60.

Syntax Description

<seconds>	Specifies the amount of time (in seconds) that the router will wait for a connection before attempting another call (valid range: 10 to 300).
-----------	---

Default Values

By default, the **dial-backup connect-timeout** period is set to 60 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to wait 120 seconds before retrying a failed dial-backup call:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup connect-timeout 120
```

dial-backup force [backup | primary]

Use the **dial-backup force** command to manually override the automatic dial-backup feature. This can be used to force a link into backup to allow maintenance to be performed on the primary link without disrupting data. Use the **no** form of this command to return to the normal dial-backup operation state.

Syntax Description

backup	Forces backup regardless of primary link state.
primary	Forces primary link regardless of its state.

Default Values

By default, this feature is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to force this endpoint into dial-backup:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup force backup
```

dial-backup maximum-retry <attempts>

Use the **dial-backup maximum-retry** command to select the number of calls the router will make when attempting to backup a link. Use the **no** form of this command to return to the default state.

Syntax Description

<attempts>	Selects the number of call retries that will be made after a sub-link failure (valid range: 0 to 15). Setting this value to 0 will allow unlimited retries during the time the network is failed.
------------	--

Default Values

By default, the **dial-backup maximum-retry** period is set to 0 attempts.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to retry a dial-backup call 4 times before considering backup operation not available:

```
(config)#interface atm 1.1
(config-atm 1.1)#dial-backup maximum-retry 4
```

dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>

Use the **dial-backup number** command to configure the phone number and the call type the router will dial upon network failure. Multiple entries can be made for a sub-interface to allow alternate sites to be dialed. For more detailed information on ATM dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [answer | answer-always | originate | originate-answer | originate-answer-always] on page 1058.

Syntax Description

<digits>	Specifies the phone numbers to call when the backup is initiated.
analog ppp	Specifies number connects to an analog modem.
digital-56k	Specifies number belongs to a digital 56 kbps per DS0 connection.
digital-64k	Specifies number belongs to a digital 64 kbps per DS0 connection.
<isdn min chan>	Specifies the minimum number of DSOs required for a digital 56 or 64 kbps connection (Range: 1 to 24).
<isdn mas chan>	Specifies the maximum number of DSOs desired for a digital 56 or 64 kbps connection (Range: 1 to 24).
<interface>	Specifies the ATM sub-interface (e.g., ATM 3.1) to use when originating or answering using this number.

Default Values

By default, there are no configured dial-backup numbers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to dial 704-555-1212 (digital 64 kbps connection) to initiate dial-backup operation on this endpoint:

```
(config)#interface atm 1.1
(config-atm 1.1)#dial-backup number 7045551212 digital-64k 1 1 atm 3.1
```

dial-backup priority <value>

Use the **dial-backup priority** command to select the backup priority for this interface. This allows the user to establish the highest priority backup link and ensure that link will override backups attempted by lower priority links. Use the **no** form of this command to return to the default value.

Syntax Description

<value>	Sets the relative priority to this link (valid range: 0 to 100). A value of 100 designates the highest priority.
---------	--

Default Values

By default, the **dial-backup priority** is set to 50.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example assigns the highest priority to this endpoint:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup priority 100
```

dial-backup randomize-timers

Use the **dial-backup randomize-timers** command to randomize the call timers to minimize potential contention for resources. Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, the AOS does not randomize the dial-backup call timers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to randomize the dial-backup timers associated with this endpoint:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup randomize-timers
```

dial-backup redial-delay <seconds>

Use the **dial-backup redial-delay** command to configure the delay after an unsuccessful call until the call will be re-tried.

Syntax Description

<seconds>	Specifies the delay (in seconds) between attempting to redial a failed backup attempt (valid range: 10 to 3600).
-----------	--

Default Values

By default, the **dial-backup redial-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures a redial delay of 25 seconds on this endpoint:

```
(config)#interface atm 1.1
(config-atm 1.1)#dial-backup redial-delay 25
```

dial-backup restore-delay <seconds>

Use the **dial-backup restore-delay** command to configure the amount of time the router will wait after the network is restored before disconnecting the backup link and reverting to the primary. This setting is used to prevent disconnecting the backup link if the primary link is “bouncing” in and out of alarm.

Syntax Description

<code><seconds></code>	Specifies the number of seconds the AOS will wait (after a primary link is restored) before disconnecting dial-backup operation (valid range: 10 to 86,400).
------------------------------	--

Default Values

By default, the **dial-backup restore-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the AOS to wait 30 seconds before disconnecting dial-backup operation and restoring the primary connection for this endpoint:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup restore-delay 30
```

dial-backup schedule [day | enable-time | disable-time]

Use the **dial-backup schedule** command to set the time of day that backup will be enabled. Use this command if backup is desired only during normal business hours and on specific days of the week. Use the **no** form of this command to disable dial-backup (as specified).

Syntax Description

day	Sets the days to allow backup (valid Monday through Sunday).
enable-time	Sets the time of day to enable backup. Time is entered in 24-hour format (00:00).
disable-time	Sets the time of day to disable backup.

Default Values

By default, dial-backup is enabled for all days and times if the dial-backup auto-backup command has been issued and the dial-backup schedule has not been entered.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example enables dial-backup Monday through Friday 8:00 am to 7:00 pm:

```
(config)#interface atm 1.1
(config-atm 1.1)#dial-backup schedule enable-time 08:00
(config-atm 1.1)#dial-backup schedule disable-time 19:00
(config-atm 1.1)#no dial-backup schedule day Saturday
(config-atm 1.1)#no dial-backup schedule day Sunday
```

dial-backup shutdown

Use the **dial-backup shutdown** command to deactivate all dial-backup functionality in the unit. Dial-backup configuration parameters are kept intact, but the unit will not initiate (or respond) to dial-backup sequences in the event of a network outage. Use the **no** form of this command to reactivate the dial-backup interface.

Syntax Description

No subcommands.

Default Values

By default, all AOS interfaces are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example deactivates the configured dial-backup interface:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dial-backup shutdown
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

Refer to *Functional Notes*, below, for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or power users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs, and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service, in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address doesn't change often or at all, but you still want an easy name to remember it by (without having to purchase your own domain name) Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com) you need Custom DNS service which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the **dynamic-dns** to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface atm 1.1  
(config-atm 1.1)#dynamic-dns dyndns-custom host user pass
```


encapsulation [aal5mux | aal5snap]

Use the **encapsulation** command to configure the encapsulation type for the ATM Adaption Layer (AAL) of the ATM Protocol Reference Model.

Variations of this command include the following:

encapsulation aal5mux [ip | ppp]

encapsulation aal5snap

Syntax Description

aal5mux	Specifies encapsulation type for multiplexed virtual circuits. A protocol must be specified.
aal5snap	Specifies encapsulation type that supports LLC/SNAP protocols.
[ip ppp]	Specifies protocol type used for multiplexed virtual circuits (aal5mux).

Default Values

By default, the encapsulation type is **aal5snap**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

For PPP and PPOE, the encapsulation type can be **aal5snap** or **aal5mux ppp**.
For IP with no bridging, the encapsulation type can be **aal5snap** or **aal5mux ip**.
For IP with bridging, the encapsulation type can only be **aal5snap**.
For bridging, the encapsulation type can only be **aal5snap**.

Usage Examples

The following example sets the encapsulation type to **aal5snap**:

```
(config)#interface atm 1.1
(config-atm 1.1)#encapsulation aal5snap
```

fair-queue <threshold>

Use the **fair-queue** command to enable weighted fair queuing (WFQ) on an interface. Use the **no** form of this command to disable WFQ and enable first-in-first-out (FIFO) queuing for an interface. WFQ is enabled by default for WAN interfaces.

Syntax Description

<threshold> Optional. Specifies the maximum number of packets that can be present in each conversation sub-queue. Packets received for a conversation after this limit is reached are discarded. Range: 16 to 512.

Default Values

By default, **fair-queue** is enabled with a threshold of 64 packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 5.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example enables WFQ on the interface with a threshold set at 100 packets:

```
(config)#interface atm 1.1  
(config-atm 1.1)#fair-queue 100
```

hold-queue <queue size> out

Use the **hold-queue out** command to change the overall size of an interface's WAN output queue.

Syntax Description

<queue size> Specifies the total number of packets the output queue can contain before packets are dropped. Range: 16 to 1000.

Default Values

The default queue size for WFQ is 400. The default queue size for PPP FIFO and Frame Relay round-robin is 200.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 5.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example sets the overall output queue size to 700:

```
(config)#interface atm 1.1  
(config-atm 1.1)#hold-queue 700 out
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Specifies the assigned IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the router to only allow Telnet traffic into the ATM sub-interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#interface atm 1.1
(config-atm 1.1)#ip access-group TelnetOnly in
```

ip address dhcp

Use the **ip address dhcp** command to use Dynamic Host Configuration Protocol (DHCP) to obtain an address on the interface. Use the **no** form of this command to remove a configured IP address (using DHCP) and disable DHCP operation on the interface.

ip address dhcp [**client-id** [*<interface>* | *<identifier>*] **hostname** <"string">]

Syntax Description

client-id	Optional. Specifies the client identifier used when obtaining an IP address from a DHCP server.
<i><interface></i>	Specifies an interface, thus defining the client identifier as the hexadecimal MAC address of the specified interface (including a hexadecimal number added to the front of the MAC address to identify the media type). For example, specifying the client-id ethernet 0/1 (where the Ethernet interface has a MAC address of d217.0491.1150) defines the client identifier as 01:d2:17:04:91:11:50 (where 01 defines the media type as Ethernet). Refer to <i>hardware-address <hardware-address> <type></i> on page 555 for a detailed listing of media types.
<i><identifier></i>	Specifies a custom client-identifier using a text string (that is converted to a hexadecimal equivalent) or 7 to 28 hexadecimal numbers (with colon delimiters). For example, a custom client identifier of 0f:ff:ff:ff:51:04:99:a1 may be entered using the <i><identifier></i> option.
host name	Optional. Specifies a text string (to override the global router name) to use as the name in the DHCP option 12 field.
<"string">	String (encased in quotation marks) of up to 35 characters to use as the name of the host for DHCP operation.
no-default-route	Specifies that the AOS not install the default route obtained via DHCP.
no-domain-name	Specifies that the AOS not install the domain name obtained via DHCP.
no-nameservers	Specifies that the AOS not install the DNS servers obtained via DHCP.

Default Values

client-id	Optional. By default, the client identifier is populated using the following formula: TYPE: INTERFACE SPECIFIC INFO : MAC ADDRESS Where TYPE specifies the media type in the form of one hexadecimal byte (refer to <i>hardware-address <hardware-address> <type></i> on page 283 for a detailed listing of media types), and the MAC ADDRESS is the Media Access Control (MAC) address assigned to the first Ethernet interface in the unit in the form of six hexadecimal bytes. (For units with a single Ethernet interface, the MAC ADDRESS assigned to Ethernet 0/1 is used in this field).
------------------	--

INTERFACE SPECIFIC INFO is only used for Frame Relay interfaces and can be determined using the following:

FR_PORT#: Q.922 ADDRESS

Where the FR_PORT# specifies the label assigned to the virtual Frame Relay interface using four hexadecimal bytes. For example, a virtual Frame Relay interface labeled 1 would have a FR_PORT# of 00:00:00:01.

The Q.922 ADDRESS field is populated using the following:

8	7	6	5	4	3	2	1
DLCI (high order)					C/R	EA	
DLCI (lower)		FECN	BECN	DE	EA		

Where the FECN, BECN, C/R, DE, and high order extended address (EA) bits are assumed to be 0 and the lower order EA bit is set to 1.

The following list provides a few example DLCIs and associated Q.922 address:
DLCI (decimal) / Q.922 address (hex)

16 / 0x0401
50 / 0x0C21
60 / 0x0CC1
70 / 0x1061
80 / 0x1401

hostname Optional. By default, the host name is the name configured using the Global Configuration **hostname** command.

<"string"> By default, the host name is the name configured using the Global Configuration **hostname** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 2.1	Command was introduced.
Release 8.1	Command was expanded to include ATM sub-interface.

Functional Notes

DHCP allows interfaces to acquire a dynamically assigned IP address from a configured DHCP server on the network. Many Internet Service Providers (ISPs) require the use of DHCP when connecting to their services. Using DHCP reduces the number of dedicated IP addresses the ISP must obtain. Consult your ISP to determine the proper values for the **client-id** and **hostname** fields.

Usage Examples

The following example enables DHCP operation on the ATM sub-interface 1.1:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip address dhcp
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the optional **secondary** keyword to define a secondary IP address. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Defines a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

Use secondary IP addresses to allow dual subnets on a single interface (when you need more IP addresses than the primary subnet can provide). When using secondary IP addresses, avoid routing loops by verifying that all devices on the network segment are configured with secondary IP addresses on the secondary subnet.

Usage Examples

The following example configures a secondary IP address of **192.22.72.101/30**:

```
(config)#interface atm 1.1
(config-atm 1.1)#ip address 192.22.72.101 255.255.255.252 secondary
```


ip dhcp [release | renew]

Use the **ip dhcp** command to release or renew the DHCP IP address. This command is only applicable when using DHCP for IP address assignment.

Syntax Description

release	Releases DHCP IP address.
renew	Renews DHCP IP address.

Default Values

No default values required for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example releases the IP DHCP address for the ATM sub-interface 1.1:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip dhcp release
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



*The **ip helper** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. See [ip forward-protocol udp <port number>](#) on page 424 for more information.*

Syntax Description

<address> Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign an address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is UDP.
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface atm 1.1  
(config-atm 1.1)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	Specifies that if only one host (or IGMP snooping switch) is connected to the interface, when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	Controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave-group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer, if no receiver responds, the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65535 ms. Default: 1000 ms.
querier-timeout <seconds>	Specifies the number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Specifies the interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Specifies the maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 7.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface and place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 7.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub upstream* [on page 1088](#) for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface atm 1.1
(config-atm 1.1)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* on page 433, *ip mcast-stub downstream* on page 1086, and *ip mcast-stub upstream* on page 1088 for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
(config)#interface atm 1.1
(config-atm 1.1)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 7.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 1086](#) for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface atm 1.1
(config-atm 1.1)#ip mcast-stub upstream
```


ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key <password>	Assigns a simple text authentication password to be used by other routers using the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32,767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte maximum) keys.
priority <value>	Sets the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
dead-interval <seconds>	40 seconds

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Example

The following example sets the maximum number of seconds allowed between hello packets to 25,000:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip ospf dead-interval 25000
```

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Specifies message-digest authentication type.
null	Optional. Specifies that no authentication be used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example specifies that no authentication will be used on the ATM sub-interface 1.1:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 3.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip ospf network broadcast
```

ip proxy-arp <address> <subnet mask>

Use the **ip proxy-arp** to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy ARP is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

In general, the principle of proxy ARP allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all proxy ARP requests with its specified MAC address and forward packets accordingly.

Enabling proxy ARP on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the ATM sub-interface 1.1:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|----------|---|
| 1 | Accepts only received RIP version 1 packets on the interface. |
| 2 | Accepts only received RIP version 2 packets on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

- | | |
|-------------|------------------------------|
| Release 1.1 | Command was introduced. |
| Release 8.1 | ATM sub-interface was added. |

Functional Notes

Use the **ip rip receive version** to specify a RIP version that will override the **version** (in the Router RIP) configuration.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the ATM sub-interface 1.1 to accept only RIP version 2 packets:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

1	Transmits only RIP version 1 packets on the interface
2	Transmits only RIP version 2 packets on the interface

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

Use the **ip rip send version** to specify a RIP version that will override the **version** (in the Router RIP) configuration.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the ATM sub-interface 1.1 to transmit only RIP version 2 packets:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip rip send version 2
```

ip route-cache <address>

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route-cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 2.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast switching on the ATM sub-interface 1.1:

```
(config)#interface atm 1.1  
(config-atm 1.1)#ip route-cache
```


ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface (in the format type slot/port) that contains the IP address to use as the source address for all packets transmitted on this interface.
-------------	---

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered eth 0/1** while in the Frame Relay Sub-Interface Configuration mode configures the Frame Relay sub-interface to use the IP address assigned to the Ethernet interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface.

Usage Examples

The following example configures the ATM sub-interface 1.1 to use the IP address assigned to the Ethernet interface (**eth 0/1**):

```
(config)#interface atm 1.1
(config-atm 1.1)#ip unnumbered eth 0/1
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:	
	ATM interfaces	64 to 1520
	Ethernet interfaces	64 to 1500
	FDL interfaces	64 to 256
	HDLC interfaces	64 to 1520
	Loopback interfaces	64 to 1500
	Tunnel interfaces	64 to 18,190
	Virtual Frame Relay sub-interfaces	64 to 1520
	Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:	
	ATM interfaces	1500
	Ethernet interfaces	1500
	FDL interfaces	256
	HDLC interfaces	1500
	Loopback interfaces	1500
	Tunnel interfaces	1500
	Virtual Frame Relay sub-interfaces	1500
	Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the ATM sub-interface 1.1:

```
(config)#interface atm 1.1
(config-atm 1.1)#mtu 1200
```

oam retry <up-count> <down-count> <retry-frequency>

Use the **oam retry** command to configure parameters related to Operation, Administration, and Maintenance (OAM) management for an ATM interface. Use the **no** form of this command to disable OAM management parameters.

Syntax Description

<up-count>	Specifies the number of consecutive end-to-end F5 OAM loopback cell responses that must be received in order to change a PVC connection state to up. The range is from 1 to 255.
<down-count>	Specifies the number of consecutive end-to-end F5 OAM loopback cell responses that are not received in order to change a PVC state to down. The range is from 1 to 255.
<retry-frequency>	Specifies the frequency (in seconds) that end-to-end F5 OAM loopback cells are transmitted when a change in the up/down state of a PVC is being verified. The range is from 1 to 600.

Default Values

By default, the up-count is set to 3, the down-count is set to 5, and the retry frequency is 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the OAM parameters with an up-count of 2, down-count of 2, and retry frequency of 10:

```
(config)#interface atm 1.1
(config-atm 1.1)#oam retry 2 2 10
```

oam-pvc managed <frequency>

Use the **oam-pvc managed** command to enable end-to-end F5 Operation, Administration, and Maintenance (OAM) loopback cell generation and OAM management for an ATM interface. Use the **no** form of this command to disable generation of OAM loopback cells.

Syntax Description

<frequency>	Specifies the time delay between transmitting OAM loopback cells. The range is from 0 to 600 seconds.
-------------	---

Default Values

By default, the frequency is 1 second.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables OAM loopback cell generation with a frequency of 5 seconds:

```
(config)#interface atm 1.1  
(config-atm 1.1)#oam-pvc managed 5
```

pvc <VPI/VCI>

Use the **pvc** command to select the ATM virtual link for this sub-interface. Use the **no** form of this command to remove the link.

Syntax Description

<VPI/VCI>	Specifies the ATM network virtual path identifier (VPI) for this PVC and the ATM network virtual path identifier (VPI) for this PVC. The VPI value range is 0 to 255, and the VCI value range is 32 to 65,535.
-----------	--

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the VPI to 8 and the VCI to 35:

```
(config)#interface atm 1.1  
(config-atm 1.1)#pvc 8/35
```

qos-policy out <mapname>

Use the **qos-policy out** command to apply a previously-configured QoS map to an interface. Use the **no** form of this command to remove the map from the interface. The keyword **out** specifies that this policy will be applied to outgoing packets.

Syntax Description

<mapname> Specifies the name of a previously-created QoS map (refer to *qos map* <mapname> <sequence number> [on page 490](#) for more information).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 6.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example applies the QoS map **VOICEMAP** to the ATM sub-interface 1.1:

```
(config)#interface atm 1.1
(config-atm 1.1)#qos-policy out VOICEMAP
```

spanning-tree bpdudfilter [enable | disable]

Use the **spanning-tree bpdudfilter** command to block BPDUs from being transmitted and received on this interface. To return to the default value, use the **no** form of this command.

Syntax Description

enable	Enables the BPDU filter.
disable	Disables the BPDU filter.

Default Values

By default, this command is set to **disable**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 5.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

The purpose of this command is to remove a port from participation in the spanning tree. This might be beneficial while debugging a network setup. It normally should not be used in a live network.

Usage Examples

The following example enables the BPDU filter on the interface:

```
(config)#interface atm 1.1  
(config-atm 1.1)#spanning-tree bpdudfilter enable
```

spanning-tree bpduguard [enable | disable]

Use the **spanning-tree bpduguard** command to block BPDUs from being received on this interface. To return to the default value, use the **no** form of this command.

Syntax Description

enable	Enables the BPDU block.
disable	Disables the BPDU block.

Default Values

By default, this command is set to **disable**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 5.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example enables the bpduguard on the interface:

```
(config)#interface atm 1.1  
(config-atm 1.1)#spanning-tree bpduguard enable
```


spanning-tree edgeport

Use the **spanning-tree edgeport** command to set this interface to be an edgeport. This command overrides the Global setting (refer to *spanning-tree edgeport default* [on page 519](#)). Use the **no** form of this command to return to the default value.

Syntax Description

No subcommands.

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 5.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Usage Examples

The following example configures the interface to be an edgeport:

```
(config)#interface atm 1.1  
(config-atm 1.1)#spanning-tree edgeport
```

An individual interface can be configured to not be considered an edgeport. For example:

```
(config)#interface atm 1.1  
(config-atm 1.1)#spanning-tree edgeport disable  
or  
(config)#interface atm 1.1  
(config-atm 1.1)#no spanning-tree edgeport
```

spanning-tree link-type [auto | point-to-point | shared]

Use the **spanning-tree link-type** command to configure the spanning-tree protocol link type for an interface. To return to the default value, use the **no** form of this command.

Syntax Description

auto	Determines link type by the port's duplex settings.
point-to-point	Manually sets link type to point-to-point, regardless of duplex settings.
shared	Manually sets link type to shared, regardless of duplex settings.

Default Values

By default, a port is set to auto.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 5.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

This command overrides the default link-type setting determined by the duplex of the individual port. By default a port configured for half-duplex is set to **shared** link type, and a port configured for full-duplex is set to **point-to-point** link type. Setting the link type manually overrides the default and forces the port to use the specified link type. Using the **link-type auto** command, restores the convention of determining link type based on duplex settings.

Usage Examples

The following example forces the link-type to point-to-point, even if the port is configured to be half-duplex:

```
(config)#bridge 1 protocol ieee
(config)#interface atm 1.1
(config-atm 1.1)#spanning-tree link-type point-to-point
```

Technology Review

Rapid transitions are possible in rapid spanning-tree protocol (RSTP) by taking advantage of point-to-point links (a port is connected to exactly one other bridge) and edge-port connections (a port is not connected to any additional bridges). Setting the link type to **auto** allows the spanning tree to automatically configure the link type based on the duplex of the link. Setting the link type to **point-to-point** allows a half-duplex link to act as if it were a point-to-point link.

spanning-tree path-cost <value>

Use the **spanning tree path-cost** command to assign a cost to a bridge group that is used when computing the spanning-tree root path. To return to the default path-cost value, use the **no** form of this command.

Syntax Description

<value>	Assigns number to the bridge interface to be used as the path cost in spanning calculations (valid range: 0 to 65,535).
---------	---

Default Values

By default, the path-cost value is set to 19.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

The specified value is inversely proportional to the likelihood the bridge interface will be chosen as the root path. Set the path-cost value lower to increase the chance the interface will be the root. To obtain the most accurate spanning tree calculations, develop a system for determining path costs for links and apply it to all bridged interfaces.

Usage Examples

The following example assigns a path cost of 100 for bridge group 17 on an ATM sub-interface:

```
(config)#interface atm 1.1
(config-atm 1.1)#spanning-tree path-cost 100
```

Technology Review

Spanning-tree protocol provides a way to prevent loopback or parallel paths in bridged networks. Using the priority values and path costs assigned to each bridging interface, the spanning-tree protocol determines the root path and identifies whether to block or allow other paths.

spanning-tree port-priority <value>

Use the **spanning-tree port-priority** command to select the priority level of a port associated with a bridge. To return to the default bridge-group priority value, use the **no** version of this command.

Syntax Description

<value>	Assigns a priority value for the bridge group; the lower the value, the higher the priority (valid range: 0 to 255).
---------	--

Default Values

By default, the bridge-group priority value is set to 128.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, and 4000 Series units.

Command History

Release 1.1	Command was introduced.
Release 8.1	ATM sub-interface was added.

Functional Notes

The only time that this priority level is used is when two interfaces with a path to the root have equal cost. At that point, the level set in this command will determine which port the bridge will use. Set the priority value lower to increase the chance the interface will be used.

Usage Examples

The following example sets the maximum priority on the ATM sub-interface labeled 1.1 in bridge group 17:

```
(config)#interface atm 1.1  
(config-atm 1.1)#spanning-tree priority 0
```

ADSL INTERFACE CONFIG COMMAND SET

To activate the ADSL Interface Configuration mode, enter the **interface adsl** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface adsl 0/1
(config-adsl 0/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

retrain [on page 1110](#)

snr-margin [*showtime monitor* | *training monitor*] <margin> [on page 1111](#)

training-mode [*G.DMT* | *G.LITE* | *Multi-Mode* | *T1.413*] [on page 1112](#)

retrain

Use the **retrain** command to force the modem to retrain.

Syntax Description

No subcommands.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example forces a modem retrain:

```
(config)#interface adsl 0/1  
(config-adsl 0/1)#retrain
```

snr-margin [showtime monitor | training monitor] <margin>

Use the **snr-margin** command to enable monitoring and set the minimum signal-to-noise ratio (SNR) during training and showtime. Use the **no** form of this command to disable monitoring.

Syntax Description

showtime monitor	Enables margin monitoring to retrain the ADSL interface if the specified minimum margin is violated during showtime.
training monitor	Enables margin monitoring to retrain the ADSL interface if the specified minimum margin is violated during training.
<margin>	Sets the minimum SNR margin in dB. The range is from 1 to 15.

Default Values

By default, SNR margin monitoring is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables SNR margin monitoring during showtime with a minimum level of 7 dB:

```
(config)#interface adsl 0/1  
(config-adsl 0/1)#snr-margin showtime monitor 7
```

training-mode [G.DMT | G.LITE | Multi-Mode | T1.413]

Use the **training-mode** command to configure the ADSL training mode.

Syntax Description

G.DMT	Specifies ANSI full-rate mode.
G.LITE	Specifies ANSI splitterless mode.
Multi-Mode	Specifies auto detect mode.
T1.413	Specifies ANSI T1.413 mode.

Default Values

By default, the training mode is set to **Multi-Mode**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the training mode to T1.413:

```
(config)#interface adsl 0/1  
(config-adsl 0/1)#training-mode T1.413
```

BGP CONFIGURATION COMMAND SET

To activate the BGP Configuration mode, enter the **router bgp** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#router bgp 1
(config-bgp)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

do on page 1465

end on page 1466

All other commands for this command set are described in this section in alphabetical order.

bgp fast-external-fallover on page 1114

bgp log-neighbor-changes on page 1115

bgp router-id <ip address> on page 1116

distance bgp <external> <internal> <local> on page 1117

hold-timer <hold time> on page 1118

bgp fast-external-fallover

Use the **bgp fast-external-fallover** command to enable the fast-external-fallover feature.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

When enabled, if the link interface over which the router is communicating with a BGP peer goes down, the BGP session with that peer is immediately cleared. When fallover is disabled and the link goes down, the session is maintained until the BGP hold timer expires.

Usage Examples

The following example enables this option:

```
(config)#router bgp 1  
(config-bgp)#bgp fast-external-fallover
```

bgp log-neighbor-changes

Use the **bgp log-neighbor-changes** command to control the logging of neighbor state changes. Use the **no** form of this command to return to the default setting.

Syntax Description

No subcommands.

Default Values

By default, neighbor changes are not logged.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command controls logging of BGP neighbor state changes (up/down) and resets. This information is useful for troubleshooting and determining network stability.

Usage Examples

The following example enables logging of BGP neighbor state changes:

```
(config)#router bgp 1  
(config-bgp)#bgp log-neighbor-changes
```

bgp router-id <ip address>

Use the **bgp router-id** command to specify the IP address that the router should use as its BGP router ID. Use the **no** form of this command to return to the default setting.

Syntax Description

<ip address> Designates the IP address this router should use as its BGP router ID.

Default Values

By default, no router ID is configured. The default action is detailed in *Functional Notes*, below.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

This command allows an IP address to be specified for use as the BGP router ID. If no IP address is configured at BGP startup, it uses the highest IP address configured on a loopback interface. If no loopback interfaces are configured, it uses the highest IP address configured on any interface that is active. If the specified router ID is changed, existing sessions with BGP neighbors are reset.

Usage Examples

The following example configures IP address 10.0.0.1 as the BGP router ID:

```
(config)#router bgp 1  
(config-bgp)#bgp router-id 10.0.0.1
```

distance bgp <external> <internal> <local>

Use the **distance bgp** command to set the administrative distance for BGP routes. Use the **no** form of this command to return to the default setting.

Syntax Description

<external>	Sets the administrative distance for BGP routes learned via eBGP sessions. A value of 255 means the route is not installed. Range: 1 to 254.
<internal>	Sets the administrative distance for BGP routes learned via iBGP sessions. A value of 255 means the route is not installed. Range: 1 to 254.
<local>	Sets the administrative distance for BGP routes learned via the network command and redistribution. A value of 255 means the route is not installed. Range: 1 to 254.

Default Values

By default external is set to 20, internal to 200, and local to 200. Normally, these default settings should not be changed.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command sets the administrative distance for BGP routes. The administrative distance is a local variable that allows a router to choose the best route when there are multiple paths to the same network. Routes with smaller administrative distances are favored.

Usage Examples

The following example gives external BGP routes an administrative distance of 30, internal BGP routes an administrative distance of 200, and local routes an administrative distance of 240:

```
(config)#router bgp 1  
(config-bgp)#distance bgp 30 200 240
```

hold-timer <*hold time*>

Use the **hold-timer** command to set the default hold time for all neighbors in the BGP process.

Syntax Description

<*hold time*> Specifies a time interval (in seconds) within which a keepalive must be received from a peer before it is declared dead peer. Range: 0 to 65,535

Default Values

By default, the hold time is 90 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

Using the **hold-timer** command in BGP configuration mode sets the default hold time for all neighbors in that BGP process. Using the **hold-timer** command in BGP neighbor configuration mode sets the hold time for only that neighbor. The peers will negotiate and use the lowest configured setting. The keepalive interval will be set to one third of the negotiated hold time.

Usage Examples

The following example sets a hold time of 120 seconds for a specific neighbor, with an understood keepalive interval of 40 seconds:

```
(config)#router bgp 1  
(config-bgp)#hold-timer 120
```

BGP NEIGHBOR CONFIGURATION COMMAND SET

To activate the BGP Neighbor Configuration mode, enter the **router bgp-neighbor** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

advertisement-interval <seconds> [on page 1121](#)

advertisement-interval <seconds> [on page 1121](#)

as-path-list <listname> [*in* | *out*] [on page 1122](#)

ebgp-multihop <hop count> [on page 1123](#)

hold-timer <hold time> [on page 1124](#)

local-as <as-number> [on page 1125](#)

next-hop-self [on page 1127](#)

password <password> [on page 1128](#)

prefix-list <listname> [*in* | *out*] [on page 1129](#)

remote-as <as-number> [on page 1130](#)

route-map <map-name> [*in* | *out*] [on page 1131](#)

send-community standard [on page 1132](#)

soft-reconfiguration inbound [on page 1133](#)

update-source <interface> [on page 1134](#)

access-list <listname> [in | out]

Use the **access-list** command to assign a predefined access list to a BGP neighbor. This list is then used to filter inbound and/or outbound BGP route updates. Use the **no** form of this command to return to default settings.

Syntax Description

<listname>	Assigns an access list to this BGP neighbor.
in	Specifies the filtering of all inbound BGP route updates.
out	Specifies the filtering of all outbound BGP route updates.

Default Values

By default, no access lists are specified for filtering.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

Before they can be assigned to a neighbor, access lists must first be defined using the **ip access-list** commands. See *ip access-list extended <listname>* [on page 387](#) and *ip access-list standard <listname> [permit | deny] <ip address>* [on page 393](#) for more information.

Usage Examples

The following example uses the **InWeb** access list to filter all inbound BGP route updates:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#access-list InWeb in
```


advertisement-interval <seconds>

Use the **advertisement-interval** command to configure the AOS to specify how long the BGP process waits before sending updates to the neighbor.

Syntax Description

<seconds> Specifies the advertisement interval in seconds. Range: 0 to 600.

Default Values

By default, the advertisement interval is 30 seconds for external neighbors and 5 seconds for internal neighbors.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

This command sets the minimum interval between sending updates to the specified neighbor.

Usage Examples

The following example configures the BGP process to wait at least 100 seconds before sending updates to the neighbor:

```
(config)#router bgp-neighbor 192.22.73.101  
(config-bgp-neighbor)#advertisement-interval 100
```

as-path-list <listname> [in | out]

Use the **as-path-list** command to assign a predefined autonomous system (AS) path list to a BGP neighbor. This list is then used to filter inbound and/or outbound BGP route updates. Use the **no** form of this command to discontinue use of the list.

Syntax Description

<listname>	Assigns an AS path list to this BGP neighbor.
in	Specifies the filtering of all inbound BGP route updates.
out	Specifies the filtering of all outbound BGP route updates.

Default Values

By default, no AS path lists are specified for filtering.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

Before they can be assigned to a neighbor, AS path lists must first be defined using the **ip as-path-list** command. See *ip as-path-list <listname>* [on page 397](#) for more information.

