Switch Stacking in AOS Quick Configuration Guide

Overview

Switch stacking on AOS products involves accessing two or more switches to operate under one IP address. Currently, stacking can handle up to 16 switches (1 Master and 15 Members) within a single stack. This configuration does not in any way allow the switches to operate as one switch stack. The AOS implementation of stacking does not currently support configuration or firmware management for stack members.

AOS Switch Stacking works by using LLDP (Link Layer Discovery Protocol) to allow the switches to communicate and register for stacking capabilities. LLDP is a Layer 2 protocol that acts as a way to pass information on a link between two devices that are directly connected.

To do this, the Stack Master will send out an LLDP packet querying the other switches it is connected to (as long as the ports that connect them have been configured to do stacking).

If a Stack Member has been configured for stacking on that port, it then will send a registration to the Stack Master. After receiving the registration, the Stack Master will acknowledge this, and add the Member as a candidate for stacking.

Once a Stack Member has been recognized as a candidate for stacking, the Stack Master then looks at its configuration to see if this candidate has an ID that would allow it to become a Stack Member. A Member in stacking is identified by the Master based on its MAC address.

After the Stack Master has verified the ID of the Member, the Stack Master then sends an Add packet to the Member. Once received, the Member then ACKs the packet and the Stacking relationship has been created.

Hardware/Software Requirements

To be able to use stacking, the NetVanta switches must have AOS version 8.01.00 or later to operate. Stacking is available on the following AOS based switching products: NetVanta 1224 Series, NetVanta 1335, NetVanta 1355, NetVanta 1524 ST, and the NetVanta 7100.

Configuration through the CLI

Whenever configuring Switch Stacking, there are two different configurations that must be done. The first is to configure the Stack Master, then configure the Members.

Configuring a Stack Master via AOS

Configuring the Master involves the following steps:

- Identifying the Master
- Assigning Members to the Stack
- Configuring Ports to Act As Stacking Ports

Identifying the Master

To configure a Master Switch, the following command must be entered:

master>enable
master#config terminal
master(config)#stack master

Although it is important for the Members to be capable of doing Stacking, they do not have to be configured to know what switch will act as the Master.

By default, Switch Stacking uses the VLAN 2386 and the IP address of 169.254.0.0 and subnet mask of 255.255.255.0. Use the following command to change the VLAN number and IP address for the stacking VLAN:

master(config)#stack master <VLAN ID> <IP Address> <Subnet Mask>

For example, to change the stacking VLAN to 23 and the IP address to 192.168.1.20 255.255.255.0, enter the following:

master(config)#stack master 23 192.168.1.20 255.255.255.0

Assigning Members to the Stack

Once a Master has been assigned, it must then be configured to know the Members of the stack and how to identify each MAC address by a member ID:

Finding the mac-address of a connected device can be done by using the command below:

master#show mac address-table

Mac Address Table

Vlan	Mac Address	Type	Ports
1	00:a0:c8:0a:2c:4e	DYNAMIC	eth 0/1
1	00:a0:c8:0a:c3:b3	DYNAMIC	eth 0/2
1	00:a0:c8:0e:a5:1f	DYNAMIC	eth 0/2
1	00:a0:c8:12:2e:01	STATIC	CPU
1	00:a0:c8:12:3f:f9	DYNAMIC	eth 0/24
1	00:a0:c8:12:40:11	DYNAMIC	eth 0/24
1	00:a0:c8:15:30:de	DYNAMIC	eth 0/7
2	00:a0:c8:12:2e:01	STATIC	CPU
2386	00:a0:c8:12:2e:01	STATIC	CPU
2386	00:a0:c8:12:3f:f9	DYNAMIC	eth 0/24

Total Mac Addresses for this criterion: 10

To decide which MAC address goes to which Member, find the MAC that coincides with the port that member is plugged into. In this case the switch on eth 0/24 has a MAC address of 00:a0:c8:12:3f:f9 which would be the MAC address needed to identify this device.

Anytime the CPU is seen as the port, that MAC address is the MAC of the switch currently being administered.

