Catalyst 2960-X Switch IGMP Snooping and MVR Configuration Guide, Cisco IOS Release 15.0(2)EX

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CONTENTS

Preface

Preface vii

Document Conventions vii

Related Documentation ix

Obtaining Documentation and Submitting a Service Request ix

CHAPTER 1

Using the Command-Line Interface 1

Information About Using the Command-Line Interface 1

Command Modes 1

Using the Help System 3

Understanding Abbreviated Commands 4

No and default Forms of Commands 4

CLI Error Messages 4

Configuration Logging 5

How to Use the CLI to Configure Features 5

Configuring the Command History 5

Changing the Command History Buffer Size 6

Recalling Commands 6

Disabling the Command History Feature 7

Enabling and Disabling Editing Features 7

Editing Commands through Keystrokes 8

Editing Command Lines That Wrap 9

Searching and Filtering Output of show and more Commands 10

Accessing the CLI through a Console Connection or through Telnet 11

CHAPTER 2

Configuring IGMP Snooping 13

Finding Feature Information 13

Restrictions for IGMP Snooping 13

Information About IGMP Snooping 14
IGMP Snooping 14
IGMP Versions 14
Joining a Multicast Group 15
Leaving a Multicast Group 17
Immediate Leave 17
IGMP Configurable-Leave Timer 17
IGMP Report Suppression 18
IGMP Snooping and Switch Stacks 18
IGMP Filtering and Throttling Overview 18
Default IGMP Snooping Configuration 19
Default IGMP Filtering and Throttling Configuration 20
How to Configure IGMP Snooping 20
Enabling or Disabling IGMP Snooping on a Switch 20
Enabling or Disabling IGMP Snooping on a VLAN Interface 21
Setting the Snooping Method 22
Configuring a Multicast Router Port 24
Configuring a Host Statically to Join a Group 25
Enabling IGMP Immediate Leave 27
Configuring the IGMP Leave Timer 28
Configuring TCN-Related Commands 30
Controlling the Multicast Flooding Time After a TCN Event 30
Recovering from Flood Mode 31
Disabling Multicast Flooding During a TCN Event 32
Configuring the IGMP Snooping Querier 33
Disabling IGMP Report Suppression 36
Configuring IGMP Profiles 37
Applying IGMP Profiles 39
Setting the Maximum Number of IGMP Groups 41
Configuring the IGMP Throttling Action 42
Monitoring IGMP Snooping 44
Displaying IGMP Snooping Information 44
Displaying IGMP Filtering and Throttling Configuration 45
Configuration Examples for IGMP Snooping 46
Example: Configuring IGMP Snooping Using CGMP Packets 46

Example: Enabling a Static Connection to a Multicast Router 46
Example: Statically Configuring a Host on a Port 46
Example: Enable Immediate Leave on a VLAN 47
Example: Setting the IGMP Snooping Querier Source Address 47
Example: Setting the IGMP Snooping Querier Maximum Response Time 47
Example: Setting the IGMP Snooping Querier Timeout 47
Example: Setting the IGMP Snooping Querier Feature 48
Example: Configuring IGMP Profiles 48
Example: Applying IGMP Profile 48
Example: Setting the Maximum Number of IGMP Groups 49
Where to Go Next for IGMP Snooping 49
Additional References 49
Feature History and Information for IGMP Snooping 50

CHAPTER 3 **Configuring Multicast VLAN Registration 51**
Finding Feature Information 51
Prerequisites for MVR 51
Restrictions for MVR 52
Information About Multicast VLAN Registration 52
MVR and IGMP 53
Modes of Operation 53
Switch Stacks 53
MVR in a Multicast Television Application 53
Default MVR Configuration 55
How to Configure MVR 55
Configuring MVR Global Parameters 55
Configuring MVR Interfaces 58
Monitoring MVR 60
Configuration Examples for MVR 61
Example: Configuring MVR Global Parameters 61
Example: Configuring MVR Interfaces 62
Where to Go Next for MVR 62
Additional References 62
Feature History and Information for MVR 63

Preface

This book describes configuration information and examples for IGMP snooping and MVR on the switch.

- Document Conventions, page vii
- Related Documentation, page ix
- Obtaining Documentation and Submitting a Service Request, page ix

Document Conventions

This document uses the following conventions:

Convention	Description
^ or Ctrl	Both the ^ symbol and Ctrl represent the Control (Ctrl) key on a keyboard. For example, the key combination **^D** or **Ctrl-D** means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.)
bold font	Commands and keywords and user-entered text appear in **bold** font.
Italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
`Courier font`	Terminal sessions and information the system displays appear in `courier` font.
`Bold Courier font`	Bold Courier font indicates text that the user must enter.
[x]	Elements in square brackets are optional.
...	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
|	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.

Convention	Description
[x | y]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
{x | y}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Reader Alert Conventions

This document uses the following conventions for reader alerts:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Tip Means *the following information will help you solve a problem.*

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Timesaver Means *the described action saves time.* You can save time by performing the action described in the paragraph.