Usage Examples

The following example uses the **no15** AS path list to filter all inbound BGP route updates:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#as-path-list no15 in
```

ebgp-multihop <hop count>

Use the **ebgp-multihop** command to configure the maximum hop count of BGP messages to a neighbor. Use the **no** form of this command to return to the default setting.

Syntax Description

<hop count>	Specifies the maximum hop count of BGP messages to a neighbor. Range: 1 to 254.
-------------	--

Default Values

By default, eBGP multihop is set to 1.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command allows an eBGP neighbor to be on a network that is not directly connected. Normally, eBGP peers are directly connected. In certain applications, a non-BGP device such as a firewall or router may reside between eBGP peers. In this case, the eBGP multihop command is required to allow updates to have a TTL greater than 1 and to allow received BGP updates to be added to the BGP table when the next hop address is not directly connected.

Usage Examples

The following example allows a BGP message to travel 10 hops to a neighbor:

```
(config)#router bgp-neighbor 192.22.73.101  
(config-bgp-neighbor)#ebgp-multihop 10
```

hold-timer <*hold time*>

Use the **hold-timer** command to set the default hold time for all neighbors in the BGP process.

Syntax Description

<*hold time*> Specifies a time interval (in seconds) within which a keepalive must be received from a peer before it is declared dead peer. Range: 0 to 65,535.

Default Values

By default, the hold time is 90 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1 Command was introduced.

Functional Notes

Using the **hold-timer** command in BGP configuration mode sets the default hold time for all neighbors in that BGP process. Using the **hold-timer** command in BGP neighbor configuration mode sets the hold time for only that neighbor. The peers will negotiate and use the lowest configured setting. The keepalive interval will be set to one-third of the negotiated hold time.

Usage Examples

The following example sets a hold time of 120 seconds for a specific neighbor, with an understood keepalive interval of 40 seconds:

```
(config)#router bgp-neighbor 192.22.73.101  
(config-bgp-neighbor)#hold-timer 120
```

local-as <as-number>

Use the **local-as** command to specify an autonomous system (AS) number for the unit to use when communicating with this BGP neighbor. Use the **no** form of this command to return to default settings.

Syntax Description

<as-number>	Specifies the AS number to use when communicating with this neighbor. Must be different than the AS number for this router and the peer router. Only valid for eBGP connections. Range is 0 to 65,535.
-------------	--

Default Values

By default, no local AS number is defined. The router's BGP AS number is used.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

This command substitutes a different AS number to be used for communicating with this BGP neighbor. (other than the one the router is actually a member of). This can be used to satisfy network designs requiring a customer to appear as one AS number when communicating with one internet service provider (ISP) and another when communicating with another ISP.

Usage Examples

The following example configures this BGP neighbor's AS number to be **300**:

```
(config)#router bgp-neighbor 192.22.73.101  
(config-bgp-neighbor)#local-as 300
```

Technology Review

This router appears (to the peer router) to be in the AS specified with the **local-as** command. Therefore all routes learned from the peer have this number prepended to the AS path. In network advertisements from routers using the **local-as** command, the router's true AS number (the number specified using the **router bgp as-number** command) is prepended to the AS path attribute, and the local-AS (the number specified in the **neighbor local-as** command) is prepended to the AS path attribute. This makes it appear that the path to the network is first through the local-AS, and then through the true AS. To further illustrate, consider the following example network.

In this network:

- Router A is in AS 100.
- Router B is in AS 300.
- Router A is an eBGP peer with Router B.
- Router A's connection to Router B specifies a **local-as** of 200.
- Router B is configured to connect to Router A in AS 200.

Therefore:

- To Router B, all aspects of Router A appear as AS 200.
- Networks advertised from Router A to Router B will have the AS path **200 100** prepended to the AS path attribute.
- Router A will add AS 200 to the AS path of networks learned from Router B.

next-hop-self

Use the **next-hop-self** command to force the next hop attribute to be changed to this unit's address when advertising networks that would not have the next hop changed under normal rules. Normal next hop rules are described in the *Functional Notes* section below. Use the **no** form of this command to cause normal next hop rules to apply.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled and normal next hop rules apply.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

In eBGP, routes are normally advertised with a next hop set to the IP address that the receiving peer has configured in its neighbor statement for this router. In the eBGP case where the receiving router is in the same subnet as the current next hop, the current next hop is not changed.

For broadcast multiaccess networks (Ethernet), this provides more efficient routing. For non-broadcast multiaccess networks (NBMA) such as Frame Relay with a partial mesh using point-to-multipoint circuits, this rule can cause significant problems. Since the partial mesh is on the same subnet, BGP applies the rule of not changing the next hop address, rendering invalid routes in certain topologies. This is one case where this command is necessary to solve a problem.

Usage Examples

The following example enables **next-hop-self**:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#next-hop-self
```

password <password>

Use the **password** command to enable MD5 password authentication on TCP. Use the **no** form of this command to disable authentication.

Syntax Description

<password> Specifies the password string to be used for authentication. The password is case-sensitive and must not exceed 80 characters.

Default Values

By default, authentication is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Functional Notes

Authentication must be configured on both peers using the same password. Every BGP TCP segment sent is authenticated. Configuring authentication causes an existing session to be torn down and re-established using the currently specified authentication.

Usage Examples

The following example enables authentication for this BGP neighbor and sets a password of **user1**:

```
(config)#router bgp-neighbor 192.22.73.101  
(config-bgp-neighbor)#password user1
```


prefix-list <listname> [in | out]

Use the **prefix-list** command to assign a predefined prefix list to a BGP neighbor. The list is then used to filter BGP route updates received and/or sent from/by the specified peer. Use the **no** form of this command to discontinue use of the prefix list.

Syntax Description

<listname>	Assigns a prefix list to this BGP neighbor.
in	Specifies the filtering of all inbound BGP route updates received from the specified peer.
out	Specifies the filtering of all outbound BGP route updates being sent to the specified peer.

Default Values

By default, no prefix lists are specified for filtering.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

Before they can be assigned to a BGP neighbor, prefix lists must first be defined using the **ip prefix-list** command. See *ip prefix-list <listname> description <"text">* [on page 443](#) for more information.

Usage Examples

The following example uses the **MyList** prefix list to filter all BGP updates received from the specified peer:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#prefix-list MyList in
```

remote-as <as-number>

Use the **remote-as** command to specify the BGP autonomous system (AS) to which the neighbor belongs, adding an entry to the BGP neighbor table. Use the **no** form of this command to return to default settings.

Syntax Description

<as-number> Specifies the AS number. This number must be different from the AS number of the local router (which is defined using the **router bgp** command). Range: 1 to 65,535. See *router bgp* on page 498 for more information.

Default Values

By default, no BGP neighbors are defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example configures a remote AS number of **200** for this neighbor:

```
(config)#router bgp-neighbor 192.22.73.101  
(config-bgp-neighbor)#remote-as 200
```

route-map <map-name> [in | out]

Use the **route-map** command to assign a route map to this BGP neighbor. The route map is then used to filter or modify inbound and/or outbound BGP route updates. Use the **no** form of this command to return to default settings.

Syntax Description

<map-name>	Assigns a route map to this BGP neighbor.
in	Specifies the filtering/modification of all inbound BGP route updates.
out	Specifies the filtering/modification of all outbound BGP route updates.

Default Values

By default, no route map is assigned.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

Before a route map can be assigned to a BGP neighbor, it must first be defined using the **route-map** command. See *route-map* <map-name> [*permit* | *deny*] <sequence number> [on page 497](#) for more information.

Usage Examples

The following example assigns a route map to this neighbor for outbound filtering:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#route-map MapName out
```

send-community standard

Use the **send-community standard** command to insert a standard BGP community attribute to all outgoing route updates for this neighbor. Use the **no** form of this command to return to default settings.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example inserts a standard BGP community attribute to all outgoing route updates for the specified neighbor:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#send-community standard
```

soft-reconfiguration inbound

Use the **soft-reconfiguration inbound** command to enable this unit to store BGP updates for the specified neighbor. Use the **no** form of this command to return to default settings.

Syntax Description

No subcommands.

Default Values

By default, this command is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Functional Notes

BGP updates are stored prior to filtering, thus allowing the **clear ip bgp soft** command to be used in the absence of route refresh (RFC2918) capability. This command affects all neighbors. See *clear ip bgp [* | <as-number> | <ip address>] [in | out | soft]* [on page 45](#) for more information.

Usage Examples

The following example enables the unit to store BGP updates for the specified neighbor:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#soft-reconfiguration inbound
```

update-source <interface>

Use the **update-source** command to specify which virtual interface's IP address will be used as the source IP address for the BGP TCP connection (when connecting to this peer). Use the **no** form of this command to return to default settings.

Syntax Description

<interface>	Specifies the interface ID (e.g., loopback 1) of the virtual interface to be used as the source IP address.
-------------	---

Default Values

By default, the outbound interface's IP address is used for BGP updates.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

This is most often configured as a loopback interface that is reachable by the peer router. The peer will specify this address in its neighbor commands for this router.

Usage Examples

The following example configures the **loopback 1** interface as the source IP:

```
(config)#router bgp-neighbor 192.22.73.101
(config-bgp-neighbor)#update-source loopback 1
```

TUNNEL CONFIGURATION COMMAND SET

To activate the Tunnel Configuration mode, enter the **interface tunnel** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface tunnel 1
(config-tunnel 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)
cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)
description <text> [on page 1464](#)
do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)
shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <polycyname> [on page 1136](#)
bandwidth <value> [on page 1139](#)
crypto map <mapname> [on page 1140](#)
dial-backup commands [begin on page 1142](#)
dynamic-dns [*dyndns* | *dyndns-custom* | *dyndns-static*] <hostname> <username>
<password> [on page 1158](#)
ip commands [begin on page 1160](#)
keepalive <period> <retries> [on page 1177](#)
lldp receive [on page 1178](#)
lldp send [*management-address* | *port-description* | *system-capabilities* | *system-description* |
system-name | *and-receive*] [on page 1179](#)
mtu <size> [on page 1181](#)
tunnel checksum [on page 1182](#)
tunnel destination <ip address> [on page 1183](#)
tunnel key <value> [on page 1184](#)
tunnel mode gre [on page 1185](#)
tunnel sequence-datagrams [on page 1186](#)
tunnel source [<ip address> | <interface>] [on page 1187](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic on an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname>	Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).
--------------	--

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access-policy <policy name>**.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the tunnel 1 interface:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```


Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access policy with the tunnel 1 interface:

```
(config)#interface tunnel 1
(config-tunnel 1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host <A.B.C.D>** to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the **<A.B.C.D> <wildcard>** format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an IP policy class that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow, discard, NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the tunnel 1 interface:

```
(config)#interface tunnel 1  
(config-tunnel 1)#access-policy MatchAll
```

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

To view default values, use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 5.1	Command was expanded to include Ethernet sub-interfaces.
Release 6.1	Command was expanded to include VLAN interfaces.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the tunnel 1 interface to 10 Mbps:

```
(config)#interface tunnel 1  
(config-tunnel 1)#bandwidth 10000
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation** CD provided with your unit.*

Syntax Description

<mapname>	Assigns a crypto map name to the interface.
-----------	---

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

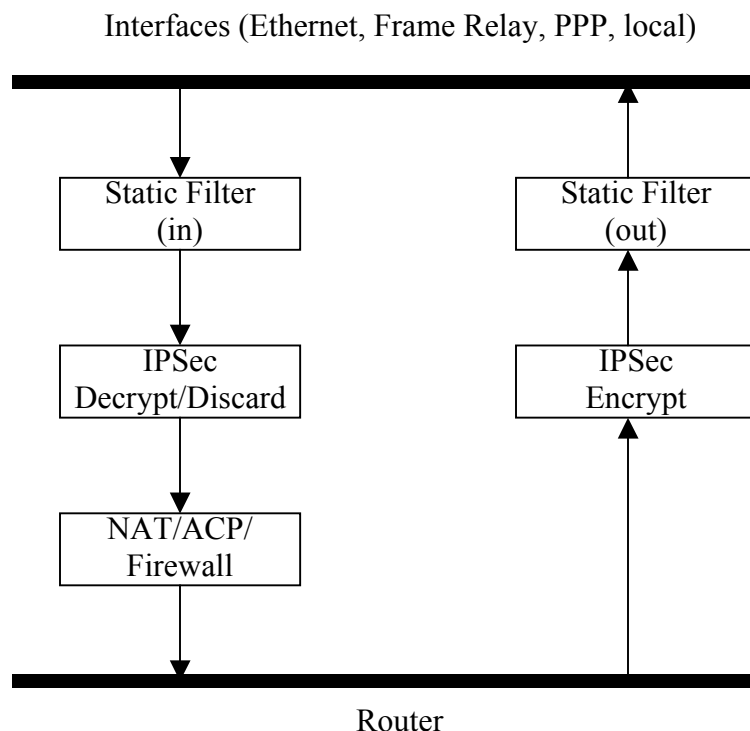
Command History

Release 4.1	Command was introduced.
-------------	-------------------------

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local-side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the tunnel interface:

```
(config)#interface tunnel 1
(config-tunnel 1)#crypto map MyMap
```

dial-backup auto-backup

Use the **dial-backup auto-backup** command to configure the PPP interface to automatically attempt a dial-backup upon failure. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 1145](#).

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically attempt dial-backup upon a failure.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example enables automatic dial-backup on the endpoint:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup auto-backup
```

dial-backup auto-restore

Use the **dial-backup auto-restore** command to configure the interface to automatically discontinue dial-backup when all network conditions are operational. Use the **no** form of this command to disable the auto-restore feature. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically restore the primary connection when the failure condition clears.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to automatically restore the primary connection when the failure condition clears:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup auto-restore
```

dial-backup backup-delay <seconds>

Use the **dial-backup backup-delay** command to configure the amount of time the router will wait after the failure condition is recognized before attempting to backup the link. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

<seconds>	Specifies the delay period (in seconds) a failure must be active before the AOS will enter backup operation on the interface. Range: 10 to 86,400 seconds.
-----------	--

Default Values

By default, the **dial-backup backup-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 60 seconds (on an endpoint with an active alarm condition) before attempting dial-backup operation:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup backup-delay 60
```


dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]

Use the **dial-backup call-mode** command to combine user data with pattern data to ensure data does not mirror standard DDS loop codes (use only on 64 kbps circuits without Frame Relay signaling). Use the **no** form of this command to return to the default value.

Syntax Description

answer	Answers and backs up primary link on failure.
answer-always	Answers and backs up regardless of primary link state.
originate	Originates backup call on primary link failure.
originate-answer	Originates or answers call on primary link failure.
originate-answer-always	Originates on failure; answers and backs up always.

Default Values

By default, the **dial-backup call-mode** is set to **originate-answer**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Functional Notes

The majority of the configuration for PPP dial-backup is configured in the PPP interface's. However, the numbers dialed are configured in the primary interface. Full sample configurations follow:

Sample configuration for remote router (dialing out)

```
hostname "Remote3200"
enable password adtran
!
interface eth 0/1
 ip address 192.168.1.254 255.255.255.0
 no shutdown
!
interface modem 1/3
 no shutdown
!
```

```
interface t1 1/1
coding b8zs
framing esf
clock source line
tdm-group 1 timeslots 1-24
no shutdown
!
interface ppp 1
ip address 10.1.1.2 255.255.255.252
dial-backup call-mode originate
dial-backup number 5551111 analog ppp 2
cross-connect 1 t1 1/1 1 ppp 1
!
interface ppp 2
description connected to corp for dial-backup
ip address 10.10.10.2 255.255.255.252
ppp authentication pap
ppp pap sent-username joe password pswrd
!
ip route 0.0.0.0 0.0.0.0 10.1.1.1
!
line telnet 0 4
password adtran
```

Sample configuration for central router (dialing in)

```
hostname "Central3200"
enable password adtran
!
interface eth 0/1
ip address 192.168.100.254 255.255.255.0
no shutdown
!
interface modem 1/3
no shutdown
!
interface t1 1/1
coding b8zs
framing esf
clock source line
tdm-group 1 timeslots 1-24
no shutdown
!
interface ppp 1
```

```
no shutdown
cross-connect 1 t1 1/1 1 ppp 1
ip address 10.1.1.1 255.255.255.252
dial-backup call-mode answer
dial-backup number 555-8888 analog ppp 2
!
interface ppp 2
description connection for remote 3200 dialin for backup
ip address 10.10.10.1 255.255.255.252
ppp authentication pap
username joe password pswrd
!
line telnet 0 4
password adtran
```

Usage Examples

The following example configures the AOS to answer dial-backup calls on this endpoint but never generate calls:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup call-mode answer-always
```

Technology Review

This technology review provides information regarding specific dial-backup router behavior (i.e., when the router will perform dial-backup, where in the configuration the AOS accesses specific routing information, etc.):

Dialing Out

1. The AOS determines to place an outbound call when either the Layer 1 or Layer 2 has a failure.
2. When placing outbound calls, the AOS matches the number dialed to a PPP interface. This is accomplished with an addition to the **dial-backup number** command (refer to *dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>* [on page 1151](#)).
3. When placing the call, the AOS uses the configuration of the related PPP interface for authentication and IP negotiation.
4. If the call fails to connect on the first number dialed, the AOS places a call to the second number if configured. The second number to be dialed references a separate PPP interface.

Dialing In

1. The AOS receives an inbound call on a physical interface.
2. Caller ID is used to match the **dial-backup number** command to the configured PPP interface.
3. If a match is found, the call connects and the AOS pulls down the primary connection if it is not already in a down state.
4. If no match is found from Caller ID, the call is terminated.

dial-backup connect-timeout <seconds>

Use the **dial-backup connect-timeout** command to specify the number of seconds to wait for a connection after a call is attempted before trying to call again or dialing a different number. It is recommended this number be greater than 60. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

<seconds>	Selects the amount of time (in seconds) that the router will wait for a connection before attempting another call (valid range: 10 to 300).
-----------	---

Default Values

By default, the **dial-backup connect-timeout** period is set to 60 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 120 seconds before retrying a failed dial-backup call:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup connect-timeout 120
```

dial-backup force [backup | primary]

Use the **dial-backup force** command to manually override the automatic dial-backup feature. This can be used to force a link into backup to allow maintenance to be performed on the primary link without disrupting data. Use the **no** form of this command to return to the normal dial-backup operation state. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1145.

Syntax Description

backup	Force backup regardless of primary link state.
primary	Force primary link regardless of its state.

Default Values

By default, this feature is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to force this interface into dial-backup:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup force backup
```

dial-backup maximum-retry <attempts>

Use the **dial-backup maximum-retry** command to select the number of calls the router will make when attempting to backup a link. Use the **no** form of this command to return to the default state. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1145.

Syntax Description

<attempts>	Selects the number of call retries that will be made after a link failure (valid range: 0 to 15).
------------	---

Setting this value to 0 will allow unlimited retries during the time the network is failed.

Default Values

By default, **dial-backup maximum-retry** is set to 0 attempts.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to retry a dial-backup call four times before considering backup operation not available:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup maximum-retry 4
```

dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>

Use the **dial-backup number** command to configure the phone number and the call type the router will dial upon network failure. Multiple entries can be made for an interface to allow alternate sites to be dialed. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [answer | answer-always | originate | originate-answer | originate-answer-always] [on page 1145](#).

Syntax Description

<digits>	Specifies the phone numbers to call when the backup is initiated.
analog	Indicates number connects to an analog modem.
digital-56k	Indicates number belongs to a digital 56 kbps per DS0 connection.
digital-64k	Indicates number belongs to a digital 64 kbps per DS0 connection.
<isdn min chan>	Specifies the minimum number of DSOs required for a digital 56 or 64 kbps connection (Range: 1 to 24).
<isdn mas chan>	Specifies the maximum number of DSOs desired for a digital 56 or 64 kbps connection (Range: 1 to 24).
<interface>	Specifies the PPP interface (e.g., PPP 3) to use when originating or answering using this number.

Default Values

By default, there are no configured dial-backup numbers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to dial 704-555-1212 (digital 64 kbps connection) to initiate dial-backup operation on this endpoint using interface PPP 3:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup number 7045551212 digital-64k 1 1 ppp 3
```

dial-backup priority <value>

Use the **dial-backup priority** command to select the backup priority for this interface. This allows the user to establish the highest priority backup link and ensure that link will override backups attempted by lower priority links. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 1145](#).

Syntax Description

<value>	Sets the relative priority of this link (valid range: 0 to 100). A value of 100 designates the highest priority.
---------	--

Default Values

By default, **dial-backup priority** is set to 50.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example assigns the highest priority to this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup priority 100
```

dial-backup randomize-timers

Use the **dial-backup randomize-timers** command to randomize the call timers to minimize potential contention for resources. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1145.

Syntax Description

No subcommands.

Default Values

By default, the AOS does not randomize the dial-backup call timers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to randomize the dial-backup timers associated with this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup randomize-timers
```

dial-backup redial-delay <seconds>

Use the **dial-backup redial-delay** command to configure the delay after an unsuccessful call until the call will be re-tried. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on [page 1145](#).

Syntax Description

<seconds>	Specifies the delay in seconds between attempting to re-dial a failed backup attempt. Range: 10 to 3600.
-----------	--

Default Values

By default, **dial-backup redial-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures a redial delay of 25 seconds on this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup redial-delay 25
```

dial-backup restore-delay <seconds>

Use the **dial-backup restore-delay** command to configure the amount of time the router will wait after the network is restored before disconnecting the backup link and reverting to the primary. This setting is used to prevent disconnecting the backup link if the primary link is “bouncing” in and out of alarm. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1145.

Syntax Description

<seconds>	Specifies the number of seconds the AOS will wait (after a primary link is restored) before disconnecting dial-backup operation. Range: 10 to 86,400.
-----------	---

Default Values

By default, **dial-backup restore-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 30 seconds before disconnecting dial-backup operation and restoring the primary connection for this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup restore-delay 30
```

dial-backup schedule [day | enable-time | disable-time]

Use the **dial-backup schedule** command to set the time of day that backup will be enabled. Use this command if backup is desired only during normal business hours and on specific days of the week. Use the **no** form of this command to disable dial-backup (as specified). For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [*answer* | *answer-always* | *originate* | *originate-answer* | *originate-answer-always*] on page 1145.

Syntax Description

day	Sets the days to allow backup (valid range: Monday through Sunday).
enable-time	Sets the time of day to enable backup. Time is entered in 24-hour format (00:00).
disable-time	Sets the time of day to disable backup.

Default Values

By default, dial-backup is enabled for all days and times if the dial-backup auto-backup command has been issued and the dial-backup schedule has not been entered.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example enables dial-backup Monday through Friday 8:00 am to 7:00 pm:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup schedule enable-time 08:00
(config-ppp 1)#dial-backup schedule disable-time 19:00
(config-ppp 1)#no dial-backup schedule day Saturday
(config-ppp 1)#no dial-backup schedule day Sunday
```

dial-backup shutdown

Use the **dial-backup shutdown** command to deactivate all dial-backup functionality in the unit. Dial-backup configuration parameters are kept intact, but the unit will not initiate (or respond) to dial-backup sequences in the event of a network outage. Use the **no** form of this command to reactivate the dial-backup interface. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

No subcommands.

Default Values

By default, all AOS interfaces are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example deactivates the configured dial-backup interface:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup shutdown
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

Refer to Functional Notes below for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or advanced users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address does not change often or at all but you still want an easy name to remember it by (without having to purchase your own domain name) Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com), you need Custom DNS service, which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the dynamic-dns to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface tunnel 1  
(config-tunnel 1)#dynamic-dns dyndns-custom host user pass
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Assigns an IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the unit to only allow Telnet traffic (as defined in the user-configured **TelnetOnly** IP access list) into the tunnel interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#interface tunnel 1
(config-tunnel 1)#ip access-group TelnetOnly in
```


ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Configures a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Usage Examples

The following example configures an IP address of **192.22.72.101/30**:

```
(config)#interface tunnel 1
(config-tunnel 1)#ip address 192.22.72.101 255.255.255.252
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



*The **ip helper-address** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets.*

Syntax Description

<address>	Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.
-----------	--

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign helper address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface tunnel 1  
(config-tunnel 1)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	Specifies that if only one host (or IGMP snooping switch) is connected to the interface, when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	Controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave-group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer, if no receiver responds, the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65,535 ms. Default: 1000 ms.
querier-timeout <seconds>	Specifies the number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Specifies the interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65,535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Specifies the maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 8.1	ATM sub-interface was added.
Release 9.1	Tunnel sub-interface was added.

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
config)#interface tunnel 1  
(config-tunnel 1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface, and to place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub upstream* [on page 1168](#) for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface tunnel 1
(config-tunnel 1)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the unit to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#), *ip mcast-stub downstream* [on page 1166](#), and *ip mcast-stub upstream* [on page 1168](#) for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
(config)#interface tunnel 1
(config-tunnel 1)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 1166](#) for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface tunnel 1
(config-tunnel 1)#ip mcast-stub upstream
```


ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key	Specifies a simple-text authentication password to be used by other routers using <i><password></i> the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32,767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte max) keys.
priority <value>	Set the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, Tunnel, and PPP
dead-interval <seconds>	40 seconds

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Usage Example

The following example sets the maximum number of seconds allowed between hello packets to 25,000:

```
(config)#interface tunnel 1  
(config-tunnel 1)#ip ospf dead-interval 25000
```

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Selects message-digest authentication type.
null	Optional. Specifies that no authentication is used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Usage Examples

The following example specifies that no authentication will be used on the tunnel interface:

```
(config)#interface tunnel 1  
(config-tunnel 1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP, Frame Relay, and tunnel default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 3.1	Command was introduced.
Release 9.1	Command was expanded to include tunnel interfaces.

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface tunnel 1  
(config-tunnel 1)#ip ospf network broadcast
```

ip proxy-arp <ip address> <subnet mask>

Use the **ip proxy-arp** command to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<ip address>	Defines the proxy ARP IP address in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy-arp is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

In general, the principle of proxy ARP allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all proxy ARP requests with its specified MAC address and forward packets accordingly.

Enabling proxy ARP on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the tunnel interface:

```
(config)#interface tunnel 1  
(config-tunnel 1)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

1	Only accept received RIP version 1 packets on the interface.
2	Only accept received RIP version 2 packets on the interface.

Default Values

By default, all interfaces implement RIP version 1 (the default value for the version command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip receive version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. See *version [1 | 2]* on page 1330 for more information.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the tunnel interface to accept only RIP version 2 packets:

```
(config)#interface tunnel 1
(config-tunnel 1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

1	Only transmits RIP version 1 packets on the interface.
2	Only transmits RIP version 2 packets on the interface.

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip send version** command to specify a RIP version that overrides the **version** (in the Router RIP) configuration. See *version [1 | 2]* on page 1330 for more information.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the tunnel interface to transmit only RIP version 2 packets:

```
(config)#interface tunnel 1
(config-tunnel 1)#ip rip send version 2
```

ip route-cache

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route-cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast switching on the tunnel interface:

```
(config)#interface tunnel 1  
(config-tunnel 1)#ip route-cache
```


keepalive <period> <retries>

Use the **keepalive** command to periodically send keepalive packets to verify the integrity of the tunnel from end to end. Use the **no** form of this command to disable keepalives.

Syntax Description

<period>	Defines the time interval (in seconds) between transmitted keepalive packets (valid range: 1 to 32,767 seconds).
<retries>	Defines the number of times to retry after failed keepalives before determining that the tunnel endpoint is down (valid range: 1 to 255 times).

Default Values

By default, keepalives are disabled. When enabled, the keepalive period defaults to 10 seconds and the retry count defaults to 3 times.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Keepalives do not have to be configured on both ends of the tunnel in order to work. A tunnel is not aware of incoming keepalive packets.

Usage Examples

The following example enables **keepalive** with a period of 30 seconds and a retry count of 5 times:

```
(config)#interface tunnel 1
(config-tunnel 1)#keepalive 30 5
```

Ildp receive

Use the **ildp receive** command to allow LLDP packets to be received on this interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are configured to send and receive LLDP packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the tunnel interface to receive LLDP packets:

```
(config)#interface tunnel 1  
(config-tunnel 1)#ildp receive
```

lldp send [management-address | port-description | system-capabilities | system-description | system-name | and-receive]

Use the **lldp send** command to configure this interface to transmit LLDP packets or to control the types of information contained in the LLDP packets transmitted by this interface.

Syntax Description

management-address	Enables transmission of management address information on this interface.
port-description	Enables transmission of port description information on this interface.
system-capabilities	Enables transmission of this device's system capabilities on this interface.
system-description	Enables transmission of this device's system description on this interface.
system-name	Enables transmission of this device's system name on this interface.
and-receive	Configures this interface to both transmit and receive LLDP packets.

Default Values

By default, all interfaces are configured to transmit and receive LLDP packets of all types.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Individual LLDP information can be enabled or disabled using the various forms of the **lldp send** command. For example, use the **lldp send and-receive** command to enable transmit and receive of all LLDP information. Then use the **no lldp send port-description** command to prevent LLDP from transmitting port description information.

Usage Examples

The following example configures the tunnel interface to transmit LLDP packets containing all enabled information types:

```
(config)#interface tunnel 1  
(config-tunnel 1)#lldp send
```

The following example configures the tunnel interface to transmit and receive LLDP packets containing all information types:

```
(config)#interface tunnel 1  
(config-tunnel 1)#lldp send and-receive
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:	
	ATM interfaces	64 to 1520
	Ethernet interfaces	64 to 1500
	FDL interfaces	64 to 256
	HDLC interfaces	64 to 1520
	Loopback interfaces	64 to 1500
	Tunnel interfaces	64 to 18,190
	Virtual Frame Relay sub-interfaces	64 to 1520
	Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:	
	ATM interfaces	1500
	Ethernet interfaces	1500
	FDL interfaces	256
	HDLC interfaces	1500
	Loopback interfaces	1500
	Tunnel interfaces	1500
	Virtual Frame Relay sub-interfaces	1500
	Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the tunnel interface:

```
(config)#interface tunnel 1
(config-tunnel 1)#mtu 1200
```

tunnel checksum

Use the **tunnel checksum** command to verify the checksum of incoming Generic Routing Encapsulation (GRE) packets and to include a checksum on outgoing packets. Use the **no** form of this command to disable checksum.

Syntax Description

No subcommands.

Default Values

By default, **tunnel checksum** is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Both ends of the tunnel must have **tunnel checksum** enabled in order for a meaningful configuration. When both endpoints have **tunnel checksum** enabled, a packet with an incorrect checksum will be dropped. If the endpoints differ in their checksum configuration, all packets will still flow without any checksum verification.

Usage Examples

The following example enables checksum on the tunnel 1 interface:

```
(config)#interface tunnel 1
(config-tunnel 1)#tunnel checksum
```

Technology Review

When enabled, the **tunnel checksum** will be calculated for each outgoing GRE packet with the result stored in the GRE header. The checksum present bit will also be set in the header.

tunnel destination <ip address>

Use the **tunnel destination** command to specify the IP address to use as the destination address for all packets transmitted on this interface. Use the **no** form of this command to clear the **tunnel destination** address.

Syntax Description

<ip address>	Specifies the IP address in dotted decimal notation to use as the destination address for all packets transmitted on this interface (for example: 192.22.73.101).
--------------	---

Default Values

By default, no tunnel destinations are defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Until a tunnel interface has a destination IP address defined, it is not operational.

The tunnel destination IP address will be the value put into the destination field of the outer IP header after GRE encapsulation of the original packet. A route must be defined for the destination address. Be certain there are no recursive routes by ensuring that a tunnel's destination address will be routed out a physical interface. There is a possibility of creating a routing loop when tunnel interface traffic gets routed back to the same tunnel interface or to another tunnel interface, which in turn, does not have a route out a physical interface. In either case, the tunnel will go down for a period of one minute, after which it will come back up to determine if the recursive routes have been resolved. This allows time for routing protocols to converge on a valid route. If a static route has caused the recursive routing loop, the tunnel status may oscillate until the route is changed.

Usage Examples

The following example sets the tunnel destination IP address to **192.22.73.101**:

```
(config)#interface tunnel 1
(config-tunnel 1)#tunnel destination 192.22.73.101
```

tunnel key <value>

Use the **tunnel key** command to specify a value shared by both endpoints of the tunnel that will provide minimal security and delineate between tunnels with the same source and destination addresses. Use the **no** form of this command to disable the key.

Syntax Description

<value> Defines the key value for this tunnel (valid range: 1 to 4,294,967,294).

Default Values

By default, a key is not configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1 Command was introduced.

Functional Notes

A matching key value must be defined on both endpoints of the tunnel or packets will be discarded.

Usage Examples

The following example sets the key on a tunnel interface to a value of 1234:

```
(config)#interface tunnel 1
(config-tunnel 1)#tunnel key 1234
```

Technology Review

When enabled, the key will be stored in the GRE header and the key present bit will be set.

tunnel mode gre

Use the **tunnel mode gre** command to encapsulate traffic destined for the tunnel interface in a Generic Routing Encapsulation (GRE) header. Use the **no** form of this command to set the tunnel to its default mode.

Syntax Description

No subcommands.

Default Values

By default, the tunnel interface will be configured for GRE mode.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

GRE is currently the only allowed mode for tunnel interface operation.

Usage Examples

The following example configures the tunnel interface for GRE mode:

```
(config)#interface tunnel 1  
(config-tunnel 1)#tunnel mode gre
```

tunnel sequence-datagrams

Use the **tunnel sequence-datagrams** command to enable sequence number checking on incoming Generic Routing Encapsulation (GRE) packets, to drop packets arriving out of order, and to include a sequence number in outgoing packets. Use the **no** form of this command to disable sequence number checking.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Both ends of the tunnel must have sequence numbering enabled. When both endpoints have sequence numbering enabled, a packet arriving with a sequence number less than the current expected value will be dropped. If the endpoints differ in their sequence numbering configuration, all packets will still flow without any sequence number verification. Be careful enabling sequence number verification on a tunnel. The tunnel can easily become out of sequence due to network conditions outside of the tunnel endpoints. It may be difficult to establish a successful traffic flow after an out of sequence condition occurs.

Technology Review

When enabled, the next valid sequence number will be placed in the GRE header of each outgoing packet, and the sequence number present bit will be set.

Usage Examples

The following example enables sequence number processing on the tunnel interface:

```
(config)#interface tunnel 1  
(config-tunnel 1)#tunnel sequence-datagrams
```

tunnel source [*<ip address>* | *<interface>*]

Use the **tunnel source** command to specify the IP address or name of a physical interface to use as the source address for all packets transmitted on this interface. Use the **no** form of this command to clear the tunnel source address.

Syntax Description

<i><ip address></i>	Specifies the IP address in dotted decimal notation to use as the source address for all packets transmitted on this interface (for example: 192.22.73.101).
<i><interface></i>	Specifies the interface (in the format type <i><slot/port></i>) that contains the IP address to use as the source address for all packets transmitted on this interface.

Default Values

By default, a tunnel source is not defined.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Until a tunnel interface has a source IP address defined and the physical interface used as the source is operational, the tunnel is not operational.

The tunnel source IP address will be the value put into the source field of the outer IP header after GRE encapsulation of the original packet.

Usage Examples

The following example sets the tunnel source IP address to **192.22.73.101**:

```
(config)#interface tunnel 1  
(config-tunnel 1)#tunnel source 192.22.73.101
```

The following example sets the tunnel source IP address to the address of the Ethernet interface labeled 0/1:

```
(config)#interface tunnel 1  
(config-tunnel 1)#tunnel source eth 0/1
```

PPP INTERFACE CONFIGURATION COMMAND SET

To activate the PPP Interface Configuration mode, enter the **interface ppp** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface ppp 1
(config-ppp 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <policyname> [on page 1191](#)

alias link<"text"> [on page 1194](#)

bandwidth <value> [on page 1195](#)

bridge-group commands [begin on page 1196](#)

crypto map <mapname> [on page 1202](#)

dial-backup commands [begin on page 1204](#)

dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname> <username>
<password> [on page 1220](#)

fair-queue <threshold> [on page 1222](#)

hold-queue <queue size> out [on page 1223](#)

ip commands [begin on page 1224](#)

keepalive <seconds> [on page 1243](#)

lldp receive [on page 1244](#)

lldp send [management-address l port-description l system-capabilities l system-description l
system-name l and-receive] [on page 1245](#)

media-gateway ip [*loopback* | *primary* | *secondary* <*ip address*>] [on page 1247](#)

mtu <*size*> [on page 1248](#)

peer default ip address <*address*> [on page 1249](#)

ppp commands [begin on page 1250](#)

pppoe ac-name <*name*> [on page 1258](#)

pppoe service-name <*name*> [on page 1259](#)

qos-policy out <*mapname*> [on page 1260](#)

snmp trap link-status [on page 1261](#)

username <*username*> *password* <*password*> [on page 1262](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic to an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname> Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 6.1	Command was expanded to include NetVanta 1000 and 2000 units.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the virtual PPP interface:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb
```

```
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```

Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access list with the PPP virtual interface (labeled 1):

```
(config)#interface ppp 1
(config-ppp 1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host <A.B.C.D>** to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the **<A.B.C.D> <wildcard>** format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an access policy that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (**access list**) and an action (**allow, discard, NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list *<access list names>*

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list *<access list names>*

All packets passed by the access list(s) entered will be dropped from the router system.

allow list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the virtual PPP interface labeled 1:

```
(config)#interface ppp 1  
(config-ppp 1)#access-policy MatchAll
```

alias link <“text”>

Each configured PPP interface (when referenced using SNMP) contains a link (physical port) and a bundle (group of links). RFC1471 (for Link Connection Protocol) provides an interface table to manage lists of bundles and associated links. The **alias link** command provides the management station an identifying description for each link (PPP physical).

