Vanguard Applications Ware
IP and LAN Feature Protocols

Ethernet Switching

Notice

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Contents

Ethernet Switching

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Overview

Introduction

The purpose of this document is to describe the Vanguard Networks Applications Ware Ethernet Switching feature. The Ethernet Switching feature is available on the Ethernet Ports 24 through 27 of the Vanguard Networks 3480 starting in Release 7.2.R000.

Before Using this Manual

Before using this manual you should have experience with IP-Routing, Ethernet MAC Bridging/Switching, and familiarity with the Vanguard Networks Products.

Trademarks

Related Vanguard Information

Refer to these related Vanguard Applications Ware documents for additional information:

- Vanguard Networks 3400 Series Installation Manual (Part No. T0288)
- Vanguard Networks IP and LAN Feature Protocols Ethernet Basics Guide (Part No. T0109)
- Vanguard Networks Basic Protocols Manual (Part No. T0113)
- Vanguard Networks Router Basics Manual (Part No. T0100-01)
- Vanguard Networks IP and LAN Feature Protocols Bridging P/N T0100-02
- Vanguard Networks IP Routing Basics Manual (Part No. T0100-03)
- Vanguard Networks IP and LAN Feature Protocols Manual (Part No. T0100-03)
- Vanguard Networks SNMP/MIB Management Manual (Part No. T0106-04)
- Vanguard Networks Alarms and Reports Manual (Part No. T0005) for details on alarms and reports generated by this feature

Ethernet Switching Theory of Operation

VLANs (Virtual Local Area Networks)

Ethernet Switching provides the ability to forward Ethernet MAC frames between like Virtual Local Area Networks (VLANS). Multiple VLANs may exist on the same Physical LAN. A 4-byte VLAN header differentiates VLANs. Figure 1 shows the Ethernet MAC Frames with and without the VLAN header.

Note

The EtherType 0x8100, which identifies the frame as having an 802.1Q format, and the VLAN tag are inserted after the MAC source address, but before the original Ethertype/Length field

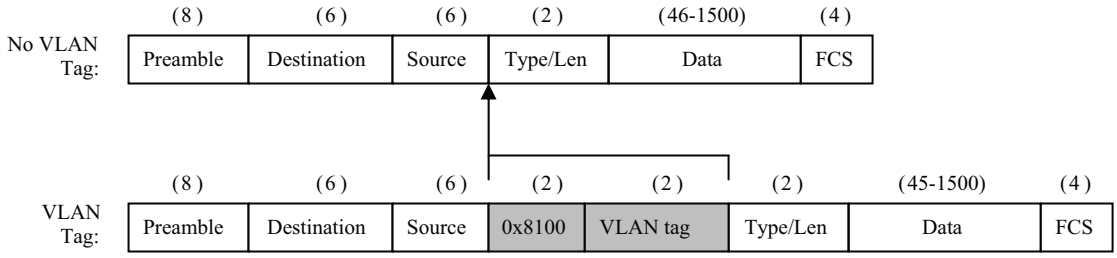


Figure 1. Ethernet MAC Frames with and without the VLAN Tag

VLAN Tag Format

In Figure 2, the 16-bit VLAN tag contains fields to identify the VLAN associated with the frame, called the VLAN ID, as well as the priority of the frame, called the Frame Priority, (FPRI). The 1-bit CFI, Canonical Format Indicator, includes a T-R Encapsulation bit so that Token Ring frames can be carried across Ethernet backbones without using 802.1H translation. Adding or removing a Tag requires re-computation of the Frame Control Sequence.

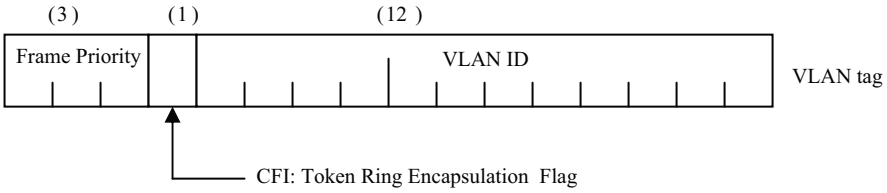


Figure 2. Ethernet MAC Frames with and without the VLAN Tag

Ethernet Switching Example

Figure 3 shows a typical example of Ethernet switching. Port 24 is a member of both VLAN-1 and VLAN-2. Port 25 is a member of VLAN-1 and of VLAN-2. Because Station A and Station C are members of VLAN-1, they are able to transmit and receive MAC frames between each other, through the 3480 Ethernet Switch. Station B and Station D are members of VLAN-2, so they are able to transmit and receive MAC frames through the 3480 Ethernet Switch.

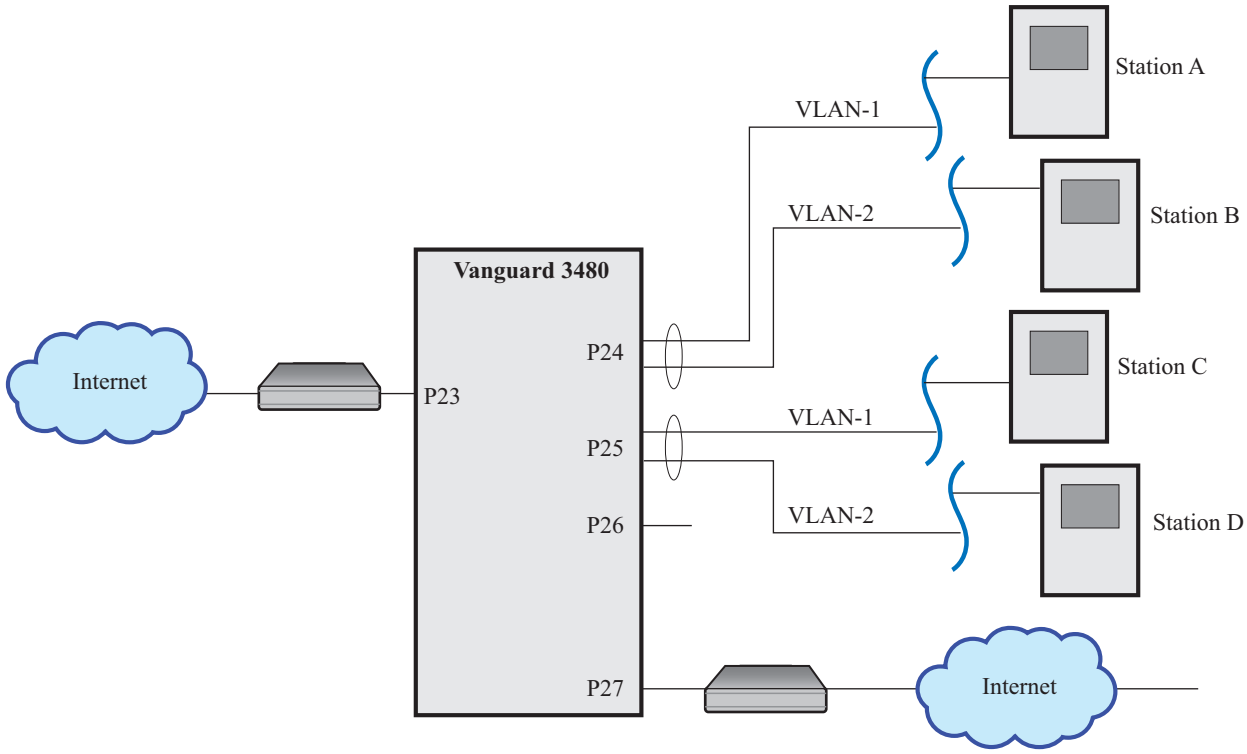


Figure 3. Example of an Ethernet Switching Application

Note

Port 23 does not support switching, and in this example, port 27 is configured to support routing only. See Vanguard Applications Ware IP and LAN Feature Protocols Ethernet Basics Guide (Part No. T0109) for a detailed description of the Switch Capabilities Parameter.

Note

Ethernet Bridging is not supported on the VN3480 platform. The Ethernet Bridging feature is replaced with the Ethernet Switching feature that is described in this manual.

3480 Ethernet Switch VLAN Assignment

The Ethernet switch ports that have their Switch Capabilities parameter set to ROUTER_ONLY or SWITCH_TO_ROUTER_UPLINK use their configured Router Interface to determine the assigned VLANs. These switch ports use the Router Interface number to reference the Router IP Interface Configuration and to read the VLAN ID from the IP Interface Configuration. For instance, in Figure 4, port 24 has a Router Interface Number equal to 1. So, port 24 accesses the IP Interface Configuration for Interface 1, entries 1 and 2, to read VLAN ID's 1 and 2, respectively. Thusly, port 24 is attached to VLANs 1 and 2 within the Ethernet Switch.