The following command will add a stack member to the master stacking switch:

master(config)#stack member <MAC address> <member id>

For example, this command would assign a switch with the MAC address of 00:A0:C8:0E:39:64 to Member ID 2:

master(config)stack member 00:A0:C8:0E:39:64 2

Configuring Ports to Act As Stacking Ports

After the members have been assigned, it is then necessary to assign a port to be configured for stacking. If a switch is connected to another switch via a non-stacking port, then they will not be able to stack. It is important to note that if a port is assigned as a stacking port, it also acts as a trunk; therefore there is no need for an extra trunking port. Below is the command for setting an interface to be a stacking port:

master(config)#interface eth 0/24
master(config-if)#switchport mode stack

Configuring a Member Switch for Stacking via AOS

As long as the default stack VLAN and IP address are used, the only step truly needed to assign a switch as a Member is to assign the port used for stacking:

member(config)#interface eth 0/24
member(config-if)#switchport mode stack

However, if the VLAN ID needs to be changed, the Member switch must be changed as well to recognize the change:

member(config)#stack vlan <VLAN ID>

Accessing Members via the Master Stack in the AOS

Once the members have been added to the Stack Master, it is then possible to telnet from the Master to a member using the telnet command:

master#telnet stack-member <Member-ID>

Where the member ID is the number assigned to that switch's MAC address

Configuring Stacking through the Web GUI

As with the CLI configuration, stacking must be configured on both the Master and the Member switches.

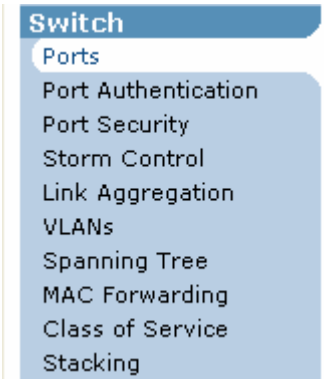
Configuration Stacking on the Master Switch

Just like above in the AOS, it is necessary to complete three steps to create the Master Switch:

- Configuring Ports to Act As Stacking Ports
- Identifying the Master
- Assigning Members to the Stack

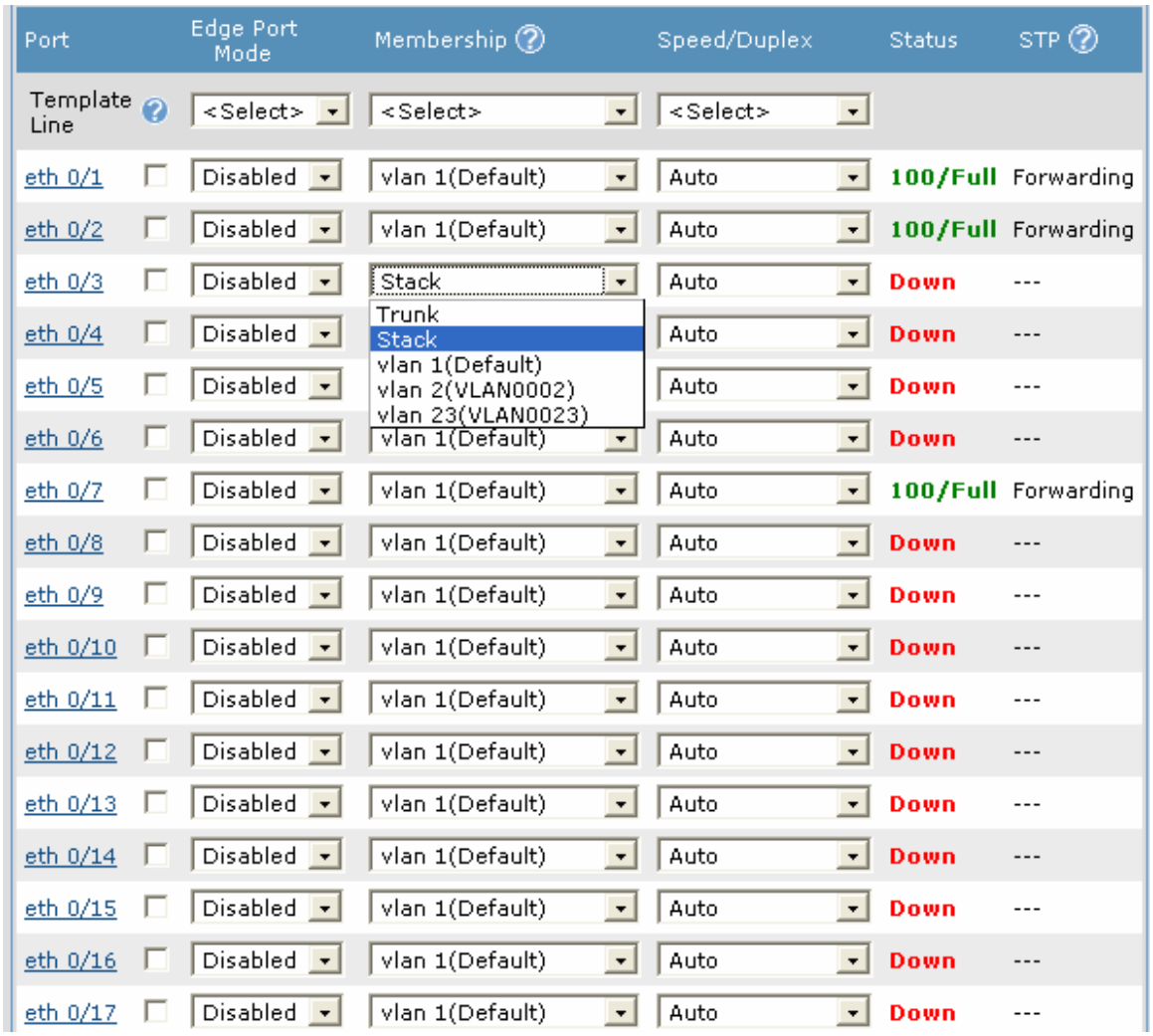
Configuring Ports to Act As Stacking Ports