Syntax Description

<“text”>	Describes the interface (for SNMP) by alphanumeric character string (must be encased in quotation marks).
----------	---

Default Values

By default, the PPP identification string appears as empty quotes. (“ ”)

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The **alias link** string should be used to uniquely identify a PPP link. Enter a string that clearly identifies the link.

Usage Examples

The following example defines a unique character string for the virtual PPP interface (1):

```
(config)#interface ppp 1
(config-ppp 1)#alias link “PPP_link_1”
```

Technology Review

Please refer to RFC1990 for a more detailed discussion on PPP links and bundles.

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies the bandwidth value in kbps.

Default Values

To view default values, use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the PPP interface to 10 Mbps:

```
(config)#interface ppp 1  
(config-ppp 1)#bandwidth 10000
```

bridge-group <group#>

Use the **bridge-group** command to assign an interface to the specified bridge group. This command is supported on all Ethernet interfaces, PPP virtual interfaces, and Frame Relay virtual sub-interfaces.

Syntax Description

<group#>	Assigns a bridge group number (range: 1 to 255).
----------	--

Default Values

By default, there are no configured bridge groups.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

A bridged network can provide excellent traffic management to reduce collisions and limit the amount of bandwidth wasted with unnecessary transmissions when routing is not necessary. Any two interfaces can be bridged (Ethernet to T1 bridge, Ethernet to Frame Relay sub-interface, etc.).

Usage Examples

The following example assigns the PPP interface to bridge-group 1:

```
(config)#interface ppp 1  
(config-ppp 1)#bridge-group 1
```

bridge-group <group#> bpdudfilter [enable | disable]

Use the **bridge-group bpdudfilter** command to block BPDUs from being transmitted and received on this interface. To return to the default value, use the **no** form of this command.

Syntax Description

<group#>	Assigns a bridge group number (range: 1 to 255).
enable	Enables the BPDU filter.
disable	Disables the BPDU filter.

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

The purpose of this command is to remove a port from participation in the spanning tree. This might be beneficial while debugging a network setup. It normally should not be used in a live network.

Usage Examples

The following example enables the BPDU filter on the interface:

```
(config)#interface ppp 1  
(config-ppp 1)#bridge-group 1 bpdudfilter enable
```

bridge-group <group#> bpduguard [enable | disable]

Use the **bridge-group bpduguard** command to block BPDUs from being received on this interface. To return to the default value, use the **no** form of this command.

Syntax Description

<group#>	Assigns a bridge group number (range: 1 to 255).
enable	Enables the BPDU block.
disable	Disables the BPDU block.

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the BPDU guard on the interface:

```
(config)#interface ppp 1  
(config-ppp 1)#bridge-group 1 bpduguard enable
```

bridge-group <group#> edgeport [disable]

Use the **bridge-group edgeport** command to set this interface to be an edgeport. This configures the interface to go to a forwarding state when the link goes up. To return to the default value, use the **no** form of this command.

Syntax Description

<group#>	Assigns a bridge group number (range: 1 to 255).
disable	Optional. Configures the interface to not be the edgeport by default. This command is designed to override the global setting of the <i>bridge <group#> protocol ieee on</i> page 349 .

Default Values

By default, this command is set to disable.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the interface to be an edgeport:

```
(config)#interface ppp 1
(config-ppp 1)#bridge-group 1 edgeport
```

An individual interface can be configured to not be considered an edgeport. For example:

```
(config)#interface ppp 1
(config-ppp 1)#bridge-group 1 edgeport disable
or
(config)#interface ppp 1
(config-ppp 1)#no bridge-group 1 edgeport
```

bridge-group <group#> link-type [auto | point-to-point | shared]

Use the **bridge-group link-type** command to configure the spanning-tree protocol link type for an interface. To return to the default value, use the **no** form of this command.

Syntax Description

<group#>	Assigns a bridge group number (range: 1 to 255).
auto	Determines link type by the port's duplex settings.
point-to-point	Manually sets link type to point-to-point, regardless of duplex settings.
shared	Manually sets link type to shared, regardless of duplex settings.

Default Values

By default, a port is set to auto.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command overrides the default link-type setting determined by the duplex of the individual port. By default a port configured for half-duplex is set to **shared** link type, and a port configured for full-duplex is set to **point-to-point** link type. Setting the link type manually overrides the default and forces the port to use the specified link type. Using the **link-type auto** command restores the convention of determining link type based on duplex settings.

Usage Examples

The following example forces the link type to point-to-point, even if the port is configured to be half-duplex:

```
(config)#bridge 1 protocol ieee
(config)#interface ppp 1
(config-ppp 1)#bridge-group 1 link-type point-to-point
```

Technology Review

Rapid transitions are possible in rapid spanning-tree protocol (RSTP) by taking advantage of point-to-point links (a port is connected to exactly one other bridge) and edge-port connections (a port is not connected to any additional bridges). Setting the link type to **auto** allows the spanning tree to automatically configure the link type based on the duplex of the link. Setting the link type to **point-to-point** allows a half-duplex link to act as if it were a point-to-point link.

bridge-group <group#> spanning-disabled

Use the **bridge-group spanning-disabled** command to transparently bridge two interfaces on a network (that have no parallel or redundant paths) without the overhead of spanning-tree protocol calculations. To enable the spanning-tree protocol on an interface, use the **no** form of this command.

Syntax Description

<group#> Assigns a bridge group number (range: 1 to 255).

Default Values

By default, spanning-tree protocol is enabled on all created bridge groups.

Applicable Platforms

This command applies to the NetVanta 5000 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

When no parallel (redundant) paths exist within a bridged network, disabling the spanning tree protocol reduces traffic on the bridged interface. This traffic reduction can be helpful when bridging over a WAN link.



Before disabling the spanning-tree protocol on a bridged interface, verify that no redundant loops exist.

Usage Examples

The following example disables the spanning-tree protocol for bridge group 17 on the PPP interface labeled 1:

```
(config)#interface ppp 1
(config-ppp 1)#bridge-group 17 spanning-disabled
```

Technology Review

Spanning-tree protocol provides a way to prevent loopback or parallel paths in bridged networks. Using the priority values and path costs assigned to each bridging interface, the spanning-tree protocol determines the root path and identifies whether to block or allow other paths.

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

<mapname> Assigns a crypto map name to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

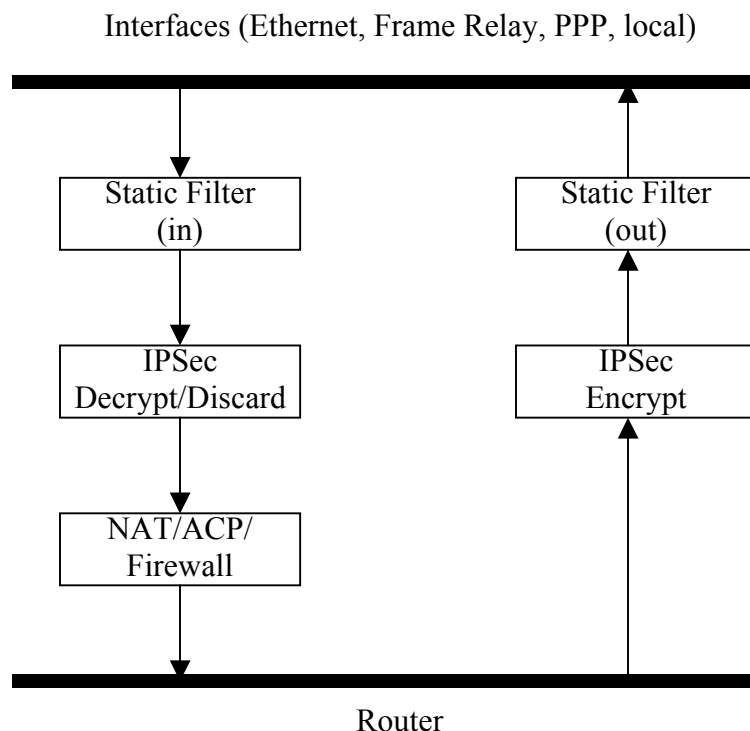
Command History

Release 4.1 Command was introduced.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following notes in mind.

When defining the policy class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local-side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the PPP interface:

```
(config)#interface ppp 1
(config-ppp 1)#crypto map MyMap
```

dial-backup auto-backup

Use the **dial-backup auto-backup** command to configure the PPP interface to automatically attempt a dial-backup upon failure. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 1207](#).

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically attempt dial-backup upon a failure.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example enables automatic dial-backup on the endpoint:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup auto-backup
```

dial-backup auto-restore

Use the **dial-backup auto-restore** command to configure the interface to automatically discontinue dial-backup when all network conditions are operational. Use the **no** form of this command to disable the auto-restore feature. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

No subcommands.

Default Values

By default, all backup endpoints will automatically restore the primary connection when the failure condition clears.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to automatically restore the primary connection when the failure condition clears:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup auto-restore
```

dial-backup backup-delay <seconds>

Use the **dial-backup backup-delay** command to configure the amount of time the router will wait after the failure condition is recognized before attempting to backup the link. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

<seconds>	Specifies the delay period (in seconds) a failure must be active before the AOS will enter backup operation on the interface. Range: 10 to 86,400 seconds.
-----------	--

Default Values

By default, the **dial-backup backup-delay** period is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 60 seconds (on an endpoint with an active alarm condition) before attempting dial-backup operation:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup backup-delay 60
```

dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]

Use the **dial-backup call-mode** command to combine user data with pattern data to ensure data does not mirror standard DDS loop codes (use only on 64 kbps circuits without Frame Relay signaling). Use the **no** form of this command to return to the default value.

Syntax Description

answer	Answers and backs up primary link on failure.
answer-always	Answers and backs up regardless of primary link state.
originate	Originates backup call on primary link failure.
originate-answer	Originates or answers call on primary link failure.
originate-answer-always	Originates on failure; answers and backs up always.

Default Values

By default, the **dial-backup call-mode** is set to **originate-answer**.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Functional Notes

The majority of the configuration for PPP dial-backup is configured in the PPP interface's. However, the numbers dialed are configured in the primary interface. Full sample configurations follow:

Sample configuration for remote router (dialing out)

```
hostname "Remote3200"
enable password adtran
!
interface eth 0/1
 ip address 192.168.1.254 255.255.255.0
 no shutdown
!
interface modem 1/3
 no shutdown
!
```

```
interface t1 1/1
coding b8zs
framing esf
clock source line
tdm-group 1 timeslots 1-24
no shutdown
!
interface ppp 1
ip address 10.1.1.2 255.255.255.252
dial-backup call-mode originate
dial-backup number 5551111 analog ppp 2
cross-connect 1 t1 1/1 1 ppp 1
!
interface ppp 2
description connected to corp for dial-backup
ip address 10.10.10.2 255.255.255.252
ppp authentication pap
ppp pap sent-username joe password pswrd
!
ip route 0.0.0.0 0.0.0.0 10.1.1.1
!
line telnet 0 4
password adtran
```

Sample configuration for central router (dialing in)

```
hostname "Central3200"
enable password adtran
!
interface eth 0/1
ip address 192.168.100.254 255.255.255.0
no shutdown
!
interface modem 1/3
no shutdown
!
interface t1 1/1
coding b8zs
framing esf
clock source line
tdm-group 1 timeslots 1-24
no shutdown
!
interface ppp 1
```



```
no shutdown
cross-connect 1 t1 1/1 1 ppp 1
ip address 10.1.1.1 255.255.255.252
dial-backup call-mode answer
dial-backup number 555-8888 analog ppp 2
!
interface ppp 2
description connection for remote 3200 dialin for backup
ip address 10.10.10.1 255.255.255.252
ppp authentication pap
username joe password pswrd
!
line telnet 0 4
password adtran
```

Usage Examples

The following example configures the AOS to answer dial-backup calls on this endpoint but never generate calls:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup call-mode answer-always
```

Technology Review

This technology review provides information regarding specific dial-backup router behavior (i.e., when the router will perform dial-backup, where in the configuration the AOS accesses specific routing information, etc.):

Dialing Out

1. The AOS determines to place an outbound call when either the Layer 1 or Layer 2 has a failure.
2. When placing outbound calls, the AOS matches the number dialed to a PPP interface. This is accomplished with an addition to the **dial-backup number** command (refer to *dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>* [on page 1213](#)).
3. When placing the call, the AOS uses the configuration of the related PPP interface for authentication and IP negotiation.
4. If the call fails to connect on the first number dialed, the AOS places a call to the second number if configured. The second number to be dialed references a separate PPP interface.

Dialing In

1. The AOS receives an inbound call on a physical interface.
2. Caller ID is used to match the **dial-backup number** command to the configured PPP interface.
3. If a match is found, the call connects and the AOS pulls down the primary connection if it is not already in a down state.
4. If no match is found from Caller ID, the call is terminated.

dial-backup connect-timeout <seconds>

Use the **dial-backup connect-timeout** command to specify the number of seconds to wait for a connection after a call is attempted before trying to call again or dialing a different number. It is recommended this number be greater than 60. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

<seconds>	Selects the amount of time (in seconds) that the router will wait for a connection before attempting another call (valid range: 10 to 300).
-----------	---

Default Values

By default, the **dial-backup connect-timeout** period is set to 60 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 120 seconds before retrying a failed dial-backup call:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup connect-timeout 120
```

dial-backup force [backup | primary]

Use the **dial-backup force** command to manually override the automatic dial-backup feature. This can be used to force a link into backup to allow maintenance to be performed on the primary link without disrupting data. Use the **no** form of this command to return to the normal dial-backup operation state. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1207.

Syntax Description

backup	Force backup regardless of primary link state.
primary	Force primary link regardless of its state.

Default Values

By default, this feature is disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to force this interface into dial-backup:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup force backup
```

dial-backup maximum-retry <attempts>

Use the **dial-backup maximum-retry** command to select the number of calls the router will make when attempting to backup a link. Use the **no** form of this command to return to the default state. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1207.

Syntax Description

<attempts>	Selects the number of call retries that will be made after a link failure (valid range: 0 to 15).
	Setting this value to 0 will allow unlimited retries during the time the network is failed.

Default Values

By default, **dial-backup maximum-retry** is set to 0 attempts.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to retry a dial-backup call four times before considering backup operation not available:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup maximum-retry 4
```

dial-backup number <digits> [analog | digital-56k | digital 64k] <isdn min chan> <isdn max chan> <interface>

Use the **dial-backup number** command to configure the phone number and the call type the router will dial upon network failure. Multiple entries can be made for an interface to allow alternate sites to be dialed. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [answer | answer-always | originate | originate-answer | originate-answer-always] [on page 1207](#).

Syntax Description

<digits>	Specifies the phone numbers to call when the backup is initiated.
analog	Indicates number connects to an analog modem.
digital-56k	Indicates number belongs to a digital 56 kbps per DS0 connection.
digital-64k	Indicates number belongs to a digital 64 kbps per DS0 connection.
<isdn min chan>	Specifies the minimum number of DS0s required for a digital 56 or 64 kbps connection (Range: 1 to 24).
<isdn mas chan>	Specifies the maximum number of DS0s desired for a digital 56 or 64 kbps connection (Range: 1 to 24).
<interface>	Specifies the PPP interface (e.g., PPP 3) to use when originating or answering using this number.

Default Values

By default, there are no configured dial-backup numbers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to dial 704-555-1212 (digital 64 kbps connection) to initiate dial-backup operation on this endpoint using interface PPP 3:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup number 7045551212 digital-64k 1 1 ppp 3
```

dial-backup priority <value>

Use the **dial-backup priority** command to select the backup priority for this interface. This allows the user to establish the highest priority backup link and ensure that link will override backups attempted by lower priority links. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* [on page 1207](#).

Syntax Description

<value>	Sets the relative priority of this link (valid range: 0 to 100). A value of 100 designates the highest priority.
---------	--

Default Values

By default, **dial-backup priority** is set to 50.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example assigns the highest priority to this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup priority 100
```

dial-backup randomize-timers

Use the **dial-backup randomize-timers** command to randomize the call timers to minimize potential contention for resources. Use the **no** form of this command to return to the default value. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1207.

Syntax Description

No subcommands.

Default Values

By default, the AOS does not randomize the dial-backup call timers.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to randomize the dial-backup timers associated with this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup randomize-timers
```

dial-backup redial-delay <seconds>

Use the **dial-backup redial-delay** command to configure the delay after an unsuccessful call until the call will be re-tried. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1207.

Syntax Description

<seconds>	Specifies the delay in seconds between attempting to re-dial a failed backup attempt. Range: 10 to 3600.
-----------	--

Default Values

By default, **dial-backup redial-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures a redial delay of 25 seconds on this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup redial-delay 25
```


dial-backup restore-delay <seconds>

Use the **dial-backup restore-delay** command to configure the amount of time the router will wait after the network is restored before disconnecting the backup link and reverting to the primary. This setting is used to prevent disconnecting the backup link if the primary link is “bouncing” in and out of alarm. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode [answer | answer-always | originate | originate-answer | originate-answer-always]* on page 1207.

Syntax Description

<seconds>	Specifies the number of seconds the AOS will wait (after a primary link is restored) before disconnecting dial-backup operation. Range: 10 to 86,400.
-----------	---

Default Values

By default, **dial-backup restore-delay** is set to 10 seconds.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example configures the AOS to wait 30 seconds before disconnecting dial-backup operation and restoring the primary connection for this endpoint:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup restore-delay 30
```

dial-backup schedule [day | enable-time | disable-time]

Use the **dial-backup schedule** command to set the time of day that backup will be enabled. Use this command if backup is desired only during normal business hours and on specific days of the week. Use the **no** form of this command to disable dial-backup (as specified). For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command *dial-backup call-mode* [*answer* | *answer-always* | *originate* | *originate-answer* | *originate-answer-always*] on page 1207.

Syntax Description

day	Sets the days to allow backup (valid range: Monday through Sunday).
enable-time	Sets the time of day to enable backup. Time is entered in 24-hour format (00:00).
disable-time	Sets the time of day to disable backup.

Default Values

By default, dial-backup is enabled for all days and times if the dial-backup auto-backup command has been issued and the dial-backup schedule has not been entered.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example enables dial-backup Monday through Friday 8:00 am to 7:00 pm:

```
(config)#interface ppp 1
(config-ppp 1)#dial-backup schedule enable-time 08:00
(config-ppp 1)#dial-backup schedule disable-time 19:00
(config-ppp 1)#no dial-backup schedule day Saturday
(config-ppp 1)#no dial-backup schedule day Sunday
```

dial-backup shutdown

Use the **dial-backup shutdown** command to deactivate all dial-backup functionality in the unit. Dial-backup configuration parameters are kept intact, but the unit will not initiate (or respond) to dial-backup sequences in the event of a network outage. Use the **no** form of this command to reactivate the dial-backup interface. For more detailed information on PPP dial-backup functionality, refer to the *Functional Notes* and *Technology Review* sections of the command.

Syntax Description

No subcommands.

Default Values

By default, all AOS interfaces are disabled.

Applicable Platforms

This command applies to the NetVanta 1000R, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the PPP interface.

Usage Examples

The following example deactivates the configured dial-backup interface:

```
(config)#interface ppp 1  
(config-ppp 1)#dial-backup shutdown
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

Refer to *Functional Notes*, below, for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A Web-based interface provides two levels of control over your domain, catering to average or power users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs, and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service, in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address doesn't change often or at all, but you still want an easy name to remember it by (without having to purchase your own domain name) Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com) you need Custom DNS service which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the **dynamic-dns** to **dyndns-custom** with hostname **host**, username **user**, and password **pass**:

```
(config)#interface ppp 1  
(config-ppp1)#dynamic-dns dyndns-custom host user pass
```

fair-queue <threshold>

Use the **fair-queue** command to enable weighted fair queuing (WFQ) on an interface. Use the **no** form of this command to disable WFQ and enable FIFO queuing for an interface. WFQ is enabled by default for WAN interfaces.

Syntax Description

<threshold> Optional. Specifies the maximum number of packets that can be present in each conversation sub-queue. Packets received for a conversation after this limit is reached are discarded. Range: 16 to 512 packets.

Default Values

By default, **fair-queue** is enabled with a threshold of 64 packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example enables WFQ on the interface with a threshold set at 100 packets:

```
(config)#interface ppp 1
(config-ppp 1)#fair-queue 100
```

hold-queue <queue size> out

Use the **hold-queue out** command to change the overall size of an interface's WAN output queue.

Syntax Description

<queue size> Specifies the total number of packets the output queue can contain before packets are dropped. Range 16 to 1000.

Default Values

The default queue size for WFQ is 400. The default queue size for PPP FIFO and Frame Relay round-robin is 200.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Usage Examples

The following example sets the overall output queue size to 700:

```
(config)#interface ppp 1  
(config-ppp 1)#hold-queue 700 out
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Indicates the assigned IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the router to only allow Telnet traffic into the PPP interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#interface ppp 1
(config-ppp 1)#ip access-group TelnetOnly in
```


ip address dhcp

Use the **ip address dhcp** command to use Dynamic Host Configuration Protocol (DHCP) to obtain an address on the interface. Use the **no** form of this command to remove a configured IP address (using DHCP) and disable DHCP operation on the interface.

Syntax Description

No subcommands.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 8.1	Command expanded to include PPP interface.

Usage Examples

The following example enables DHCP operation on the PPP interface 1:

```
(config)#interface ppp 1  
(config-ppp 1)#ip address dhcp
```

ip address negotiated [no-default]

Use the **ip address negotiated** command to allow the interface to negotiate (i.e., be assigned) an IP address from the far end PPP connection. Use the **no** form of this command to disable the negotiation for an IP address.

Syntax Description

no-default	Optional. Prevents the insertion of a default route. Some systems already have a default route configured and need a static route to the PPP interface to function correctly.
-------------------	---

Default Values

By default, the interface is assigned an address with the **ip address <address><mask>** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the PPP interface to negotiate an IP address from the far end connection:

```
(config)#interface ppp 1  
(config-ppp 1)#ip address negotiated
```

The following example enables the PPP interface to negotiate an IP address from the far end connection without inserting a default route:

```
(config)#interface ppp 1  
(config-ppp 1)#ip address negotiated no-default
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the optional keyword **secondary** to define a secondary IP address. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Configures a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use secondary IP addresses to allow dual subnets on a single interface (when you need more IP addresses than the primary subnet can provide). When using secondary IP addresses, avoid routing loops by verifying that all devices on the network segment are configured with secondary IP addresses on the secondary subnet.

Usage Examples

The following example configures a secondary IP address of **192.22.72.101/30**:

```
(config)#interface ppp 1  
(config-ppp 1)#ip address 192.22.72.101 255.255.255.252 secondary
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



*The **ip helper** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. Refer to [ip forward-protocol udp <port number>](#) on page 424 for more information.*

Syntax Description

<address>	Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.
-----------	--

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign a helper address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface ppp 1  
(config-ppp 1)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	If only one host (or IGMP snooping switch) is connected to the interface, when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	Controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer, if no receiver responds, the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65535 ms. Default: 1000 ms.
querier-timeout <seconds>	Specifies the number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Specifies the interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Specifies the maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, 5000 and Total Access 900 Series units.

Command History

Release 7.1 Command was introduced.

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface ppp 1  
(config-ppp 1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface and place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. Refer to *ip mcast-stub helper-address <ip address>* on page 433 and *ip mcast-stub upstream* on page 1234 for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface ppp 1
(config-ppp 1)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	Command was expanded to include PPP interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the unit to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#), *ip mcast-stub downstream* [on page 1232](#), and *ip mcast-stub upstream* [on page 1234](#) for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
(config)#interface ppp 1
(config-ppp 1)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 1232](#) for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface ppp 1
(config-ppp 1)#ip mcast-stub upstream
```

ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key <password>	Assigns a simple-text authentication password to be used by other routers using the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32,767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte max) keys.
priority <value>	Sets the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
dead-interval <seconds>	40 seconds

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sets the maximum number of seconds allowed between hello packets to 25,000:

```
(config)#interface ppp 1
(config-ppp 1)#ip ospf dead-interval 25000
```

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Selects message-digest authentication type.
null	Optional. Specifies that no authentication be used.

Default Values

By default, **ip ospf authentication** is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that no authentication will be used on the PPP interface:

```
(config)#interface ppp 1  
(config-ppp 1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface ppp 1
(config-ppp 1)#ip ospf network broadcast
```

ip proxy-arp <address> <subnet mask>

Use the **ip proxy-arp** to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example, 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy ARP is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

In general, the principle of proxy ARP allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy ARP is enabled, the AOS will respond to all proxy ARP requests with its specified MAC address and forward packets accordingly.

Enabling proxy ARP on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy ARP on the virtual PPP interface:

```
(config)#interface ppp 1  
(config-ppp 1)#ip proxy-arp
```

ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|----------|---|
| 1 | Accepts only received RIP version 1 packets on the interface. |
| 2 | Accepts only received RIP version 2 packets on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip receive version** to specify a RIP version that overrides the **version** (in the Router RIP) configuration.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the virtual PPP interface to accept only RIP version 2 packets:

```
(config)#interface ppp 1  
(config-ppp 1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface. Use the **no** form of this command to restore the default value.

Syntax Description

- | | |
|---|--|
| 1 | Transmits only RIP version 1 packets on the interface. |
| 2 | Transmits only RIP version 2 packets on the interface. |

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip send version** to specify a RIP version that overrides the **version** (in the Router RIP) configuration.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the virtual PPP interface to transmit only RIP version 2 packets:

```
(config)#interface ppp 1
(config-ppp 1)#ip rip send version 2
```


ip route-cache

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

Fast-cache switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast-cache switching on the virtual PPP interface:

```
(config)#interface ppp 1
(config-ppp 1)#ip route-cache
```

ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface (in the format type slot/port) that contains the IP address to use as the source address for all packets transmitted on this interface.
-------------	---

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered eth 0/1** while in the PPP Interface Configuration mode configures the PPP interface to use the IP address assigned to the Ethernet interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface. Static routes may either use the interface name (ppp 1) or the far-end address (if it will be discovered).

Usage Examples

The following example configures the PPP interface (labeled **ppp 1**) to use the IP address assigned to the Ethernet interface (**eth 0/1**):

```
(config)#interface ppp 1  
(config-ppp 1)#ip unnumbered eth 0/1
```

keepalive <seconds>

Use the **keepalive** command to enable the transmission of keepalive packets on the interface and specify the time interval in seconds between transmitted packets.

Syntax Description

<seconds> Defines the time interval (in seconds) between transmitted keepalive packets (valid range: 0 to 32,767 seconds).

Default Values

By default, the time interval between transmitted keepalive packets is 10 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

If three keepalive packets are sent to an interface with no response, the interface is considered down. To detect interface failures quickly, specify a smaller keepalive time.

Usage Examples

The following example specifies a keepalive time of 5 seconds on the virtual PPP interface:

```
(config)#interface ppp 1
(config-ppp 1)#keepalive 5
```

Ildp receive

Use the **ildp receive** command to allow LLDP packets to be received on this interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are configured to send and receive LLDP packets.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the PPP interface to receive LLDP packets:

```
(config)#interface ppp 1  
(config-ppp 1)#ildp receive
```

lldp send [management-address | port-description | system-capabilities | system-description | system-name | and-receive]

Use the **lldp send** command to configure this interface to transmit LLDP packets or to control the types of information contained in the LLDP packets transmitted by this interface.

Syntax Description

management-address	Enables transmission of management address information on this interface.
port-description	Enables transmission of port description information on this interface.
system-capabilities	Enables transmission of this device's system capabilities on this interface.
system-description	Enables transmission of this device's system description on this interface.
system-name	Enables transmission of this device's system name on this interface.
and-receive	Configures this interface to both transmit and receive LLDP packets.

Default Values

By default, all interfaces are configured to transmit and receive LLDP packets of all types.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
-------------	-------------------------

Functional Notes

Individual LLDP information can be enabled or disabled using the various forms of the **lldp send** command. For example, use the **lldp send and-receive** command to enable transmit and receive of all LLDP information. Then use the **no lldp send port-description** command to prevent LLDP from transmitting port description information.

Usage Examples

The following example configures the PPP interface to transmit LLDP packets containing all enabled information types:

```
(config)#interface ppp 1  
(config-ppp 1)#lldp send
```

The following example configures the PPP interface to transmit and receive LLDP packets containing all information types:

```
(config)#interface ppp 1  
(config-ppp 1)#lldp send and-receive
```

media-gateway ip [loopback | primary | secondary <ip address>]

Use the **media-gateway ip** command to associate an IP address source to use for RTP traffic. When configuring VoIP, RTP traffic needs an IP address to be associated with it. However, some interfaces allow "dynamic" configuration of IP addresses, and thus, this value could change periodically.

Syntax Description

loopback	Use an IP address statically defined to a loopback interface. Helpful when using a single IP address across multiple WAN interfaces for RTP traffic.
primary	Use the IP address that is configured as primary on this interface. Applies to static, DHCP, or negotiated addresses.
secondary <ip-address>	Use the statically defined secondary IP address of this interface to be used for RTP traffic.

Default Values

By default, **media-gateway ip** is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example configures the unit to use the primary IP address for RTP traffic:

```
(config)#interface ppp 1  
(config-ppp 1)#media-gateway ip primary
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit (MTU) size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:	
	ATM interfaces	64 to 1520
	Ethernet interfaces	64 to 1500
	FDL interfaces	64 to 256
	HDLC interfaces	64 to 1520
	Loopback interfaces	64 to 1500
	Tunnel interfaces	64 to 18,190
	Virtual Frame Relay sub-interfaces	64 to 1520
	Virtual PPP interfaces	64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:	
	ATM interfaces	1500
	Ethernet interfaces	1500
	FDL interfaces	256
	HDLC interfaces	1500
	Loopback interfaces	1500
	Tunnel interfaces	1500
	Virtual Frame Relay sub-interfaces	1500
	Virtual PPP interfaces	1500

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the virtual PPP interface:

```
(config)#interface ppp 1
(config-ppp 1)#mtu 1200
```


peer default ip address <address>

Use the **peer default ip address** command to specify the default IP address of the remote end of this interface.