The Ethernet switch ports with their Switch Capabilites parameter set to SWITCH_PORT use the Router Interface of the port configured in their Switch to Router Uplink configuration. In Figure 4, ports 25 through 27 are configured with a Switch Capabilities of SWITCH_PORT and a Switch to Router Uplink port of 24, therefore they use the VLANs of port 24, or VLANs 1 and 2. See page 22 for details on VLAN ID configuration within the Ethernet Switch.

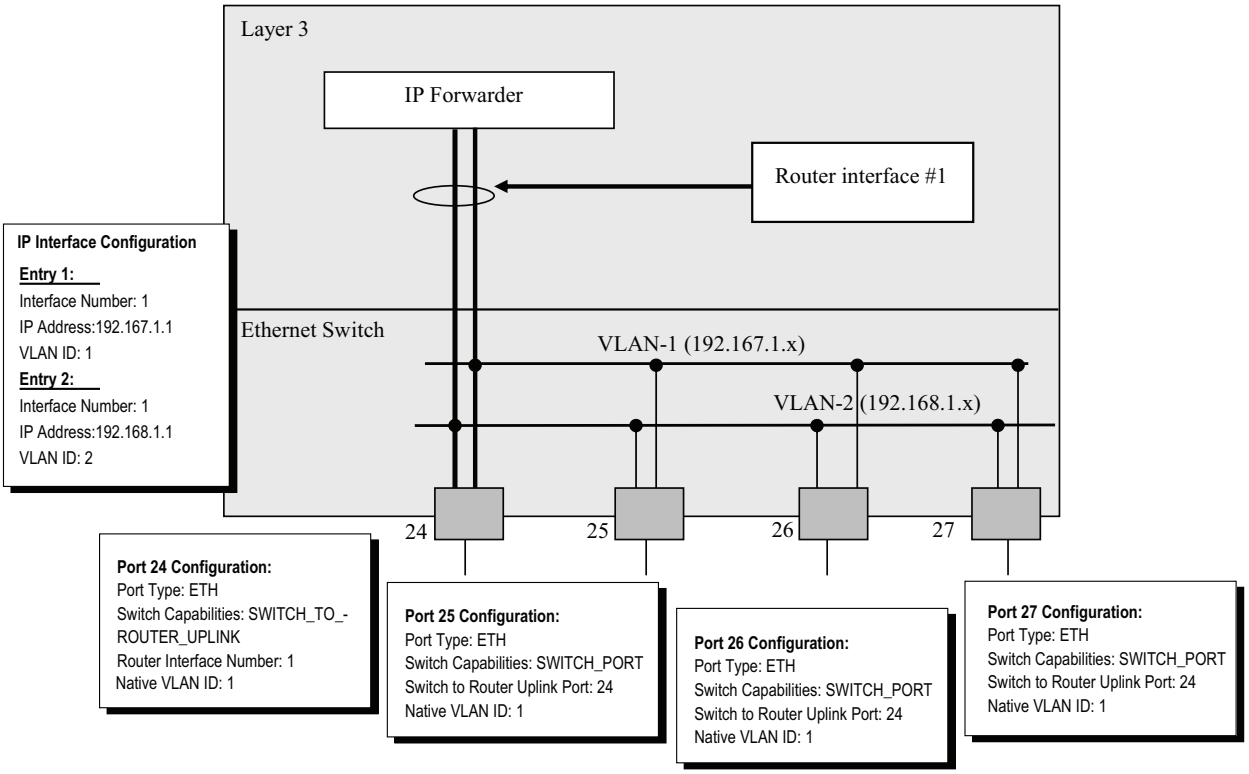


Figure 4. Assignment of VLANs to 3480 Ethernet Ports 24 through 27

Native VLAN Assignment to Ethernet Switch Ports

The 3480 Switch Ports, 24 through 27, are assigned a Native VLAN ID in their Ethernet Port configuration. Ethernet Frames received by a 3480 Ethernet Switch Port without a VLAN tag are assigned to the VLAN specified by the port's Native VLAN ID parameter. Ethernet Frames transmitted by the Ethernet Switch Port with a VLAN tag containing the VLAN ID corresponding to the port's Native VLAN ID are transmitted untagged. Figure 5 shows an IP Packet being routed from subnet 192.168.1.X (VLAN 2) to 192.167.1.X (VLAN 1). The packet is received by port 24 containing a VLAN tag with a VLAN ID of 2. When the packet is routed by the IP Forwarder to port 25, it is transmitted, by port 25, without a VLAN tag. The VLAN tag is being stripped, because VLAN 1 is the native VLAN of port 25.

The 3480 Switch Ports, 24 through 27, with a Switch Capabilities set to SWITCH_PORT must have their Native VLAN ID set to the Native VLAN ID of the Switch to Router Uplink Port.

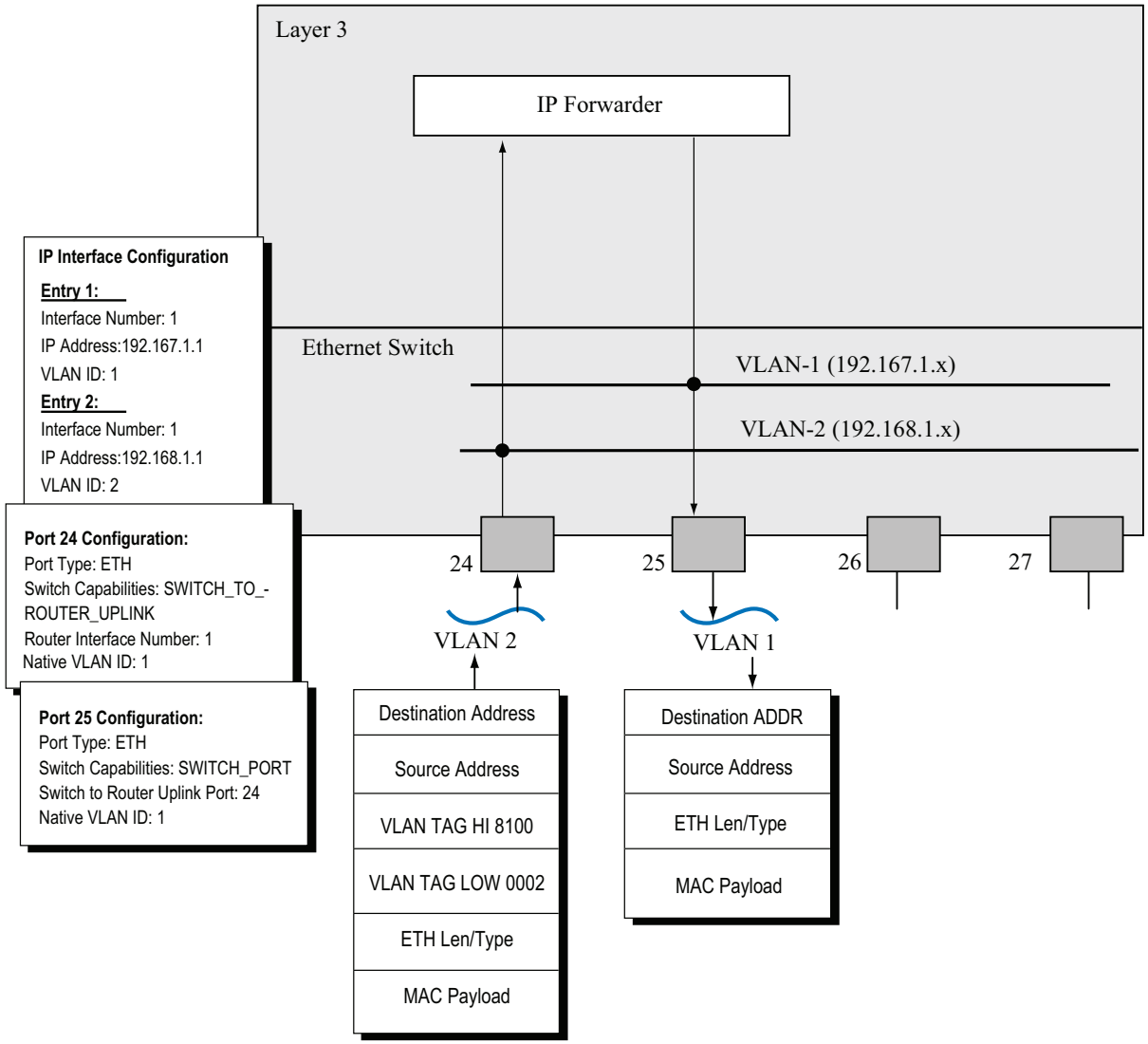


Figure 5. Example of the VLAN Tag being stripped

VLAN Frame Priority (FPRI)

The FPRI field in the VLAN header is a value from 0 to 7 where 0 is the lowest and 7 is the highest. The Frame Priority determines the Class of Service during the Ethernet switch processing. The untagged frames received by Switch Ports (24-27) are assigned Default Frame Priority configured with the Ethernet port configuration. The tagged frames received by Switch Ports (24-27) may have their FPRI field overidden via the Ethernet port's Piority Tag Overide parameter. This parameter allows the FPRI field to be overwritten by a priority field configured in the Ethernet Switch VLAN Table configuration.