To configure ports as stacking ports, navigate to the Ports sub-menu under the Switch menu.



Once in this menu, set the port to be used as a stacking port to do stacking. It is important to note that if a port is assigned as a stacking port, it also acts as a trunk, therefore there is no need for an extra port for trunking..

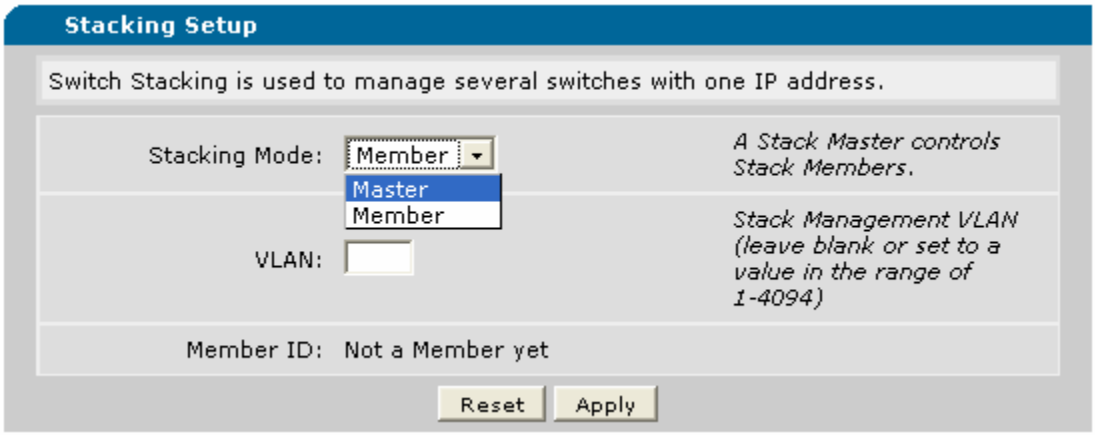
To set a port for stacking, change the Membership type to be Stack as shown below:



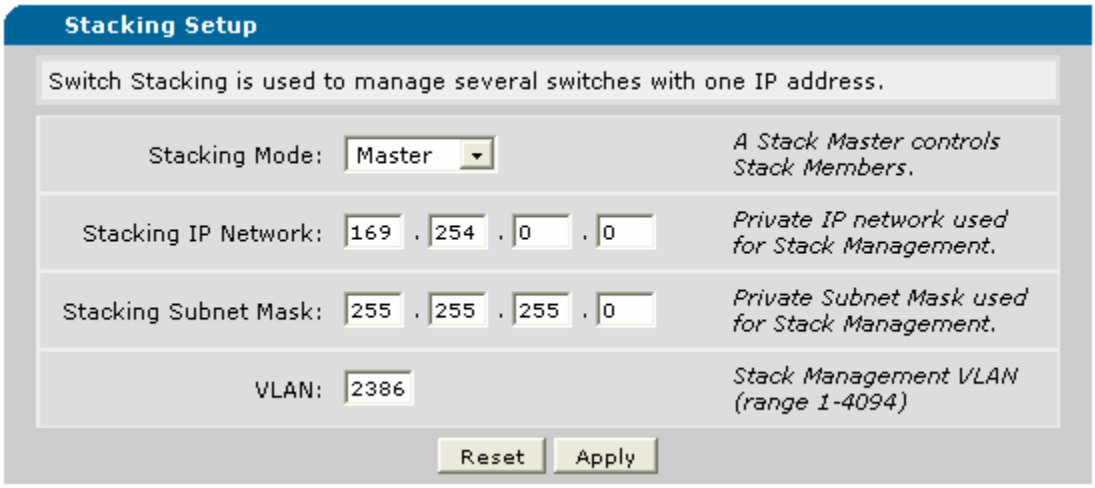
Identifying the Master

To identify the Stack Master, it is first important to locate where stacking can be configured via the Web GUI. As shown below, stacking can be configured via the Web GUI by navigating to the Stacking tab under the Switch sub-menu.

Once there, assign a switch as a Master by click on the drop down box labeled Stacking Mode. This will gives the option to either set this Switch to operate as a Member or a Master.

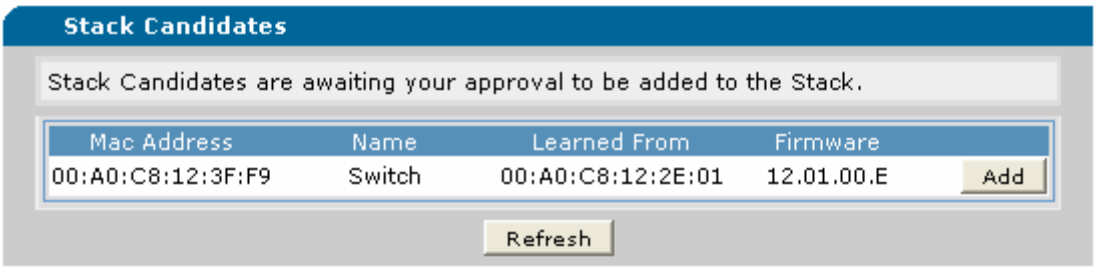


After the Master has been assigned, configure the stacking IP address and VLAN:

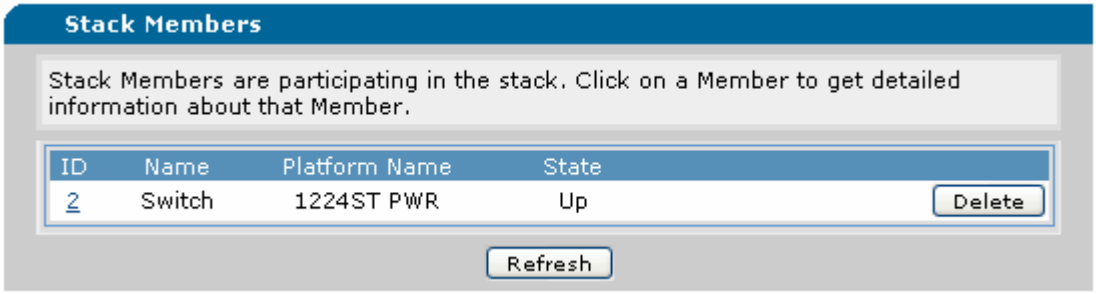


Assigning Members to the Stack

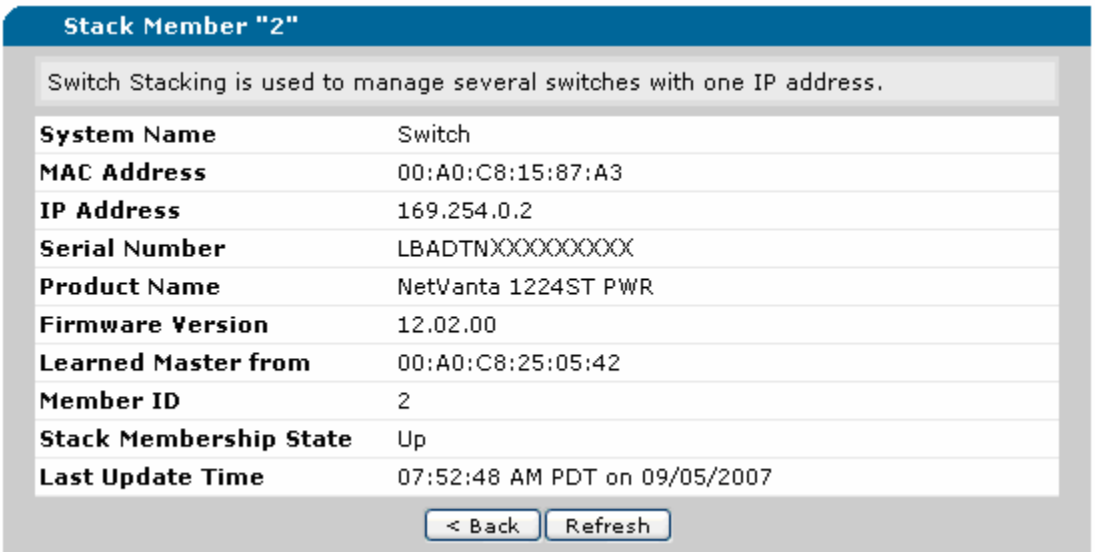
After the Master has been assigned and a Member has been created the Member should show up in the Stack Candidates section underneath the Stacking Setup. This box shows the Member switch's MAC Address, the Member's name, what the MAC Address was of the switch the Master learned it from, and what firmware revision is loaded on that switch.



As shown above, stacking candidates can be added to the stack on the Stack Master. From the Web GUI, click the add button and it will update the page and show the Member in the Stack Members table directly below the Stack Candidates.



The Stack Members table shows the ID of the switch, its name, and the state of the connection with the master. By click on the ID number, it is possible to see detailed information including the product, firmware revision, serial number and system name as shown below:



Configuring a Member via Web GUI

Configuring a Member from the Web GUI essentially takes two steps:

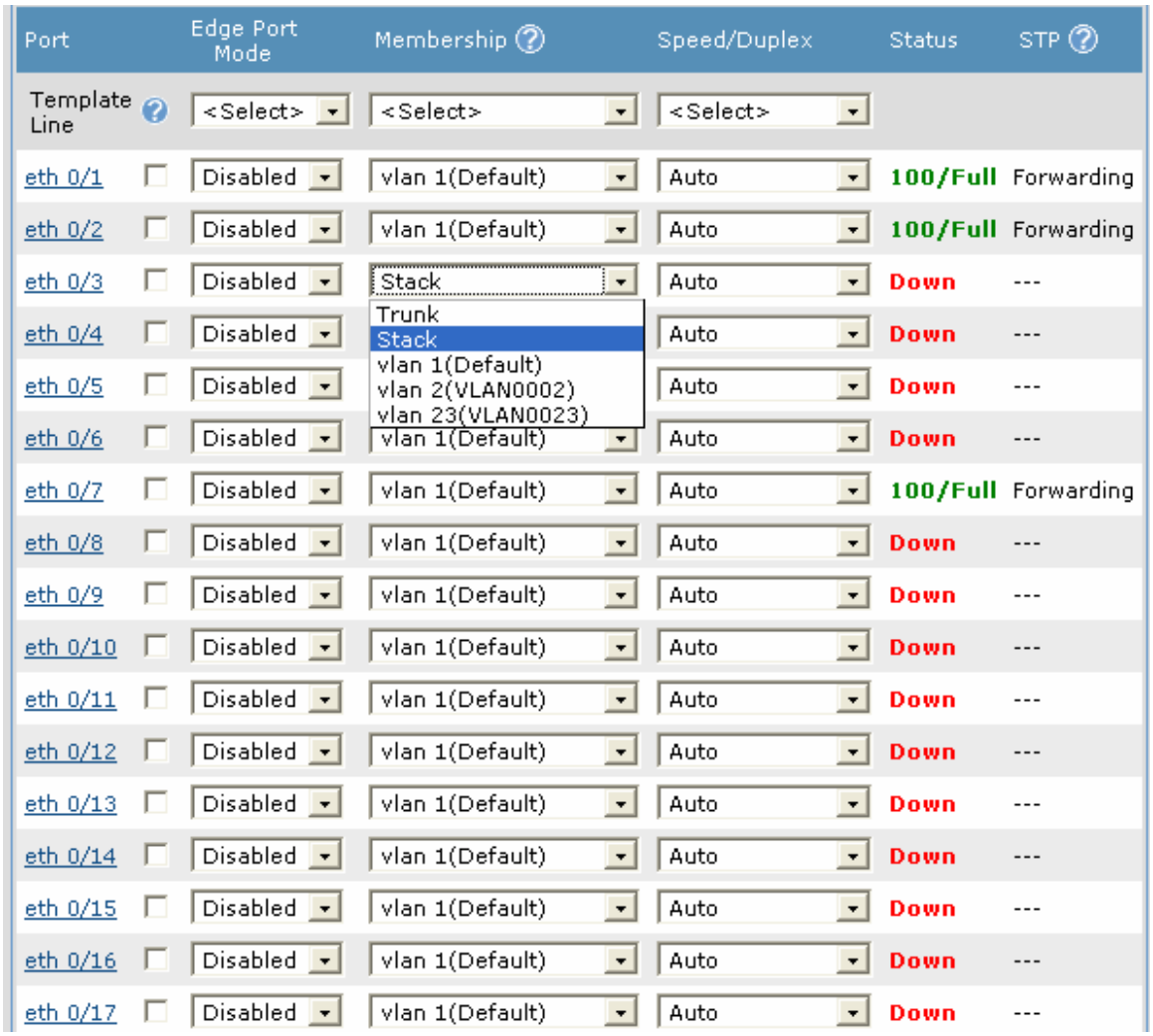
- Assigning a Port for Stacking
- Configuring Device to be a Member Switch

Assigning a Port for Stacking

To configure ports as stacking ports, navigate to the Ports sub-menu under the Switch menu.

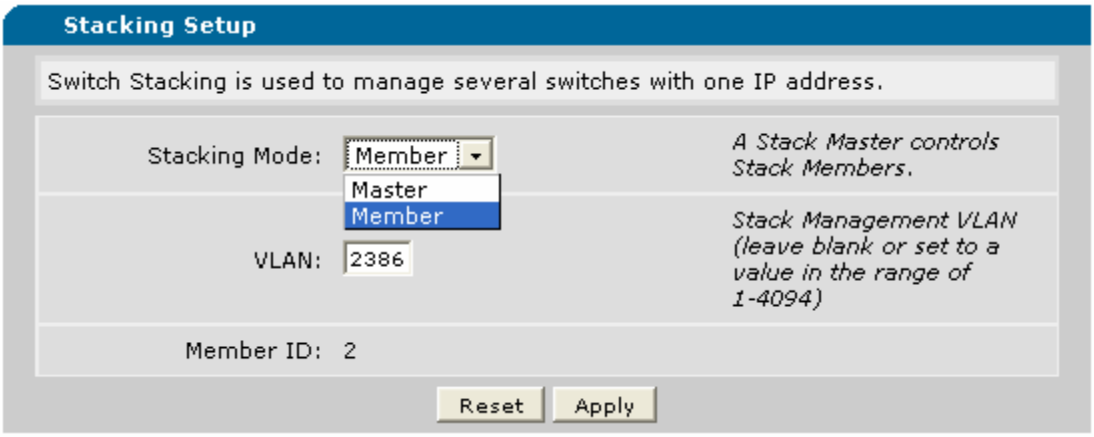
Once in this menu set the port to be used as a stacking port. It is important to note that this also puts the port into trunking mode, therefore there is not a need for another port to be configured for trunking.