Syntax Description

<address> Specifies the default IP address for the remote end (A.B.C.D).

Default Values

By default, there is no assigned peer default IP address.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

This command is useful if the peer does not send the IP address option during PPP negotiations.

Usage Examples

The following example sets the default peer IP address to 192.22.71.50:

```
(config)#interface ppp 1  
(config-ppp 1)#peer default ip address 192.22.71.50
```

ppp authentication [chap | pap]

Use the **ppp authentication** command to specify the authentication protocol on the PPP virtual interface that the peer should use to authenticate itself.

Syntax Description

chap	Configures CHAP authentication on the interface.
pap	Configures PAP authentication on the interface.

Default Values

By default, PPP endpoints have no authentication configured.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Technology Review

CHAP and PAP are two authentication methods that enjoy widespread support. Both methods are included in the AOS and are easily configured.



The authentication method set up on the local router can be different from that on the peer. Also, just because one router requires authentication from its peer does not mean it also has to authenticate itself to the peer.

Defining PAP

The Password Authentication Protocol (PAP) is used to verify that the PPP peer is a permitted device by checking a username and password configured on the peer. The username and password are both sent unencrypted across the connecting private circuit.

PAP requires two-way message passing. First, the router that is required to be authenticated (say the peer) sends an authentication request with its username and password to the router requiring authentication (say the local router). The local router then looks up the username and password in the username database within the PPP interface, and if they match sends an authentication acknowledge back to the peer.



The PPP username and password database is separate and distinct from the global username password database. For PAP and CHAP, use the database under the PPP interface configuration.

Several example scenarios are given below for clarity.

Configuring PAP Example 1: Only the local router requires the peer to authenticate itself.

On the local router (hostname Local):

```
Local(config-ppp 1)#ppp authentication pap  
Local(config-ppp 1)#username farend password same
```

On the peer (hostname Peer):

```
Peer(config-ppp 1)#ppp pap sent-username farend password same
```

The first line of the configuration sets the authentication mode as PAP. This means the peer is required to authenticate itself to the local router via PAP. The second line is the username and password expected to be sent from the peer. On the peer, the **ppp pap sent-username** command is used to specify the appropriate matching username and password.

Configuring PAP Example 2: Both routers require the peer to authenticate itself.

On the local router (hostname Local):

```
Local(config-ppp 1)#ppp authentication pap  
Local(config-ppp 1)#username farend password far  
Local(config-ppp 1)#ppp pap sent-username nearend password near
```

On the peer (hostname Peer):

```
Peer(config-ppp 1)#ppp authentication pap  
Peer(config-ppp 1)#username nearend password near  
Peer(config-ppp 1)#ppp pap sent-username farend password far
```

Now both routers send the authentication request, verify that the username and password sent match what is expected in the database, and send an authentication acknowledge.

Defining CHAP

The Challenge-Handshake Authentication Protocol (CHAP) is a three-way authentication protocol composed of a challenge response and success or failure. The MD5 protocol is used to protect usernames and passwords in the response.

First, the local router (requiring its peer to be authenticated) sends a "challenge" containing only its own unencrypted username to the peer. The peer then looks up the username in the username database within the PPP interface, and if found takes the corresponding password and its own hostname and sends a "response" back to the local router. This data is encrypted. The local router verifies that the username and password are in its own username database within the PPP interface, and if so sends a "success" back to the peer.



The PPP username and password database is separate and distinct from the global username password database. For PAP and CHAP, use the database under the PPP interface configuration.

Several example scenarios are given below for clarity.

Configuring CHAP Example 1: Only the local router requires the peer to authenticate itself.

On the local router (hostname Local):

```
Local(config-ppp 1)#ppp authentication chap
Local(config-ppp 1)#username Peer password same
```

On the peer (hostname Peer):

```
Peer(config-ppp 1)#username Local password same
```

The first line of this configuration sets the authentication mode to CHAP. This means the peer is required to authenticate itself to the local router via CHAP. The second line is the username and password expected to be sent from the peer. The peer must also have the **username** up both to verify the incoming username from the local router and to use the password (along with its hostname) in the response to the local router.



Both ends must have identical passwords.

Configuring CHAP Example 2: Both routers require the peer to authenticate itself.

On the local router (hostname Local):

```
Local(config-ppp 1)#ppp authentication chap
Local(config-ppp 1)#username Peer password same
```

On the peer (hostname Peer):

```
Peer(config-ppp 1)#ppp authentication chap
Peer(config-ppp 1)#username Local password same
```

This is basically identical to Example 1 except that both routers will now challenge each other and respond.

Configuring CHAP Example 3: Using the ppp chap hostname command as an alternate solution.

On the local router (hostname Local):

```
Local(config-ppp 1)#ppp authentication chap
Local(config-ppp 1)#username Peer password same
Local(config-ppp 1)#ppp chap hostname nearend
```

On the peer (hostname Peer):

```
Peer(config-ppp 1)#username nearend password same
```

Notice the peer is expecting username "nearend" even though the local router's hostname is "Local." Therefore the local router can use the **ppp chap hostname** command to send the correct name on the challenge.

Configuring CHAP Example 4: Using the ppp chap password command as an alternate solution.

On the local router (hostname Local):

```
Local(config-ppp 1)#ppp authentication chap
```

```
Local(config-ppp 1)#username Peer password different
```

On the peer (hostname Peer):

```
Peer(config-ppp 1)#username Local password same
```

```
Peer(config-ppp 1)#ppp chap password different
```

Here the local router challenges with hostname "Local." The peer verifies the name in the username database, but instead of sending the password "same" in the response, it uses the one in the **ppp chap password** command. The local router then verifies that user "Peer" with password "different" is valid and sends a "success."

ppp chap hostname <hostname>

Use the **ppp chap hostname** command to configure an alternate hostname for CHAP PPP authentication. Use the **no** form of this command to remove a configured hostname. For more information on PAP and CHAP functionality, refer to the *Technology Review* section for the command *ppp authentication [chap | pap]* on page 1250.

Syntax Description

<hostname> Specifies a hostname using an alphanumeric string up to 80 characters in length.

Default Values

By default, there are no configured PPP CHAP hostnames.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example specifies a PPP CHAP hostname of **my_host**:

```
(config)#interface ppp 1
(config-ppp 1)#ppp chap hostname my_host
```

ppp chap password <password>

Use the **ppp chap password** command to configure an alternate password when the peer requires CHAP PPP authentication. Use the **no** form of this command to remove a configured password. For more information on PAP and CHAP functionality, refer to the *Technology Review* section for the command *ppp authentication [chap | pap]* on page 1250.

Syntax Description

<password> Specifies a password using an alphanumeric string up to 80 characters in length.

Default Values

By default, there is no defined PPP CHAP password.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example specifies a PPP CHAP password of **my_password**:

```
(config)#interface ppp 1
(config-ppp 1)#ppp chap password my_password
```

ppp multilink [fragmentation | interleave]

Use the **ppp multilink** command to enable multilink PPP (MPPP) operation on an existing PPP interface. Use the **no** form of this command to disable.

Syntax Description

fragmentation	Enables multilink fragmentation operation.
interleave	Enables multilink interleave operation.

Default Values

By default, MPPP is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
Release 7.2	Fragmentation and interleave operation were added.

Functional Notes

When enabled, this interface is capable of the following:

- Combining multiple physical links into one logical link.
- Receiving upper layer protocol data units (PDU), fragmenting and transmitting over the physical links.
- Receiving fragments over the physical links and reassembling them into PDUs.

The fragmentation and interleave options can be used to enhance the multilink operation. Fragmentation is used to reduce serialization delays of large packets. The fragmentation process evenly divides the data among all links in the bundle with a minimum packet size of 96 bytes. The interleave operation is used with streaming protocols to reduce delay by giving priority to packets identified as high priority. In order delivery is guaranteed with multilink fragmentation, but is not guaranteed with multilink interleave operation.

The multilink bundle will remain active with a minimum of one physical link. Physical links may be dynamically added or removed from the multilink bundle with minor interruption to traffic flow.

Usage Examples

The following example enables MPPP:

```
(config)#interface ppp 1
(config-ppp 1)#ppp multilink
```

ppp pap sent-username <username> password <password>

Use the **ppp pap sent-username/password** command to configure a username and password when the peer requires PAP PPP authentication. Use the **no** form of this command to remove a configured password. For more information on PAP and CHAP functionality, refer to the *Technology Review* section for the command *ppp authentication [chap | pap]* on page 1250.

Syntax Description

<username>	Specifies a username by alphanumeric string up to 80 characters in length (the username is case-sensitive).
<password>	Specifies a password by alphanumeric string up to 80 characters in length (the password is case-sensitive).

Default Values

By default, there is no defined **ppp pap sent-username** and **password**.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies a PPP PAP sent-username of **local** and a password of **my_password**:

```
(config)#interface ppp 1  
(config-ppp 1)#ppp pap sent-username local password my_password
```

pppoe ac-name <name>

Use the **pppoe ac-name** command to identify the Access Concentrator (AC) with which the AOS expects to establish a PPPoE session. Use the **no** form of this command to return to the default setting.

Syntax Description

<name>	Specifies an AC by text string (up to 255 characters) corresponding to the AC-Name Tag under RFC2516. If this field is not specified, any access concentrator is acceptable. The AC value may be a combination of trademark, model, and serial ID information (or simply the MAC address of the unit).
---------------------	--

Default Values

By default, no AC is specified.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example identifies the AC with which the AOS expects to establish a PPPoE session:

```
(config)#interface ppp 1  
(config-ppp 1)#pppoe acc-name Access_Concentrator_Name
```

pppoe service-name <name>

Use the **pppoe service-name** command to use this tag value to filter PPPoE session offers from PPPoE servers. Use the **no** form of this command to return to the default setting.

Syntax Description

<name>	Specifies a service name by text string (up to 255 characters) corresponding to the Service-Name Tags under RFC2516. This string indicates an ISP name (or a class or quality of service). If this field is not specified, any service is acceptable.
---------------------	---

Default Values

By default, no names are specified.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines a service type that is not to be accepted by the AOS:

```
(config)#interface ppp 1  
(config-ppp 1)#pppoe service-name Service_Name
```

qos-policy out <mapname>

Use the **qos-policy out** command to apply a previously-configured QoS map to an interface. Use the **no** form of this command to remove the map from the interface. The keyword **out** specifies that this policy will be applied to outgoing packets.

Syntax Description

<mapname> Specifies the name of a previously-created QoS map (refer to *qos map* <mapname> <sequence number> [on page 490](#) for more information).

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

The following example applies the QoS map **VOICEMAP** to the PPP 1 interface:

```
(config)#interface ppp 1
(config-ppp 1)#qos-policy out VOICEMAP
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the virtual PPP interface:

```
(config)#interface ppp 1
(config-ppp 1)#no snmp trap link-status
```

username <username> **password** <password>

Configures the username and password of the peer to use for PPP authentication.

Syntax Description

<username>	Specifies a username by alphanumerical string up to 30 characters in length (the username is case-sensitive).
<password>	Specifies a password by alphanumerical string up to 30 characters in length (the password is case-sensitive).

Default Values

By default, there is no established username and password.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

PAP uses this entry to check received information from the peer. CHAP uses this entry to check the received peer hostname and a common password.

Usage Examples

The following example creates a username of **ADTRAN** with password **ADTRAN** for the PPP link labeled 5:

```
(config)#interface ppp 5
(config-ppp 5)#username ADTRAN password ADTRAN
```

T3 INTERFACE CONFIGURATION COMMAND SET

To activate the T3 Interface Configuration mode, enter the **interface t3** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface t3 1/1
(config-t3 1/1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

clock source [*local* | *loop*] [on page 1264](#)

coding [*b3zs*] [on page 1265](#)

framing [*m13* | *cbit*] [on page 1266](#)

line-length [*short* | *long*] [on page 1267](#)

loopback network [*line* | *payload*] [on page 1268](#)

loopback remote [*line* | *payload*] [on page 1269](#)

remote-loopback [on page 1270](#)

show [*bert*] [on page 1271](#)

snmp trap link-status [on page 1272](#)

test-pattern [*clear* | *insert* | *ones* | *p215* | *p223* | *zeros*] [on page 1273](#)

clock source [local | loop]

Use the **clock source** command to configure the source timing used for the interface. The clock specified using the **clock source** command is also the system master clock. Use the **no** form of this command to return to the default value.

Syntax Description

local	Configures the unit to provide clocking using the internal oscillator.
loop	Configures the unit to recover clocking from the T3 circuit.

Default Value

By default, all T3 interfaces are configured with loop as the clock source.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example configures the unit to recover clocking from the circuit:

```
(config)#interface t3 1/1  
(config-t3 1/1)#clock source loop
```


coding [b3zs]

Use the **coding** command to configure the line coding for a T3 physical interface. This setting must match the line coding supplied on the circuit by the service provider.

Syntax Description

b3zs Configures the line coding for bipolar three zero substitution (B3ZS).

Default Value

By default, all T3 interfaces are configured with B3ZS line coding.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1 Command was introduced.

Functional Notes

The line coding configured in the unit must match the line coding of the T3 circuit. A mismatch will result in line errors (e.g., BPVs).

Usage Example

The following example configures the T1 interface for B3ZS line coding:

```
(config)#interface t3 1/1
(config-t3 1/1)#coding b3zs
```

framing [m13 | cbit]

Use the **framing** command to configure the network framing format for a T3 physical interface.

Syntax Description

m13	Configures the interface for M13 framing.
cbit	Configures the interface for C-bit parity framing.

Default Value

By default, all T3 interfaces are configured for C-bit parity framing.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Functional Notes

M13 is an asynchronous framing format that uses all 21 DS3 M-Frame C-bits for bit stuffing indicators. End-to-end path parity and datalink capabilities are not provided by the standard M13 format. C-bit parity framing differs from M13 by allowing monitoring of the data path (end-to-end) and supporting out-of-band data links.

Usage Example

The following example configures the T3 interface for M13 framing:

```
(config)#interface t3 1/1  
(config-t3 1/1)#framing m13
```

line-length [short | long]

Use the **line-length** command to configure the line length for a T3 physical interface.

Syntax Description

short	Configures the line length for a distance of 0 to 225 feet of cable.
long	Configures the line length for a distance of 225 to 450 feet of cable.

Default Value

By default, all T3 interfaces are configured for a short line length.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the T3 interface for long line length:

```
(config)#interface t3 1/1  
(config-t3 1/1)#line-length long
```

loopback network [line | payload]

Use the **loopback network** command to initiate a local T3 loopback on the interface toward the network. Use the **no** form of this command to deactivate the loopback.

Syntax Description

line	Initiates a loopback of the physical T3 network interface; that is, data received on the T3 is transmitted back out on the T3.
payload	Initiates a loopback of the T3 framer (TSU portion) of the T3 network interface.

Default Value

No default necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example initiates a payload loopback of the T3 interface:

```
(config)#interface t3 1/1  
(config-t3 1/1)#loopback network payload
```

loopback remote [line | payload]

Use the **loopback remote** command to initiate a loopback test on the T3 interface that sends a remote loopback code out the T3 circuit to loop up the far end. This command only applies when C-bit framing is used on the circuit. Use the **no** form of this command to deactivate the loopback.

Syntax Description

line	Initiates a line loopback.
payload	Initiates a payload loopback.

Default Value

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

This example initiates a remote loopback on the T3 interface:

```
(config)#interface t3 1/1  
(config-t3 1/1)#loopback remote
```

remote-loopback

Use the **remote-loopback** command to configure the T3 interface to be looped *from* the far end (remote device, telco, etc.). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Value

By default, all interfaces respond to remote loopbacks.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

This example enables remote loopbacks on the T3 interface:

```
(config)#interface t3 1/1  
(config-t3 1/1)#remote-loopback
```

show [bert]

The **show bert** command displays the results for the bit error rate test (BERT) conducted on the T3 interface.

Syntax Description

No subcommands.

Default Value

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example instructs the unit to display the BERT results:

```
(config)#interface t3 1/1  
(config-t3 1/1)#show bert
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Value

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example disables the link-status trap on the T3 interface:

```
(config)#interface t3 1/1  
(config-t3 1/1)#no snmp trap link-status
```


test-pattern [clear | insert | ones | p215 | p223 | zeros]

Use the **test-pattern** command to activate the built-in pattern generator and begin sending the selected test pattern toward the network. This pattern generation can verify a data path when used in conjunction with an active loopback. Use the **no** form of this command to cease pattern generation.

Syntax Description

clear	Clears the test pattern error count.
insert	Inserts an error into the currently active test pattern. Display the injected error result using the show test pattern command.
ones	Generates a test pattern of continuous ones.
p215	Generates a pseudorandom test pattern sequence based on a 15-bit shift register.
p223	Generates a pseudorandom test pattern sequence based on a 23-bit shift register.
zeros	Generates a test pattern of continuous zeros.

Default Value

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 5000 Series.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example inserts a p215 test pattern:

```
(config)#interface t3 1/1
(config-t3 1/1)#test-pattern 2^15 insert
```

LOOPBACK INTERFACE CONFIGURATION COMMAND SET

To activate the Loopback Interface Configuration mode, enter the **interface loopback** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#interface loopback 1
(config-loop 1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

All other commands for this command set are described in this section in alphabetical order.

access-policy <polycyname> [on page 1275](#)

bandwidth <value> [on page 1278](#)

crypto map <mapname> [on page 1279](#)

dynamic-dns [*dyndns* | *dyndns-custom* | *dyndns-static*] <hostname> <username> <password> [on page 1281](#)

ip commands [begin on page 1283](#)

mtu <size> [on page 1301](#)

snmp trap [on page 1302](#)

snmp trap link-status [on page 1303](#)

access-policy <polycyname>

Use the **access-policy** command to assign a specified access policy for the inbound traffic to an interface. Use the **no** form of this command to remove an access policy association.



*Configured access policies will only be active if the **ip firewall** command has been entered at the Global Configuration mode prompt to enable the AOS security features. All configuration parameters are valid, but no security data processing will be attempted unless the security features are enabled.*

Syntax Description

<polycyname> Identifies the configured access policy by alphanumeric descriptor (all access policy descriptors are case-sensitive).

Default Values

By default, there are no configured access policies associated with an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1	Command was introduced.
Release 6.1	Command was expanded to include NetVanta 1000 and 2000 units.

Functional Notes

To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** <policy name>.

Usage Examples

The following example associates the access policy **UnTrusted** (to allow inbound traffic to the Web server) to the loopback interface:

Enable the AOS security features:

```
(config)#ip firewall
```

Create the access list (this is the packet selector):

```
(config)#ip access-list extended InWeb  
(config-ext-nacl)#permit tcp any host 63.12.5.253 eq 80
```

Create the access policy that contains the access list **InWeb**:

```
(config)#ip policy-class UnTrusted
(config-policy-class)#allow list InWeb
```

Associate the access policy with the loopback interface:

```
(config)#interface loopback 1
(config-loop 1)#access-policy UnTrusted
```

Technology Review

Creating access policies and lists to regulate traffic through the routed network is a four-step process:

Step 1:

Enable the security features of the AOS using the **ip firewall** command.

Step 2:

Create an access list to permit or deny specified traffic. Standard access lists provide pattern matching for source IP addresses only. (Use extended access lists for more flexible pattern matching.) IP addresses can be expressed in one of three ways:

1. Using the keyword **any** to match any IP address. For example, entering **deny any** will effectively shut down the interface that uses the access list because all traffic will match the **any** keyword.
2. Using the **host** <A.B.C.D> to specify a single host address. For example, entering **permit host 196.173.22.253** will allow all traffic from the host with an IP address of 196.173.22.253.
3. Using the <A.B.C.D> <wildcard> format to match all IP addresses in a "range." Wildcard masks work in reverse logic from subnet mask. Specifying a one in the wildcard mask equates to a "don't care." For example, entering **permit 192.168.0.0 0.0.0.255** will permit all traffic from the 192.168.0.0/24 network.

Step 3:

Create an IP policy class that uses a configured access list. AOS access policies are used to permit, deny, or manipulate (using **NAT**) data for each physical interface. Each ACP consists of a selector (access list) and an action (**allow**, **discard**, **NAT**). When packets are received on an interface, the configured ACPs are applied to determine whether the data will be processed or discarded. Possible actions performed by the access policy are as follows:

allow list <access list names>

All packets passed by the access list(s) entered will be allowed to enter the router system.

discard list <access list names>

All packets passed by the access list(s) entered will be dropped from the router system.

allow list <access list names> **policy** <access policy name>

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be permitted to enter the router system. This allows for configurations to permit packets to a single interface and not the entire system.

discard list *<access list names>* **policy** *<access policy name>*

All packets passed by the access list(s) entered and destined for the interface using the access policy listed will be blocked from the router system. This allows for configurations to deny packets on a specified interface.

nat source list *<access list names>* **address** *<IP address>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the entered IP address. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address entered. This hides private IP addresses from outside the local network.

nat source list *<access list names>* **interface** *<interface>* **overload**

All packets passed by the access list(s) entered will be modified to replace the source IP address with the primary IP address of the listed interface. The **overload** keyword allows multiple source IP addresses to be replaced with the single IP address of the specified interface. This hides private IP addresses from outside the local network.

nat destination list *<access list names>* **address** *<IP address>*

All packets passed by the access list(s) entered will be modified to replace the destination IP address with the entered IP address. The **overload** keyword is not an option when performing NAT on the destination IP address; each private address must have a unique public address. This hides private IP addresses from outside the local network.

Step 4:

Apply the created access policy to an interface. To assign an access policy to an interface, enter the interface configuration mode for the desired interface and enter **access policy** *<policy name>*. The following example assigns access policy **MatchAll** to the loopback interface labeled 1:

```
(config)#interface loopback 1  
(config-loop 1)#access-policy MatchAll
```

bandwidth <value>

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

<value> Specifies bandwidth in kbps.

Default Values

To view default values, use the **show interfaces** command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the loopback interface to 10 Mbps:

```
(config)#interface loopback 1  
(config-loop 1)#bandwidth 10000
```

crypto map <mapname>

Use the **crypto map** command to associate crypto maps with the interface.



When you apply a map to an interface, you are applying all crypto maps with the given map name. This allows you to apply multiple crypto maps if you have created maps which share the same name but have different map index numbers.



*For VPN configuration example scripts, refer to the technical support note **Configuring VPN** located on the **ADTRAN OS Documentation CD** provided with your unit.*

Syntax Description

<mapname> Specifies the crypto map name that you wish to assign to the interface.

Default Values

By default, no crypto maps are assigned to an interface.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

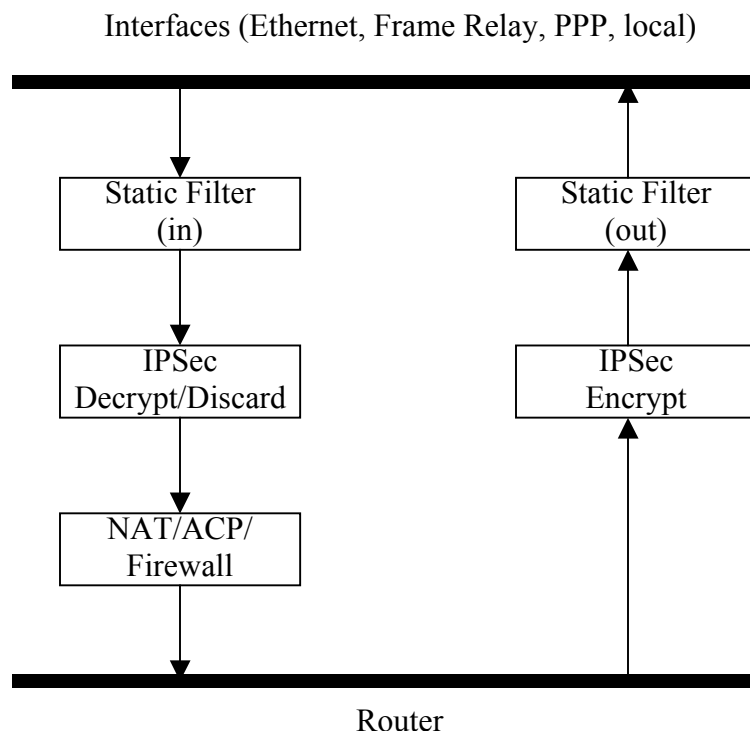
Command History

Release 4.1 Command was introduced.

Functional Notes

When configuring a system to use both the stateful inspection firewall and IKE negotiation for VPN, keep the following information in mind:

When defining the policy class and associated access-control lists (ACLs) that describe the behavior of the firewall, do not forget to include the traffic coming into the system over a VPN tunnel terminated by the system. The firewall should be set up with respect to the unencrypted traffic that is destined to be sent or received over the VPN tunnel. The following diagram represents typical AOS data-flow logic.



As shown in the diagram above, data coming into the product is first processed by the static filter associated with the interface on which the data is received. This access group is a true static filter and is available for use regardless of whether the firewall is enabled or disabled. Next (if the data is encrypted) it is sent to the IPsec engine for decryption. The decrypted data is then processed by the stateful inspection firewall. Therefore, given a terminating VPN tunnel, only unencrypted data is processed by the firewall.

The ACLs for a crypto map on an interface work in reverse logic to the ACLs for a policy class on an interface. When specifying the ACLs for a crypto map, the source information is the private local side, unencrypted source of the data. The destination information will be the far end, unencrypted destination of the data. However, ACLs for a policy class work in reverse. The source information for the ACL in a policy class is the far end. The destination information is the local-side.

Usage Examples

The following example applies all crypto maps with the name **MyMap** to the loopback interface:

```
(config)#interface loopback 1
(config-loop 1)#crypto map MyMap
```

**dynamic-dns [dyndns | dyndns-custom | dyndns-static] <hostname>
<username> <password>**

Use the **dynamic-dns** command to configure Dynamic DNS service provided by Dynamic Network Services, Inc. (www.dyndns.org).

Syntax Description

See *Functional Notes*, below, for argument descriptions.

Default Values

No default is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
-------------	-------------------------

Functional Notes

dyndns - The Dynamic DNSSM service allows you to alias a dynamic IP address to a static hostname in various domains. This allows your unit to be more easily accessed from various locations on the Internet. This service is provided for up to five hostnames.

dyndns-custom - DynDNS.org's Custom DNSSM service provides a full DNS solution, giving you complete control over an entire domain name. A web-based interface provides two levels of control over your domain, catering to average or power users. Five globally redundant DNS servers ensure that your domain will always resolve.

A choice of two interfaces is available. The basic interface is designed for most users. It comes preconfigured for the most common configuration and allows for easy creation of most common record types. The advanced interface is designed for system administrators with a solid DNS background, and provides layout and functionality similar to a BIND zone file, allowing for the creation of nearly any record type.

Custom DNSSM can be used with both static and dynamic IPs and has the same automatic update capability through Custom DNS-aware clients as Dynamic DNS.

dyndns-static - The Static DNS service is similar to Dynamic DNS service in that it allows a hostname such as yourname.dyndns.org to point to your IP address. Unlike a Dynamic DNS host, a Static DNS host does not expire after 35 days without updates, but updates take longer to propagate through the DNS system. This service is provided for up to five hostnames.

If your IP address doesn't change often or at all, but you still want an easy name to remember it by (without having to purchase your own domain name), Static DNS service is ideal for you.

If you would like to use your own domain name (such as yourname.com), you need Custom DNS service which also provides full dynamic and static IP address support.

Usage Examples

The following example sets the dynamic-dns to dyndns-custom with hostname **host**, username **user**, and password **pass**:

```
(config)#interface loopback 1  
(config-loop 1)#dynamic-dns dyndns-custom host user pass
```

ip access-group <listname> [in | out]

Use the **ip access-group** command to create an access list to be used for packets transmitted on or received from the specified interface. Use the **no** form of this command to disable this type of control.

Syntax Description

<listname>	Specifies IP access list name.
in	Enables access control on packets received on the specified interface.
out	Enables access control on packets transmitted on the specified interface.

Default Values

By default, these commands are disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

When this command is enabled, the IP destination address of each packet must be validated before being passed through. If the packet is not acceptable per these settings, it is dropped.

Usage Examples

The following example sets up the router to allow only Telnet traffic into the loopback interface:

```
(config)#ip access-list extended TelnetOnly
(config-ext-nacl)#permit tcp any any eq telnet
(config-ext-nacl)#interface loopback 1
(config-loop 1)#ip access-group TelnetOnly in
```

ip address <address> <mask> secondary

Use the **ip address** command to define an IP address on the specified interface. Use the optional **secondary** keyword to define a secondary IP address. Use the **no** form of this command to remove a configured IP address.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<mask>	Specifies the subnet mask that corresponds to the listed IP address.
secondary	Optional. Configures a secondary IP address for the specified interface.

Default Values

By default, there are no assigned IP addresses.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 2.1	Added ip address dhcp for DHCP client support.

Functional Notes

Use secondary IP addresses to allow dual subnets on a single interface (when you need more IP addresses than the primary subnet can provide). When using secondary IP addresses, avoid routing loops by verifying that all devices on the network segment are configured with secondary IP addresses on the secondary subnet.

Usage Examples

The following example configures a secondary IP address of **192.22.72.101/30**:

```
(config)#interface loopback 1
(config-loop 1)#ip address 192.22.72.101 255.255.255.252 secondary
```

ip helper-address <address>

Use the **ip helper-address** command to configure the AOS to forward User Datagram Protocol (UDP) broadcast packets received on the interface. Use the **no** form of this command to disable forwarding packets.



The **ip helper** command must be used in conjunction with the **ip forward-protocol** command to configure the AOS to forward UDP broadcast packets. See [ip forward-protocol udp <port number>](#) on page 424 for more information.

Syntax Description

<address>	Specifies the destination IP address (in dotted decimal notation) for the forwarded UDP packets.
-----------	--

Default Values

By default, broadcast UDP packets are not forwarded.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When used in conjunction with the **ip forward-protocol** command, the **ip helper-address** feature allows you to customize which broadcast packets are forwarded.

To implement the helper address feature, assign a helper-address(es) (specifying the device that needs to receive the broadcast traffic) to the interface closest to the host that transmits the broadcast packets. When broadcast packets (of the specified type forwarded using the **ip forward-protocol** command) are received on the interface, they will be forwarded to the device that needs the information.

Only packets meeting the following criteria are considered eligible by the **ip helper-address** feature:

1. The packet IP protocol is User Datagram Protocol (UDP).
2. Any UDP port specified using the **ip forward-protocol** command.
3. The media access control (MAC) address of the frame is an all-ones broadcast address (ffff.ffff.ffff).
4. The destination IP address is broadcast defined by all ones (255.255.255.255) or a subnet broadcast (for example, 192.33.4.251 for the 192.33.4.248/30 subnet).

Usage Examples

The following example forwards all DNS broadcast traffic to the DNS server with IP address 192.33.5.99:

```
(config)#ip forward-protocol udp domain  
(config)#interface loopback 1  
(config-loop 1)#ip helper-address 192.33.5.99
```

ip igmp

Use the **ip igmp** command to configure multicasting-related functions for the interface.

Syntax Description

immediate-leave	If only one host (or IGMP snooping switch) is connected to the interface, when a leave is received, multicast of that group is immediately terminated as opposed to sending a group query and timing out the group if no device responds. Works in conjunction with ip igmp last-member-query-interval . Applies to all groups when configured.
last-member-query-interval <milliseconds>	This command controls the timeout used to detect whether any group receivers remain on an interface after a receiver leaves a group. If a receiver sends a leave group message (IGMP Version 2), the router sends a group-specific query on that interface. After twice the time specified by this command plus as much as one second longer, if no receiver responds, the router removes that interface from the group and stops sending that group's multicast packets to the interface. Range: 100 to 65535 ms. Default: 1000 ms.
querier-timeout <seconds>	Number of seconds that the router waits after the current querier's last query before it takes over as querier (IGMP V2). Range: 60 to 300 seconds. Default: 2x the query-interval value.
query-interval <seconds >	Interval at which IGMP queries are sent on an interface. Host query messages are addressed to the all-hosts multicast group with an IP TTL of 1. The router uses queries to detect whether multicast group members are on the interface and to select an IGMP designated router for the attached segment (if more than one multicast router exists). Only the designated router for the segment sends queries. For IGMP V2, the designated router is the router with the lowest IP address on the segment. Range: 0 to 65535 seconds. Default: 60 seconds.
query-max-response-time <seconds>	Maximum response time advertised by this interface in queries when using IGMP V2. Hosts are allowed a random time within this period to respond, reducing response bursts. Default: 10 seconds.
static-group <group-address>	Configures the router's interface to be a statically-connected member of the specified group. Packets received on the correct RPF interface are forwarded to this interface regardless of whether any receivers have joined the specified group using IGMP.
version [1 2]	Sets the interface's IGMP version. The default setting is version 2.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the query message interval on the interface to 200 milliseconds:

```
(config)#interface loopback 1  
(config-loop 1)#ip igmp last-member-query-interval 200
```

ip mcast-stub downstream

Use the **ip mcast-stub downstream** command to enable multicast forwarding and IGMP (router mode) on an interface and place it in multicast stub downstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub upstream** commands. Downstream interfaces connect to segments with multicast hosts. Multiple interfaces may be configured in downstream mode; however, interfaces connecting to the multicast network (upstream) should not be configured in downstream mode. Interfaces configured as downstream should have the lowest IP address of all IGMP-capable routers on the connected segment in order to be selected as the designated router and ensure proper forwarding. See *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub upstream* [on page 1291](#) for more information.