Figure 6 shows the case where the Ethernet Switch Port Priority tag mode is set to VLAN and Ethernet Switch Configuration of VLAN 1 is configured with a Priority of 2. The ingress frame tag, in this example, has an Ingress VLAN ID equal to 1 and an Ingress FPRI equal to 3. The FPRI field is overridden with a priority equal to 2, when the frame ingresses the Ethernet Switch Port 24. When the frame egresses the switch via port 25, the piority is set to 2.

Figure 6 shows the Frame Priority Field being altered from 3 to 2 due to the Tag Override Parameter being set to VLAN and the VLAN Priority for VID 1 being equal to 2.

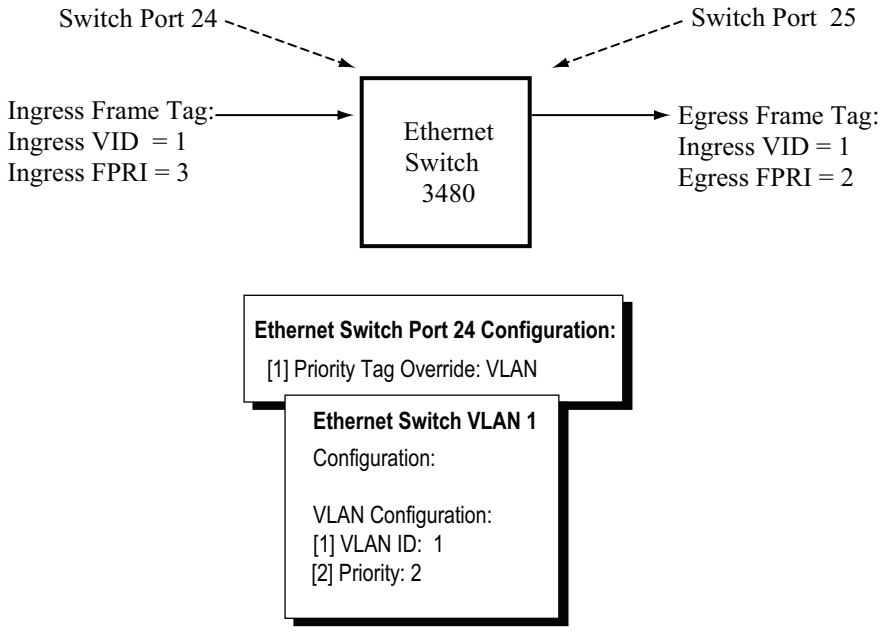


Figure 6. Example of VLAN Frame Priority

DSCP to COS Mapping

Ethernet Ports 24 through 27, that are configured with a Switch Capabilities Parameter equal to ROUTER_ONLY or SWITCH_TO_ROUTER_UPLINK, allow configuration of a profile to map an IP DSCP (Internet Protocol Differential Service Code Points) to a Class of Service (COS). This allows IP packets from the port's router interface to have the FPRI field set in the VLAN Tag to a value from 0 through 7.

Ethernet Ports 24 through 27, that are configured with a Switch Capabilities Parameter equal to SWITCH_PORT, use the DSCP to COS Profile of their Switch to Router Uplink Port.

Figure 7 shows an example of a DSCP to COS Profile configuration in Port 24. In this example, the DSCP to COS Profile in Port 24 is set to profile 1. In the COS to DSCP Mapping Profile, a profile is configured as shown in Figure 7. An IP Packet is shown at Stage 1, with a DSCP set to 58, being transmitted from Layer 3 to the DSCP to COS Mapping Function. The DSCP to COS Mapping function applies the COS DSCP Map for Profile 1 on behalf of port 24. Since the DSCP is set to 58, the FPRI field is set to 7 by the DSCP to COS Mapping Function, at Stage 2 in Figure 7. Finally, at Stage 3, the Ethernet MAC frame is transmitted by the Ethernet Switch Port 24. At Stage 3, this packet contains the MAC header, the VLAN tag, and the IP Datagram with a DSCP = 58.

Note

The VLAN Tag FPRI field is set to 7 by the DSCP to COS Mapping function.

Note

The DSCP to COS Mapping feature does not support overwriting the COS field of a packet that was already VLAN encapsulated when it ingressed the 3480 via an Ethernet Port.

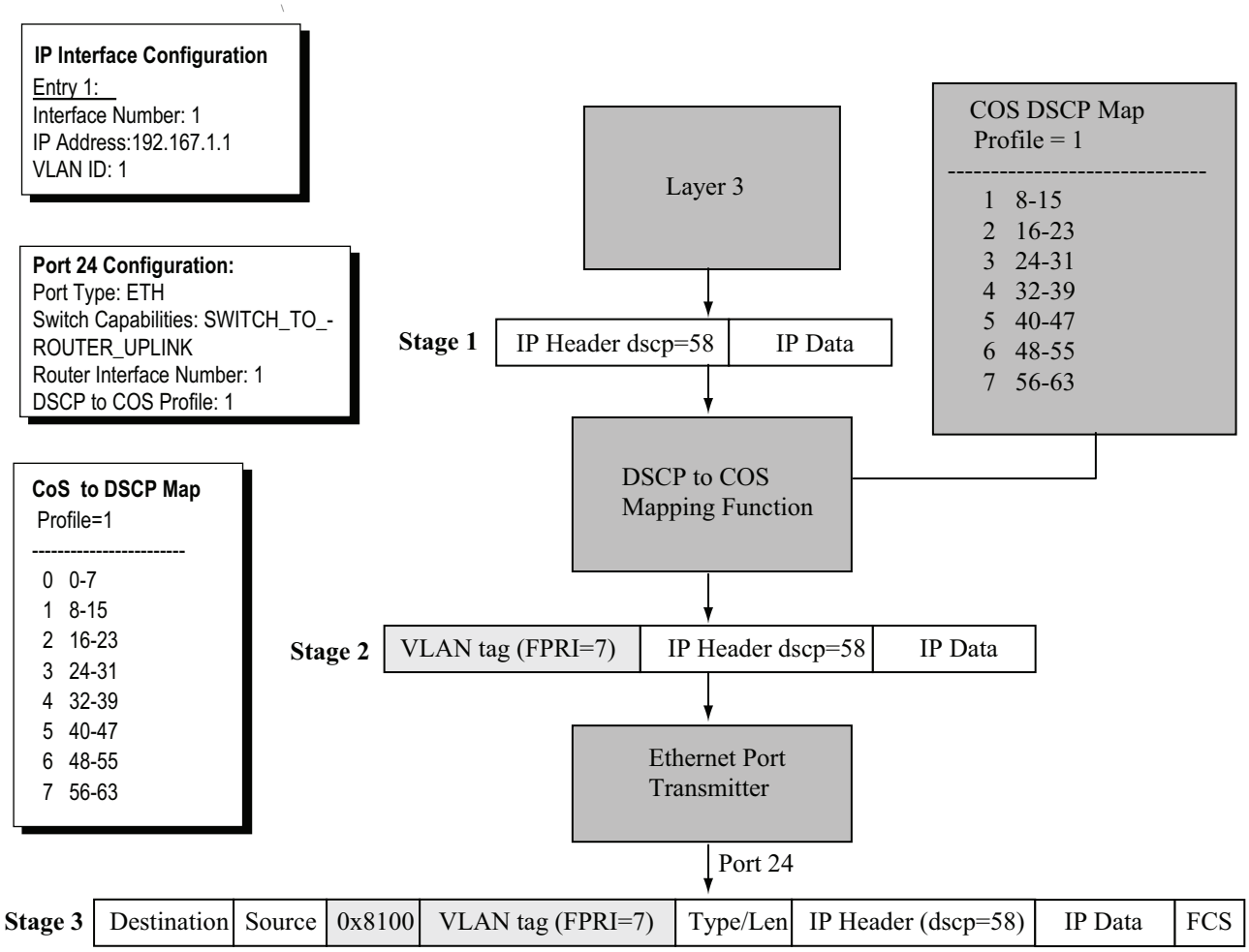


Figure 7. Application of the DSCP to COS Mapping Function

Ethernet Switch Source Learned Forwarding

Ethernet Switching supports Learned Source MAC Address Forwarding on a per VLAN basis. The Ethernet Switch Module uses the Source Learning Algorithm to Forward Frames between Switch Ports (attached to the same VLAN). Fig 8 shows an example of Source Learned Forwarding. In step 1, PC-A transmits a frame to 3430/3480 Port 24. The Switch Matrix Port number 0 (P0) receives the frame, writes the source address 00-00-00-00-00-0A and the Port the frame was received on, P0, to the Learned Table, and broadcasts the frame to Switch Matrix Ports P1, P2, P3, and P5 (router port).