Warning **Means *reader be warned.* In this situation, you might perform an action that could result in bodily injury.**

Related Documentation

Note Before installing or upgrading the switch, refer to the release notes.

- Catalyst 2960-X Switch, located at http://www.cisco.com/go/cat2960x_docs.
- Cisco SFP and SFP+ modules documentation, including compatibility matrixes, located at:

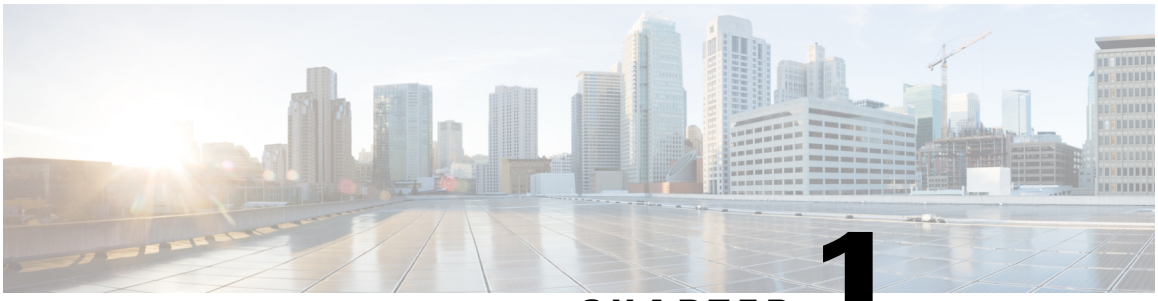
  http://www.cisco.com/en/US/products/hw/modules/ps5455/tsd_products_support_series_home.html

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.



CHAPTER 1

Using the Command-Line Interface

This chapter contains the following topics:

- Information About Using the Command-Line Interface, page 1
- How to Use the CLI to Configure Features, page 5

Information About Using the Command-Line Interface

This section describes the Cisco IOS command-line interface (CLI) and how to use it to configure your switch.

Command Modes

The Cisco IOS user interface is divided into many different modes. The commands available to you depend on which mode you are currently in. Enter a question mark (?) at the system prompt to obtain a list of commands available for each command mode.

You can start a CLI session through a console connection, through Telnet, a SSH, or by using the browser.

When you start a session, you begin in user mode, often called user EXEC mode. Only a limited subset of the commands are available in user EXEC mode. For example, most of the user EXEC commands are one-time commands, such as **show** commands, which show the current configuration status, and **clear** commands, which clear counters or interfaces. The user EXEC commands are not saved when the switch reboots.

To have access to all commands, you must enter privileged EXEC mode. Normally, you must enter a password to enter privileged EXEC mode. From this mode, you can enter any privileged EXEC command or enter global configuration mode.

Using the configuration modes (global, interface, and line), you can make changes to the running configuration. If you save the configuration, these commands are stored and used when the switch reboots. To access the various configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and line configuration mode.

This table describes the main command modes, how to access each one, the prompt you see in that mode, and how to exit the mode.

Table 1: Command Mode Summary

Mode	Access Method	Prompt	Exit Method	About This Mode
User EXEC	Begin a session using Telnet, SSH, or console.	`Switch>`	Enter **logout** or **quit**.	Use this mode to • Change terminal settings. • Perform basic tests. • Display system information.
Privileged EXEC	While in user EXEC mode, enter the **enable** command.	`Switch#`	Enter **disable** to exit.	Use this mode to verify commands that you have entered. Use a password to protect access to this mode.
Global configuration	While in privileged EXEC mode, enter the **configure** command.	`Switch(config)#`	To exit to privileged EXEC mode, enter **exit** or **end**, or press **Ctrl-Z**.	Use this mode to configure parameters that apply to the entire switch.
VLAN configuration	While in global configuration mode, enter the **vlan** *vlan-id* command.	`Switch(config-vlan)#`	To exit to global configuration mode, enter the **exit** command. To return to privileged EXEC mode, press **Ctrl-Z** or enter **end**.	Use this mode to configure VLAN parameters. When VTP mode is transparent, you can create extended-range VLANs (VLAN IDs greater than 1005) and save configurations in the switch startup configuration file.
Interface configuration	While in global configuration mode, enter the **interface** command (with a specific interface).	`Switch(config-if)#`	To exit to global configuration mode, enter **exit**. To return to privileged EXEC mode, press **Ctrl-Z** or enter **end**.	Use this mode to configure parameters for the Ethernet ports.

Mode	Access Method	Prompt	Exit Method	About This Mode
Line configuration	While in global configuration mode, specify a line with the **line vty** or **line console** command.	`Switch(config-line)#`	To exit to global configuration mode, enter **exit**. To return to privileged EXEC mode, press **Ctrl-Z** or enter **end**.	Use this mode to configure parameters for the terminal line.

Using the Help System

You can enter a question mark (?) at the system prompt to display a list of commands available for each command mode. You can also obtain a list of associated keywords and arguments for any command.