Usage Examples

The following example enables multicast forwarding and IGMP on the interface:

```
(config)#interface loopback 1
(config-loop 1)#ip mcast-stub downstream
```

ip mcast-stub helper-enable

Use the **ip mcast-stub helper-enable** command to assign the **ip mcast-stub helper-address** as the IGMP proxy. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 8.1	Command was introduced.
Release 10.1	Command was expanded to include loopback interfaces.

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address**, **ip mcast-stub upstream**, and **ip mcast-stub downstream** commands. When enabled, the interface becomes a helper forwarding interface. The IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the unit to perform as an IGMP proxy. Refer to *ip mcast-stub helper-address <ip address>* [on page 433](#), *ip mcast-stub downstream* [on page 1289](#), and *ip mcast-stub upstream* [on page 1291](#) for more information.

Usage Examples

The following example sets the helper address as the IGMP proxy:

```
(config)#interface loopback 1
(config-loop 1)#ip mcast-stub helper-enable
```

ip mcast-stub upstream

Use the **ip mcast-stub upstream** command to enable multicast forwarding on an interface and place it in multicast stub upstream mode. Use the **no** form of this command to disable.

Syntax Description

No subcommands.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 7.1	Command was introduced.
-------------	-------------------------

Functional Notes

This command is used in IP multicast stub applications in conjunction with the **ip mcast-stub helper-address** and **ip mcast-stub downstream** commands. When enabled, the interface becomes a candidate to be a helper forwarding interface. If chosen as the best path toward the helper address by the router's unicast route table, the IGMP host function is dynamically enabled and the interface becomes the active upstream interface, enabling the router to perform as an IGMP proxy. Though multiple interfaces may be candidates, no more than one interface will actively serve as the helper forwarding interface. See *ip mcast-stub helper-address <ip address>* [on page 433](#) and *ip mcast-stub downstream* [on page 1289](#) for more information.

Usage Examples

The following example enables multicast forwarding on the interface:

```
(config)#interface loopback 1
(config-loop 1)#ip mcast-stub upstream
```

ip ospf

Use the **ip ospf** command to customize OSPF settings (if needed).

Syntax Description

authentication-key	Specifies a simple-text authentication password to be used by other routers using <i><password></i> the OSPF simple password authentication.
cost <value>	Specifies the OSPF cost of sending a packet on the interface. This value overrides any computed cost value. Range: 1 to 65,535.
dead-interval <seconds>	Sets the maximum interval allowed between hello packets. If the maximum is exceeded, neighboring devices will determine that the device is down. Range: 0 to 32,767.
hello-interval <seconds>	Specifies the interval between hello packets sent on the interface. Range: 0 to 32767.
message-digest-key <keyid> md5 <key>	Configures OSPF Message Digest 5 (MD5) authentication (16-byte max) keys.
priority <value>	Set the OSPF priority. The value set in this field helps determine the designated router for this network. Range: 0 to 255.
retransmit-interval <seconds>	Specifies the time between link-state advertisements (LSAs). Range: 0 to 32,767.
transmit-delay <seconds>	Sets the estimated time required to send an LSA on the interface. Range: 0 to 32,767.

Default Values

retransmit-interval <seconds>	5 seconds
transmit-delay <seconds>	1 second
hello-interval <seconds>	10 seconds: Ethernet, point-to-point, Frame Relay, and PPP
dead-interval <seconds>	40 seconds

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Example

The following example sets the maximum number of seconds allowed between hello packets to 25,000:

```
(config)#interface loopback 1  
(config-loop 1)#ip ospf dead-interval 25000
```

ip ospf authentication [message-digest | null]

Use the **ip ospf authentication** command to authenticate an interface that is performing OSPF authentication.

Syntax Description

message-digest	Optional. Specifies the message-digest authentication type.
null	Optional. Specifies for no authentication to be used.

Default Values

By default, this is set to null (meaning no authentication is used).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies that no authentication will be used on the loopback interface:

```
(config)#interface loopback 1  
(config-loop 1)#ip ospf authentication null
```

ip ospf network [broadcast | point-to-point]

Use the **ip ospf network** command to specify the type of network on this interface.

Syntax Description

broadcast	Sets the network type for broadcast.
point-to-point	Sets the network type for point-to-point.

Default Values

By default, Ethernet defaults to broadcast. PPP and Frame Relay default to point-to-point.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

A point-to-point network will not elect designated routers.

Usage Examples

The following example designates a broadcast network type:

```
(config)#interface loopback 1  
(config-loop 1)#ip ospf network broadcast
```

ip proxy-arp <address> <subnet mask>

Use the **ip proxy-arp** command to enable proxy Address Resolution Protocol (ARP) on the interface. Use the **no** form of this command to disable this feature.

Syntax Description

<address>	Defines the IP address for the interface in dotted decimal notation (for example: 192.22.73.101).
<subnet mask>	Specifies the subnet mask that corresponds to the listed IP address.

Default Values

By default, proxy arp is enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

In general, the principle of proxy-arp allows a router to insert its IP address in the source IP address field of a packet (if the packet is from a host on one of its subnetworks). This allows hosts to reach devices on other subnetworks without implementing routing or specifying a default gateway.

If proxy-arp is enabled, the AOS will respond to all proxy-arp requests with its specified MAC address and forward packets accordingly.

Enabling proxy-arp on an interface may introduce unnecessary ARP traffic on the network.

Usage Examples

The following enables proxy-arp on the loopback interface:

```
(config)#interface loopback 1
(config-loop 1)#ip proxy-arp
```


ip rip receive version [1 | 2]

Use the **ip rip receive version** command to configure the RIP version the unit accepts in all RIP packets received on the interface.

Syntax Description

- | | |
|----------|---|
| 1 | Accepts only received RIP version 1 packets on the interface. |
| 2 | Accepts only received RIP version 2 packets on the interface. |

Default Values

By default, all interfaces implement RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip receive version** to specify a RIP version that overrides the **version** (in the Router RIP) configuration.

The AOS only accepts one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the loopback interface to accept only RIP version 2 packets:

```
(config)#interface loopback 1
(config-loop 1)#ip rip receive version 2
```

ip rip send version [1 | 2]

Use the **ip rip send version** command to configure the RIP version the unit sends in all RIP packets transmitted on the interface.

Syntax Description

- | | |
|---|--|
| 1 | Transmits only RIP version 1 packets on the interface. |
| 2 | Transmits only RIP version 2 packets on the interface. |

Default Values

By default, all interfaces transmit RIP version 1 (the default value for the **version** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **ip rip send version** to specify a RIP version that overrides the **version** (in the Router RIP) configuration.

The AOS only transmits one version (either 1 or 2) on a given interface.

Usage Examples

The following example configures the loopback interface to transmit only RIP version 2 packets:

```
(config)#interface loopback 1  
(config-loop 1)#ip rip send version 2
```

ip route-cache

Use the **ip route-cache** command to enable fast-cache switching on the interface. Use the **no** form of this command to disable fast-cache switching and return to process switching mode.



*Using Network Address Translation (NAT) or the AOS firewall capabilities on an interface requires process switching mode (using the **no ip route-cache** command).*

Syntax Description

No subcommands.

Default Values

By default, fast-cache switching is enabled on all Ethernet and virtual Frame Relay sub-interfaces. IP route-cache is enabled for all virtual PPP interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 2.1 Command was introduced.

Functional Notes

Fast switching allows an IP interface to provide optimum performance when processing IP traffic.

Usage Examples

The following example enables fast switching on the loopback interface:

```
(config)#interface loopback 1  
(config-loop 1)#ip route-cache
```

ip unnumbered <interface>

Use the **ip unnumbered** command to use the IP address assigned to the specified interface for all IP processing on the active interface. Use the **no** form of this command to remove the unnumbered configuration.

Syntax Description

<interface>	Specifies the interface in the format type slot/port (e.g., ppp 1) that contains the IP address to be used as the source address for all packets transmitted on this interface. Enter ip unnumbered ? for a complete list of valid interfaces.
-------------	--

Default Values

By default, all interfaces are configured to use a specified IP address (using the **ip address** command).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

If **ip unnumbered** is enabled on an interface, all IP traffic from the interface will use a source IP address taken from the specified interface. For example, specifying **ip unnumbered ppp 1** while in the Ethernet Interface Configuration mode configures the Ethernet interface to use the IP address assigned to the PPP interface for all IP processing. In addition, the AOS uses the specified interface information when sending route updates over the unnumbered interface.

Usage Examples

The following example configures the loopback interface (labeled **loop 1**) to use the IP address assigned to the PPP interface (**ppp 1**):

```
(config)#interface loopback 1
(config-loop 1)#ip unnumbered ppp 1
```

mtu <size>

Use the **mtu** command to configure the maximum transmit unit size for the active interface. Use the **no** form of this command to return to the default value.

Syntax Description

<size>	Configures the window size for transmitted packets. The valid ranges for the various interfaces are listed below:
	ATM interfaces 64 to 1520
	Ethernet interfaces 64 to 1500
	FDL interfaces 64 to 256
	HDLC interfaces 64 to 1520
	Loopback interfaces 64 to 1500
	Tunnel interfaces 64 to 18,190
	Virtual Frame Relay sub-interfaces 64 to 1520
	Virtual PPP interfaces 64 to 1500

Default Values

<size>	The default values for the various interfaces are listed below:
	ATM interfaces 1500
	Ethernet interfaces 1500
	FDL interfaces 256
	HDLC interfaces 1500
	Loopback interfaces 1500
	Tunnel interfaces 1500
	Virtual Frame Relay sub-interfaces 1500
	Virtual PPP interfaces 1500

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

OSPF will not become adjacent on links where the MTU sizes do not match. If router A and router B are exchanging hello packets but their MTU sizes do not match, they will never reach adjacency. This is by design and required by the RFC.

Usage Examples

The following example specifies an MTU of 1200 on the loopback interface:

```
(config)#interface loopback 1
(config-loop 1)#mtu 1200
```

snmp trap

Use the **snmp trap** command to enable all supported Simple Network Management Protocol (SNMP) traps on the interface.

Syntax Description

No subcommands.

Default Values

By default, all interfaces (except virtual Frame Relay interfaces and sub-interfaces) have SNMP traps enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Ethernet sub-interfaces and Gigabit Ethernet interfaces.

Usage Examples

The following example enables SNMP capability on the Ethernet interface:

```
(config)#interface eth 0/1  
(config-eth 0/1)#snmp trap
```

snmp trap link-status

Use the **snmp trap link-status** command to control the Simple Network Management Protocol (SNMP) variable ifLinkUpDownTrapEnable (RFC2863) to enable (or disable) the interface to send SNMP traps when there is an interface status change. Use the **no** form of this command to disable this trap.

Syntax Description

No subcommands.

Default Values

By default, the ifLinkUpDownTrapEnable OID is enabled for all interfaces except virtual Frame Relay interfaces.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 3.1	Command was extended to the SHDSL interface.
Release 5.1	Command was expanded to include Gigabit Ethernet, port channel, VLAN, E1, and G.703 interfaces.

Functional Notes

The **snmp trap link-status** command is used to control the RFC2863 ifLinkUpDownTrapEnable OID (OID number 1.3.6.1.2.1.31.1.1.1.14.0).

Usage Examples

The following example disables the link-status trap on the loopback interface:

```
(config)#interface loopback 1  
(config-loop 1)#no snmp trap link-status
```

LINE (CONSOLE) INTERFACE CONFIG COMMAND SET

To activate the Line (Console) Interface Configuration mode, enter the **line console 0** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#line console 0
(config-con 0)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

do on page 1465

end on page 1466

exit on page 1467

All other commands for this command set are described in this section in alphabetical order.

databits [7 | 8] on page 1305

flowcontrol [none | software in] on page 1306

line-timeout <minutes> on page 1307

login on page 1308

login authentication <aaa login list> on page 1309

login local-userlist on page 1310

parity [even | mark | none | odd | space] on page 1311

password [md5] <password> on page 1312

speed <rate> on page 1313

stopbits [1 | 2] on page 1314

databits [7 | 8]

Use the **databits** command to set the number of databits per character for a terminal session. This value must match the configuration of your VT100 terminal or terminal emulator software. The default is 8 databits per character. Use the **no** form of this command to return to the default value.

Syntax Description

7	Specifies 7 data bits per character.
8	Specifies 8 data bits per character.

Default Values

By default, the databits are set to 8.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures 7 databits per character for the console terminal session:

```
(config)#line console 0  
(config-con 0)#databits 7
```

flowcontrol [none | software in]

Use the **flowcontrol** command to set flow control for the line console.

Syntax Description

none	Specifies no flow control.
software in	Configures AOS to derive flow control from the attached device.

Default Values

By default, flow control is set to none.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures no flow control for the line console:

```
(config)#line console 0
(config-con 0)#flowcontrol none
```

line-timeout <minutes>

Use the **line-timeout** command to specify the number of minutes a line session may remain inactive before the AOS terminates the session. Use the **no** form of this command to return to the default value.

Syntax Description

<minutes> Specifies the number of minutes a line session may remain inactive before the AOS terminates the session.

Entering a **line-timeout** value of 0 disables the feature.

Default Values

By default the **line-timeout** is set to 15 minutes (Console and Telnet).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example specifies a timeout of 2 minutes:

```
(config)#line console 0
(config-con 0)#line-timeout 2
```

login

Use the **login** command to enable security login on the line session requiring the password configured using the **password** command. Use the **no** form of this command to disable the login feature.

Syntax Description

No subcommands.

Default Values

By default, there is no login password set for access to the unit.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the security login feature and specifies a password on the available console session:

```
(config)#line console 0
(config-console 0)#login
(config-console 0)#password mypassword
```

login authentication <aaa login list>

Use the **login authentication** command to specify the named AAA login list to use for authenticating users connecting on this line.

Syntax Description

<aaa login list> Specifies the AAA login list to use for authentication.

Default Values

The default value is the default AAA list.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

If the AAA subsystem is activated but no login authentication list is given, the default list is used. If the default list is used but the default list is not configured, the behavior for consoles is to be granted access. This prevents a lockout configuration.

Usage Examples

The following example specifies that **myList** will be used for authenticating users connecting on this line:

```
(config)#line console 0
(config-con 0)#login authentication myList
```

login local-userlist

Use the **login local-userlist** command to enable security login for the terminal session requiring the usernames and passwords configured using the **username/password** Global Configuration command. Use the **no** form of this command to disable the login local-userlist feature.



*All user properties assigned using the **username/password** command are valid when using the **login local-userlist** command.*

Syntax Description

No subcommands.

Default Values

By default, there is no login password set for access to the unit.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example displays creating a local userlist and enabling the security login feature on the **CONSOLE** port:

```
(config)#username my_user password my_password  
(config)#line console 0  
(config-con 0)#login local-userlist
```

When connecting to the unit, the following prompts are displayed:

```
User Access Login  
Username: ADTRAN  
Password:  
Router#
```

parity [even | mark | none | odd | space]

Use the **parity** command to specify the type of parity used as error correction. This value must match the configuration of your VT100 terminal or terminal emulator software. Use the **no** form of this command to return to the default value.

Syntax Description

even	Sets the parity bit to 0 if the number of 1 bits in the data sequence is odd, or set to 1 if the number of 1 bits is even.
mark	Always sets the parity bit to 1.
none	No parity bit used.
odd	Sets the parity bit to 1 if the number of 1 bits in the data sequence is even, or set to 0 if the number is odd.
space	Always sets the parity bit to 0.

Default Values

By default, the parity option is set to **none**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

Parity is the process used to detect whether characters have been altered during the data transmission process. Parity bits are appended to data frames to ensure that parity (whether it be odd or even) is maintained.

Usage Examples

The following example specifies mark parity for the console terminal session:

```
(config)#line console 0
(config-con 0)#parity mark
```

password [md5] <password>

Use the **password** command to configure the password (with optional encryption) required on the line session when security login is enabled (using the **login** command). Use the **no** form of this command to remove a configured password.

Syntax Description

md5	Specifies Message Digest 5 (MD5) as the encryption protocol to use when displaying the enable password during show commands. If the MD5 keyword is not used, encryption is not used when displaying the enable password during show commands.
<password>	Specifies the password for the line session using an alphanumeric character string (up to 16 characters).

Default Values

By default, there is no login password set for access to the unit.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 6.1	Added encryption.

Usage Examples

The following example enables the security login feature and specifies a password on the **CONSOLE** port:

```
(config)#line console 0
(config-con 0)#login
(config-con 0)#password mypassword
```

To provide extra security, the AOS can encrypt the enable password when displaying the current configuration. For example, the following is a **show configuration** printout (password portion) with an unencrypted enable password (ADTRAN):

```
!
enable password ADTRAN
!
```

Alternately, the following is a **show configuration** printout (password portion) with an enable password of ADTRAN using md5 encryption:

```
!
enable password md5 encrypted 5aa5fbae7d01a90e79fb57705ce74676
!
```


speed <rate>

Use the **speed** command to specify the data rate for the **CONSOLE** port. This setting must match your VT100 terminal emulator or emulator software. Use the **no** form of this command to restore the default value.

Syntax Description

<rate>	Specifies rate of data transfer on the interface (2400; 4800; 9600; 19,200; 38,400; 57,600; or 115,200 bps).
--------	--

Default Values

By default, the speed is set to 9600 bps.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures the **CONSOLE** port for 19200 bps:

```
(config)#line console 0
(config-con 0)#speed 19200
```

stopbits [1 | 2]

Use the **stopbits** command to set the number of stopbits per character for a terminal session. This value must match the configuration of your VT100 terminal or terminal emulator software. The default is 1 stopbit per character. Use the **no** form of this command to return to the default value.

Syntax Description

1	Specifies 1 stopbit per character.
2	Specifies 2 stopbits per character.

Default Values

By default, the **stopbits** are set to **1**.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures 2 stopbits per character for the console terminal session:

```
(config)#line console 0
(config-con 0)#stopbits 2
```

LINE (TELNET) INTERFACE CONFIG COMMAND SET

To activate the Line (Telnet) Interface Configuration mode, enter the **line telnet** command specifying a Telnet session(s) at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#line telnet 0 4
(config-telnet0-4)#
```

You can select a single line by entering the **line telnet** command followed by the line number (0-4). For example:

```
>enable
#configure terminal
(config)#line telnet 2
(config-telnet2)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

```
cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
  on page 1461
do on page 1465
end on page 1466
exit on page 1467
```

All other commands for this command set are described in this section in alphabetical order.

```
access-class <listname> in on page 1316
line-timeout <minutes> on page 1317
login on page 1318
login authentication <aaa login list> on page 1319
login local-userlist on page 1320
password [md5] <password> on page 1321
```

access-class <listname> in

Use the **access-class in** command to restrict Telnet access using a configured access list. Received packets passed by the access list will be allowed. Use the access list configuration to deny hosts or entire networks or to permit specified IP addresses.

Syntax Description

<listname>	Identifies the configured access list using an alphanumeric descriptor (all access list descriptors are case-sensitive).
------------	--

Default Values

By default, there are no configured access lists associated with Telnet sessions.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

When using the **access-class in** command to associate an access list with a Telnet session, remember to duplicate the **access-class in** command for all configured Telnet sessions 0 through 4. Telnet access to the unit using a particular Telnet session is not possible. Users will be assigned the first available Telnet session.

Usage Examples

The following example associates the access list **Trusted** (to allow Telnet sessions from the 192.22.56.0/24 network) with all Telnet sessions (0 through 4):

Create the access list:

```
(config)#ip access-list standard Trusted
(config)#permit 192.22.56.0 0.0.0.255
```

Enter the line (telnet) :

```
(config)#line telnet 0 4
```

Associate the access list with the Telnet session:

```
(config-telnet0-4)#access-class Trusted in
```

line-timeout <minutes>

Use the **line-timeout** command to specify the number of minutes a line session may remain inactive before the AOS terminates the session. Use the **no** form of this command to return to the default value.

Syntax Description

<minutes> Specifies the number of minutes a line session may remain inactive before the AOS terminates the session.

Entering a **line-timeout** value of 0 disables the feature.

Default Values

By default the **line-timeout** is set to 15 minutes (Console and Telnet).

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example specifies a timeout of 2 minutes:

```
(config)#line telnet 0
(config-telnet0)#line-timeout 2
```

login

Use the **login** command to enable security login on the line session requiring the password configured using the **password** command. Use the **no** form of this command to disable the login feature.

Syntax Description

No subcommands.

Default Values

By default, there is no login password set for access to the unit.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the security login feature and specifies a password on all the available Telnet sessions (0 through 4):

```
(config)#line telnet 0 4  
(config-telnet0-4)#login  
(config-telnet0-4)#password mypassword
```

login authentication <aaa login list>

Use the **login authentication** command to specify the named AAA login list to use for authenticating users connecting on this line.

Syntax Description

<aaa login list> Specifies the AAA login list to use for authentication.

Default Values

The default value is the default AAA list.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 5.1 Command was introduced.

Functional Notes

If the AAA subsystem is activated but no login authentication list is given, the default list is used. If the default list is used but the default list is not configured, the behavior for telnets is to use the local user database.

Usage Examples

The following example specifies that **myList** will be used for authenticating users connecting on this line:

```
(config)#line telnet 2
(config-telnet2)#login authentication myList
```

login local-userlist

Use the **login local-userlist** command to enable security login for the terminal session requiring the usernames and passwords configured using the **username/password** Global Configuration command. Use the **no** form of this command to disable the login local-userlist feature.



*All user properties assigned using the **username/password** command are valid when using the **login local-userlist** command.*

Syntax Description

No subcommands.

Default Values

By default, there is no login password set for access to the unit.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example displays creating a local userlist and enabling the security login feature:

```
(config)#username my_user password my_password
(config)#line telnet 0
(config-telnet0)#login local-userlist
```

When connecting to the unit, the following prompts are displayed:

```
User Access Login
Username: my_user
Password:
Router#
```


password [md5] <password>

Use the **password** command to configure the password (with optional encryption) required on the line session when security login is enabled (using the **login** command). Use the **no** form of this command to remove a configured password.

Syntax Description

md5	Optional. Specifies Message Digest 5 (MD5) as the encryption protocol to use when displaying the enable password during show commands. If the MD5 keyword is not used, encryption is not used when displaying the enable password during show commands.
<password>	Specifies the password for the line session using an alphanumeric character string (up to 16 characters).

Default Values

By default, there is no login password set for access to the unit.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables the security login feature and specifies a password for the Telnet session 0:

```
(config)#line telnet 0
(config-telnet0)#login
(config-telnet0)#password mypassword
```

To provide extra security, the AOS can encrypt the enable password when displaying the current configuration. For example, the following is a **show configuration** printout (password portion) with an unencrypted enable password (ADTRAN):

```
!
enable password ADTRAN
!
```

Alternately, the following is a **show configuration** printout (password portion) with an enable password of ADTRAN using md5 encryption:

```
!
enable password md5 encrypted 5aa5fbae7d01a90e79fb57705ce74676
!
```

ROUTER (RIP) CONFIGURATION COMMAND SET

To activate the Router (RIP) Configuration mode, enter the **router rip** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#router rip
(config-rip)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

auto-summary [on page 1323](#)

default-metric <value> [on page 1324](#)

network <address> <subnet mask> [on page 1325](#)

passive-interface <interface> [on page 1326](#)

redistribute connected [metric <value>] [on page 1327](#)

redistribute ospf [metric <value>] [on page 1328](#)

redistribute static [metric <value>] [on page 1329](#)

version [1 | 2] [on page 1330](#)

auto-summary

Use the **auto-summary** command to have RIP version 2 summarize subnets to the classful boundaries. Use the **no** form of this command to disable this summarization.

Syntax Description

No subcommands.

Default Values

By default, auto-summary is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use this command if you are subdividing a classful network into many subnets and these subnets are to be advertised over a slow link (64k or less) to a router that can only reach the classful network via the router you are configuring.

Usage Examples

The following example configures the router to not automatically summarize network numbers:

```
(config)#router rip  
(config-rip)#no auto-summary
```

default-metric <value>

Use the **default-metric** command to set the default metric value for the RIP routing protocol. Use the **no** form of this command to return to the default settings.

Syntax Description

<value>	Sets the default metric value (range: 1 to 4,294,967,295 Mbps).
---------	---

Default Values

By default, this value is set at 0.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

The metric value defined using the **redistribute** command overrides the **default-metric** command's metric setting. Refer to *redistribute ospf [metric <value>]* [on page 1328](#) for related information.

Usage Examples

The following example shows a router using both RIP and OSPF routing protocols. The example advertises OSPF-derived routes using the RIP protocol and assigns the OSPF-derived routes a RIP metric of 10.

```
(config)#router rip
(config-rip)#default-metric 10
(config-rip)#redistribute ospf
```

network <address> <subnet mask>

Use the **network** command to enable RIP on the specified network. The AOS will only allow processing (sending and receiving) RIP messages on interfaces with IP addresses that are contained in the networks listed using this command. All RIP messages received on interfaces not listed using this command will be discarded. To allow for receiving and participating in RIP but not for transmitting, use the **passive-interface** command (refer to *passive-interface* <interface> on page 1326). Use the **no** form of this command to remove a network from the list.

Syntax Description

<address>	Specifies the IP address of the network on which RIP will be enabled.
<subnet mask>	Specifies the subnet mask that corresponds to the entered IP address.

Default Values

By default, RIP is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables RIP on the 102.22.72.252/30, 192.45.2.0/24, and 10.200.0.0/16 networks:

```
(config)#router rip
(config-rip)#network 102.22.72.252 255.255.255.252
(config-rip)#network 192.45.2.0 255.255.255.0
(config-rip)#network 10.200.0.0 255.255.0.0
```

passive-interface <interface>

Use the **passive-interface** command to disable the transmission of routing updates on the specified interface. All routing updates received on that interface will still be processed (and advertised to other interfaces), but no updates will be transmitted to the network connected to the specified interface. Multiple **passive-interface** commands may be used to create a customized list of interfaces. Use the **no** form of this command to enable the transmission of routing updates on an interface.

Syntax Description

<interface> Specifies the interface that will not transmit routing updates.

Default Values

By default, RIP is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example disables routing updates on the Frame Relay link (labeled 1.17) and the PPP link (labeled 1):

```
(config)#router rip
(config-rip)#passive-interface frame-relay 1.17
(config-rip)#passive-interface ppp 1
```

redistribute connected [metric <value>]

Use the **redistribute connected** command to pass routes from one network to another, regardless of the routing protocol implemented on the routing domain. Using the **connected** keyword allows the propagation of routes connected to other interfaces using the RIP routing protocol. Use the **no** form of this command to disable the propagation of the specified route type.

Syntax Description

metric <value>	Optional. Specifies the hop count to use for advertising redistributed OSPF routes in RIP.
-----------------------	--

Default Values

By default, RIP is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

Redistributing connected routes imports those routes into RIP without the interfaces in question actually participating in RIP. The connected routes imported this way are not covered by a network command and therefore do not send/receive RIP traffic.

Usage Examples

The following example passes the connected routes found in the route table to other networks running the RIP routing protocol:

```
(config)#router rip  
(config-rip)#redistribute connected
```

redistribute ospf [metric <value>]

Use the **redistribute ospf** command to advertise routes from one protocol to another, regardless of the routing protocol implemented on the routing domain. Using the **ospf** keyword allows the propagation of OSPF routes into RIP. Use the **no** form of this command to disable the propagation of the specified route type.

Syntax Description

metric <value>	Optional. Specifies the hop count to use for advertising redistributed OSPF routes in RIP.
-----------------------	--

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Functional Notes

Redistributing OSPF routes imports those routes into RIP without the interfaces in question actually participating in RIP. The OSPF routes imported this way are not covered by a network command and therefore do not send/receive RIP traffic.

If **redistribute ospf** is enabled and no metric value is specified, the value defaults to **0**. The metric value defined using the **redistribute ospf metric** command overrides the **default-metric** command's metric setting. Refer to the section *default-metric <value>* [on page 1324](#) for more information.

Usage Examples

The following example imports OSPF routes into RIP:

```
(config)#router rip
(config-rip)#redistribute ospf
```


redistribute static [metric <value>]

Use the **redistribute static** command to pass routes from one network to another, regardless of the routing protocol implemented on the routing domain. Using the **static** keyword allows the propagation of static routes to other interfaces using the RIP routing protocol. Use the **no** form of this command to disable the propagation of the specified route type.



The gateway network for the static route must participate in RIP by using the network command for the gateway network.

Syntax Description

metric <value> Optional. Specifies the hop count to use for advertising redistributed OSPF routes in RIP.

Default Values

By default, RIP is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1 Command was introduced.

Functional Notes

Redistributing static routes allows other network devices to learn about paths (not compatible with their system) without requiring manual input to each device on the network.

version [1 | 2]

Use the **version** command to specify (globally) the Routing Information Protocol (RIP) version used on all IP interfaces. This global configuration is overridden using the configuration commands **ip rip send version** and **ip rip receive version**. Use the **no** form of this command to return to the default value.

Syntax Description

1	Specifies RIP version 1 be used globally.
2	Specifies RIP version 2 be used globally.

Default Values

By default, RIP is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies RIP version 2 as the global RIP version:

```
(config)#router rip  
(config-rip)#version 2
```

ROUTER (OSPF) CONFIGURATION COMMAND SET

To activate the Router (OSPF) Configuration mode, enter the **router ospf** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#router ospf
(config-ospf)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

do [on page 1465](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

end [on page 1466](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

area <area id> *default-cost* <value> [on page 1332](#)

area <area id> *range* <ip address> <network mask> [*advertise* | *not-advertise*] [on page 1333](#)

area <area id> *stub* [*no-summary*] [on page 1334](#)

auto-cost *reference-bandwidth* <rate> [on page 1335](#)

default-information-originate [*always* | *metric* <value> | *metric-type* <type>] [on page 1336](#)

default-metric <value> [on page 1337](#)

network <ip address> <wildcard> *area* <area id> [on page 1338](#)

redistribute *connected* [*metric* <value> | *metric-type* <type> | *subnets*] [on page 1339](#)

redistribute *rip* [*metric* <value> | *metric-type* <type> | *subnets*] [on page 1340](#)

redistribute *static* [*metric* <value> | *metric-type* <type> | *subnets*] [on page 1341](#)

summary-address <address> <mask | prefix mask> *not-advertise* [on page 1342](#)

timers *lsa-group-pacing* <seconds> [on page 1343](#)

timers *spf* <delay> <hold> [on page 1344](#)

area <area id> default-cost <value>

Use the **area default-cost** command to assign a cost of the default summary route sent into a stub area or not-so-stubby-area (NSSA). Use the **no** form of this command to delete the assigned cost.

Syntax Description

<area id>	Specifies the identifier for this area. Specifies as an integer (range: 0 to 4,294,967,295) or an IP address <A.B.C.D>.
<value>	Specifies the default summary route cost. Range: 0 to 166,777,214.

Default Values

By default the summary route cost is set to 0. There is no default for the area ID.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines a default cost of 85 to a specific area:

```
(config)#router ospf  
(config-ospf)#area 192.22.72.0 default-cost 85
```

area <area id> range <ip address> <network mask> [advertise | not-advertise]

Use the **area range** command to configure area route summarizations and to determine whether an address range is advertised to the networks.

Syntax Description

<area id>	Specifies an identifier for this area. Specifies as an integer (range: 0 to 4,294,967,295) or an IP address <A.B.C.D>.
<ip address>	Specifies the IP address of the advertised summary route.
<network mask>	Specifies the mask of the advertised summary route.
advertise	Specifies the specified address range will be advertised to other networks.
not-advertise	Specifies the specified address range will not be advertised to other networks.

Default Values

By default, OSPF is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines an address range for a specific area that allows the unit to advertise this range to other networks:

```
(config)#router ospf
(config-ospf)#area 11.0.0.0 range 11.0.0.0 255.0.0.0 advertise
```

area <area id> stub [no-summary]

Use the **area stub** command to configure an area as a stub area. Use the **no** form of this command to disable stub-designation for areas defined as stubs using this command.

Syntax Description

<area id>	Specifies an identifier for this stub area. Specifies as an integer (range: 0 to 4,294,967,295) or an IP address <A.B.C.D>.
no-summary	Optional. Designates the area as a total stub area. No summary link advertisements will be sent by the ABR into the stub area.

Default Values

By default, OSPF is not enabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Technology Review

It is important to coordinate configuration of all routers and access servers in the stub area. The **area stub** command must be configured for each of those pieces of equipment. Use the **area router configuration** command with the **area default-cost** command to specify the cost of a default internal router sent into a stub area by an ABR. Refer to *area <area id> default-cost <value>* on page 1332 for related information.

Usage Examples

The following example configures area 2 as a stub area:

```
(config)#router ospf
(config-ospf)#area 2 stub
```

auto-cost reference-bandwidth <rate>

Use the **auto-cost reference-bandwidth** command to assign a different interface cost to an interface. It may be necessary to assign a higher number to high-bandwidth links. This value is used in OSPF metric calculations.