Next, the PC-B sends a frame destined for PC-A. The Switch Matrix receives this frame on Port P3 and writes address 00000000000B with the Port No that the frame was received on, P3, to the Learned table. Then, the Switch Matrix searches the Learned Table for the destination MAC 00000000000B. The switch matrix finds this address in entry 1 of the Learned Table. Within entry 1, the Switch Matrix reads the Destination Port, on which to transmit the frame, P0. The Switch Matrix transmits the frame on P0 and PC-A is receives the frame. Therefore, only during the initial learning process are frames broadcasted to all ports. So, once the MAC Addresses become learned, the overhead of broadcast traffic in the network reduces.

The Aging Period configured in the Ethernet Switch Global Parameters Configuration determines the time period at which learned entries are removed from the Forwarding Table if the entries have not encountered any activity. The Learned Address table stores 256 addresses per VLAN.

1- PC A transmits a frame to Port 24.
2- The Switch Matrix receives the frame on Port 0 (P0).
3- The Switch Matrix writes Entry 1 to the Learned Table.
4- The Switch Matrix Broadcasts the Frame to P1, P2, & P3.
5- The PC-B sends a frame destined for PC-A.
6- The Switch Matrix writes Entry 2 to the Learned Table.
7- The Switch Matrix searches the Learned Table for 00000000000A
8- The Switch Matrix finds it in entry 1, so knows P0 is destination.
9- The Switch Matrix transmits the frame to P0.

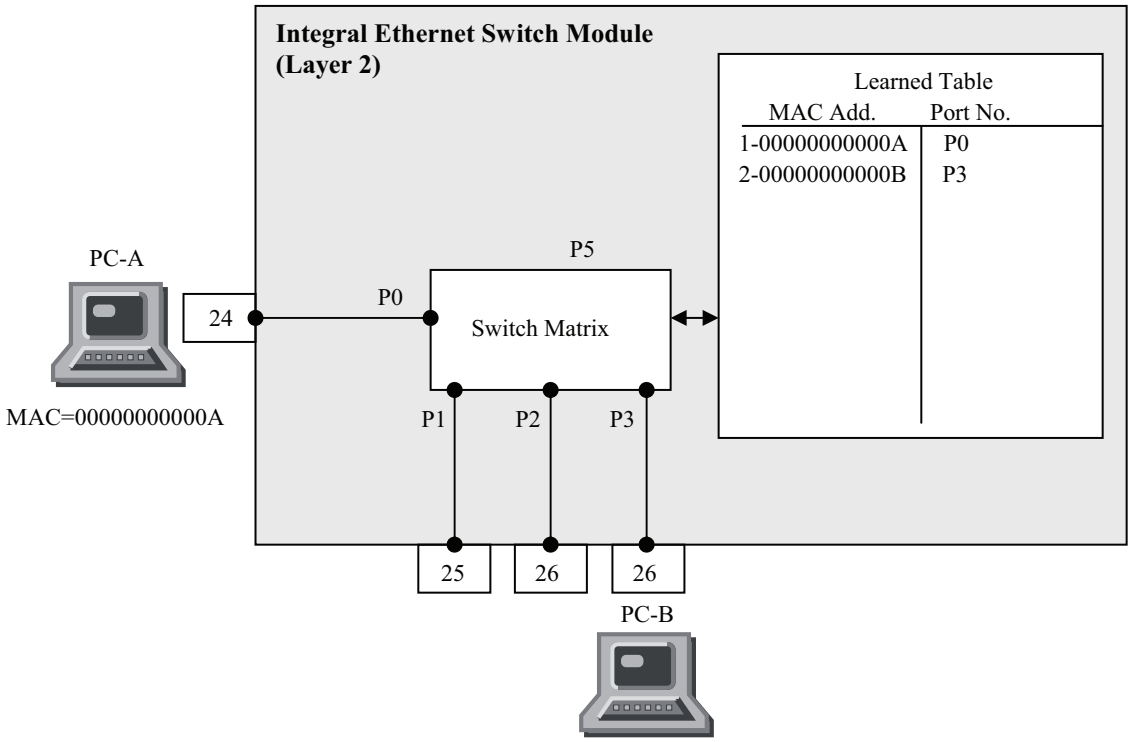


Figure 8. Example of Source Learned Forwarding

Typical 3480 Ethernet Switching Application

Figure 9 shows the 3480 in a typical Ethernet switching application. In this example, Ports 23 and 24 are an Ethernet WAN connection to the Internet. Port 25 provides DMZ support. Port 26 and Port 27 support Ethernet Switching connectivity to the Trust Zone. Layer 2 switching occurs between Port 26 and Port 27. Access between the zones is via router interfaces and the Vanguard Networks Firewall. Refer to the ***Vanguard ApplicationsWare IP and LAN Feature Protocols*** (P/N T100-01).

In Figure 9, Port 23 supports routing. (Note that port 23 may not be configured for switching.) Ports 24 and 25 are configured with a Switch Capability set to ROUTER_ONLY. (They do not need to do switching in this application). Port 26 is configured with a Switch Capabilities of SWITCH_TO_ROUTER_UPLINK. Port 27 is configured with a Switch Capabilities parameter of SWITCH_PORT and with a Switch to Router Uplink Port parameter of 26. Thus ports 26 and 27 are part of a switch group and layer 2 switching can occur between them.

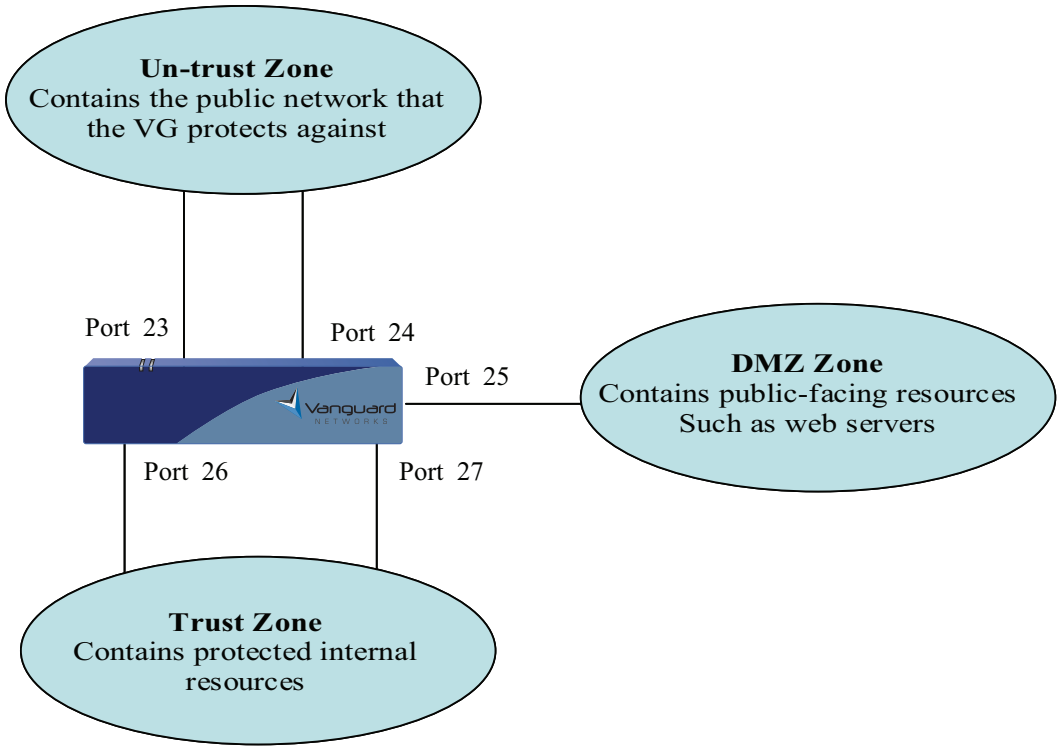
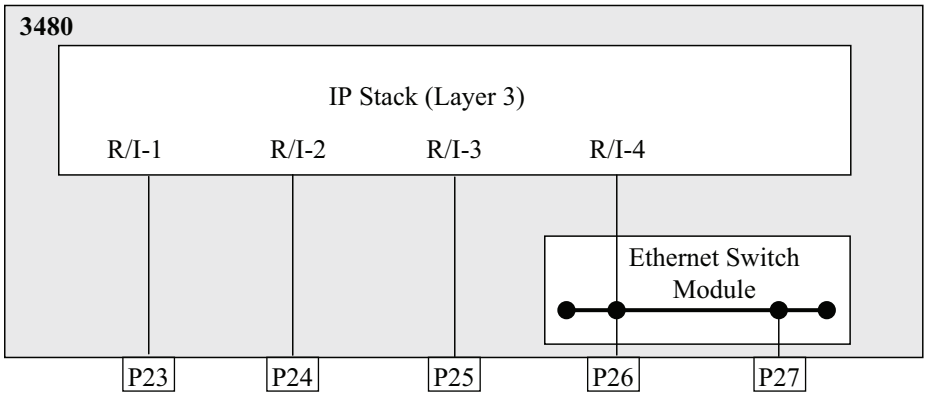