SUMMARY STEPS

1. **help**
2. *abbreviated-command-entry* **?**
3. *abbreviated-command-entry* <Tab>
4. **?**
5. *command* **?**
6. *command keyword* **?**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**help** **Example:** `Switch# help`	Obtains a brief description of the help system in any command mode.

Step 2	*abbreviated-command-entry* **?**
	Example:
	`Switch# di?`
	`dir disable disconnect`
		Obtains a list of commands that begin with a particular character string.

Step 3	*abbreviated-command-entry* <Tab> **Example:** `Switch# sh conf`<tab> `Switch# show configuration`	Completes a partial command name.

	Command or Action	Purpose
Step 4	**?** **Example:** `Switch> ?`	Lists all commands available for a particular command mode.
Step 5	*command* **?** **Example:** `Switch> show ?`	Lists the associated keywords for a command.

Step 6	*command keyword* **?**
	
	Example:
	`Switch(config)# cdp holdtime ?`
	`  <10-255> Length of time (in sec) that receiver must keep this packet`
		Lists the associated arguments for a keyword.

Understanding Abbreviated Commands

You need to enter only enough characters for the switch to recognize the command as unique.

This example shows how to enter the **show configuration** privileged EXEC command in an abbreviated form:

```
Switch# show conf
```

No and default Forms of Commands

Almost every configuration command also has a **no** form. In general, use the **no** form to disable a feature or function or reverse the action of a command. For example, the **no shutdown** interface configuration command reverses the shutdown of an interface. Use the command without the keyword **no** to reenable a disabled feature or to enable a feature that is disabled by default.

Configuration commands can also have a **default** form. The **default** form of a command returns the command setting to its default. Most commands are disabled by default, so the **default** form is the same as the **no** form. However, some commands are enabled by default and have variables set to certain default values. In these cases, the **default** command enables the command and sets variables to their default values.

CLI Error Messages

This table lists some error messages that you might encounter while using the CLI to configure your switch.

Table 2: Common CLI Error Messages

Error Message	Meaning	How to Get Help
`% Ambiguous command: "show con"`	You did not enter enough characters for your switch to recognize the command.	Reenter the command followed by a question mark (?) with a space between the command and the question mark. The possible keywords that you can enter with the command appear.
`% Incomplete command.`	You did not enter all the keywords or values required by this command.	Reenter the command followed by a question mark (?) with a space between the command and the question mark. The possible keywords that you can enter with the command appear.
`% Invalid input detected at '^' marker.`	You entered the command incorrectly. The caret (^) marks the point of the error.	Enter a question mark (?) to display all the commands that are available in this command mode. The possible keywords that you can enter with the command appear.

Configuration Logging

You can log and view changes to the switch configuration. You can use the Configuration Change Logging and Notification feature to track changes on a per-session and per-user basis. The logger tracks each configuration command that is applied, the user who entered the command, the time that the command was entered, and the parser return code for the command. This feature includes a mechanism for asynchronous notification to registered applications whenever the configuration changes. You can choose to have the notifications sent to the syslog.

Note Only CLI or HTTP changes are logged.

How to Use the CLI to Configure Features

Configuring the Command History

The software provides a history or record of commands that you have entered. The command history feature is particularly useful for recalling long or complex commands or entries, including access lists. You can customize this feature to suit your needs.

Changing the Command History Buffer Size

By default, the switch records ten command lines in its history buffer. You can alter this number for a current terminal session or for all sessions on a particular line. This procedure is optional.

SUMMARY STEPS

1. **terminal history** [**size** *number-of-lines*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**terminal history** [**size** *number-of-lines*] **Example:** `Switch# terminal history size 200`	Changes the number of command lines that the switch records during the current terminal session in the privileged EXEC mode. You can configure the size from 0 through 256.

Recalling Commands

To recall commands from the history buffer, perform one of the actions listed in this table. These actions are optional.

Note The arrow keys function only on ANSI-compatible terminals such as VT100s.

SUMMARY STEPS

1. **Ctrl-P** or use the **up arrow** key
2. **Ctrl-N** or use the **down arrow** key
3. **show history**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**Ctrl-P** or use the **up arrow** key	Recalls commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Step 2	**Ctrl-N** or use the **down arrow** key	Returns to more recent commands in the history buffer after recalling commands with **Ctrl-P** or the up arrow key. Repeat the key sequence to recall successively more recent commands.

	Command or Action	Purpose
Step 3	**show history** **Example:** `Switch# show history`	Lists the last several commands that you just entered in privileged EXEC mode. The number of commands that appear is controlled by the setting of the **terminal history** global configuration command and the **history** line configuration command.

Disabling the Command History Feature

The command history feature is automatically enabled. You can disable it for the current terminal session or for the command line. This procedure is optional.

SUMMARY STEPS

1. **terminal no history**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**terminal no history** **Example:** `Switch# terminal no history`	Disables the feature during the current terminal session in the privileged EXEC mode.