Syntax Description

<rate> Sets the default reference bandwidth rate (range: 1 to 4,294,967 Mbps).

Default Values

By default, the rate is set to 100.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following example sets the auto cost reference-bandwidth to 1000 Mbps:

```
(config)#router ospf  
(config-ospf)#auto-cost reference-bandwidth 1000
```

default-information-originate [always | metric <value> | metric-type <type>]

Use the **default-information-originate** command to cause an ASBR to generate a default route. It must have its own default route before it generates one unless the **always** keyword is used.

Syntax Description

always	Optional. Specifies to always advertise default route.
metric <value>	Optional. Configures the metric value (range is 0 to 16,777,214).
metric type <type>	Optional. Configures the metric type (1 or 2).

Default Values

metric <value>	10
metric type <type>	2

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures a router to always advertise default routes and assigns the default router a metric value of 10000 and a metric type of 2:

```
(config)#router ospf  
(config-ospf)#default-information-originate always metric 10000 metric-type 2
```


default-metric <value>

Use the **default-metric** command to set a metric value for redistributed routes.

Syntax Description

<value> Sets the default metric value (range: 0 to 4,294,967,295).

Default Values

By default, **default-metric** value is set at 20.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Functional Notes

The metric value defined using the **redistribute** command overrides the **default-metric** command's metric setting. Refer to *redistribute ospf [metric <value>]* [on page 1328](#) for related information.

Usage Examples

The following example shows a router using both RIP and OSPF routing protocols. The example advertises RIP-derived routes using the OSPF protocol and assigns the RIP-derived routes an OSPF metric of 10.

```
(config)#router ospf
(config-ospf)#default-metric 10
(config-ospf)#redistribute rip
```

network <ip address> <wildcard> area <area id>

Use the **network area** command to enable routing on an IP stack and to define area IDs for the interfaces on which OSPF will run. Use the **no** form of this command to disable OSPF routing for interfaces defined using this command.

Syntax Description

<ip address>	Specifies the network address <A.B.C.D>.
<wildcard>	The wildcard mask is in an IP-address-type format and includes “don’t care” bits.
<area id>	Specifies an identifier for this area. Specifies as an integer (range: 0 to 4,294,967,295) or an IP address <A.B.C.D>.

Default Values

No default values required for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Technology Review

In order for OSPF to operate on an interface, the *primary* address for the interface must be included in the **network area** command. Assigning an interface to an OSPF area is done using the **network area** command. There is no limit to the number of **network area** commands used on a router. If the address ranges defined for different areas overlap, the first area in the **network area** command list is used and all other overlapping portions are disregarded. Try to avoid overlapping to avoid complications.

Usage Examples

In the following example, the OSPF routing process is enabled and two OSPF areas are defined:

```
(config)#router ospf
(config-ospf)#network 192.22.72.101 0.0.0.255 area 0
(config-ospf)#network 10.0.0.0 0.255.255.255 area 10.0.0.0
```

redistribute connected [**metric** <value> | **metric-type** <type> | **subnets**]

Use the **redistribute connected** command to advertise routes from one protocol to another. Using the **connected** keyword allows the advertisement of connected routes into the OSPF routing protocol. This will advertise all connected routes on OSPF-enabled interfaces. It does not enable OSPF on all interfaces. Use the **no** form of this command to disable the propagation of the specified route type.

Syntax Description

metric <value>	Optional. Specifies a metric value to be carried from one OSPF process to the next (if no other value is specified).
metric-type <type>	Optional. Specifies a type 1 or type 2 external route as the external link type. If not specified, the default is 2.
subnets	Optional. Specifies subnet redistribution when redistributing routes into OSPF.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 10.1	Subcommands were added.

Functional Notes

Redistributing connected routes imports those routes into OSPF without the interfaces in question actually participating in OSPF. The connected routes imported this way are not covered by a network command and therefore do not send/receive OSPF traffic.

Usage Examples

The following example imports connected routes into OSPF:

```
(config)#router ospf  
(config-ospf)#redistribute connected
```

redistribute rip [**metric** <value> | **metric-type** <type> | **subnets**]

Use the **redistribute rip** command to advertise routes from one protocol to another, regardless of the routing protocol implemented on the routing domain. Using the **rip** keyword allows the propagation of RIP routes into OSPF. Use the **no** form of this command to disable the propagation of the specified route type.

Syntax Description

metric <value>	Optional. Specifies a metric value to be carried from one OSPF process to the next (if no other value is specified).
metric-type <type>	Optional. Specifies a type 1 or type 2 external route as the external link type. If not specified, the default is 2.
subnets	Optional. Specifies subnet redistribution when redistributing routes into OSPF.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
Release 10.1	Subcommands were added.

Functional Notes

Redistributing RIP routes imports those routes into OSPF without the interfaces in question actually participating in OSPF. The RIP routes imported this way are not covered by a network command and therefore do not send/receive OSPF traffic.

Usage Examples

The following example imports RIP routes into OSPF:

```
(config)#router ospf  
(config-ospf)#redistribute rip
```

redistribute static [metric <value> | metric-type <type> | subnets]

Use the **redistribute static** command to advertise routes from one protocol to another. Using the **static** keyword allows the advertisement of static routes into the OSPF routing protocol. This will advertise all static routes on OSPF-enabled interfaces. It does not enable OSPF on all interfaces. Use the **no** form of this command to disable the propagation of the specified route type.

Syntax Description

metric <value>	Optional. Specifies a metric value to be carried from one OSPF process to the next (if no other value is specified).
metric-type <type>	Optional. Specifies a type 1 or type 2 external route as the external link type. If not specified, the default is 2.
subnets	Optional. Specifies subnet redistribution when redistributing routes into OSPF.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 10.1	Subcommands were added.

Functional Notes

Redistributing static routes imports those routes into OSPF without the interfaces in question actually participating in OSPF. The static routes imported this way are not covered by a network command and therefore do not send/receive OSPF traffic.

Usage Examples

The following example imports static routes into OSPF:

```
(config)#router ospf
(config-ospf)#redistribute static
```

summary-address <address> <mask | prefix mask> **not-advertise**

Use the **summary-address** command to control address summarization of routes that are redistributed into OSPF from other sources (e.g., RIP-to-OSPF, static-to-OSPF, etc.). The **not-advertise** option causes suppression of routes that match the specified mask/prefix mask pair.

Syntax Description

<address>	Specifies the IP address or Prefix A.B.C.D.
<mask prefix mask>	Routes matching this mask/prefix mask pair will be suppressed if the not-advertise command is enabled.
not advertise	Optional. Causes suppression of routes that match the specified mask/prefix mask pair.

Default Values

By default, this command is disabled.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example suppresses advertisement of the routes which match the specified address/mask:

```
(config)#router ospf  
(config-ospf)#summary-address 11.0.0.0 255.0.0.0 not-advertise
```

timers lsa-group-pacing <seconds>

Use the **timers lsa-group-pacing** command to change the link state advertisement (LSA) refresh interval.

Syntax Description

<seconds> Sets the LSA refresh interval in seconds (range: 10 to 1800).

Default Values

By default, this value is set at 240 seconds.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1 Command was introduced.

Usage Examples

The following example sets the refresh interval for six minutes:

```
(config)#router ospf  
(config-ospf)#timers lsa-group-pacing 360
```

timers spf <delay> <hold>

Use the **timers spf** command to configure the shortest path first (SPF) calculation and hold intervals.

Syntax Description

<delay>	Specifies the time in seconds between OSPF's receipt of topology changes and the beginning of SPF calculations.
<hold>	Specifies the time in seconds between consecutive SPF calculations. Range: 10 to 1800 seconds.

Default Values

<delay>	5 seconds
<hold>	10 seconds

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 3.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example defines a delay of 10 seconds and a hold-time of 30 seconds:

```
(config)#router ospf  
(config-ospf)#timers spf 10 30
```


QUALITY OF SERVICE (QoS) MAP COMMANDS

A QoS policy is defined using a QoS map in the AOS CLI. The QoS map is a named list with sequenced entries. An entry contains a single match reference and one or more actions (priority, set, or both). To activate the QoS Command Set (which allows you to create and/or edit a map), enter a valid version of the QoS command at the Global Configuration mode prompt. Multiple map entries for the same QoS map are differentiated by a sequence number. The sequence number is used to assign match order.

Once created, a QoS map must be applied to an interface (using the **qos-policy out** *<map-name>* command) in order to actively process traffic. Any traffic for the interface that is not sent to the priority queue is sent using the default queuing method for the interface (such as weighted fair queuing).

For example:

```
>enable
#config terminal
(config)#qos map VOICEMAP 10
(config-qos-map)#match precedence 5
(config-qos-map)#priority 512
(config-qos-map)#exit
(config)#interface fr 1
(config-fr 1)#qos-policy out VOICEMAP
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect *<#>* *<from interface>* *<slot/port>* *<tdm-group#>* *<to interface>* *<slot/port>*
 [on page 1461](#)
do [on page 1465](#)
end [on page 1466](#)
exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

bandwidth [*percent* | *remaining* | *<value>*] [on page 1346](#)
match [on page 1347](#)
priority [on page 1348](#)
set dscp *<0-63>* [on page 1349](#)
set precedence *<0-7>* [on page 1350](#)

bandwidth [percent | remaining | <value>]

Use the **bandwidth** command to provide the bandwidth value of an interface to the higher-level protocols. This value is used in cost calculations. Use the **no** form of this command to restore the default values.

Syntax Description

percent	Specifies percent of total interface bandwidth.
remaining	Specifies percent of total interface bandwidth minus any priority entry bandwidth values on this QoS map.
<value>	Specifies the bandwidth value in kbps. Valid range is from 8 to 2000000

Default Values

TBy default, there is no bandwidth configured for a QoS map entry.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.1	Command was introduced.
Release 10.1	New subcommands percent and remaining were added.

Functional Notes

The **bandwidth** command is an informational value that is communicated to the higher-level protocols to be used in cost calculations. This is a routing parameter only and does not affect the physical interface.

Usage Examples

The following example sets bandwidth of the QoS map to 10 Mbps:

```
(config)#qos map 1
(config-qos-map 1)#bandwidth 10000
```

match

Use the **match** command to specify which traffic should be processed by this QoS map. Possible variations of this command include:

```

match dscp <0-63>
match ip rtp <port #>
match ip rtp <first port # in range> <last port # in range>
match ip rtp <first port # in range> <last port # in range> all
match list <listname>
match precedence <0-7>
match protocol bridge
match protocol bridge netbeui

```

Syntax Description

dscp <0-63>	Matches IP packets with the specified DSCP value.
ip rtp <start><end> all	Matches RTP packets with even UDP destination port numbers in the specified range (between start and end). If all (which is optional) is specified, even and odd ports are matched in the specified range.
list <listname>	Specifies the name of the access-list (ACL) you wish to use to match packets for this QoS map. Refer to <i>ip access-list extended <listname></i> on page 387 for more information on creating access-lists.
precedence <0-7>	Matches IP packets with the specified IP precedence value.
protocol bridge	Matches frames being bridged by the router.
protocol bridge netbeui	Matches only NetBEUI frames being bridged by the router.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example assigns a traffic match pattern to the existing QoS map VOICEMAP:

```

(config)#qos map VOICEMAP 10
(config-qos-map)#match ip rtp 16384 20000

```

priority

The **priority** command provides a high-priority queue, prioritizing this traffic above all others. If no traffic is present in any other queue, priority traffic is allowed to burst up to the interface rate; otherwise, priority traffic above the specified bandwidth is dropped. Use the **no** form of this command to disable this feature.

Variations of this command include:

priority <bandwidth>

priority <bandwidth> <burst>

priority unlimited

Syntax Description

<bandwidth>	Specifies the permitted priority queue bandwidth in kilobits per second. This sets an upper limit for how much bandwidth is reserved for priority traffic.
<burst>	Optional. Specifies the burst size (in bytes) for traffic in this priority queue. This parameter should be left unconfigured for optimal performance.
unlimited	Optional. Specifies no limits on the priority queue bandwidth.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1	Command was introduced.
-------------	-------------------------

Usage Examples

This example assigns the matched traffic to a high priority output queue for any assigned interface:

```
(config)#qos map VOICEMAP 10
(config-qos-map)#match ip rtp 16384 20000
(config-qos-map)#priority 512
```

set dscp <0-63>

The **set dscp** command is an optional command for a QoS map that can be used to modify the DSCP field (on matching packets) to the specified value.

Syntax Description

<0-63> Specifies the decimal DSCP value.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

This command sets the DSCP value (for all matching traffic) to 46:

```
(config)#qos map VOICEMAP 10  
(config-qos-map)#set dscp 46
```

set precedence <0-7>

The **set precedence** command is an optional command for a QoS map that can be used to modify the IP precedence value (on matching packets) to the specified value.

Syntax Description

<0-7> Specifies the decimal IP precedence value.

Default Values

No default value is necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 6.1 Command was introduced.

Usage Examples

This command sets the IP precedence value (for all matching traffic) to 5:

```
(config)#qos map VOICEMAP 10  
(config-qos-map)#set precedence 5
```

VOICE USER COMMAND SET

To activate the Voice User Interface Configuration mode, enter the **voice user** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#voice user 4444
(config-4444)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

block-caller-id [on page 1353](#)

call-waiting [on page 1354](#)

caller-id-override [*external-number* <number> | *internal-name* <empty> <name> | *internal-number* <empty> <number>] [on page 1355](#)

codec-group <name> [on page 1356](#)

connect [*fxs* <slot/port> | *sip*] [on page 1357](#)

cos day <input> [on page 1358](#)

coverage [*external* <number> | *internal* <number>] [on page 1359](#)

did <number> [on page 1360](#)

directory-include [on page 1361](#)

dnd [on page 1362](#)

echo-cancellation [on page 1363](#)

first-name <name> [on page 1364](#)

forward <number> [on page 1365](#)

forward-disconnect [*battery remove* | *battery reverse* | *delay* <milliseconds>] [on page 1366](#)

fwd-courtesy [on page 1367](#)

hotel [on page 1368](#)

hotline <number> [on page 1369](#)

last-name <name> [on page 1370](#)

message-waiting [*both* | *dialtone-only* | *lamp-only*] [on page 1371](#)

num-rings <rings> [on page 1372](#)

password <password> [on page 1373](#)

rtp dtmf-relay [*inband* | *nte* <event-value>] [on page 1374](#)

rtp frame-packetization <time> [on page 1375](#)

rtp jitter-delay maximum <milliseconds> [on page 1376](#)

rtp qos dscp <code> [on page 1377](#)

special-ring-cadences [on page 1378](#)

station-lock [*admin* <inbound-outbound> | *user* <inbound-outbound>] [on page 1379](#)

vad [on page 1380](#)

block-caller-id

Use the **block-caller-id** command to block all inbound call ID delivery to this user. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the **block-called-id** command for user 4444:

```
(config)#voice user 4444
(config-4444)#block-caller-id
```

call-waiting

Use the **call waiting** command to enable call waiting for a user. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the **call-waiting** command for user 4444:

```
(config)#voice user 4444  
(config-4444)#call-waiting
```

caller-id-override [external-number <number> | internal-name <empty> <name> | internal-number <empty> <number>]

Use the **caller-id-override** command to override caller ID information for the user. Use the **no** form of this command to disable this feature.

Syntax Description

external-number <number>	Replaces the caller ID number on external calls with the specified number.
internal-name <empty>	Replaces the caller ID name on internal calls. Makes the caller ID name on internal calls display as blank.
<name>	Inserts this name for caller ID for internal calls.
internal-number <empty>	Replaces caller ID number on internal calls. Makes the caller ID number on internal calls display as blank.
<number>	Inserts this number for caller ID for internal calls.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the **caller-id-override** command for external numbers for user 4444:

```
(config)#voice user 4444
(config-4444)#caller-id-override external-number 256-555-8000
```

This examples activates the **caller-id-override** command for names with internal calls and makes the display appear blank:

```
(config)#voice user 4444
(config-4444)#caller-id-override internal-number empty
```

codec-group <name>

Use the **codec-group** command to configure the CODEC groups to use for the account. Generally you will have three CODEC groups: trunk, user, and fax. You will need to define CODEC lists to specify CODEC order (see *voice codec-list <name>* [on page 531](#) for information). You will then use the *Codec List Command Set* [on page 1384](#) to define the specific CODEC you want each group to use for negotiation.

Syntax Description

<name>	Specifies the name of the CODEC group to be used for the account. Generally three basic CODEC groups are needed: user , trunk , and fax .
--------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates the CODEC group with the name **trunk**:

```
(config)#voice user 4444
(config-4444)#codec-group trunk
```

connect [fxs <slot/port> | sip]

Use the **connect** command to associate physical ports with the user.

Syntax Description

fxs <slot/port>	Specifies that an FXS port is associated with the user.
sip	Specifies that this is a SIP user.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example associates an FXS port with the user **4444**:

```
(config)#voice user 4444  
(config-4444)#connect fxs 1/1
```

The following example associates a SIP port with the user **4444**.

```
(config)#voice user 4444  
(config-4444)#connect sip
```

cos day <input>

Use the **cos day** command to sets the day mode class-of-service for the user.

Syntax Description

<input> Specifies the predefined class-of-service to set for this mode.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example assigns class of service **adtran** for user **4444**:

```
(config)#voice user 4444  
(config-4444)#cos day adtran
```

coverage [external <number> | internal <number>]

Use the **coverage** command to configure call coverage parameters for the user.

Syntax Description

external <number> Forwards the phone to an external number.
internal <number> Forwards the phone to an internal number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example specifies that the user's phone be forwarded to the internal extension **8500**.

```
(config)#voice user 4444  
(config-4444)#coverage internal 8500
```

did <number>

Use the **did** command to configure direct inward dial (DID) parameters for the extension.

Syntax Description

<number> Specifies the **did** number for the user.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example assigns a **did** number of 555-4560 to user **4444**:

```
(config)#voice user 4444  
(config-4444)#did 5554560
```


directory-include

Use the **directory-include** command to include the user in a dial-by-name directory. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example adds the user **4444** to a dial-by-name directory:

```
(config)#voice user 4444  
(config-4444)#directory-include
```

dnd

Use the **dnd** command to enable the do not disturb (DND) option for the user. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables DND for user **4444**:

```
(config)#voice user 4444  
(config-4444)#dnd
```

echo-cancellation

Use the **echo-cancellation** command to improve voice quality for packetized-based voice calls such as VoIP or MGCP.

Syntax Description

No subcommands.

Default Values

Echo-cancellation is on by default.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates **echo-cancellation** for user **4444**:

```
config)#voice user 4444  
(config-4444)#echo-cancellation
```

first-name <name>

Use the **first-name** command to specify the user's first name.

Syntax Description

<name> Specifies the user's first name.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example specifies the first name of user **4444**:

```
(config)#voice user 4444  
(config-4444)#first-name john
```

forward <number>

Use the **forward** command forwards all calls to a specified number. Use the **no** form of this command to disable this feature.

Syntax Description

<number>	Forwards all calls to the specified number. Do not include dashes or hyphens in the number.
----------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example forwards all calls to user **4444** to the number 256-555-8000:

```
(config)#voice user 4444
(config-4444)#forward 2565558000
```

forward-disconnect [battery remove | battery reverse | delay <milliseconds>]

Use the **forward-disconnect** command to specify the forward disconnect options. Use the **no** form of this command to disable this feature.

Syntax Description

battery remove	Specifies that the battery will be removed upon disconnect.
battery reverse	Specifies that the battery will be reversed upon disconnect.
delay <milliseconds>	Sets a forward disconnect delay time in milliseconds. Enter 250, 500, 750, 1000, or 2000.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example removes the battery upon disconnect for user **4444**. This command is used most often with a fax machine that needs to be alerted that a call has ended:

```
(config)#voice user 4444  
(config-4444)#forward-disconnect battery remove
```

fwd-courtesy

Use the **fwd-courtesy** command to send a courtesy ring when a call is forwarded. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sends a courtesy ring when a call is forwarded:

```
(config)#voice user 4444  
(config-4444)#fwd-courtesy
```

hotel

Use the **hotel** command to allow hotelling for the user. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables hotelling for user **4444**:

```
(config)#voice user 4444
(config-4444)#hotel
```


hotline <number>

Use the **hotline** command to configure the user's phone as a hotline phone. Use the **no** form of this command to disable this feature.

Syntax Description

<number> Specifies the hotline number to dial when the phone is off-hook.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets up user **4444** as a hotline and specifies that the number 256-555-8000 will be dialed when user 4444's phone is off-hook:

```
(config)#voice user 4444  
(config-4444)#hotline 2565558000
```

last-name <name>

Use the **last-name** command to specify the user's last name.

Syntax Description

<name> Specifies the user's last name.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example specifies the last name of user **4444**:

```
(config)#voice user 4444  
(config-4444)#last-name smith
```

message-waiting [both | dialtone-only | lamp-only]

Use the **message-waiting** command to configure message waiting notification methods.

Syntax Description

both	Sets message-waiting notification for both dialtone and lamp.
dialtone-only	Sets message-waiting notification for dialtone only.
lamp-only	Sets message-waiting notification or lamp-only.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets message-waiting notification for user **4444** for both dialtone and lamp:

```
(config)#voice user 4444  
(config-4444)#message-waiting both
```

num-rings <*rings*>

Use the **num-rings** command to set the number of rings per station until the first call coverage action occurs.

Syntax Description

<*rings*> Specifies the number of rings for the station. Enter a number between 0 and 30.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets the number of rings for the station to **5**:

```
(config)#voice user 4444  
(config-4444)#num-rings 5
```

password <password>

Use the **password** command to create a password or personal identification number (PIN) number.

Syntax Description

<password> Specifies a 4-digit password (or PIN) number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following sets the password for user **4444** to **4321**:

```
(config)#voice user 4444  
(config-4444)#password 4321
```

rtp dtmf-relay [inband | nte <event-value>]

Use the **rtp dtmf-relay** command to configure Realtime Transport Protocol (RTP) Dual Tone Multi-Frequency (DTMF) relay event settings.

Syntax Description

inband	Configures RTP DTMF relay events for inband.
nte <event-value>	Configures RTP DTMF relay events for NTE. Enter a value between 96 and 127.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures RTP DTMF relay events for **inband**:

```
(config)#voice user 4444  
(config-4444)#rtp dtmf-relay inband
```

rtp frame-packetization <*time*>

Use the **rtp frame-packetization** command to configure the Realtime Transport Protocol (RTP) frame packetization time in milliseconds.

Syntax Description

<*time*> Configures the RTP frame packetization time in milliseconds. Enter 10, 20, or 30.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets the frame packetization time for user **4444** to **20** milliseconds:

```
(config)#voice user 4444  
(config-4444)#rtp frame-packetization 20
```

rtp jitter-delay maximum <milliseconds>

Use the **rtp** command to configure the maximum Realtime Transport Protocol (RTP) jitter delay.

Syntax Description

<milliseconds> Configures the maximum RTP jitter delay time in milliseconds. Enter a value between 10 and 100 in 10 millisecond intervals.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following configures the maximum RTP jitter delay for user **4444** to **20** milliseconds:

```
(config)#voice user 4444  
(config-4444)#rtp jitter-delay maximum 20
```


rtp qos dscp <code>

Use the **rtp** command to configure the maximum Realtime Transport Protocol (RTP) quality of service (QOS) parameters for differentiated services code point (DSCP).

Syntax Description

<code> Configures the RTP QOS parameter for DSCP. Enter a value between 10 and 63.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example configures the RTP QOS DSCP for user **4444** to **44**:

```
(config)#voice user 4444  
(config-4444)#rtp qos dscp 44
```

special-ring-cadences

Use the **special-ring-cadences** command to enable special ring cadences for this user. Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures enables special ring cadences for user **4444**:

```
(config)#voice user 4444  
(config-4444)#special-ring-cadences
```

station-lock [admin <inbound-outbound> | user <inbound-outbound>]

Use the **station-lock** command to lock the station's ability to place or receive phone calls.

Syntax Description

admin <inbound-outbound> Enables inbound and outbound administrator station lock.

user <inbound-outbound> Enables inbound and outbound user station lock.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example configures an administrator inbound and outbound station lock:

```
(config)#voice user 4444
(config-4444)#station-lock admin inbound-outbound
```

vad

Use the **vad** command to enable voice activation detection (VAD). Use the **no** form of this command to disable this feature.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables VAD for user **4444**:

```
(config)#voice user 4444  
(config-4444)#vad
```

AS PATH LIST COMMAND SET

To activate the Autonomous System (AS) Path List Configuration mode, enter the **ip as-path-list** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#ip as-class-list listname
(config-as-path-list)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

All other commands for this command set are described in this section in alphabetical order.

deny [on page 1382](#)

permit [on page 1383](#)

deny

Use the **deny** command to deny a BGP route that matches the as-path attributes.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example denies BGP routes that match as-path attributes:

```
(config)#ip as-path-list listname  
(config-as-path-list)#deny
```

permit

Use the **permit** command to allow a BGP route that matches the as-path attributes.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example permits BGP routes that match the as-path attributes:

```
(config)#ip as-path-list listname  
(config-as-path-list)#permit
```

CODEC LIST COMMAND SET

To activate the CODEC List Interface Configuration mode, enter the **voice codec-list trunk voice codec-list** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#voice codec-list trunk
(config-codec)#
```

(config)#**voice codec-list trunk**The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

codec [g711ulaw | g729] [on page 1385](#)

default [on page 1387](#)

codec [g711ulaw | g729]

Use the **codec** command to select either the g711ulaw or g729 CODEC for call negotiation for a specific CODEC list. For information on creating CODEC lists for call negotiation, see *codec-group <name>* on [page 1356](#).

Syntax Description

g711ulaw	Assigns g711ulaw as the preferred CODEC for negotiation.
g729	Assigns g729 (support for Annex A - no VAD) as the preferred CODEC for negotiation.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

The primary reason to assign CODEC lists is to save time. The lists can be created once and applied to many users. CODEC lists are lists of CODECs arranged in preferred order with the first listed CODEC being the most preferred for negotiation. The order of preference is used primarily to conserve bandwidth on WAN-based interfaces.

For example, create a CODEC list for users where g711ulaw is the first and g729 is the second CODEC listed (see *Usage Example* on the next page). Create a second list for trunks, where g729 is listed first and g711ulaw is listed second. Apply the user CODEC list to the users of interest, and apply the trunk CODEC list to the trunks of interest.

When a user makes an outbound call from an FXS port to a SIP trunk, the trunk will look at its CODEC list and query the user making the call as to which CODEC is to be used according to its CODEC list. It will query with the first CODEC (which in this example is g729). If this CODEC is listed in the CODEC list that is applied to the user (even though it is second), then g729 is agreed upon and the call will be converted and sent out the trunk. This is the most bandwidth conservative CODEC in this case.

When a user makes an outbound call from an FXS port to a SIP trunk, the trunk will query the user with the first CODEC on its list (which in this example is g729). If g729 is listed in the user's CODEC list (even though it is second), then g729 is agreed upon and the call will be converted and sent out the trunk. This is the most bandwidth conservative CODEC in this case.

Now imagine another analog user, in this case a fax machine where g729 is not viable. The user's CODEC list will only include g711ulaw. (You can use the **codec** command in the user command set and assign g711ulaw directly to the user rather than creating a separate list for this task. It should be noted that if an individual CODEC is assigned using the **codec** command and a CODEC list is also defined, then the individual CODEC will be processed first and the CODEC list will be processed second.) When the fax machine makes an outbound call, the trunk will again query the user if g729 is available. This query will fail to negotiate, and the trunk will query the user with the next CODEC in its list (g711ulaw). This CODEC will match the one listed for the user and be used to send the fax out the trunk.

Usage Examples

The following example selects the g729a CODEC (support for Annex A - no VAD) for call negotiation for the CODEC list **trunk**.

```
(config)#voice codec-list trunk  
(config-codec)#codec g729a
```

default

Use the **default** command to set a CODEC list as the default for call negotiaton.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets the CODEC list **trunk** as the default for call negotiation:

```
(config)#voice codec-list trunk  
(config-codec)#default
```

COMMUNITY LIST COMMAND SET

To activate the Community List Configuration mode, enter the **ip community-list** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#ip community-list listname
(config-comm-list)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

do [on page 1465](#)

All other commands for this command set are described in this section in alphabetical order.

deny [on page 1389](#)

permit [on page 1390](#)

deny

Use the **deny** command to deny a BGP route that matches the community number.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example denies BGP routes that match community numbers:

```
(config)#ip as-path-list listname
(config-comm-list)#deny
```

permit

Use the **permit** command to allow a BGP route that matches the community numbers.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the NetVanta 300, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example permits BGP routes that match the community numbers:

```
(config)#ip as-path-list listname
(config-comm-list)#permit
```

VOICE TRUNK GROUP COMMAND SET

To activate the Voice Trunk Group Configuration mode, enter the **voice grouped-trunk** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#voice grouped-trunk TestGroupvoice grouped-trunk TestGroup
(config-TestGroup)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

accept <pattern> [*cost* <cost value>] [on page 1392](#)

reject <pattern> [on page 1393](#)

resource-selection [*circular* | *linear*] [on page 1394](#)

trunk <trunk id> [on page 1395](#)

accept <pattern> [cost <cost value>]

Use the **accept** command to specify numbers users can dial on the trunk.

Syntax Description

<pattern>	Specifies the patterns users can dial on the trunk. You can use wildcards to help define accepted numbers. Wildcards are N= 2 to 9, M = 1 to 8, X = 0 to 9, and [1, 2, 3].
cost <cost value>	Specifies the cost value for the trunk. This option is used if a call is accepted by several trunks. The call will be routed to the trunk with the lowest cost value.

Default Values

The default cost value is zero.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

The available wildcards for this command are:

555-8123 = Any digit matches only itself.

X = Any single digit (0 to 9).

N = Any digit 2 to 9.

\$ = Any number of digits of any value.

[1, 2, 3] = Any single digit in this list.

The special characters (), -, + are always ignored.

- Examples:
- 1) 555-81XX matches 555-8100 to 555-8199.
 - 2) 555-812[0,1,2] matches 555-8120 to 555-8122.
 - 3) 1-800\$ matches any 1-800 calls.
 - 4) Nxx-xxxx matches 7 digit local.
 - 5) 1-Nxx-Nxx-xxxx matches LD calls North America.

Usage Examples

The following example allows users on the trunk **TestGroup** to dial any local number:

```
(config)#voice grouped-trunk TestGroup
```

```
(config-TestGroup)#accept Nxxxxxx
```


reject <pattern>

Use the **reject** command to specify numbers users cannot dial on the trunk.

Syntax Description

<pattern>	Specifies the patterns that users cannot dial on the trunk. You can use wildcards to help define rejected numbers. Wildcards are N = 2 to 9, M = 1 to 8, X = 0 to 9, and [1, 2, 3]. For example, you can enter 900\$ to prevent users from dialing all 900 numbers.
-----------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

The available wildcards for this command are:

555-8123 = Any digit matches only itself.

X = Any single digit (0 to 9).

N = Any digit 2 to 9.

\$ = Any number of digits of any value.

[1, 2, 3] = Any single digit in this list.

Punctuation characters (), -, + are always ignored.

- Examples:
- 1) 555-81XX matches 555-8100 to 555-8199.
 - 2) 555-812[0,1,2] matches 555-8120 to 555-8122.
 - 3) 1-800\$ matches any 1-800 calls.
 - 4) Nxx-xxxx matches 7 digit local.
 - 5) 1-Nxx-Nxx-xxxx matches LD calls North America.

Usage Examples

The following example blocks calls to any 900 number on the trunk **TestGroup**:

```
(config)#voice grouped-trunk TestGroup
(config-TestGroup)#reject 900$
```

resource-selection [circular | linear]

Use the **resource-selection** command to determine how the switchboard uses outbound call resources contained within a TDM-based trunk group.

Syntax Description

circular	Performs call load balancing among available DS0s/B-channels on this group. Subsequent calls will be delivered to the next available DS0/B-channel in a round-robin fashion.
linear	Specifies that a call being delivered to this group will be accepted out the first available DS0/B-channel available at the time the call is received.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies circular resource selection:

```
(config)#voice grouped-trunk TestGroup  
(config-TestGroup)#resource-selection circular
```

trunk <trunk id>

Use the **trunk** command to add an existing trunk to the trunk group so outbound calls may be placed out that trunk.

Syntax Description

<trunk id> Specifies an ID number for the trunk. The trunk ID is in the format Txx where xx is the trunk ID number. Enter a trunk ID between 1 and 99. For example, trunk **T02**.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example adds trunk T02 to the trunk group:

```
(config)#voice grouped-trunk TestGroup  
(config)#trunk t02
```

VOICE TRUNK SIP COMMAND SET

To activate the Voice Trunk Session Initiation Protocol (SIP) Interface Configuration mode, enter the **voice trunk** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#voice trunk T01 type sip
(config-T01)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

description <text> [on page 1464](#)

do [on page 1465](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

authentication username <username> *password* <password> [on page 1397](#)

caller-id-override <number> [on page 1398](#)

codec-group <groupname> [on page 1399](#)

match <number> *substitute* <number> [on page 1400](#)

outbound-proxy primary <FQDN or IP address> [*udp* <port#>] [on page 1401](#)

registrar primary <FQDN or IP address> [*udp* <port#>] [on page 1402](#)

reject-external [on page 1403](#)

sip-server primary <FQDN or IP address> [*udp* <port#>] [on page 1404](#)

authentication username <username> password <password>

Use the **authentication** command to enable authentication between the SIP server and the unit. Use the **no** form of this command to return to default settings.