Figure 9. Typical 3480 Ethernet Switching Application

3480 Ethernet Switch Port Mapping

Figure 10 shows the Port Mapping for the application shown in Figure 9. In this configuration, Port 23 attaches directly to Router Interface 1 since Port 23 does not support switching. Ports 24 and 25 attach to Router Interfaces 2 and 3, respectively, because their Switch Capabilities Parameter is set to ROUTER_ONLY. Port 26 has a Switch Capabilities setting of SWITCH_TO_ROUTER_UPLINK, so it attaches through the Switch Matrix to Router Interace 4. Port 27 has a Switch Capabilities setting of SWITCH_PORT and a Switch to Router Uplink Port setting of 26, therefore Port 27 gains access to the IP Stack (Layer 3) using R/I-4.



	P23	P24	P25	P26	P27
Switch Capability:	N/A	ROUTER_ONLY	ROUTER_ONLY	SWITCH_TO_-ROUTER_UPLINK	SWITCH_PORT
Switch Port:	N/A	N/A	N/A	N/A	26

Figure 10. 3480 Internal Port Mapping

3480 Ethernet Switch Group Application

Figure 11 shows a typical example of the 3480 supporting 2 separate switch groups. Ports 24 and 25 are attached to Zone A. Ports 26 and 27 are attached to Zone B. In this example, ports 24 and 25 are members of the same switch group. Likewise, ports 26 and 27 are members of the same switch group. Zone A and Zone B must be configured to be on different VLANs from one another. In this example, the switch group associated with Zone A is configured for VLAN 1, and the switch group associated with Zone B is configured for VLAN 2.

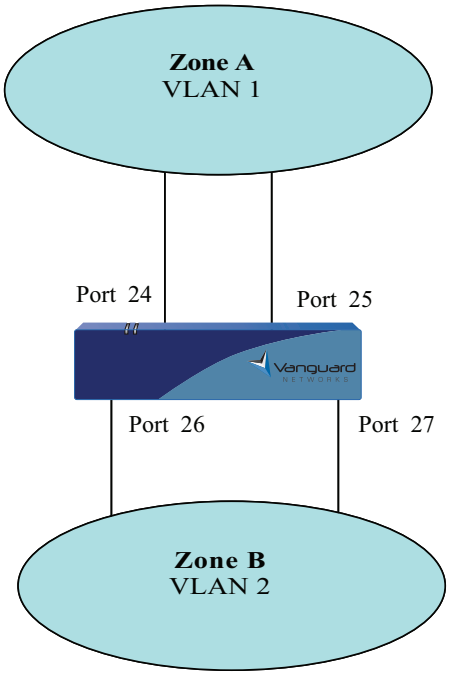


Figure 11. Ethernet Switching Application with two Switch Groups

3480 Ethernet Switch Group Configuration Example

Figure 12 shows the port mapping and configuration for the application shown in Figure 11. Switch Group 1 is configured for the 192.167.X subnet, VLAN 1, and ports 24 and 25. Switch Group 2 is configured for the 192.168.X subnet, VLAN 2, and ports 26 and 27.

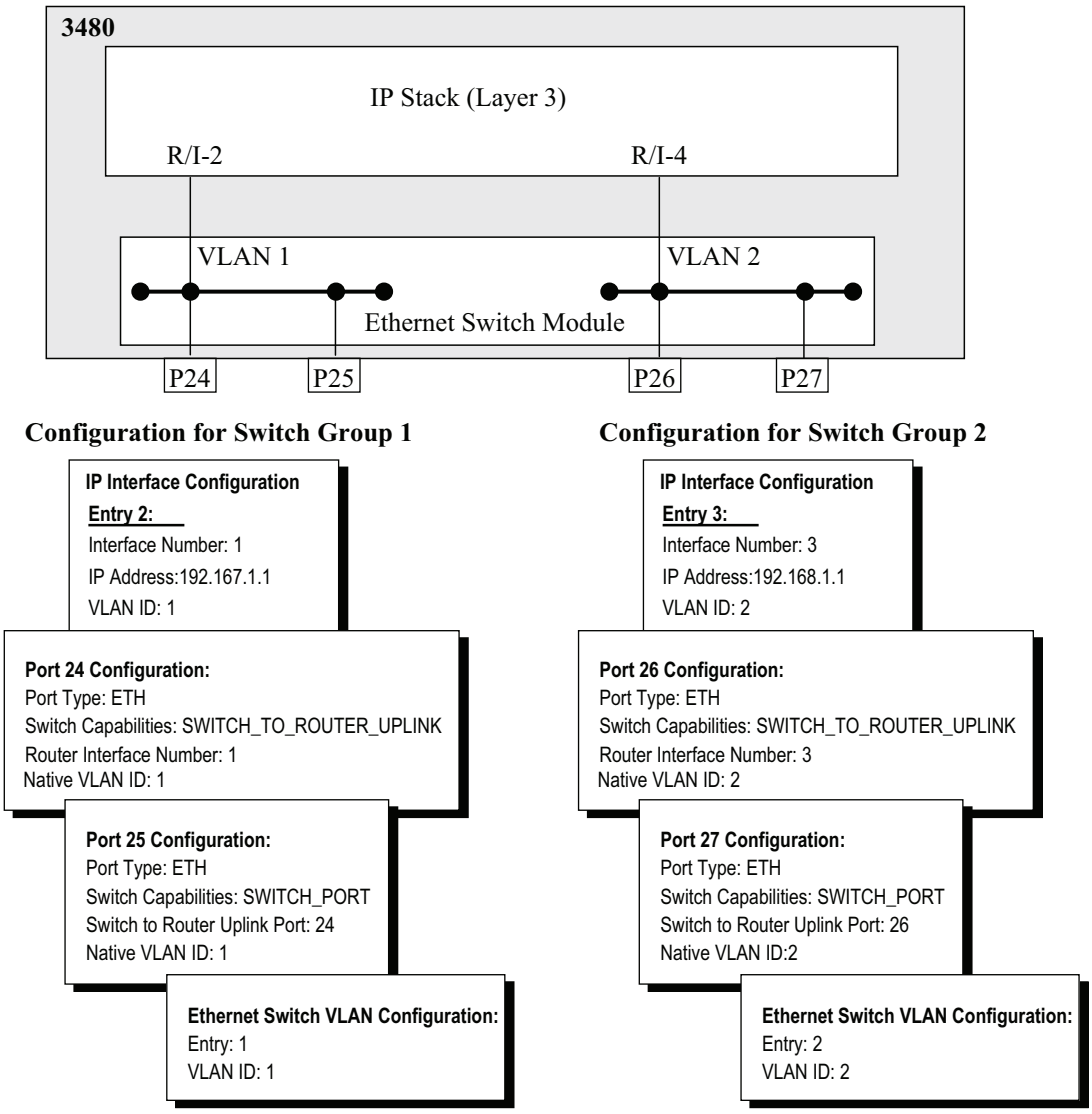


Figure 12. Ethernet Switching Port Mapping and configuration for an application with two Switch Groups

Note

When more than one VN3480 Ethernet Port (24 through 27) is configured with a Switch Capabilities parameter set to SWITCH_TO_ROUTER_UPLINK, the ports' associated Router Interfaces should be configured with a unique VLAN ID and a unique IP address. If there is an overlap of the VLAN ID or IP Address between both ports associated Router Interface, the Port Status of the higher numbered port will become "MISCONFIG".