Enabling and Disabling Editing Features

Although enhanced editing mode is automatically enabled, you can disable it, and reenable it.

SUMMARY STEPS

1. **terminal editing**
2. **terminal no editing**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**terminal editing** **Example:** `Switch# terminal editing`	Reenables the enhanced editing mode for the current terminal session in the privileged EXEC mode.

	Command or Action	Purpose
Step 2	**terminal no editing** **Example:** `Switch# terminal no editing`	Disables the enhanced editing mode for the current terminal session in the privileged EXEC mode.

Editing Commands through Keystrokes

The keystrokes help you to edit the command lines. These keystrokes are optional.

Note The arrow keys function only on ANSI-compatible terminals such as VT100s.

Table 3: Editing Commands

Editing Commands	Description
Ctrl-B or use the **left arrow** key	Moves the cursor back one character.
Ctrl-F or use the **right arrow** key	Moves the cursor forward one character.
Ctrl-A	Moves the cursor to the beginning of the command line.
Ctrl-E	Moves the cursor to the end of the command line.
Esc B	Moves the cursor back one word.
Esc F	Moves the cursor forward one word.
Ctrl-T	Transposes the character to the left of the cursor with the character located at the cursor.
Delete or **Backspace** key	Erases the character to the left of the cursor.
Ctrl-D	Deletes the character at the cursor.
Ctrl-K	Deletes all characters from the cursor to the end of the command line.
Ctrl-U or **Ctrl-X**	Deletes all characters from the cursor to the beginning of the command line.
Ctrl-W	Deletes the word to the left of the cursor.

Esc D	Deletes from the cursor to the end of the word.
Esc C	Capitalizes at the cursor.
Esc L	Changes the word at the cursor to lowercase.
Esc U	Capitalizes letters from the cursor to the end of the word.
Ctrl-V or **Esc Q**	Designates a particular keystroke as an executable command, perhaps as a shortcut.
Return key	Scrolls down a line or screen on displays that are longer than the terminal screen can display. **Note** The More prompt is used for any output that has more lines than can be displayed on the terminal screen, including **show** command output. You can use the **Return** and **Space** bar keystrokes whenever you see the More prompt.
Space bar	Scrolls down one screen.
Ctrl-L or **Ctrl-R**	Redisplays the current command line if the switch suddenly sends a message to your screen.

Editing Command Lines That Wrap

You can use a wraparound feature for commands that extend beyond a single line on the screen. When the cursor reaches the right margin, the command line shifts ten spaces to the left. You cannot see the first ten characters of the line, but you can scroll back and check the syntax at the beginning of the command. The keystroke actions are optional.

To scroll back to the beginning of the command entry, press **Ctrl-B** or the left arrow key repeatedly. You can also press **Ctrl-A** to immediately move to the beginning of the line.

Note The arrow keys function only on ANSI-compatible terminals such as VT100s.

The following example shows how to wrap a command line that extend beyond a single line on the screen.

SUMMARY STEPS

1. **access-list**
2. **Ctrl-A**
3. **Return** key

DETAILED STEPS

	Command or Action	Purpose

Step 1	**access-list**
	
	Example:
	`Switch(config)# access-list 101 permit tcp 10.15.22.25 255.255.255.0 10.15.22.35`
	`Switch(config)# $ 101 permit tcp 10.15.22.25 255.255.255.0 10.15.22.35 255.25`
	`Switch(config)# $t tcp 10.15.22.25 255.255.255.0 131.108.1.20 255.255.255.0 eq`
	`Switch(config)# $15.22.25 255.255.255.0 10.15.22.35 255.255.255.0 eq 45`
		Displays the global configuration command entry that extends beyond one line.
		
		When the cursor first reaches the end of the line, the line is shifted ten spaces to the left and redisplayed. The dollar sign ($) shows that the line has been scrolled to the left. Each time the cursor reaches the end of the line, the line is again shifted ten spaces to the left.

Step 2	**Ctrl-A** **Example:** `Switch(config)# access-list 101 permit tcp 10.15.22.25 255.255.255.0 10.15.2$`	Checks the complete syntax. The dollar sign ($) appears at the end of the line to show that the line has been scrolled to the right.
Step 3	**Return** key	Execute the commands. The software assumes that you have a terminal screen that is 80 columns wide. If you have a different width, use the **terminal width** privileged EXEC command to set the width of your terminal. Use line wrapping with the command history feature to recall and modify previous complex command entries.

Searching and Filtering Output of show and more Commands

You can search and filter the output for **show** and **more** commands. This is useful when you need to sort through large amounts of output or if you want to exclude output that you do not need to see. Using these commands is optional.

SUMMARY STEPS

1. {**show** | **more**} *command* | {**begin** | **include** | **exclude**} *regular-expression*

DETAILED STEPS

	Command or Action	Purpose
Step 1	{**show** | **more**} *command* | {**begin** | **include** | **exclude**} *regular-expression*	Searches and filters the output.