Syntax Description

username <username>	Specifies a string to be sent as the username in authentication.
password <password>	Specifies a string to be sent as the password in authentication.

Default Values

By default, authentication is not enabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

If all users on the trunk use the same username/password, enter the username and password for authentication under the trunk. Otherwise, enter authentication information for each user individually in the Voice User command set. See *Voice User Command Set* [on page 1351](#) for more information.

Usage Examples

The following example configures a username and password at the trunk level:

```
(config)#voice trunk T01 type sip
(config-T01)#authentication username iaduser password totalaccess
```

caller-id-override <number>

Use the **caller-id-override** command to override the caller ID information for this trunk with a specified number.

Syntax Description

<number> Specifies the caller ID number to display.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example displays the number 4422 on the caller ID display for this trunk:

```
(config)#voice trunk T01 type sip  
(config-T01)#caller-id-override 4422
```

codec-group <groupname>

Use the **codec-group** command to apply a CODEC list to an SIP trunk. Use the **no** form of this command to return to default settings.

Syntax Description

<groupname> Specifies the name of the CODEC list you wish to apply to the trunk.

Default Values

By default, there is no CODEC group configured.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Functional Notes

Order is important. The trunk attempts to use the first CODEC in the list to negotiate a call. If the first CODEC negotiation is unsuccessful, the trunk uses the second CODEC in the list. If this is unsuccessful, the call will fail. For information on defining CODEC groups, see *codec-group* <name> on page 1356.

Usage Examples

The following example sets the CODEC group to **729only** (a CODEC list that has already been configured):

```
(config)#voice trunk T01 type sip
(config-T01)#codec-group 729only
```

match <number> **substitute** <number>

Use the **match substitute** command to substitute a different number for the number originally dialed by a user. If no match occurs (or no match statements have been entered) the original dialed number is propagated without being modified. Use the **no** form of this command to return to default settings.



You can enter multiple match commands on each trunk. If multiple valid match statements exist for a given dialed number, the first rated match is used.. Therefore, order of input is important.

Syntax Description

match <number> Specifies the dialed number you are trying to match.
substitute <number> Specifies the number to be sent in place of the first argument matched.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example attempts to match the dialed number 555-8000 and specifies that number 555-8500 be sent if no match occurs:

```
(config)#voice trunk T01 type sip  
(config-T01)#match 5558000 substitute 5558500
```

outbound-proxy primary <FQDN or IP address> [udp <port#>]

Use the **outbound-proxy primary** command to define the primary name/address of the SIP proxy server to which the trunk will send all SIP messages. Use the **no** form of this command to return to default settings.

Syntax Description

<FQDN or IP address>	Specifies the FQDN or IP address of the outbound proxy server.
udp <port#>	Optional. Sets the UDP port of the outbound proxy server. Port number range: 0 to 65,535

Default Values

By default, the IP address is set to 0.0.0.0 and the UDP port is set to 5060.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

The configured value must resolve to a valid IP address.

Usage Examples

The following example sets the outbound proxy server to **sip-proxy.adtran.com** with a udp port of **2222**:

```
(config)#voice trunk T01 type sip
(config-T01)#outbound-proxy primary sip-proxy.adtran.com udp 2222
```

registrar primary <FQDN or IP address> [udp <port#>]

Use the **registrar primary** command to define the primary SIP registrar FQDN name or IP address. Use the **no** form of this command to return to default settings.

Syntax Description

<FQDN or IP address>	Specifies the FQDN or IP address of the registrar server.
udp <port#>	Optional. Sets the UDP port of the registrar server. Port number range: 0 to 65,535.

Default Values

By default, the IP address is set to 0.0.0.0 and the UDP port is set to 5060.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

This command specifies which trunk will send SIP register messages. The configured value must resolve to a valid IP address.

Usage Examples

The following example sets the registrar server to **as1.adtran.com** with a UDP port of **9060**:

```
(config)#voice trunk T01 type sip
(config-T01)#registrar primary as1.adtran.com udp 9060
```

reject-external

Use the **reject-external** command to prevent inbound calls on the trunk from being accidentally routed back out the same trunk. Use the **no** form of this command to return to default settings.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

In general, trunks are assigned to the user role, which means they terminate lines from a Telco provider. If this is the case, **reject-external** should be enabled so that inbound calls on the trunk cannot be accidentally routed back out the same trunk. If a poor configuration is used, inbound long-distance calls could be routed back out the same trunk incurring long-distance charges. For network-role trunks and SIP-based trunks, this command should be disabled to allow calls to be properly routed in the unit.

Usage Examples

The following example activates **reject-external**:

```
(config)#voice trunk T01 type sip
(config-T01)#reject-external
```

sip-server primary <FQDN or IP address> [udp <port#>]

Use the **sip-server primary** command to define the primary name/address of the SIP server to which the trunk will send call-related SIP messages. Use the **no** form of this command to return to default settings.

Syntax Description

<FQDN or IP address> Specifies the FQDN or IP address of the SIP proxy server.
udp <port#> Optional. Sets the UDP port of the SIP proxy server. Port number range: 0 to 65,535

Default Values

By default, the IP address is set to 0.0.0.0 and the UDP port is set to 5060.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets the SIP proxy server to **as1.adtran.com** with a udp port of **9060**:

```
(config)#voice trunk T01 type sip
(config-T01)#sip-server primary as1.adtran.com udp 9060
```

VOICE TRUNK T1 WINK COMMAND SET

To activate the Voice Trunk T1 Wink Interface Configuration mode, enter the following command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#voice trunk t01 type t1-rbs supervision wink role network
(config-T01)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
on page 1461

description <text> on page 1464

do on page 1465

exit on page 1467

All other commands for this command set are described in this section in alphabetical order.

busy all [now] on page 1406

busy t1 <slot/port> tdm-group <group#> <now> on page 1407

codec-group <name> on page 1408

connect t1 <slot/port> tdm-group <group#> on page 1409

did digits-transferred <#digits> [prefix <prefix#>] on page 1410

echo-cancellation on page 1411

match <number> substitute <number> on page 1412

reject-external on page 1413

resource-selection [circular | linear] on page 1414

rtp dtmf-relay [inband | nte <event-value>] on page 1415

rtp frame-packetization <milliseconds> on page 1416

rtp jitter-delay maximum <milliseconds> on page 1417

rtp qos dscp <code> on page 1418

vad on page 1419

busy all [now]

Use the **busy all** command to set all DS0s to busy so that no calls are allowed inbound or outbound. If any calls are active at the time this command is issued, the calls will stay active until either party hangs up to terminate the call. Once terminated, the DS0s are busied out. Use the **no** form of this command to return to default settings.

Syntax Description

now	Optional. Terminates calls that are active at the time the command is issued (for example, in the middle of a conversation).
------------	--

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets all DS0s on trunk T01 to busy and terminates calls that are active at the time the command is issued:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network  
(config-T01)#busy all now
```

busy t1 <slot/port> tdm-group <group#> <now>

Use the **busy t1** command to set a particular set of DS0s (defined in a TDM group) to busy so that no calls are allowed inbound or outbound. If any calls are active at the time this command is issued, the calls will stay active until either party terminates the call. Once terminated, the DS0s are set to busy.

Syntax Description

<slot/port>	Specifies the slot/port for the T1.
tdm-group <group#>	Specifies the TDM group ID number.
<now>	Terminates calls that are active at the time the command is issued (for example, in the middle of a conversation).

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example sets DS0s in TDM group 2 to busy and terminates calls that are active when the command is issued:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network
(config-T01)#busy t1 0/1 tdm-group 2 now
```

codec-group <name>

Use the **codec-group** command to specify the CODEC group to use for this trunk. For information on defining CODEC groups, see *codec-group <name>* [on page 1356](#).

Syntax Description

<name> Specifies the name of the CODEC group you want to use.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example associates the CODEC group **user** with this trunk:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network  
(config-T01)#codec-group user
```


connect t1 *<slot/port>* **tdm-group** *<group#>*

Use the **connect t1** command to specify the DS0s that this trunk will be using.

Syntax Description

<slot/port> Specifies the slot/port for the T1.
tdm-group *<group#>* Specifies the TDM group ID number.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example specifies that this trunk will use the DS0s in TDM group 3:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network  
(config-T01)#connect t1 0/1 tdm-group 3
```

did digits-transferred <#digits> [prefix <prefix#>]

Use the **did digits-transferred** command to define how many of the received digits should be sent to the internal switchboard from an incoming call on a User Role Trunk. The number of digits transferred are the least digits received. Direct Inward Dialing (DID) should be used if a Telco provider is providing digits to the unit on inbound calls or if the unit needs to provide DID information to a piece of CPE equipment.

Syntax Description

<#digits>	Specifies the number of digits to be transferred (1 to 16).
prefix <prefix#>	Optional. Specifies a sequence of digits to be prepended to the digits that will be transmitted. For example, if seven digits will be transferred via DID, then prefix the seven digits with 256. Thus 555-8000 would be prefixed with 256, transmitting out the string of digits 256-555-8000.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

User Role Example:

555-1000 is an incoming call on the trunk. With **did** set to 4, the number 1000 should be sent to the switchboard. On a network role trunk, the **did** command allows you to define how many of the digits from the Accept criteria should be sent externally from a call that was routed by the switchboard. The number of digits transferred are the least significant digits received.

Network Role Example:

555-1000 is accepted on the UT interface. With DID Digits Transferred set to 4, the number of 1000 will be sent to the device connected to the UT interface. This command cannot be specified if and when **trunk-number** is being used. Conversely, if **did** is used, **trunk-number** will not be allowed.

Usage Examples

The following example transfers the digits 555-8000 and adds the prefix 256:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network
(config-T01)#did digits-transferred 5558000 prefix 256
```

echo-cancellation

Use the **echo-cancellation** command to improve voice quality for packetized-based voice calls such as VoIP or MGCP.

Syntax Description

No subcommands.

Default Values

Echo-cancellation is on by default.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example activates **echo-cancellation**:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network  
(config-T01)#echo-cancellation
```

match <number> **substitute** <number>

Use the **match substitute** command to substitute a different number for the number originally dialed by a user of the system. If no match occurs (or no match statements have been entered) the original dialed number will be propagated without being modified. Use the **no** form of this command to return to default settings.



You may enter multiple match commands on each trunk. The first valid match that is found for outbound numbers will be used in configurations where more than one match statement might be valid for a given dialed number. Therefore, order of input is important.

Syntax Description

match <number>	Specifies the dialed number that you are trying to match.
substitute <number>	Specifies the number that will be sent in place of the first argument that was matched.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example attempts to match the dialed number 555-8000 and specifies that number 555-8500 will be sent if no match occurs:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network
(config-T01)#match 5558000 substitute 5558500
```

reject-external

Use the **reject-external** command to make sure inbound calls on the trunk cannot be accidentally routed back out the same trunk. Use the **no** form of this command to return to default settings.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Functional Notes

In general, trunks are assigned to the user role, which means they terminate lines from a Telco provider. If this is the case, you want to have **reject-external** enabled so that inbound calls on the trunk cannot be accidentally routed back out the same trunk. If a poor configuration is used, inbound long distance calls could be routed back out the same trunk. This would cause the owner of the unit to be charged unknowingly for long distance calls. For network-role trunks and SIP-based trunks, this command should be disabled to allow calls to be properly routed in the unit.

Usage Examples

The following example activates **reject-external**:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network
(config-T01)#reject-external
```

resource-selection [circular | linear]

Use the **resource-selection** command to determine how the switchboard uses outbound call resources contained within a TDM-based trunk group.

Syntax Description

circular	Performs call load balancing among available DS0s/B-channels on this group. Subsequent calls will be delivered to the next available DS0/B-channel in a round-robin fashion.
linear	Specifies that a call being delivered to this group will be accepted out the first available DS0/B-channel available at the time the call is received.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example specifies circular resource selection:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network
(config-T01)#resource-selection circular
```

rtp dtmf-relay [inband | nte <event-value>]

Use the **rtp dtmf-relay** command to configure the method by which Realtime Transport Protocol (RTP) Dual Tone Multi-Frequency (DTMF) events are relayed, either inband in the RTP stream or out-of-band using Named Telephone Events (NTE).

Syntax Description

inband	Configures RTP DTMF relay events for inband.
nte <event-value>	Configures RTP DTMF relay events for NTE. Enter a value between 96 and 127.

Default Values

By default, the **rtp dtmf-relay** is set for NTE 101.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example configures RTP DTMF relay events for NTE:

```
(config)#voice trunk T02 type t1-rbs supervision wink role network
```

```
(config-T02)#rtp dtmf-relay nte 101
```

rtp frame-packetization <milliseconds>

Use the **rtp frame-packetization** command to configure the Realtime Transport Protocol (RTP) frame packetization time in milliseconds for individual trunks and users.

Syntax Description

<milliseconds> Configures the RTP frame packetization time in milliseconds. Select from 10, 20, or 30.

Default Values

By default, the **rtp frame-packetization** time is set to 20 milliseconds on all trunks and users.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example sets the frame packetization time for trunk T01 to 20 milliseconds:

```
(config)#voice trunk t01 type t1-rbs supervision wink  
(config-t01)#rtp frame-packetization 20
```


rtp jitter-delay maximum <milliseconds>

Use the **rtp jitter-delay maximum** command to configure the maximum Realtime Transport Protocol (RTP) jitter delay on individual trunks or users.

Syntax Description

<milliseconds> Configures the maximum RTP jitter delay time in milliseconds. Enter a value between 10 and 100 in 10 millisecond intervals.

Default Values

The default **rtp jitter-delay maximum** value is 100 milliseconds.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3 Command was introduced.

Usage Examples

The following example configures the maximum RTP jitter delay on trunk T01 to 20 milliseconds:

```
(config)#voice trunk t01 type t1-rbs supervision wink role network  
(config-T01)#rtp jitter-delay maximum 20
```

rtp qos dscp <code>

Use the **rtp qos dscp** command to configure the maximum Realtime Transport Protocol (RTP) quality of service (QoS) parameters for differentiated services code point (DSCP).

Syntax Description

<code><code></code>	Configures the RTP QoS parameter for differentiated services code point. Enter a value between 10 and 63.
---------------------------	---

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

By setting the **rtp qos dscp** value on an individual trunk or user, you will override the global **rtp qos dscp** setting for RTP packets. The following example sets the DSCP value for RTP packets that trunk T02 generates to 46.

```
(config)#voice trunk T02 type t1-rbs supervision wink role network  
(config-T02)#rtp qos dscp 46
```

vad

Use the **vad** command to enable voice activation detection.

Syntax Description

No subcommands.

Default Values

By default, **vad** is enabled for all T1 RBS trunks and users.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 9.3	Command was introduced.
-------------	-------------------------

Usage Examples

The following example enables voice activation detection on trunk T02:

```
(config)#voice trunk t02 type t1-rbs supervision wink  
(config-T02)#vad
```

VOICE CoS COMMAND SET

To activate the Voice Class-of-Service mode, enter the **voice class-of-service** command at Global Configuration command prompt. For example:

```
>enable
#configure terminal
(config)# voice class-of-service set 1
(config-cos-set1)#
```

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

do [on page 1465](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

billing-codes [on page 1422](#)

block-callerid [on page 1423](#)

call-privilege [*900-number* | *all* | *extensions* | *international* | *local* | *long-distance* | *operator-assisted* | *specify-carrier* | *toll-free* | *user*] [on page 1424](#)

camp-on [on page 1426](#)

conference [on page 1427](#)

default-level [on page 1428](#)

deny-template <*template*> [on page 1429](#)

disable-callwaiting [on page 1430](#)

dnd [on page 1431](#)

external-fwd [on page 1432](#)

forward [on page 1433](#)

hold [on page 1434](#)

hotel [on page 1435](#)

message-waiting [on page 1436](#)

override-passcode <*passcode*> [on page 1437](#)

permit-template <*template*> [on page 1438](#)

redial [on page 1439](#)

remote-fwd [on page 1440](#)

rename <name> [on page 1441](#)

return-last-call [on page 1442](#)

station-lock [on page 1443](#)

system-mode [on page 1444](#)

transfer [on page 1445](#)

trunk-trunk [on page 1446](#)

billing-codes

Use the **billing-codes** command to enable account code collection. If enabled, the user must enter a billing code prior to dialing a number. Use the **no** form of this command to disable account code collection.

Syntax Description

No subcommands.

Default Values

By default, billing codes are disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables account code collection in rule set set1:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#billing-codes
```

block-callerid

Use the **block-callerid** command to block caller ID for outbound calls. Use the **no** form of this command to allow caller ID for outbound calls.

Syntax Description

No subcommands.

Default Values

By default, per call outbound call ID block is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example blocks caller ID for outbound calls in rule set set1:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#block-callerid
```

call-privilege [900-number | all | extensions | international | local | long-distance | operator-assisted | specify-carrier | toll-free | user]

Use the **call-privilege** command to assign general call privileges for outbound access. This determines what type of calls a user is permitted to make as a member of this CoS. Use the **no** form of this command to remove general call privileges for outbound access.

Syntax Description

900-number	Permits 900 calls in the form 1-900-NXX-XXXX and 976-XXXX.
all	Permits all calls.
extensions	Permits internal calls.
international	Permits international calls in the form 011-number.
local	Permits local calls in the form NXX-XXXX.
long-distance	Permits long distance calls in the form 1-NXX-NXX-XXXX.
operator-assisted	Permits operator assisted calls.
specify-carrier	Permits calls that specify carrier.
toll-free	Permits toll free calls.
user1	Permits calls that match the 1st user-defined template.
user2	Permits calls that match the 2nd user-defined template.
user3	Permits calls that match the 3rd user-defined template.

Valid characters include: 0-9 - Any single digit.
 X - Any single digit 0-9.
 N - Any single digit 2-9.

Default Values

By default, no call privileges are enabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example permits long distance calls:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#call-privilege long-distance
```

camp-on

Use the **camp-on** command to allow automatic retry of a busy extension. Use the **no** form of this command to disable automatic retry.

Syntax Description

No subcommands.

Default Values

By default, camp on is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables automatic retry of a busy extension:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#camp-on
```

conference

Use the **conference** command to allow initiation of 3-way conference calls. Use to **no** form of this commands to disallow initiation of 3-way conference calls.

Syntax Description

No subcommands.

Default Values

By default, 3-way conference calls are not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the initiation of 3-way conference calls:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#conference
```

default-level

Use the **default-level** command to set this CoS level as the default. When enabled, new users that are added to the system are assigned this CoS by default. To change the default from this CoS level, use the **no** form of this command.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example sets the rle set set1 as the default CoS level:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#default-level
```

deny-template <template>

Use the **deny-template** command to configure a number template that specifies calls users in this CoS are not allowed to make. Use the **no** form of this command to remove a deny template.

Syntax Description

<template>	Specifies number template. All calls matching this pattern will be denied. Valid characters include: 0-9 - Any single digit. X - Any single digit 0-9. N - Any single digit 2-9. M - Any single digit 2-8. [] - Any single digit of those within the brackets. -(), - Punctuation characters that are ignored. For example: 963-81XX matches 963-8100 through 963-8199. 963-812[0,1,2] matches 963-8120 through 963-8122.
------------	---

Default Values

No default necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example denies the user the ability to make any call beginning with **963**:

```
(config)#voice class-of-service set1
```

```
Configuring Existing Level "set1".
```

```
(config-cos-set1)#deny-template 963-xxxx
```

disable-callwaiting

Use the **disable-callwaiting** command to allow call waiting to be disabled. Use the **no** form of this command to deny disabling of call waiting.

Syntax Description

No subcommands.

Default Values

By default, disable-callwaiting is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the user to disable callwaiting:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#disable-callwaiting
```

dnd

Use the **dnd** command to enable do-not-disturb. Do-not-disturb makes the line appear busy to incoming calls. Use the **no** form of this command to disable do not disturb.

Syntax Description

No subcommands.

Default Values

By default, do-not-disturb is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables the do-not-disturb feature:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#dnd
```

external-fwd

Use the **external-fwd** command to allow forwarding of calls to an external number. Use the **no** form of this command to deny forwarding of calls to an external number.

Syntax Description

No subcommands.

Default Values

By default, forwarding calls to an external number is not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the user to forward calls to an external number:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#external-fwd
```


forward

Use the **forward** command to allow the forwarding of calls. Use the **no** form of this command to deny the forwarding of calls.

Syntax Description

No subcommands.

Default Values

By default, call forwarding is not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the user to forward calls:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#forward
```

hold

Use the **hold** command to allow the user to place calls on hold. Use the **no** form of this command to deny placing calls on hold.

Syntax Description

No subcommands.

Default Values

By default, placing a call on hold is not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables the user to place a call on hold:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#hold
```

hotel

Use the **hotel** command to allow extension reassignment to an alternate phone. Use the **no** form of this command to deny extension reassignment.

Syntax Description

No subcommands.

Default Values

By default, the hotel feature is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables the user to assign an extension to be reassigned to an alternate phone:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#hotel
```

message-waiting

Use the **message-waiting** command to allow message waiting indicator control. This allows the user to change the manner in which message notification takes place. Use the **no** form of this command to deny message waiting indicator control.

Syntax Description

No subcommands.

Default Values

By default, message waiting indicator control is not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example allows the user to manage message waiting indicators:

```
(config)#voice class-of-service set1
```

```
Configuring Existing Level "set1".
```

```
(config-cos-set1)#message-waiting
```

override-passcode <passcode>

Use the **override-passcode** command to assign an override passcode. This four-digit code is used in conjunction with the CoS override feature and enables a user to override an extension's configured CoS with the new CoS as defined by the passcode. Use the **no** form of this command to remove an override passcode.

Syntax Description

<passcode> Specifies passcode in form xxxx.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example sets the override passcode to **1234**:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#override-passcode 1234
```

permit-template <template>

Use the **permit-template** command to configure a number template that specifies calls users in this CoS are allowed to make. Use the **no** form of this command to remove a permit template.

Syntax Description

<template>	Specifies number template. All calls matching this pattern will be denied. Valid characters include: 0-9 - Any single digit. X - Any single digit 0-9. N - Any single digit 2-9. M - Any single digit 2-8. [] - Any single digit of those within the brackets. -(), - Punctuation characters that are ignored. For example: 963-81XX matches 963-8100 through 963-8199. 963-812[0,1,2] matches 963-8120 through 963-8122.
------------	---

Default Values

No Default necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows users to make any call beginning with **963**:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#permit-template 963-xxxx
```

redial

Use the **redial** command to allow the user to use the redial functionality of the system to redial the last number dialed. Use the **no** form of this command to deny last number redial.

Syntax Description

No subcommands.

Default Values

By default, the last number redial feature is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables the last number redial feature:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#redial
```

remote-fwd

Use the **remote-fwd** command to allow a user to enable call forwarding from a remote location. Use the **no** form of this command to deny remote forwarding.

Syntax Description

No subcommands.

Default Values

By default, remote forwarding is not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables remote forwarding of a phone:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#remote-fwd
```


rename *<name>*

Use the **rename** command to rename the CoS rule set.

Syntax Description

<name> Specifies the new name of the CoS rule set.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example changed the name of rule set set1 to **accounting**:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#rename accounting
```

```
(config-cos-accounting)#
```

return-last-call

Use the **return-last-call** command to allow returning the last call received. Use the **no** form of this command to deny returning the last call received.

Syntax Description

No subcommands.

Default Values

By default, the return-last-call feature is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the user to return the last call received:

```
(config)#voice class-of-service set1
```

```
Configuring Existing Level "set1".
```

```
(config-cos-set1)#return-last-call
```

station-lock

Use the **station-lock** command to allow user to place an extension in a locked mode for outbound calls. Use the **no** form of this command to unlock the extension.

Syntax Description

No subcommands.

Default Values

By default, the station-lock feature is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the user to lock station:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#station-lock
```

system-mode

Use the **system-mode** command to configure system modes (day/night/etc.) of operation. Use the **no** form of this command to disable system mode of operation.

Syntax Description

No subcommands.

Default Values

By default, system-mode is disabled.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables configuration system mode:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#system-mode
```

transfer

Use the **transfer** command to allow user to perform call transfers. Use the **no** form of this command to disable call transfers.

Syntax Description

No subcommands.

Default Values

By default, call transfers are not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example allows the user to perform call transfers:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#transfer
```

trunk-trunk

Use the **trunk-trunk** command to allow trunk-to-trunk transfer. This allows users the ability to connect one external call to another external call or number. Use the **no** form of this command to deny trunk-to-trunk transfers.

Syntax Description

No subcommands.

Default Values

By default, trunk-to-trunk transfers are not allowed.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example enables trunk to trunk transfers:

```
(config)#voice class-of-service set1
```

Configuring Existing Level "set1".

```
(config-cos-set1)#trunk-trunk
```

VOICE RING GROUP COMMAND SET

To activate the Voice Ring Group Interface Configuration mode, enter the **voice ring-group** command at the Global Configuration mode prompt. For example:

```
>enable
#configure terminal
(config)#voice ring-group xxxx*
(config-xxxx)#
```

*where xxxx = the ring group's four-digit extension.

The following commands are common to multiple command sets and are covered in a centralized section of this guide. For more information, refer to the sections listed below:

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

exit [on page 1467](#)

All other commands for this command set are described in this section in alphabetical order.

assistant-extension <extension> [on page 1448](#)

coverage [external | internal] <number> [on page 1449](#)

did <number> [on page 1450](#)

executive-extension <extension> [on page 1451](#)

extension <extension> [on page 1452](#)

login-member <extension> [on page 1453](#)

max-inbound <number> [on page 1454](#)

member <extension> [on page 1455](#)

num-rings <number> [on page 1456](#)

prefix [on page 1457](#)

type [all | executive | linear | ucd] [on page 1458](#)

assistant-extension <extension>

Use the **assistant-extension** command to tie an assistant's extension to an executive's extension.



*This command only applies to a ring groups of **type executive**. Refer to type [*all | executive | linear | ucd*] [on page 1458](#) for more information*

Syntax Description

<extension> Specifies the number for the assistant.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Functional Notes

This command is used in conjunction with the **executive-extension** command (refer to *executive-extension* <extension> [on page 1451](#)). When the executive's extension is dialed, both the assistant's and the executive's phones will ring. If neither phone is answered (or both are busy or set to do-not-disturb), the call is forwarded through the executive's call coverage list.

Usage Examples

The following example creates the executive ring group **1234** and causes both the executive (extension **1234**) and the assistant (extension **4444**) phones to ring when the executive extension is dialed:

```
(config)#voice ring-group 1234
(config-1234)#type executive
(config-1234)#executive-extension 1234
(config-1234)#assistant-extension 4444
```


coverage [external | internal] <number>

Use the **coverage** command to configure call parameters for this group, allowing you to forward an unanswered call to alternate numbers.



*This command does not apply to a ring groups of **type executive**. Refer to type [all | executive | linear | ucd] on [page 1458](#) for more information*

Syntax Description

external	Forwards a call to an external number.
internal	Forwards a call to an internal extension.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Functional Notes

You may configure up to five call coverage options. If the call is not answered (or the phone is busy or on do-not-disturb), the call coverage options are executed in the order they were configured.

Usage Examples

The following example creates a three-option coverage list for unanswered calls for ring group **1234**:

```
(config)#voice ring-group 1234
(config-1234)#coverage external 5557772222
(config-1234)#coverage internal 8743
(config-1234)#coverage internal 9473
```

did <number>

Use the **did** command to configure Direct Inward Dialing (DID) for this group. DID is used if a service provider is providing digits to the unit on inbound calls or if the unit needs to provide DID information to a piece of CPE equipment.

Syntax Description

<number> Defines the DID number assigned to the ring group.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example assigns DID **44** to the ring group **1234**:

```
(config)#voice ring-group 1234  
(config-1234)#did 44
```

executive-extension <extension>

Use the **executive-extension** command to tie an executive's extension to an assistant's extension.



*This command only applies to a ring groups of **type executive**. Refer to type [all | executive | linear | ucd] on page 1458 for more information*

Syntax Description

<extension> Specifies the executive's extension.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Functional Notes

This command is used in conjunction with the **assistant-extension** command (refer to *assistant-extension* <extension> on page 1448). When the executive's extension is dialed, both the assistant's and the executive's phones will ring. If neither phone is answered (or both are busy or set to do-not-disturb), the call is forwarded through the executive's call coverage list.

Usage Examples

The following example creates the executive ring group **1234** and causes both the executive (extension **1234**) and the assistant (extension **4444**) phones to ring when the executive extension is dialed:

```
(config)#voice ring-group 1234
(config-1234)#type executive
(config-1234)#executive-extension 1234
(config-1234)#assistant-extension 4444
```

extension <extension>

Use the **extension** command to change the extension for this ring group.

Syntax Description

<extension> Specifies the extension of the ring group.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example changes the extension of the ring group **1234** to **4321**:

```
(config)#voice ring-group 1234  
(config-1234)#extension 4321  
(config-4321)#
```

login-member <extension>

Use the **login-member** command to log an existing member of the ring group into the system. You must first use the **member** command to create a new group member. Refer to *member <extension>* on page 1455 for more information.

Syntax Description

<extension> Specifies the extension of the user who is logging in.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Functional Notes

This command allows a user to log in and out of a ring group, letting the system know when a user is available to accept calls.

Usage Examples

The following example logs in the user at extension **4422**:

```
(config)#voice ring-group 1234
(config-1234)#login-member 4422
```

max-inbound <number>

Use the **max-inbound** command to define the maximum number of calls that can be inbound at the same time.

Syntax Description

<number>	Specifies the maximum number of calls that can be inbound at the same time. Valid range: 1 to 10.
----------	--

Default Values

By default, the maximum number of inbound calls is set to 1.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example sets the maximum number of inbound calls on ring group **1234** to **7**:

```
(config)#voice ring-group 1234  
(config-1234)#max-inbound 7
```

member <extension>

Use the **member** command to create a new member of the ring group. Use the **no** form of this command to remove a user's extension from a ring group.

Syntax Description

<extension> Specifies the extension of the user you want to add as a ring group member.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Functional Note

A user can log in and out of the ring group using the **login-member** and **no login-member** commands. Refer to *login-member* <extension> [on page 1453](#) for more information

Usage Examples

The following example adds the user at extension **4422** to the ring group **1234**:

```
(config)#voice ring-group 1234  
(config-1234)#member 4422
```

num-rings <number>

Use the **num-rings** command to define the maximum number of rings allowed at each extension in the ring group before the call is forwarded as specified by the ring group's coverage list.

Syntax Description

<number> Specifies the maximum number of rings for the ring group. Valid range: 2 to 10.

Default Values

By default, the maximum number of rings allowed at each extension is 2.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1 Command was introduced.

Usage Examples

The following example sets the maximum number of rings for the ring group **1234** to **6**:

```
(config)#voice ring-group 1234  
(config-1234)#num-rings 6
```


prefix

Use the **prefix** command to turn on the caller ID prefix for this ring group, causing **GRP:** to display in front of the caller ID information. Use the **no** form of this command to turn the prefix off.

Syntax Description

No subcommands.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example turns on the caller ID prefix for ring group **1234**:

```
(config)#voice ring-group 1234  
(config-1234)#prefix
```

type [all | executive | linear | ucd]

Use the **type** command to configure the group type for the ring group.

Syntax Description

all	Configures the group as an all-inclusive ring group. When a ring group call comes in, all phones ring simultaneously.
executive	Configures an executive ring group. Refer to <i>executive-extension</i> <extension> on page 1451 for more information.
linear	Configures the group as a linear hunt ring group. Member phones ring one at a time until the call is picked up. When the next call comes in, the call cycle begins again by ringing the first ring group member. Refer to <i>member</i> <extension> on page 1455 for more information.
ucd	Configures the group as a Uniform Call Distribution (UCD) ring group. Member phones ring one at a time until the call is picked up. When the next call comes in, the system remembers which member extension it last dialed and then continues the call cycle by ringing the next member in the ring group.

Default Values

No default value necessary for this command.

Applicable Platforms

This command applies to the Total Access 900 Series units.

Command History

Release 10.1	Command was introduced.
--------------	-------------------------

Usage Examples

The following example configures the ring group **1234** to ring all phones in the ring group each time a call comes in:

```
(config)#voice ring-group 1234
(config-1234)#type all
```

COMMON COMMANDS

The following section contains descriptions of commands which are common across multiple command sets. These commands are listed in alphabetical order.

alias <"text"> [on page 1460](#)

cross-connect <#> <from interface> <slot/port> <tdm-group#> <to interface> <slot/port>
[on page 1461](#)

description <text> [on page 1464](#)

do [on page 1465](#)

end [on page 1466](#)

exit [on page 1467](#)

shutdown [on page 1468](#)

alias <“text”>

Use the **alias** command to populate the ifAlias OID (Interface Table MIB of RFC2863) for all physical and virtual interfaces when using SNMP management stations.

Syntax Description

<“text”>	Describes the interface (for SNMP) using an alphanumeric character string enclosed in quotation marks (no more than 64 characters).
----------	---

Default Values

No defaults required for this command.

Applicable Command Modes

Applies to all interface mode command sets.

Applicable Platforms

Applies to all AOS products.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Functional Notes

The ifAlias OID is a member of the ifXEntry object-type (defined in RFC2863) used to provide a non-volatile, unique name for various interfaces. This name is preserved through power cycles. Enter a string (using the **alias** command) which clearly identifies the interface.

Usage Examples

The following example defines a unique character string for the T1 interface:

```
(config)#interface t1 1/1
(config-t1 1/1)#alias "CIRCUIT_ID_23-908-8887-401"
```

Technology Review

Please refer to RFC2863 for more detailed information on the ifAlias display string.

cross-connect <#> <from interface> <slot/port> <tdm-group#>
<to interface> <slot/port>

Use the **cross-connect** command to create a cross-connect map from a created TDM group on an interface to a virtual interface.



Changing **cross-connect** settings could potentially result in service interruption.

Syntax Description

<#>	Identifies the cross-connect using a number descriptor or label for (useful in systems that allow multiple cross-connects).
<from interface>	Specifies the interface (physical or virtual) on one end of the cross-connect. Enter cross-connect 1 ? for a list of valid interfaces.
<slot/port>	Used when a physical interface is specified in the <from interface> subcommand (For example: specifying the T1 port of a T1 module would be t1 1/1).
<tdm-group#>	Specifies which configured TDM group to use for this cross-connect. This subcommand only applies to T1 physical interfaces.
<to interface>	Specifies the virtual interface on the other end of the cross-connect. Use the ? to display a list of valid interfaces.
<slot/port>	Used when a physical interface is specified in the <to interface> subcommand. (For example, specifying the primary T1 port of a T1 module would be t1 1/1).

Default Values

By default, there are no configured cross-connects.

Applicable Platforms

This command applies to the NetVanta 300, 1000, 1000R, 2000, 3000, 4000, and 5000 and Total Access 900 Series units.

Command History

Release 1.1	Command was introduced.
Release 5.1	Command was expanded to include the E1 interface.

Functional Notes

Cross-connects provide the mechanism for connecting a configured virtual (layer 2) endpoint with a physical (layer 1) interface. Supported layer 2 protocols include Frame Relay and point-to-point protocol (PPP).

Usage Examples

The following example creates a Frame Relay endpoint and connects it to the T1 1/1 physical interface:

1. Create the Frame Relay virtual endpoint and set the signaling method:

```
(config)# interface frame-relay 1  
(config-fr 1)# frame-relay lmi-type cisco
```

2. Create the sub-interface and configure the PVC parameters (including DLCI and IP address):

```
(config-fr 1)# interface fr 1.1  
(config-fr 1.1)# frame-relay interface-dlci 17  
(config-fr 1.1)# ip address 168.125.33.252 255.255.255.252
```

3. Create the TDM group of 12 DS0s (64K) on the T1 physical interface:
(THIS STEP IS ONLY VALID FOR T1 INTERFACES.)