To set a port for stacking, change the Membership type to be Stack as shown below:

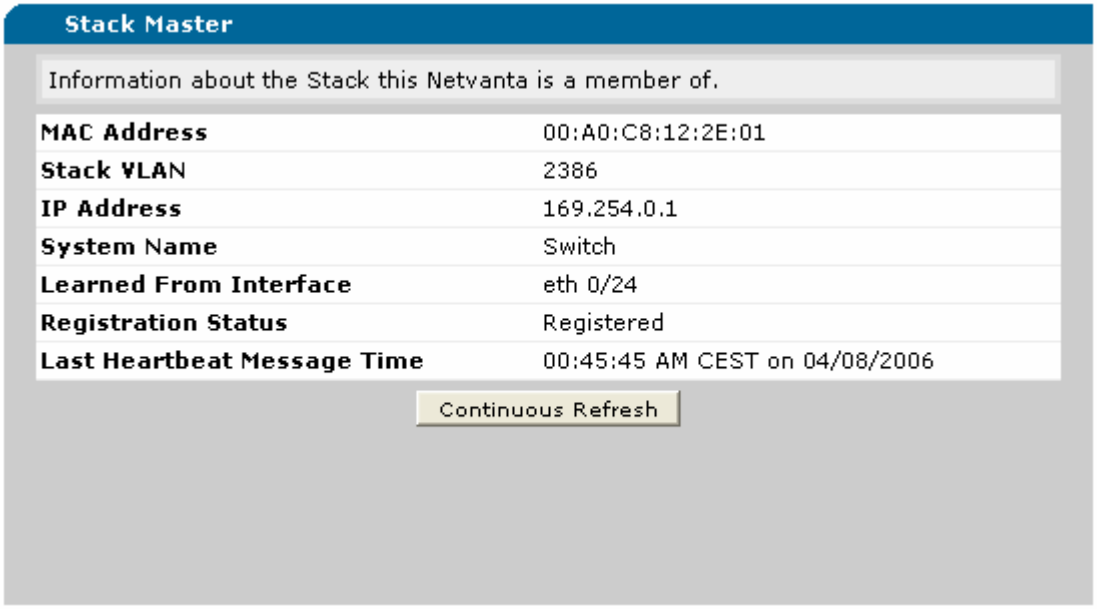


Configuring Device to be a Member Switch

From the GUI, go to the Stacking sub-menu under Switching on the right hand of the page as shown earlier. Once there, configure the device to be a Member. Also, as stated before, this also allows configuration of the VLAN for stacking.



Below is the information on the Stack Master:



Troubleshooting

The commands listed below can be helpful in troubleshooting Switch Stacking:

show LLDP neighbors
show stack candidates
show stack
debug LLDP verbose
debug stack verbose

show lldp neighbors shows information regarding directly connected neighbors.

master#show lldp neighbors

```
Capability Codes: R - Router, B - Bridge, H - Host, D - DOCSIS Device,
                  W - WLAN Access Point, r - Repeater, T - Telephone

System Name       Port ID       TTL    Cap.     Platform       Local Int
----------------- ------------- ------ -------- -------------- --------------
Router            eth 0/1       114    ----R--- NetVanta 3305  eth 0/1
1224ST            eth 0/12      100    --B----- NetVanta 1224  eth 0/2
Router            eth 0/1       94     ----R--- NetVanta 3200  eth 0/7
Switch            eth 0/24      107    --B----- NetVanta 1224  eth 0/24
```

As is shown above, show lldp neighbors provides information on the devices that are directly connected to the switch.