	Command or Action	Purpose

	Example:
	`Switch# show interfaces | include protocol`
	`Vlan1 is up, line protocol is up`
	`Vlan10 is up, line protocol is down`
	`GigabitEthernet1/0/1 is up, line protocol is down`
	`GigabitEthernet1/0/2 is up, line protocol is up`
		Expressions are case sensitive. For example, if you enter **| exclude output**, the lines that contain **output** are not displayed, but the lines that contain **output** appear.

Accessing the CLI through a Console Connection or through Telnet

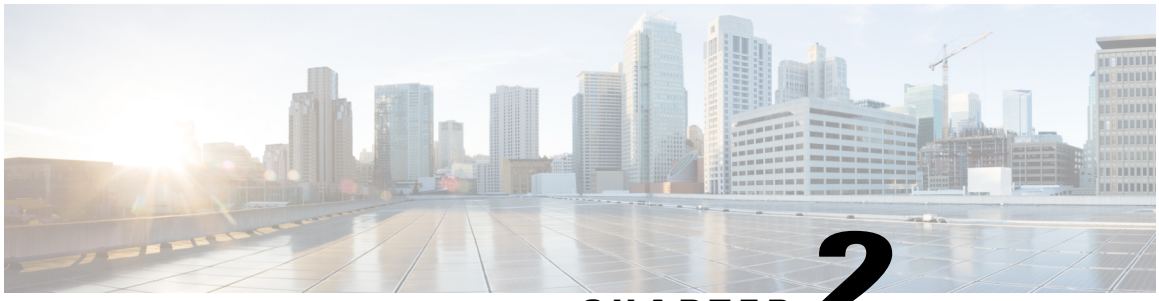
Before you can access the CLI, you must connect a terminal or a PC to the switch console or connect a PC to the Ethernet management port and then power on the switch, as described in the hardware installation guide that shipped with your switch.

If your switch is already configured, you can access the CLI through a local console connection or through a remote Telnet session, but your switch must first be configured for this type of access.

You can use one of these methods to establish a connection with the switch:

- Connect the switch console port to a management station or dial-up modem, or connect the Ethernet management port to a PC. For information about connecting to the console or Ethernet management port, see the switch hardware installation guide.
- Use any Telnet TCP/IP or encrypted Secure Shell (SSH) package from a remote management station. The switch must have network connectivity with the Telnet or SSH client, and the switch must have an enable secret password configured.
    - The switch supports up to 16 simultaneous Telnet sessions. Changes made by one Telnet user are reflected in all other Telnet sessions.
    - The switch supports up to five simultaneous secure SSH sessions.

  After you connect through the console port, through the Ethernet management port, through a Telnet session or through an SSH session, the user EXEC prompt appears on the management station.



CHAPTER 2

Configuring IGMP Snooping

- Finding Feature Information, page 13
- Restrictions for IGMP Snooping, page 13
- Information About IGMP Snooping, page 14
- How to Configure IGMP Snooping, page 20
- Monitoring IGMP Snooping, page 44
- Configuration Examples for IGMP Snooping, page 46
- Where to Go Next for IGMP Snooping, page 49
- Additional References, page 49
- Feature History and Information for IGMP Snooping, page 50

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Restrictions for IGMP Snooping

The following are the restrictions for IGMP snooping:

- The switch supports homogeneous stacking and mixed stacking. Mixed stacking is supported only with the Catalyst 2960-S switches. A homogenous stack can have up to eight stack members, while a mixed stack can have up to four stack members. All switches in a switch stack must be running the LAN Base image.

Information About IGMP Snooping

IGMP Snooping

Layer 2 switches can use IGMP snooping to constrain the flooding of multicast traffic by dynamically configuring Layer 2 interfaces so that multicast traffic is forwarded to only those interfaces associated with IP multicast devices. As the name implies, IGMP snooping requires the LAN switch to snoop on the IGMP transmissions between the host and the router and to keep track of multicast groups and member ports. When the switch receives an IGMP report from a host for a particular multicast group, the switch adds the host port number to the forwarding table entry; when it receives an IGMP Leave Group message from a host, it removes the host port from the table entry. It also periodically deletes entries if it does not receive IGMP membership reports from the multicast clients.

Note For more information on IP multicast and IGMP, see RFC 1112 and RFC 2236.

The multicast router sends out periodic general queries to all VLANs. All hosts interested in this multicast traffic send join requests and are added to the forwarding table entry. The switch creates one entry per VLAN in the IGMP snooping IP multicast forwarding table for each group from which it receives an IGMP join request.

The switch supports IP multicast group-based bridging, instead of MAC-addressed based groups. With multicast MAC address-based groups, if an IP address being configured translates (aliases) to a previously configured MAC address or to any reserved multicast MAC addresses (in the range 224.0.0.xxx), the command fails. Because the switch uses IP multicast groups, there are no address aliasing issues.

The IP multicast groups learned through IGMP snooping are dynamic. However, you can statically configure multicast groups by using the **ip igmp snooping vlan** *vlan-id* **static** *ip_address* **interface** *interface-id* global configuration command. If you specify group membership for a multicast group address statically, your setting supersedes any automatic manipulation by IGMP snooping. Multicast group membership lists can consist of both user-defined and IGMP snooping-learned settings.