3480 Ethernet Switch Spanning Tree

The 3480 Ethernet Switch supports the IEEE 802.1d Spanning Tree Algorithm. This Spanning Tree Algorithm may be enabled or disabled from the 3480 Ethernet Switch Global Parameters Configuration Menu via the Spanning Tree Enable parameter. It is applies to Ports 24 through 27 when their Switch Capabilities Parameter is set to SWITCH_TO_ROUTER_UPLINK or SWITCH_PORT. If port 24 through 27 is configured with a Switch Capabilities Parameter set to ROUTER_ONLY, it does not participate in the Spanning Tree Algorithm. (Port 23 of the 3480 does not participate in the Ethernet Switch Spanning Tree Algorithm.)

The Ethernet Switch Spanning Tree Algorithm controls the Spanning Tree Protocol messages that communicate between the switches. By processing these messages, the switches automatically determine a spanning tree for the network. These messages are continually updated so the spanning tree automatically adjusts to the current topology. These messages consume a small amount of the bandwidth.

The Ethernet Switch Spanning Tree Algorithm is primarly responsible for preventing Ethernet Ports, 24-27, from being involved in a Ethernet MAC frame loop. The Spanning Tree Algorithm prevents loops by first detecting the loop. and then reacting to the loop by blocking one or more of the redundant paths. The Spanning Tree Algorithm will set the forwarding state of the port based on the configured Path Cost. When a loop is detected, the path with the least path cost remains in the Forwarding state while the redundant path, with the higher path cost, goes into the Blocking state.

3480 Ethernet Switch Spanning Tree Example

Figure 13 shows an example of where two of the Ethernet Switch ports, 24 and 25, create a loop. In this example, port 25 gets set to the BLOCKING State by the Ethernet Switch Spanning Tree Function, because port 25 has a higher path cost than port 24. Port 24 gets set to FORWARDING state because it has a lower path cost. The Ethernet MAC frames are transmitted and received on port 24. Port 25, the redundant path, and will be set to the FORWARDING state, by the Ethernet Switch Spanning Tree Module if port 24 goes down.

The 3480 Ethernet Switch Spanning Tree Feature supports 802.1d Spanning Tree so it does not support a per-VLAN Spanning Tree. For more information on the Spanning Tree Protocol, please refer to IEEE 802.1d and ***Vanguard ApplicationsWare IP and LAN Feature Protocols Bridging P/N T0100-02.***

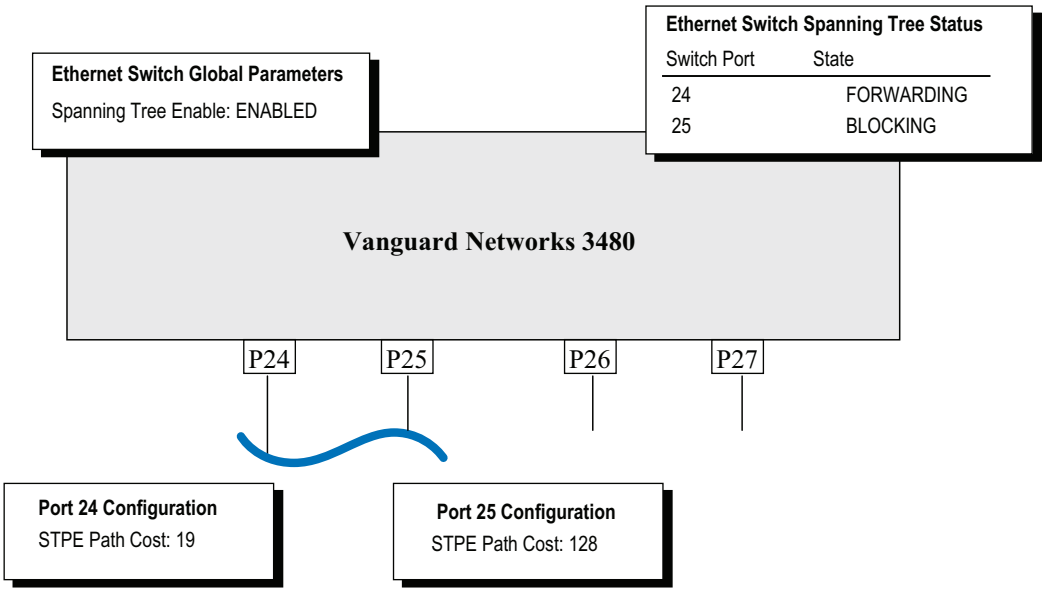


Figure 13. Ethernet Switch Spanning Tree Example

3480 Ethernet Switch Spanning Tree Interoperability

Figure 14 shows an example of the 3480 Ethernet Switch connected to two Cisco Catalyst 2950 switches. For interoperability with these Cisco switches, the switch "spanning-tree mode" must be set to "pvst" as shown in the illustration. When the Cisco switch is set to "pvst" mode, the 3480 Ethernet Switch recognizes the Spanning Tree BPDUs from the Cisco Switch.

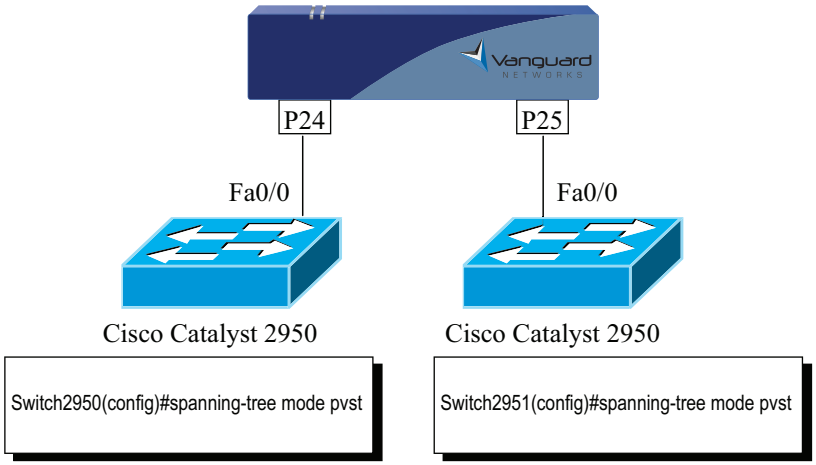


Figure 14. Cisco Interoperability with the 3480 Ethernet Switch

Configuration of the 3480 Ethernet Switch

Introduction

To set up a Vanguard 3480 Ethernet Switch, configure the following:

- Ethernet Switch Menu
- Ethernet Port Record

  Note
  For details on configuring the Ethernet ports, see Vanguard IP and LAN Feature Protocols Ethernet Basic Guide (Part No. T0109)

- Router

  Note
  For details on configuring your node for IP Routing operation, refer to:
  Vanguard Router Basics Manual (Part No. T0100-01)
  Vanguard IP Routing Basics Manual (Part No. T0100-03)

Configuring a Node

Follow the steps in the table below to configure the 3480 Ethernet Switch related parameters:

Action	*Result*
Select **Configure (6)** from the CTP Main menu.	The Configure menu displays.

Configure Menu

Figure 15 shows a sample Configure Menu:

```
Node: ethswx          Address: 101              Date: 14-AUG-2009  Time: 13:20:38
Menu: Configure                                 Path: (Main.6)

1.  Node                                19. Configure LAN Connections
2.  Port                                20. Alarms Throttling
3.  Configure Network Services          21. Configure Router
4.  Inbound Call Translation Table      22. LLC to SDLC Tables
5.  Outbound Call Translation Table     23. TCP
6.  PAD Prompt Table                    24. PPP/MLP Authentication Parameter
7.  Software Key Table                  25. PPP/MLP Profiles
8.  Calling Addr Translation Table      26. Configure SPFM Connection Table
9.  NUI/Password Table                  27. ToW Table
10. PAD Profile Table                   28. AT Dialer Profile
11. Remote PAD Parameter Table          29. T1/E1 Interface
12. CUD based Addr Translation Table    30. Configure SNMP
13. Node to node download               31. Virtual Port Mapping Table
14. BSC/DSP3270 Device Table            32. Configure TFTP Server
15. SDLC Port Stations                  33. TCP to BSC Conv Record Configure
16. FRI Stations                        34. Configure Ethernet Switch
17. Configure Bridge
18. Configure Network Security

#Enter Selection:
```

Figure 15. Typical 3480 Configuration Menu

Configuring Port Records

Introduction

Port Records store the port configuration parameters, with each active port having a separate record. Active port number (location) and port type must be defined before you configure the remaining Port Record parameters.