Show stack candidates can be used to see the devices that have stacking enabled and can possibly be added as members.

master#show stack candidates

```
Displaying all known Stack candidates...

MAC Address       System Name    Learned Master from   AOS Revision  Stack Rev
----------------- -------------- ------------------ ------------- ---------
00:A0:C8:12:3F:F9  Switch         00:A0:C8:12:2E:01     12.01.00.E        1
```

Notice that this information coincides with the Stack Candidates box under Stacking in the Web GUI. By using the show stack candidates command with the stack member <MAC Address> <Member ID>, it is possible to build the stack members through the use of AOS.

Show stack provides information on the status of this switch as well as showcasing the members on the switch.

master#show stack

```
Stack mode is MASTER
  Management Vlan is 2386, firmware version is 12.01.00.E
  Stack network is 169.254.0.0/24

Stack members...

Member  MAC Address        Mgmt IP Address  Source Interface  State
------- ------------------ ---------------- ----------------- --------
2       00:A0:C8:12:3F:F9   169.254.0.2      stack port        Up
Switch#
```

The two last commands are **debug LLDP verbose** and **debug stack verbose**.

Debug LLDP verbose gives information regarding the packets sent and received for LLDP. Below is an example of its output:

```
Switch#LLDP: eth 0/24: TX LLDPDU on 2006.08.28 10:21:08
LLDP:   Chassis ID (MAC Address) "00:A0:C8:12:2E:01"
```

```
LLDP:   Port ID (Locally Assigned) "eth 0/24"
LLDP:   TTL 120
LLDP:   System Description "NetVanta 1224R"
LLDP:   System Name "Switch"
LLDP:   System Description "NetVanta 1224R, Version: 12.01.00.E, Date: Thu Mar
23 21:55:24 2006"
LLDP:    System Capabilities:
LLDP:       Bridge, Router
LLDP:    Enabled System Capabilities:
LLDP:       Bridge
LLDP:    Management Address:
LLDP:      Type: "IP version 4"  Address: "10.19.236.1"
LLDP:      Interface Type: "Interface Index" Id: 36
LLDP:      OID: "1.3.6.1.2.1.2.2.1.1.36"
LLDP:   Stacking-capable: version 1
LLDP:    Stack Master:
LLDP:       MAC:  00:A0:C8:12:2E:01
LLDP:       VLAN: 2386
LLDP:    Stack MAC: 00:A0:C8:12:2E:01
LLDP: Next Update for eth 0/24 in 30 seconds
LLDP: eth 0/24: RX LLDPDU from 00:A0:C8:12:40:11 len = 206
LLDP:    Chassis ID (MAC Address) "00:A0:C8:12:3F:F9"
LLDP:    Port ID (Locally Assigned) "eth 0/24"
LLDP:    TTL 120
LLDP:    Platform ""
LLDP:    System Name "Switch"
LLDP:    System Description "NetVanta 1224R, Version: 12.01.00.E, Date: Thu Mar
23 21:55:24 2006"
LLDP:    System Capabilities:
LLDP:       Bridge, Router
LLDP:    Enabled System Capabilities:
LLDP:       Bridge
LLDP:    Management Address:
LLDP:      Type: "IP version 4"  Address: "10.19.236.45"
LLDP:      Interface Type: "Interface Index" Id: 26
LLDP:      OID: "1.3.6.1.2.1.2.2.1.1.26"
LLDP:    Stacking-Capable: version 1
LLDP:    Stack MAC: 00:A0:C8:12:3F:F9
```

Finally, debug stack verbose will give information regarding the LLDP packets that have been received and are useful to stacking:

```
no2006.08.28 10:22:07 Stacking:  RX register msg from (00:A0:C8:12:3F:F9,
Switch)
2006.08.28 10:22:07 Stacking:    learnedFromMac = 00:A0:C8:12:2E:01
2006.08.28 10:22:07 Stacking:    protocol version = 1
2006.08.28 10:22:07 Stacking:    software revision = 12.01.00.E
2006.08.28 10:22:07 Stacking:    product name = NetVanta 1224R
2006.08.28 10:22:07 Stacking:  TX REG-ACK to 00:A0:C8:12:3F:F9
```

If you experience any problems using your ADTRAN product, please contact ADTRAN Technical Support.

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