Note You can manage IP multicast group addresses through features such as IGMP snooping and Multicast VLAN Registration (MVR), or by using static IP addresses. For information about MVR, see the next chapter.

You can configure an IGMP snooping querier to support IGMP snooping in subnets without multicast interfaces because the multicast traffic does not need to be routed.

If a port spanning tree, a port group, or a VLAN ID change occurs, the IGMP snooping-learned multicast groups from this port on the VLAN are deleted.

IGMP Versions

The switch supports IGMP Version 1, IGMP Version 2, and IGMP Version 3. These versions are interoperable on the switch. For example, if IGMP snooping is enabled on an IGMPv2 switch and the switch receives an IGMPv3 report from a host, the switch can forward the IGMPv3 report to the multicast router.

Note The switch supports IGMPv3 snooping based only on the destination multicast MAC address. It does not support snooping based on the source MAC address or on proxy reports.

An IGMPv3 switch supports Basic IGMPv3 Snooping Support (BISS), which includes support for the snooping features on IGMPv1 and IGMPv2 switches and for IGMPv3 membership report messages. BISS constrains the flooding of multicast traffic when your network includes IGMPv3 hosts. It constrains traffic to approximately the same set of ports as the IGMP snooping feature on IGMPv2 or IGMPv1 hosts.

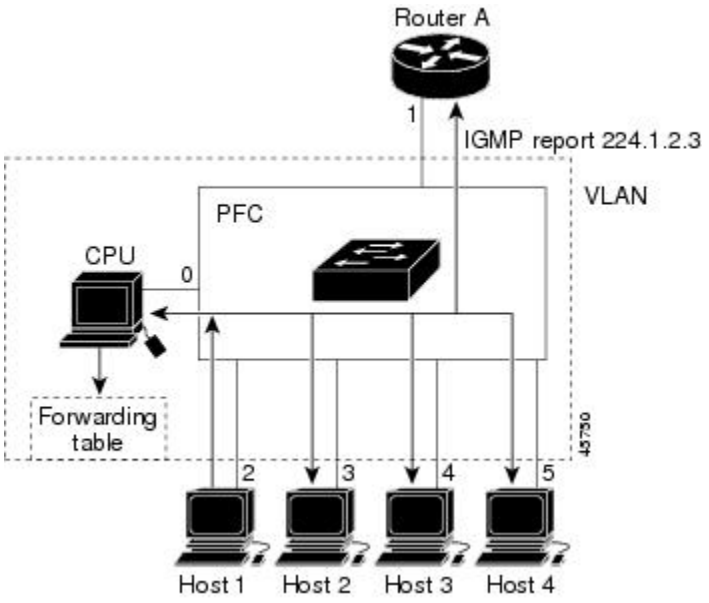
Note IGMPv3 join and leave messages are not supported on switches running IGMP filtering or MVR.

An IGMPv3 switch can receive messages from and forward messages to a device running the Source Specific Multicast (SSM) feature.

Joining a Multicast Group

When a host connected to the switch wants to join an IP multicast group and it is an IGMP version 2 client, it sends an unsolicited IGMP join message, specifying the IP multicast group to join. Alternatively, when the switch receives a general query from the router, it forwards the query to all ports in the VLAN. IGMP version 1 or version 2 hosts wanting to join the multicast group respond by sending a join message to the switch. The switch CPU creates a multicast forwarding-table entry for the group if it is not already present. The CPU also adds the interface where the join message was received to the forwarding-table entry. The host associated with that interface receives multicast traffic for that multicast group.

Figure 1: Initial IGMP Join Message



Router A sends a general query to the switch, which forwards the query to ports 2 through 5, which are all members of the same VLAN. Host 1 wants to join multicast group 224.1.2.3 and multicasts an IGMP

membership report (IGMP join message) to the group. The switch CPU uses the information in the IGMP report to set up a forwarding-table entry that includes the port numbers connected to Host 1 and to the router.

Table 4: IGMP Snooping Forwarding Table

Destination Address	Type of Packet	Ports
224.1.2.3	IGMP	1, 2

The switch hardware can distinguish IGMP information packets from other packets for the multicast group. The information in the table tells the switching engine to send frames addressed to the 224.1.2.3 multicast IP address that are not IGMP packets to the router and to the host that has joined the group.

If another host (for example, Host 4) sends an unsolicited IGMP join message for the same group, the CPU receives that message and adds the port number of Host 4 to the forwarding table. Because the forwarding table directs IGMP messages only to the CPU, the message is not flooded to other ports on the switch. Any known multicast traffic is forwarded to the group and not to the CPU.