Configuration

Follow these steps to configure the Port Records:

Step	*Action*	*Result*
1	Select **Configure** from the CTP Main menu.	The Configure menu displays.
2	Select **Port** from the Configure menu.	The Port Number parameter displays.
3	At the prompt, enter the number of the port you want to configure and press Return.	The parameters are successively displayed. **Note** When an asterisk appears beside a parameter in a record, a Node Boot is needed for any changes to that parameter to take effect.

Configuring the Ethernet Port Record

Ethernet Port Record Parameters

The Ethernet Port record contains these parameters:

Port Number

Range:	24, 25, 26, 27
Default:	24
Description:	Enter the number of the port to configure. This number is the Port Record reference number and represents both physical and virtual ports. Physical ports are located at the front and rear of the hardware chassis.

*Port Type

Range:	NULL, ETH
Default:	ETH
Description:	Specify the type of port you are configuring: • NULL - NULL port type • ETH - Ethernet port type **Note** A change to this parameter requires a node boot to take effect.

*Router Interface Number

Range:	1 to 50
Default:	1
Description:	Specifies the router interface number associated with this LAN port.

Switch Capabilities

Range:	ROUTER_ONLY, SWITCH_TO_ROUTER_UPLINK, SWITCH_PORT
Default:	ROUTER ONLY
Description:	This parameter determines the capabilities of the Ethernet Port. ROUTER_ONLY This setting creates an Ethernet port with direct access to layer 3 via the associated Router Interface and isolates this port from any switch functionality. SWITCH_TO_ROUTER_UPLINK This setting creates an Ethernet port that is attached to the internal Ethernet switch and provides access to layer 3 of the router via the Router Interface specified below. This port and its associated Switch Ports are automatically assigned the VLAN ID(s) of the Router Interface. SWITCH_PORT This setting creates an Ethernet port that is attached to the internal Ethernet switch. Frames received on this port are forwarded to layer 3 via the associated uplink port. This port's VLAN ID is automatically assigned with the VLAN ID of the associated uplink port's Router Interface. **Note** You must perform a node boot for changes to this parameter to take effect.

Switch to Router Uplink Port

Range:	24 to 27
Default:	24
Description:	This parameter specifies the uplink port associated with an Ethernet Port with a Switch Capabilities Field of SWITCH_PORT. The uplink port is used by this port to get access to Layer 3. The port numbered here must have its Switch Capabilities configured as SWITCH_TO_ROUTER_UPLINK.

Ethernet Switch Configure Tables

Follow These Steps...

Follow these steps to configure the Ethernet Switch Table record:

Step	*Action*	*Result*
1	Select **Configure** from the CTP Main menu.	The Configure menu displays.
2	Select **Ethernet Switch Record Configure** from the Configure menu..	The Port Number parameter displays.
3	Select the feature to configure: 1. Ethernet Switch Global Parameters 2. Ethernet Switch VLAN Parameters	At the prompt, enter the number of the feature you are configuring.

Ethernet Switch Configure Menu

Figure 16 below shows the Ethernet Switch Configure Menus.

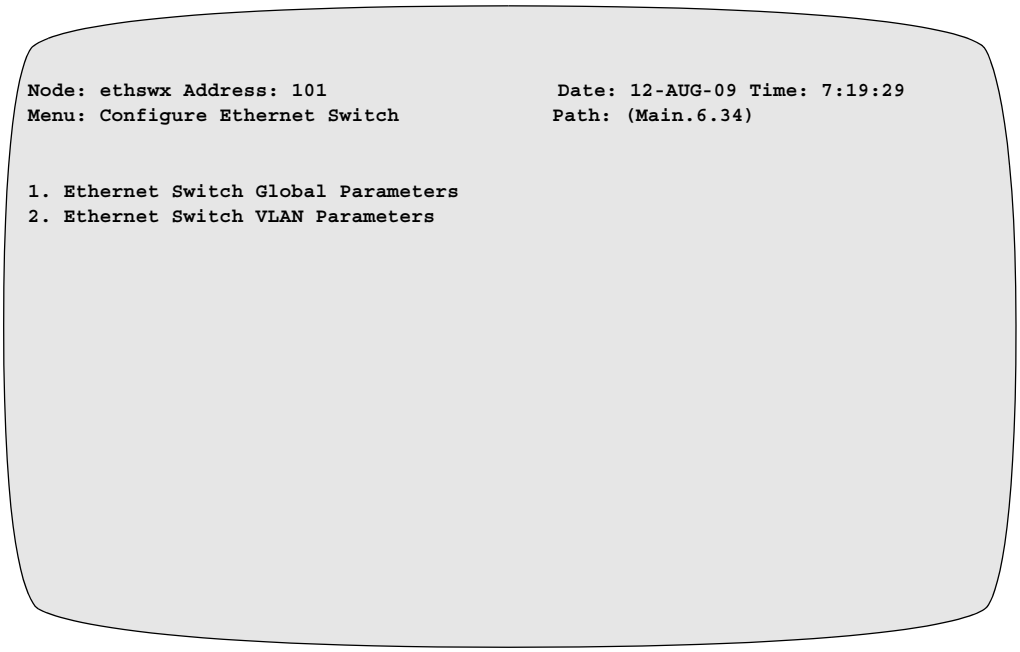


Figure 16. Ethernet Switch Configuration Menus

Ethernet Switch Global Parameters Configuration

*Spanning Tree Enable

Range:	ENABLED, DISABLED
Default:	ENABLED
Description:	Enable Ethernet Switch 802.1d Spanning Tree. **Note** A change to this parameter requires a node boot to take effect

Aging Period

Range:	10-3825
Default:	300
Description:	This is the time in seconds that a learned entry in the Forwarding Table will be allowed to remain in the table without being updated (relearned). If not updated within this time period, the entry is discarded from the table.

Ethernet Switch VLAN Parameters

Entry Number

Range:	1-8
Default:	1
Description:	Entry number used to reference this table record.

VLAN ID

Range:	1 - 4093
Default:	CLIENT
Description:	This is the VLAN ID associated with this VLAN. Frames with the same VLAN ID in their VLAN header are considered to be on the same Virtual LAN ie VLAN. This VLAN ID must not be repeated in other VLAN entries. **Note** A change to this parameter requires an Ethernet Switch VLAN Boot and a Ethernet Switch Boot to take effect.

Default Frame Priority

Range:	0-7
Default:	1

Default Frame Priority *(continued)*

Description:	The VLAN Default Priority is written into the VLAN Header's Priority field of frames received on an Ethernet Switch Ports whose Priority Override is set to VLAN. **Note** A change to this parameter requires an Ethernet Switch VLAN Boot and a Ethernet Switch Boot to take effect..

Statistics

Introduction

This chapter describes how to generate Ethernet Switch Statistics.

Types of Ethernet Switch Statistics

You can generate these Ethernet Switch Statistics:

- Ethernet Switch Summary Statistics
- Ethernet Switch VLAN Statistics
- Ethernet Switch 802.1d Spanning Tree Statistics

Generate and Reset Statistics

Follow these steps to generate and reset statistics:

Step	*Action*	*Result*
1	Select Status/statistics for the Control Terminal Port (CTP) Main Menu.	The menu for Status/statistics displays.
2	Select **Ethernet Switch Statistics** from the Status/statistics menu..	The Ethernet Switch Statistics menu displays.

Ethernet Switch Statistics Menu

Figure 17 below shows the Ethernet Switch Statistics Menu.

