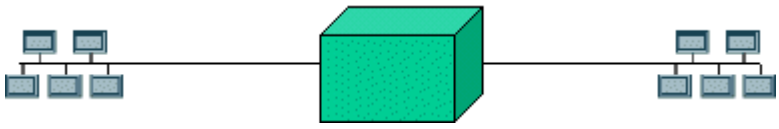
TECHNICAL SUPPORT NOTE
Configuring Bridging in AOS Quick Configuration Guide

Introduction

Bridging is an OSI model, layer 2 function. Bridges and switches are often talked about interchangeably, because both of these devices work at the Data Link layer. They are a step above a network device called a hub. A hub operates at the Physical layer, connecting one or more network devices on the LAN sharing bandwidth or as a termination point for multiple network devices in a star topology. A bridge is a LAN (Local Bridge) or WAN (Remote Bridge) device that interconnects network segments and uses the destination MAC address of each frame of information to determine whether to pass the signal to another to the other network segment. Bridges can be used to connect network segments of dissimilar media, extend the number of hosts allowed on a single segment, or segment the data traffic to reduce overall bandwidth usage.

A bridge keeps a forwarding table, which is a list of MAC (or layer 2) addresses with their associated interface. If the bridge does not have an entry for a destination address that comes across, the packet will be forwarded to all attached interfaces. All broadcast and multicast packets are forwarded to all interfaces (flooded).

Care should be used in deciding when to use a bridge. In general, it is only wise to bridge data that cannot be routed. The NetVanta 3200 series can route IP and bridge all other protocols. This mode is interoperable with Cisco simple bridging mode.



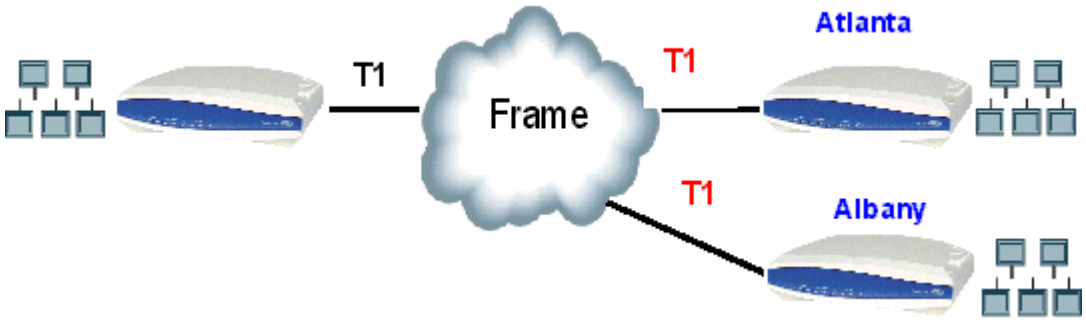
Local Bridge

Remote Bridge – Like the NetVanta 3200s

* Before You Begin

Before configuring and testing a bridging application, verify that the point to point network connection is installed and operational. All cables necessary for network connection installation are provided with your NetVanta shipment. Obtain the correct IP Addresses for the Ethernet interfaces from your network administrator before configuring this application. The network administrator can assist you in this process. Generally, the Ethernet interfaces on all units will need to be in on the same subnet for bridging applications. The first example details a simple point to point bridge will be configured using the PPP as the WAN protocol. The second example demonstrates how to configure the NetVanta 3200 router configuration for multipoint bridging over frame relay.

PPP Point to Point Bridging Example



Frame Relay Multipoint Bridging example

Configuring Point to Point Bridging

Log into the router via the craft port and enable enter the privilege enable (privileged) mode by typing *enable* and entering the password (if enable passwords are configured). Next, enter the router global configuration mode by typing *config -t* . From the router global configuration mode, enter the *bridge* command with and specify a bridge group number. (The valid range for a bridge group number is 1 through 255.) Specify the protocol for the bridge group at the end of the command. The bridging protocol should must match the protocol used on the remote NetVanta 3200 or compatible router. In this example the bridge group 1 is being configured to use the IEEE bridging protocol.

```
Router(config)# bridge 1 protocol ieee
```

Figure 1. Bridge Command Example Syntax

Configuring Bridge Interfaces

1. All interfaces that are involved in the bridging process (WAN & LAN) must belong to the appropriate bridge group (Refer to Configuring Point to Point Bridging for details on creating a bridge group). Include an interface in the bridge group by using the *bridge* command while in the interface configuration mode. (To enter the interface configuration mode, enter *config interface <interface type interface slot/port>* from the global configuration prompt.

```
Router(config-eth 0/1)# bridge-group 1
SPANNING TREE: Using default Address 00:A0:C8:08:CA:EE.
Please ensure this is unique.
```

2. Figure 2. Assigning Ethernet 0/1 Interface to Bridge Group 1
3.
4. The bridge command must be used on the sub-interface to configure bridging interfaces on WAN ports implementing Frame Relay signaling. (Enter the sub-interface configuration mode by typing *interface frame relay X.Y* from the global configuration mode prompt (where X is the frame relay interface number and Y is the subinterface – usually the DLCI – number). For PPP the virtual interface must be included in the bridge group (e.g. ppp 1)

```
Router(config-fr 1.16)# bridge-group 1
SPANNING TREE: Using default Address 00:A0:C8:08:CA:EE.
Please ensure this is unique.
```

5. Figure 3. Assigning a Frame Relay Sub-Interface to Bridge Group 1
6.

```
Router(config-ppp 1)# bridge-group 1
SPANNING TREE: Using default Address 00:A0:C8:08:CA:EE.
Please ensure this is unique.
```

7. Figure 4. Assigning a PPP Sub-Interface to Bridge Group 1

8.