Figure 2: Second Host Joining a Multicast Group

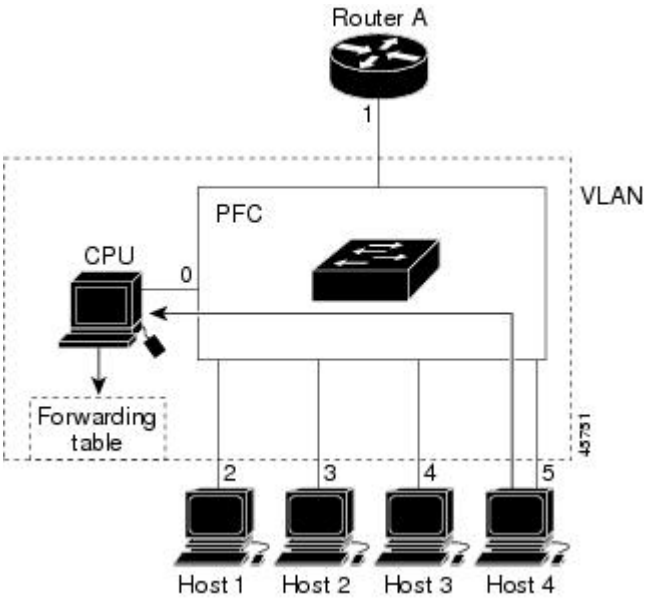


Table 5: Updated IGMP Snooping Forwarding Table

Destination Address	Type of Packet	Ports
224.1.2.3	IGMP	1, 2, 5

Related Topics

Configuring a Host Statically to Join a Group, on page 25

Example: Statically Configuring a Host on a Port, on page 46

Leaving a Multicast Group

The router sends periodic multicast general queries, and the switch forwards these queries through all ports in the VLAN. Interested hosts respond to the queries. If at least one host in the VLAN wants to receive multicast traffic, the router continues forwarding the multicast traffic to the VLAN. The switch forwards multicast group traffic only to those hosts listed in the forwarding table for that IP multicast group maintained by IGMP snooping.

When hosts want to leave a multicast group, they can silently leave, or they can send a leave message. When the switch receives a leave message from a host, it sends a group-specific query to learn if any other devices connected to that interface are interested in traffic for the specific multicast group. The switch then updates the forwarding table for that MAC group so that only those hosts interested in receiving multicast traffic for the group are listed in the forwarding table. If the router receives no reports from a VLAN, it removes the group for the VLAN from its IGMP cache.

Immediate Leave

The switch uses IGMP snooping Immediate Leave to remove from the forwarding table an interface that sends a leave message without the switch sending group-specific queries to the interface. The VLAN interface is pruned from the multicast tree for the multicast group specified in the original leave message. Immediate Leave ensures optimal bandwidth management for all hosts on a switched network, even when multiple multicast groups are simultaneously in use.

Immediate Leave is only supported on IGMP version 2 hosts. IGMP version 2 is the default version for the switch.

Note You should only use the Immediate Leave feature on VLANs where a single host is connected to each port. If Immediate Leave is enabled in VLANs where more than one host is connected to a port, some hosts might inadvertently be dropped.

Related Topics

Enabling IGMP Immediate Leave, on page 27

Example: Enable Immediate Leave on a VLAN, on page 47

IGMP Configurable-Leave Timer

You can configure the time that the switch waits after sending a group-specific query to determine if hosts are still interested in a specific multicast group. The IGMP leave response time can be configured from 100 to 5000 milliseconds. The timer can be set either globally or on a per-VLAN basis. The VLAN configuration of the leave time overrides the global configuration.

Related Topics

Configuring the IGMP Leave Timer, on page 28

IGMP Report Suppression

Note IGMP report suppression is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports.

The switch uses IGMP report suppression to forward only one IGMP report per multicast router query to multicast devices. When IGMP router suppression is enabled (the default), the switch sends the first IGMP report from all hosts for a group to all the multicast routers. The switch does not send the remaining IGMP reports for the group to the multicast routers. This feature prevents duplicate reports from being sent to the multicast devices.

If the multicast router query includes requests only for IGMPv1 and IGMPv2 reports, the switch forwards only the first IGMPv1 or IGMPv2 report from all hosts for a group to all the multicast routers.

If the multicast router query also includes requests for IGMPv3 reports, the switch forwards all IGMPv1, IGMPv2, and IGMPv3 reports for a group to the multicast devices.

If you disable IGMP report suppression, all IGMP reports are forwarded to the multicast routers.

Related Topics

Disabling IGMP Report Suppression, on page 36

IGMP Snooping and Switch Stacks

IGMP snooping functions across the switch stack; that is, IGMP control information from one switch is distributed to all switches in the stack. Regardless of the stack member through which IGMP multicast data enters the stack, the data reaches the hosts that have registered for that group.

If a switch in the stack fails or is removed from the stack, only the members of the multicast group that are on that switch will not receive the multicast data. All other members of a multicast group on other switches in the stack continue to receive multicast data streams. However, multicast groups that are common for both Layer 2 and Layer 3 (IP multicast routing) might take longer to converge if the active switch is removed.