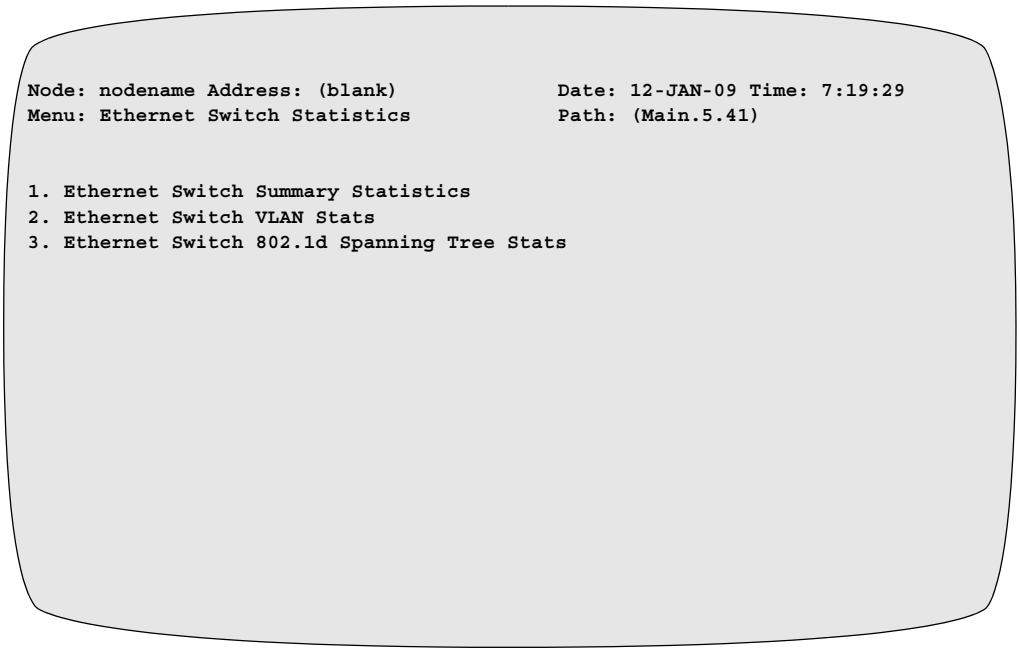


Figure 17. Ethernet Switch Statistics Menu

Ethernet Switch Summary Statistics

Figure 18 below shows the Ethernet Switch Summary Statistics.

```
Node: ethswx Address: 2706                Date: 13-JAN-2009 Time: 14:33:32
Ethernet Switch Summary Statistics        Page: 1 of 1

VLAN Entry     VLAN ID          Status       Associated Switch Ports
============== ================ ============ ===========================
1              0001             Inactive     24*
2              0002             Inactive     25*
3              0003             Inactive
4              0004             Inactive
5              0005             Inactive
6              0006             Inactive
7              0007             Inactive
8              0008             Inactive




* = VLAN is this Port's Native VLAN ID
```

Figure 18. Ethernet Switch Summary Statistics

Description of Terms

This table describes the information on the Ethernet VLAN Statistics.

Screen Term	*Description*
MAC Address	MAC Address of the station whose address was placed in the table.
Status	Status of the entry: Learned, Local.
Switch Port Number	Switch port that is associated with the MAC address. For entries containing a Learned MAC address, this is the port that received the frame with this source MAC address.

Ethernet Switch VLAN Statistics

Figure 19 below shows the Ethernet Switch VLAN Statistics.

```
Node: Nodename Address: (blank)         Date: 12-FEB-2009 Time: 1:35:27

Detailed Switch VLAN Statistics: VLAN Entry Number #1
Forwarding Database: VLAN ID = 0001

MAC Address             Status          Switch Port Number
------------------------------------------------------------
08-00-3e-00-33-44       Learned         24


Last Statistics Reset: 13-FEB-2000 23:38:18




Press any key to continue ( ESC to exit ) ...
```

Figure 19. Ethernet Switch VLAN Statistics

Ethernet Switch Spanning Tree Statistics

Figure 20 below shows the Ethernet Switch Spanning Tree Statistics.

```
Node: ethswx  Address: 101                          Date: 12-FEB-2009  Time:  1:39:44
Spanning Tree Status                                Page: 1 of  1

STPE Control:    ENABLED
STPE Bridge ID:  32768:080000000001          Root Bridge ID: 32768:080000000001
Root Path Cost:  0 Root Port:                N/A
Max Age:                                     Forward Delay:  15
Last Topological Change:   13-FEB-2009 23:38:53
Topological Changes:       2

          Switch Port               State               Priority            Path Cost
         ---------------           -------             ----------          -------------
               24                  Forwarding             128                  19
               25                  Forwarding             128                  19
               26                  N/A Note 1
               27                  N/A Note 1

Note 1 - STP is not supported on a port with Switch Capability = ROUTER_ONLY.
```

Figure 20. Ethernet Switch Spannng Tree Statistics

Description of Terms

This table describes the information on the Ethernet VLAN Statistics.

Screen Term	*Description*
STPE Control	MAC Address of the station whose address was placed in the table.
STPE Bridge ID	Status of the entry: Learned, Local.
Root Bridge ID	This is the ID of the Bridge/Switch that is the root of the spanning tree.
Root Path Cost	This is the path cost of the root bridge. It is 0 if this is the root bridge.
Root Port	This is the port toward the root bridge.
Max Age	This is the maximum spanning tree protocol information is retained.
Forward Delay	This is the time spent in the Listening state before a port moves to the Forwarding state.
Last Topological Change	This is the time of last spanning tree topoloty change.
Topological Changes	This is the total number of past topology changes.
Switch Port	Number of switch port participating in Spanning Tree.

Screen Term *(continued)*	***Description*** *(continued)*
State	State of port with spanning tree: Blocking, Listening, Blocking, Learning. Disabled.
Priority	This is used in root bridge determination.
Path Cost	The contribution to the total path cost by this port.

Ethernet Switch Boot Menu

Figure 21 below shows the Ethernet Switch Boot Menu.

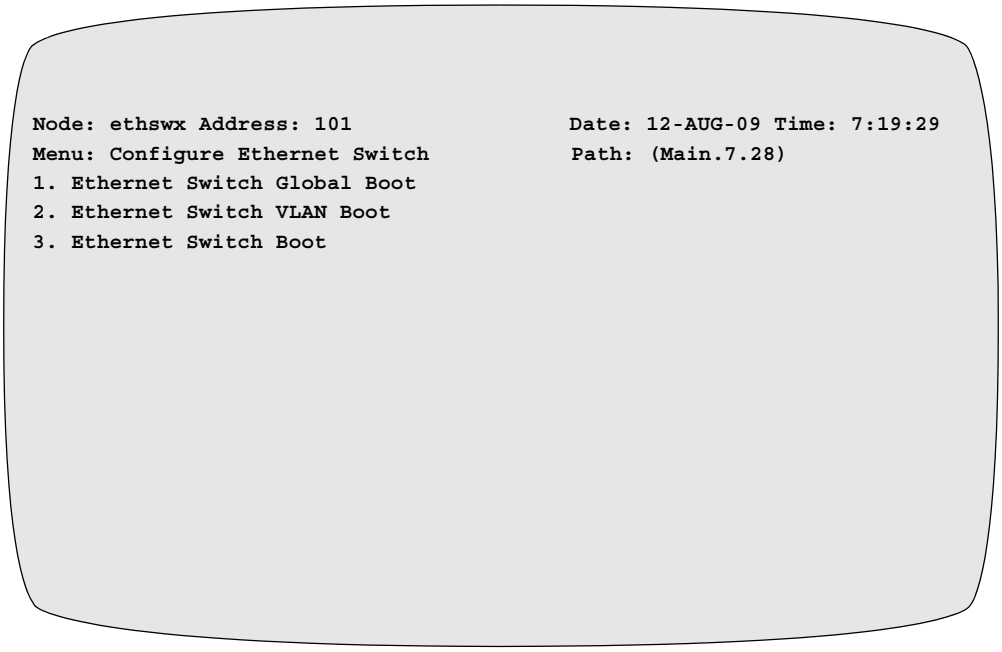


Figure 21. Ethernet Switch Boot Menu

Description of Terms

This table describes the information on the Ethernet VLAN Statistics.

Screen Term	*Description*
Ethernet Switch Global Boot	The Ethernet Switch Global Boot activates the Ethernet Switch Global.
Ethernet Switch VLAN Boot	The Ethernet Switch VLAN Boot activates the Ethernet Switch VLAN Parameters.
Ethernet Switch Boot	The Ethernet Switch Boot does a complete reinitialization of the Ethernet Switch module. It reinitializes the Global Parameters, all of the VLAN parameters and the Ethernet Port Parameters. An Ethernet Switch Boot should be performed after an Ethernet Switch Port boot to affect the port's Native VLAN ID change or a change in the VLAN ID of the ports associated router interface..

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