9. If you are only bridging and do not wish to route IP, IP routing must should be disabled. Enter **no ip** routing at the global configuration mode prompt to disable IP routing for all interfaces on the router. For simple bridging applications (IP traffic is routed and all other protocols are bridged), ip routing is not disabled and the unit must be properly configured for routing (the remote ip address must be on a unique subnet).

```
Router(config)# no ip routing
```

10. Figure 5. Disabling IP Routing

11.

12. The complete configuration for the point-point PPP bridging application is shown below in the format of a script:

```
no ip routing
!
interface eth 0/1
full-duplex
speed auto
ip address 192.168.4.1 255.255.255.0
bridge-group 1
no shutdown
!
interface ser 1/1
no shutdown
!
interface ppp 1
ip address 192.168.4.1 255.255.255.0
no shutdown
cross-connect 1 serial 1/1 ppp 1
!
bridge-group 1
!
exit
bridge 1 protocol ieee
```

```
end
```

13. *** NOTE - If you cannot enter an IP address on your PPP interface, you should upgrade your firmware if you wish to remotely manage your routers.**
14. Figure 6. – PPP Point-Point Configuration Script
15. Frame-Relay Multipoint – Multipoint bridging applications are useful for two remote offices that have small traffic requirements and need to access local office resources (desiring minimal changes to the local and main office servers). If all resources are using NetBEUI protocol, bridging is the only option. There are minimal differences when configuring point-point and multipoint applications (including frame relay configuration and assigning all sub-interfaces (PVCs) to the bridge group). The complete configuration for multipoint bridging is shown below and is annotated to highlight the differences from the point-point application.

```
no ip routing
!
interface eth 0/1
full-duplex
speed auto
ip address 192.168.4.1 255.255.255.0
bridge-group 1
no shutdown
!
interface ser 1/1
no shutdown
!
interface bri 1/2
shutdown
!
! Note that a frame relay virtual interface is created
interface fr 1 point-to-point
no shutdown
cross-connect 1 ser 1/1 frame-relay 1
!
! Here are the two sub-interfaces to the remote locations
interface fr 1.16 point-to-point
frame-relay interface-dlci 16
ip address 192.168.4.1 255.255.255.0
bridge-group 1
!
interface fr 1.17 point-to-point
frame-relay interface-dlci 17
ip address 192.168.4.1 255.255.255.0
bridge-group 1
```

*** NOTE - If you cannot enter an IP address on your Frame Relay sub-interfaces, you should upgrade your firmware if you wish to remotely manage your routers.**

Figure 7 – Frame relay Relay Multipoint Bridging Configuration

Troubleshooting the Application

When troubleshooting any network problem, it is essential to work through all layers of the OSI model beginning with the physical layer. For bridging applications, verify that the interface and link layernetwork protocol are functioning properly before troubleshooting the bridging configuration. If workstations at one end of the link cannot access workstations on the other end, use the following tools to help determine the cause:

1. **show interface (T1 1/1, or DDS 1/1, or Serial 1/1)** – Indicate the state of the physical layer
2. **show frame pvc** – This utility displays whether the frame relay virtual interface is active, inactive, or deleted.

Router#show frame-relay pvc

Frame Relay Virtual Circuit Statistics for interface FR 1

	Active	Inactive	Deleted	Static
local	1	0	0	1

DLCI = 16, DLCI USAGE = LOCAL , PVC STATUS = ACTIVE, INTERFACE = FR 1.1

MTU: 1500		
input pkts: 10	**output pkts: 10**	**in bytes: 1000**
out bytes: 1000	**dropped pkts: 0**	**in FECN pkts: 0**
in BECN pkts: 0	**in DE pkts: 0**	**out DE pkts: 0**

pvc create time: 00:00:00:11 last time pvc status changed: 00:00:00:43

3.

4. **show ppp 1** – Shows the state of the PPP connection.

```
Router#show int ppp 1

PPP 1
Link state is OPENED
Internet address is 192.168.1.1, Mask is 255.255.255.0
Far end internet address is 192.168.1.2
MTU is unknown
BW 1544 Kbit
Keepalive set (10 sec)
Authentication protocol is NONE
OPEN: LCP, Bridge
CLOSED: IPCP
8 packets input, 134 bytes
Received 8 broadcasts
0 input errors, 0 discards
9 packets output, 162 bytes
0 output errors, 0 discards
```

5.

6. **show bridge 1** – This command gives the current state of the bridge group and the forwarded addresses.

Completing the Application

Configure the remote end NetVanta 3200 is configured likesimilarly to the local site, but with only one frame relay sub-interface for the multipoint application. The remote PPP site is similar to the local site shown above. Both the local and remote NetVanta 3200's will have distinct host addresses assigned to the respective Ethernet ports, and they will be in the same subnet.

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