```
(config)# interface t1 1/1  
(config-t1 1/1)# tdm-group 1 timeslots 1-12 speed 64  
(config-t1 1/1)# exit
```

4. Connect the Frame Relay sub-interface with port T1 1/1:

```
(config)# cross-connect 1 t1 1/1 1 fr 1
```

Technology Review

Creating an endpoint that uses a layer 2 protocol (such as Frame Relay) is generally a four-step process:

Step 1:

Create the Frame Relay virtual endpoint (using the **interface frame-relay** command) and set the signaling method (using the **frame-relay lmi-type** command). Also included in the Frame Relay virtual endpoint are all the applicable Frame Relay timers logging thresholds, encapsulation types, etc. Generally, most Frame Relay virtual interface parameters should be left at their default state. For example, the following creates a Frame Relay interface labeled **7** and sets the signaling method to **ansi**.

```
(config)# interface frame-relay 7  
(config-fr 7)# frame-relay lmi-type ansi
```

Step 2:

Create the sub-interface and configure the PVC parameters. Using the sub-interface , apply access policies to the interface, create bridging interfaces, configure dial-backup, assign an IP address, and set the PVC data-link control identifier (DLCI). For example, the following creates a Frame Relay sub-interface labeled **22**, sets the DLCI to **30**, and assigns an IP address of **193.44.69.253** to the interface.

```
(config-fr 7)# interface fr 7.22  
(config-fr 7.22)# frame-relay interface-dlci 30  
(config-fr 7.22)# ip address 193.44.69.253 255.255.255.252
```

Step 3: (VALID ONLY FOR T1 INTERFACES)

Specify the group of DS0s used for signaling on the T1 interface by creating a TDM group. Group any number of contiguous DS0s together to create a data pipe for layer 2 signaling. Also use the **tdm-group** command to specify the per-DS0 signaling rate on the interface. For example, the following creates a TDM group labeled **9** containing 20 DS0s (each DS0 having a data rate of 56 kbps).

```
(config)# interface t1 1/1  
(config-t1 1/1)# tdm-group 9 timeslots 1-20 speed 56  
(config-t1 1/1)# exit
```

Step 4:

Make the association between the layer 2 endpoint and the physical interface using the **cross-connect** command. Supported layer 2 protocols include Frame Relay and point-to-point protocol (PPP). For example, the following creates a cross-connect (labeled **5**) to make an association between the Frame Relay virtual interface (**fr 7**) and the TDM group configured on interface t1 1/1 (**tdm-group 9**).

```
(config)# cross-connect 5 t1 1/1 9 fr 7
```

description <text>

Use the **description** command to identify the specified interface (for example, circuit ID, contact information, etc.).

Syntax Description

<text> Identifies the specified interface using up to 80 alphanumeric characters.

Default Values

No defaults required for this command.

Applicable Command Modes

Applies to all interface mode command sets.

Applicable Platforms

Applies to all AOS products.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example enters comment information using the **description** command:

```
(config)#interface t1 1/1  
(config-t1 1/1)#description This is the Dallas office T1
```


do

Use the **do** command to execute any AOS command, regardless of the active configuration mode.

Syntax Description

No subcommands.

Default Values

No defaults required for this command.

Applicable Command Modes

Applies to all mode command sets.

Applicable Platforms

Applies to all AOS products.

Command History

Release 2.1	Command was introduced.
-------------	-------------------------

Functional Notes

Use the **do** command to view configurations or interface states after configuration changes are made without exiting to the Enable mode.

Usage Examples

The **do** command provides a way to execute commands in other modes without taking the time to exit the current mode and enter the desired one. The following example shows the **do** command used to view the Frame Relay interface configuration while currently in the T1 interface:

```
(config)#interface t1 1/1
(config-t1 1/1)#do show interfaces fr 7
fr 7 is ACTIVE
  Signaling type is ANSI signaling role is USER
  Polling interval is 10 seconds full inquiry interval is 6 polling intervals
Output queue: 0/0 (highest/drops)
  0 packets input 0 bytes
  0 pkts discarded 0 error pkts 0 unknown protocol pkts
  0 packets output 0 bytes
  0 tx pkts discarded 0 tx error pkts
```

end

Use the **end** command to exit the current configuration mode and enter the Enable Security mode.



*When exiting the Global Configuration mode, remember to perform a **copy running-config startup-config** to save all configuration changes.*

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Command Modes

Applies to all mode command sets except Basic mode.

Applicable Platforms

Applies to all AOS products.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example shows the **end** command being executed in the T1 Configuration mode:

```
(config-t1 1/1)#end  
#
```

#- Enable Security mode command prompt

exit

Use the **exit** command to exit the current configuration mode and enter the previous one. For example, using the **exit** command in the Interface Configuration mode will activate the Global Configuration mode. When using the **exit** command in the Basic mode, the current session will be terminated.



*When exiting the Global Configuration mode, remember to perform a **copy running-config startup-config** to save all configuration changes.*

Syntax Description

No subcommands.

Default Values

No defaults necessary for this command.

Applicable Command Modes

Applies to all mode command sets.

Applicable Platforms

Applies to all AOS products.

Command History

Release 1.1 Command was introduced.

Usage Examples

The following example shows the **exit** command being executed in the Global Configuration mode:

```
(config)#exit  
#
```

#- Enable Security mode command prompt

shutdown

Use the **shutdown** command to disable the interface (both physical and virtual) so that no data will be passed through. Use the **no** form of this command to turn on the interface and allow it to pass data. By default, all interfaces are disabled.

Syntax Description

No subcommands.

Default Values

By default, all interfaces are disabled.

Applicable Command Modes

Applies to all interface mode command sets.

Applicable Platforms

Applies to all AOS products.

Command History

Release 1.1	Command was introduced.
-------------	-------------------------

Usage Examples

The following example administratively disables the modem interface:

```
(config)#interface modem 1/2  
(config-modem 1/2)#shutdown
```

Index

A

- aaa authentication 336
- aaa authentication enable default 337
- aaa group server 665
- aaa group server radius 340
- aaa on 341
- aaa processes 343
- able 17, 135
- abort 687
- accept 1392
- access-class in 1316
- access-list 1120
- access-policy 568, 696, 761, 982, 1047, 1136, 1191, 1275
- advertisement-interval 1121
- alarm-threshold 935
- alias 1460
- alias link 571, 1194
- answer-supervision 919
- antireplay 646, 655
- apply 688
- area default-cost 1332
- area range 1333
- area stub 1334
- arp arpa 344, 699, 735, 764
- as-path-list 1122
- assistant-extension 1448
- atm routed-bridged 1050
- attribute 622, 629
- authentication 1397
- authentication pre-share 623
- auto cost reference-bandwidth 1335
- auto-summary 1323

B

- bandwidth 572, 700, 765, 962, 985, 1051, 1139, 1195, 1278, 1346
- banner 345
- basic 8
- Basic Mode command set 16
- BGP Configuration command set 1113
- bgp fast-external-fallover 1114
- bgp log-neighbor-changes 1115
- BGP Neighbor Configuration command set 1119
- bgp router-id 1116
- billing-codes 1422
- block-caller-id 1353
- block-callerid 1423
- bonding txadd-timer 951
- bonding txcid-timer 952
- bonding txdeq-timer 953

- bonding txfa-timer 954
- bonding txinit-timer 955
- bonding txnull-timer 956
- boot alternate-image 936
- boot config 346
- boot system flash 347
- BRI Interface Configuration command set 950
- bridge protocol 349
- bridge-group 573, 701, 766, 986, 1052, 1196
- bridge-group bpdofilter 1197
- bridge-group bpduguard 1198
- bridge-group edgeport 1199
- bridge-group link-type 1200
- bridge-group spanning-disabled 1201
- busy all 1398, 1406, 1449
- busy t1 1407

C

- CA Profile command set 667
- caller-id override 947, 957
- caller-id-override 1355
- call-privilege 1424
- call-waiting 1354
- camp-on 1426
- certificate 679
- certificate ca 680
- Certificate Configuration command set 678
- channel-group mode on 767
- clear access-list 28
- clear arp-cache 29
- clear arp-entry 30
- clear bridge 31
- clear buffers max-used 32
- clear counters 33
- clear counters media-gateway 34, 80, 90
- clear counters port-channel 35
- clear counters vlan 36
- clear counters voice-trunk 37
- clear crypto ike sa 38
- clear crypto ipsec sa 39
- clear dump-core 41
- clear event-history 42
- clear gvrp statistics 43
- clear host 44
- clear ip bgp 45
- clear ip dhcp-server binding 40
- clear ip igmp group 47
- clear ip policy-sessions 49
- clear ip policy-stats 51
- clear ip prefix-list 52

- clear ip route 53
 - clear lldp counters 54
 - clear lldp counters interface 55
 - clear lldp neighbors 56
 - clear mac address-table dynamic 57
 - clear port-security 58
 - clear port-security violation-count 59
 - clear pppoe 60
 - clear qos map 61
 - clear spanning-tree counters 63
 - clear spanning-tree detected-protocols 64
 - CLI
 - accessing with PC 8
 - error messages 13
 - introduction 8
 - shortcuts 10
 - client authentication host 630
 - client authentication host xauth-type 631
 - client authentication server list 632
 - client configuration pool 633
 - client-identifier 549
 - client-name 551
 - clock auto-correct-dst 65
 - clock no-auto-correct-dst 66
 - clock rate 841
 - clock set 67
 - clock source 350, 842, 862, 887, 1264
 - clock timezone 68
 - codec g711ulaw 1385
 - codec-group 1356, 1399, 1408
 - coding 863, 877, 888, 902, 1265
 - command descriptions 14
 - command level path 10
 - Command Line Interface
 - accessing with PC 8
 - error messages 13
 - shortcuts 10
 - command security levels
 - basic 8
 - enable 8
 - common CLI functions 11
 - common commands 1459
 - conference 1427
 - configuration 334
 - configuration modes
 - global 9
 - interface 9
 - line 9
 - router 9
 - configure 70
 - connect fxs 1357
 - connect t1 1409
 - connected 1327, 1339
 - console port
 - configuring 8
 - receiving files 77
 - copy 71
 - copy console 73
 - copy flash 74
 - copy interface 75
 - copy tftp 76
 - copy xmodem 77
 - cos 1358
 - coverage 1449
 - coverage external 1359
 - crl 681
 - crl optional 668
 - cross-connect 351, 1461
 - crypto ca authenticate 354
 - crypto ca certificate chain 356
 - crypto ca enroll 357
 - crypto ca import certificate 359
 - crypto ca import crl 361
 - crypto ca profile 362
 - crypto ike 363
 - crypto ike policy 628
 - crypto ike remote-id 367
 - crypto ipsec transform-set 370
 - crypto map 372, 574, 702, 768, 987, 1053, 1140, 1202, 1279
 - Crypto Map IKE command set 645
 - crypto map ipsec-ike 645
 - crypto map ipsec-manual 654
 - Crypto Map Manual command set 654
 - customer service 3
- ## D
- databits 1305
 - data-coding scrambled 843
 - DDS Interface Configuration command set 840
 - debug 12
 - debug aaa 78
 - debug access-list 79
 - debug arp 80
 - debug atm events 81
 - debug atm oam 82
 - debug atm packet 83
 - debug bridge 84
 - debug crypto 85
 - debug dial-backup 86
 - debug dialup-interfaces 87
 - debug dynamic-dns 88
 - debug firewall 89
 - debug firewall alg sip 90
 - debug frame-relay 91

debug frame-relay multilink 92
debug gvrp bpdus 93
debug gvrp interface 94
debug gvrp vlans 95
debug hdlc 96
debug interface 97
debug interface adsl events 98
debug ip bgp 99
debug ip dhcp-client 100
debug ip dhcp-server 101
debug ip dns-client 102
debug ip dns-proxy 103
debug ip http 104
debug ip icmp 105
debug ip igmp 106
debug ip mrouting 107
debug ip ospf 108
debug ip rip 110
debug ip tcp events 111
debug ip tcp md5 113
debug ip udp 114
debug isdn events 116
debug lldp 117
debug port security 119
debug port-auth 118
debug ppp 120
debug pppoe client 121
debug radius 122
debug sip 123
debug sip stack 124
debug snmp 125
debug spanning-tree 127
debug spanning-tree bpdu 126
debug stack 128
debug system 129
debug voice 130
default-information-originate 1336
default-level 1428, 1429, 1430
default-metric 1324, 1337
default-router 552
deny 1389
deny-template 1429
description 1464
DHCP Pool command set 548
dial-backup auto-backup 576, 989, 1055, 1142, 1204
dial-backup auto-restore 577, 990, 1056, 1143, 1205
dial-backup backup-delay 578, 991, 1057, 1144, 1206
dial-backup call-mode 579, 992, 1058, 1145, 1207
dial-backup connect-timeout 582, 995, 1061, 1148, 1210
dial-backup force 583, 996, 1062, 1149, 1211
dial-backup maximum retry 584, 997, 1063, 1150, 1212
dial-backup number 585, 998, 1064, 1151, 1213
dial-backup priority 586, 999, 1065, 1152, 1214
dial-backup randomize-timers 587, 1000, 1066, 1153, 1215
dial-backup redial delay 588, 1001, 1154, 1216
dial-backup redial-delay 1067
dial-backup restore-delay 589, 1002, 1068, 1155, 1217
dial-backup schedule 590, 1003, 1069, 1156, 1218
dial-backup shutdown 591, 1004, 1070, 1157, 1219
dialin 948
did 1360, 1450
did digits-transferred 1410
dir 132, 133
disable, basic mode 17
disable, enable mode 134
disable-callwaiting 1430
distance bgp 1117
dnd 1362, 1431
dns-server 553, 642
do 1465
domain-name 554
DSX-1 Interface Configuration command set 876
dynamic-dns 592, 704, 770, 1005, 1071, 1158, 1220, 1281
E
E1 Interface Configuration command set 886
ebgp-multihop 1123
echo-cancellation 1363, 1411
email address 669
enable 17, 135
enable password 374
enable, basic mode 17, 135
enable, enable mode 26
enable, understanding 8
encapsulation 1073
encapsulation 802.1q 772
encapsulation frame-relay ietf 963
encryption 624
end 1466
enrollment retry 670
enrollment terminal 671
enrollment url 672
equipment-type 937
erase 136
et-clock-source 853
Ethernet Interface Configuration command set 758
Ethernet Sub-Interface Configuration command set 758
event-history on 376, 380
event-history priority 376, 377, 380
events 137
exception report 379
exception report generate 138

executive-extension 1451

exit 1467

extension 1452

external-fwd 1432

external-loopback-request 849

F

factory-default 139

fair-queue 594, 964, 1074, 1222

fdl 864

first-name 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 1364, 1365, 1366, 1367, 1368, 1369, 1371, 1372, 1373, 1374, 1375, 1376, 1377, 1378, 1379, 1380, 1392, 1415, 1416, 1417, 1418, 1419, 1422, 1423, 1424, 1426, 1427, 1456, 1457

flowcontrol 1306

forward 1365, 1433

forward-disconnect 1366, 1367, 1379

fqdn 673

Frame Relay Interface Configuration command set 961, 1042, 1109

Frame Relay Sub-Interface Config command set 981, 1045

frame-relay bc 1007

frame-relay be 1008

frame-relay fragment 1009

frame-relay interface-dlci 1010

frame-relay intf-type 965

frame-relay lmi-n391dce 966

frame-relay lmi-n391dte 967

frame-relay lmi-n392dce 968

frame-relay lmi-n392dte 969

frame-relay lmi-n393dce 970

frame-relay lmi-n393dte 971

frame-relay lmi-t391dte 972

frame-relay lmi-t392dce 973

frame-relay lmi-type 974

frame-relay multilink 975

framing 865, 878, 889, 903, 1266

ftp authentication 381

full-duplex 773

G

G.703 Interface Configuration command set 901

garp timer 382

Gigabit-Ethernet Interface Configuration command set 758

Global Configuration Mode command set 334

group 625

gvrp 383

H

half-duplex 775

hardware-address 555

hash 626

HDLC Configuration command set 566

hold 1434

hold-queue 595, 977, 1075, 1223

hold-timer 1118, 1124

host 557

hostname 384

hotel 1368, 1435

hotline 1369

HSSI Interface Configuration command set 848

I

ignore dcd 854

IKE Client command set 641

IKE Policy Attributes command set 622

IKE Policy command set 628

ike-policy 647, 656

impedance 909, 920

inband-detection 938

inband-protocol 939

initiate 634

interface 385

interface adsl 1109

interface bri 950

interface dds 840

interface e1 886

interface ethernet 758

interface ethernet sub 758

interface frame-relay 961, 981, 1042, 1045

interface G.703 901

interface gigabit-ethernet 758

interface hdlc 566

interface hssi 848

interface loopback 1274

interface modem 946

interface port-channel 734

interface ppp 1189

interface range 386, 758

interface serial 852

interface shdsl 934

interface t1 861, 876

interface t3 1263

interface tunnel 1135

interface vlan 695

invert etclock 855

invert rxclock 856

invert txclock 857

ip access-group 596, 706, 776, 1011, 1076, 1160, 1224, 1283

ip access-list extended 387

ip access-list standard 393

- ip address 707, 930, 1161
- ip address dhcp 708, 777, 1012, 1077, 1225
- ip address negotiated 1226
- ip address secondary 597, 780, 1015, 1080, 1227, 1284
- ip classless 398
- ip crypto 400
- ip default-gateway 401
- ip dhcp 710, 711, 1016, 1081
- ip dhcp release 781
- ip dhcp renew 782
- ip dhcp-server database local 402
- ip dhcp-server excluded-address 403
- ip dhcp-server ping packets 404
- ip dhcp-server ping timeout 405
- ip dhcp-server pool 406, 548
- ip domain-lookup 407
- ip domain-name 408
- ip domain-proxy 409
- ip firewall 410
- ip firewall alg 416
- ip firewall attack-log threshold 417, 421, 423, 456
- ip firewall check reflexive-traffic 418
- ip firewall check syn-flood 419
- ip firewall check winnuke 420
- ip firewall policy-log threshold 422
- ip forward-protocol udp 424
- ip ftp access-class 426
- ip ftp agent 427
- ip ftp source-interface 428
- ip helper-address 598, 712, 783, 1017, 1082, 1162, 1228, 1285
- ip host 429
- ip http 430
- ip igmp 600, 714, 785, 1019, 1084, 1164, 1230, 1287
- ip igmp join 431
- ip learn-address 931
- ip load-sharing per-destination 432
- ip mcast-stub downstream 602, 716, 787, 1021, 1086, 1087, 1166, 1232, 1289
- ip mcast-stub helper-address 433, 788
- ip mcast-stub helper-enable 603, 717, 1022, 1167, 1233, 1290
- ip mcast-stub upstream 604, 718, 789, 1023, 1088, 1168, 1234, 1291
- ip mtu 719
- ip multicast routing 434
- ip name-server 435
- ip ospf 605, 720, 790, 1024, 1089, 1169, 1235, 1292
- ip ospf authentication 607, 722, 791, 1025, 1091, 1171, 1236, 1294
- ip ospf network 608, 723, 792, 1026, 1092, 1172, 1237, 1295
- ip policy-class 436
- ip policy-timeout 440
- ip prefix-list description 443
- ip prefix-list seq 444
- ip proxy-arp 609, 724, 793, 1027, 1093, 1173, 1238, 1296
- ip radius source-interface 446
- ip rip receive version 610, 725, 794, 1028, 1094, 1174, 1239, 1297, 1330
- ip rip send version 611, 726, 795, 1029, 1095, 1175, 1240, 1298, 1330
- ip route 447
- ip route-cache 612, 727, 796, 1030, 1096, 1176, 1241, 1299
- ip routing 448
- ip rtp firewall-traversal 449
- ip rtp udp 450
- ip scp server 451
- ip sip qos dscp 452
- ip snmp agent 453
- ip snmp source-interface 454
- ip subnet-zero 455
- ip tftp source-interface 457
- ip unnumbered 613, 728, 797, 1031, 1097, 1242, 1300
- ip-address 674
- ip-range 643
- isdn spid1 958
- isdn spid2 959
- isdn switch-type 960
- K**
- keepalive 614, 1177, 1243
- L**
- last-name 1370
- lbo 866
- lease 558
- lifetime 627
- line 458
- Line (Console) Interface Configuration command set 1304
- Line (Telnet) Interface Configuration command set 1315
- line console 1304
- line telnet 1315
- line-length 879, 1267
- linerate 940
- line-timeout 1307, 1317
- lldp 460
- lldp receive 615, 736, 798, 1032, 1178, 1244
- lldp send 616, 737, 799, 1033, 1179, 1245
- local-as 1125
- local-id 635

- logging console 462
- logging email 463
- logging email address-list 464
- logging email on 464
- logging email priority-level 465
- logging email receiver-ip 466
- logging email source-interface 468
- logging facility 469
- logging forwarding on 471
- logging forwarding priority-level 471, 472
- logging forwarding receiver-ip 473
- logging forwarding source-interface 474
- login 1308, 1318
- login authentication 1309, 1319
- login local-userlist 1310, 1320
- login-member 1453
- logout 18, 140
- loop-alarm-detect 890
- loopback 844, 850, 910, 921
- Loopback Interface Configuration command set 1274
- loopback network 867, 880, 891, 904, 941, 1268
- loopback remote 942, 1269
- loopback remote inband 943
- loopback remote line 868
- loopback remote line inband 881
- loopback remote payload 869
- loopback remote V54 892

M

- mac address-table aging-time 475
- mac address-table static 476, 477
- mac-address 729, 801
- match 1347
- match address 648, 657
- match substitute 1400, 1412
- max-inbound 1454
- media 683
- media-gateway ip 618, 802, 1247
- member 1455
- message-waiting 1371, 1436
- modem countrycode 478
- mtu 619, 803, 932, 1035, 1098, 1181, 1248, 1301

N

- name 684
- nat-traversal 637
- netbios-name-server 559, 644
- netbios-node-type 560
- network 561, 1325
- network area 1338
- next-hop-self 1127
- no enable password 374
- ntp-server 562

- num-rings 1372, 1456

O

- option 563
- outage-retrain 944
- outbound-proxy primary 1401

P

- parity 1311
- passive-interface 1326
- password 675, 1128, 1312, 1321, 1373
- peer 638
- peer default ip address 933, 1249
- permit 1390
- permit-template 1437, 1438
- ping 19, 141
- ping stack-member 143
- port-auth auth-mode 804
- port-auth control-direction 805
- port-auth default 482
- port-auth max-req 483
- port-auth multiple-hosts 806
- port-auth port-control 807
- port-auth re-authentication 484
- port-auth timeout 485
- Port-Channel Interface Configuration command set 734
- power-supply shutdown automatic 487
- ppoe ac-name 1258
- ppp authentication 1250
- ppp chap hostname 1254
- ppp chap password 1255
- ppp chap sent-username/password 1257
- PPP Interface Configuration command set 1189
- ppp multilink 1256
- pppoe service-name 1259
- prefix 1457
- prefix-list 1129
- preventing unauthorized users 9
- priority 1348
- product support 3

Q

- qos 739, 810
- QoS command set 1345
- qos dscp-cos 489
- qos map 490

R

- Radius Group command set 665
- radius-server 494
- redial 1439
- redistribute connected 1327, 1339
- redistribute ospf 1328
- redistribute rip 1340
- redistribute static 1329, 1341

registrar primary 1402
reject 1393
reject-external 1403, 1413
reload 144
remote-alarm 870, 893
remote-as 1130
remote-fwd 1440
remote-loopback 845, 871, 882, 894, 1270
rename 1441
reset 689
resource-selection 1394, 1414
respond 640
retrain 1110
return-last-call 1442
rip 1340
route-map 497, 1131
Router (OSPF) Configuration command set 1331
Router (RIP) Configuration command set 1322
router bgp 498
router bgp command 1113
router bgp-neighbor command 1119
router ospf 499, 1331
router rip 500
rtp 1375, 1376, 1377, 1416, 1417, 1418
rtp dtmf-relay 1374, 1415
rx-gain 911, 922

S

sa4tx-bit 895
send-community standard 1132
Serial Interface Configuration command set 852
serial-mode 858
serial-number 676
server 666
set dscp 1349
set peer 650, 659
set pfs 651
set precedence 1350
set security-association lifetime 652
set session-key 660
set transform-set 653, 664
SHDSL Interface Configuration command set 934
shortcuts 10
show 690
show access-lists 145
show arp 146
show atm 147
show bert 1271
show bridge 148
show buffers 149
show buffers users 150
show channel-group 152
show clock 21, 153
show configuration 154
show connections 156
show crypto ca 157
show crypto ike 158
show crypto ipsec 160
show crypto map 161
show debugging 162
show dial-backup interfaces 163
show dialin interfaces 165
show dynamic-dns 166
show event-history 167, 376, 380
show fan-tach 168
show flash 169
show frame-relay 171
show frame-relay fragment 170
show frame-relay multilink 173
show garp timer 174
show gvrp configuration 175
show gvrp statistics interface 176
show hosts 177
show interfaces 178
show interfaces adsl 182
show interfaces shdsl 183
show interfaces switchport 187
show interfaces tunnel 808
show ip access-lists 188
show ip arp 189
show ip as-path-list 190
show ip bgp 195, 199
show ip bgp community 191
show ip bgp community-list 193
show ip bgp neighbors 200
show ip cache 203
show ip community-list 204
show ip dhcp-client lease 205
show ip dhcp-server binding 206
show ip igmp groups 207
show ip igmp interface 208
show ip interfaces 209
show ip mroute 210
show ip ospf 211
show ip ospf database 212
show ip ospf interface 214
show ip ospf neighbor 215
show ip ospf summary-address 216
show ip policy-class 217
show ip policy-sessions 218
show ip policy-stats 219
show ip prefix-list 220
show ip protocols 221

show ip route 222
show ip traffic 224
show lldp 225
show lldp device 226
show lldp interface 227
show lldp neighbors interface 228
show lldp neighbors statistics 230
show mac address-table 231
show mac address-table address 233
show mac address-table aging-time 235
show mac address-table count 236
show mac address-table dynamic 237
show mac address-table interface 239
show mac address-table static 241
show media-gateway 243
show memory 244
show modules 246
show monitor session 247
show output-startup 248
show port-auth 249
show port-security 251
show power inline 252
show power supply 253
show processes 255
show qos 257
show qos map 259
show queue 263
show queuing 264
show radius statistics 265
show route map 266
show rtp resources 268
show running-config 270
show running-config voice 272
show sip 274
show snmp 22, 275
show snmp 276
show spanning-tree active 278
show spanning-tree blockedports 279
show spanning-tree interface ethernet 281
show spanning-tree interface gigabit-ethernet 283
show spanning-tree interface port-channel 285
show spanning-tree pathcost method 287
show spanning-tree realtime 288
show spanning-tree root 289
show spanning-tree summary 290
show spanning-tree, status 277
show stack 291
show startup-config 294
show startup-config checksum 296
show system 297
show tcp info 298
show tech 300, 304
show temperature 301
show test-pattern 872, 896
show toneservices resources 302
show udp info 304
show users 306
show version 23, 308
show vlan 324
show voice ani 309
show voice available 310
show voice current-mode 311
show voice dial-plan 312
show voice did 313
show voice directory 314
show voice extensions 315
show voice grouped-trunk 316
show voice ring-group 317
show voice service-mode 319
show voice spre 320
show voice switchboard 321
show voice trunk 322
show voice users 323
shutdown 1468
signal 923
signaling-mode 883
sip-server primary 1404
snmp trap 731, 740, 811, 846, 859, 979, 1043, 1302
snmp trap link-status 621, 732, 741, 812, 847, 851, 860,
873, 884, 897, 905, 980, 1044, 1261, 1272, 1303
snmp-server chassis-id 502
snmp-server community 503
snmp-server contact 504, 505
snmp-server enable traps 506
snmp-server host traps 507
snmp-server host traps version 508
snmp-server location 509
snmp-server source-interface 512
snmp-server view 513
snr-margin 1111
snmp retry-timeout 514
snmp server 515
snmp wait-time 516
soft-reconfiguration inbound 1133
spanning-tree bpdupfilter 742, 813, 1036, 1103
spanning-tree bpduguard 743, 814, 1037, 1104
spanning-tree bpduguard filter 518
spanning-tree cost 744, 815
spanning-tree edgeport 745, 816, 1038, 1105
spanning-tree link-type 746, 817, 1039, 1106
spanning-tree path-cost 1040, 1107
spanning-tree pathcost 818

- spanning-tree port-priority 747, 819
 - spanning-tree priority 1041, 1108
 - special-ring-cadences 1378
 - speed 820, 1313
 - stack 526
 - state 685
 - static 1329
 - station-lock 1443
 - stopbits 1314
 - storm-control 748, 821
 - storm-control action 750, 823
 - subject-name 677
 - summary-address 1342
 - summary-address not-advertise 1342
 - switchport access vlan 824
 - switchport gvrp 752, 825
 - switchport mode 826
 - switchport port-security 828
 - switchport port-security aging 829
 - switchport port-security expire 830
 - switchport port-security mac-address 831
 - switchport port-security maximum 832
 - switchport port-security violation 833
 - switchport protected 827
 - switchport trunk allowed vlan 834
 - switchport trunk fixed vlan 755, 835
 - switchport trunk native vlan 837
 - system-mode 1444
- T**
- T1 Interface Configuration command set 861
 - T3 Interface Configuration command set 1263
 - tdm-group 874, 898
 - telnet 24, 326
 - telnet stack-member 327
 - terminal length 328
 - test battery 912
 - test loop 924
 - test reverse-battery 913
 - test ring-ground 925
 - test ringing 914
 - test signalling-bits 926
 - test tip-open 915
 - test tone 916, 927
 - test-pattern 875, 885, 899, 906, 945, 1273
 - tftp-server 564
 - timers lsa-group-pacing 1343
 - timers spf 1344
 - timezone-offset 565
 - traceroute 25, 329
 - traffic-shape rate 733, 838
 - training 5
- training-mode 1112
 - transfer 1445
 - trunk 1395
 - trunk-trunk 1446
 - ts16 900, 907
 - tunnel checksum 1182
 - Tunnel Configuration command set 1135
 - tunnel destination 1183
 - tunnel key 1184
 - tunnel mode gre 1185
 - tunnel sequence-datagrams 1186
 - tunnel source 1187
 - tx-gain 917, 928
 - type 1458
- U**
- unauthorized users 9
 - undebug all 330
 - update-source 1134
 - username password 528, 1262
- V**
- vad 1380, 1419
 - version 1330
 - vlan
 - command set 682
 - media 692
 - name 693
 - state 694
 - vlan id 691
 - VLAN Configuration command set 682
 - vlan database 331
 - VLAN Database Configuration command set 686
 - VLAN Interface Configuration command set 695
 - vlan-id 839
 - voice 530, 531
 - voice ani match 529
 - voice current-mode 532, 535, 542, 546
 - voice dial-plan 533
 - voice did 534
 - voice grouped-trunk 538
 - voice hold-reminder 539
 - voice hookflash 536, 537
 - voice park-return 540
 - voice ring-group 541
 - voice spre 543
 - voice timeouts interdigit 544
 - voice trunk 545
 - VT100 configuration 8
- W**
- warranty 3
 - write 333