Related Topics

Configuring the IGMP Snooping Querier, on page 33
Example: Setting the IGMP Snooping Querier Source Address, on page 47
Example: Setting the IGMP Snooping Querier Maximum Response Time, on page 47
Example: Setting the IGMP Snooping Querier Timeout, on page 47
Example: Setting the IGMP Snooping Querier Feature, on page 48

IGMP Filtering and Throttling Overview

In some environments, for example, metropolitan or multiple-dwelling unit (MDU) installations, you might want to control the set of multicast groups to which a user on a switch port can belong. You can control the distribution of multicast services, such as IP/TV, based on some type of subscription or service plan. You might also want to limit the number of multicast groups to which a user on a switch port can belong.

With the IGMP filtering feature, you can filter multicast joins on a per-port basis by configuring IP multicast profiles and associating them with individual switch ports. An IGMP profile can contain one or more multicast groups and specifies whether access to the group is permitted or denied. If an IGMP profile denying access to a multicast group is applied to a switch port, the IGMP join report requesting the stream of IP multicast traffic is dropped, and the port is not allowed to receive IP multicast traffic from that group. If the filtering action permits access to the multicast group, the IGMP report from the port is forwarded for normal processing. You can also set the maximum number of IGMP groups that a Layer 2 interface can join.

IGMP filtering controls only group-specific query and membership reports, including join and leave reports. It does not control general IGMP queries. IGMP filtering has no relationship with the function that directs the forwarding of IP multicast traffic. The filtering feature operates in the same manner whether CGMP or MVR is used to forward the multicast traffic.

IGMP filtering applies only to the dynamic learning of IP multicast group addresses, not static configuration.

With the IGMP throttling feature, you can set the maximum number of IGMP groups that a Layer 2 interface can join. If the maximum number of IGMP groups is set, the IGMP snooping forwarding table contains the maximum number of entries, and the interface receives an IGMP join report, you can configure an interface to drop the IGMP report or to replace the randomly selected multicast entry with the received IGMP report.

Note IGMPv3 join and leave messages are not supported on switches running IGMP filtering.

Related Topics

Configuring the IGMP Throttling Action, on page 42

Default IGMP Snooping Configuration

This table displays the default IGMP snooping configuration for the switch.

Table 6: Default IGMP Snooping Configuration

Feature	Default Setting
IGMP snooping	Enabled globally and per VLAN
Multicast routers	None configured
Multicast router learning (snooping) method	PIM-DVMRP
IGMP snooping Immediate Leave	Disabled
Static groups	None configured
TCN[1] flood query count	2
TCN query solicitation	Disabled
IGMP snooping querier	Disabled

Feature	Default Setting
IGMP report suppression	Enabled

1 (1) TCN = Topology Change Notification

Default IGMP Filtering and Throttling Configuration

This table displays the default IGMP filtering and throttling configuration for the switch.

Table 7: Default IGMP Filtering Configuration

Feature	Default Setting
IGMP filters	None applied.
IGMP maximum number of IGMP groups	No maximum set. **Note** When the maximum number of groups is in the forwarding table, the default IGMP throttling action is to deny the IGMP report.
IGMP profiles	None defined.
IGMP profile action	Deny the range addresses.

How to Configure IGMP Snooping

Enabling or Disabling IGMP Snooping on a Switch

By default, IGMP snooping is globally enabled on the switch. When globally enabled or disabled, it is also enabled or disabled in all existing VLAN interfaces. IGMP snooping is by default enabled on all VLANs, but can be enabled and disabled on a per-VLAN basis.

Global IGMP snooping overrides the VLAN IGMP snooping. If global snooping is disabled, you cannot enable VLAN snooping. If global snooping is enabled, you can enable or disable VLAN snooping.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping**
3. **end**
4. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping** **Example:** `Switch(config)# ip igmp snooping`	Globally enables IGMP snooping in all existing VLAN interfaces. **Note** To globally disable IGMP snooping on all VLAN interfaces, use the **no ip igmp snooping** global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Enabling or Disabling IGMP Snooping on a VLAN Interface

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping vlan** *vlan-id*
3. **end**
4. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping vlan** *vlan-id* **Example:** `Switch(config)# ip igmp snooping vlan 7`	Enables IGMP snooping on the VLAN interface. The VLAN ID range is 1 to 1001 and 1006 to 4094. IGMP snooping must be globally enabled before you can enable VLAN snooping. **Note** To disable IGMP snooping on a VLAN interface, use the **no ip igmp snooping vlan** *vlan-id* global configuration command for the specified VLAN number.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Setting the Snooping Method

Multicast-capable router ports are added to the forwarding table for every Layer 2 multicast entry. The switch learns of the ports through one of these methods:

- Snooping on IGMP queries, Protocol-Independent Multicast (PIM) packets, and Distance Vector Multicast Routing Protocol (DVMRP) packets.
- Listening to Cisco Group Management Protocol (CGMP) packets from other routers.
- Statically connecting to a multicast router port using the **ip igmp snooping mrouter** global configuration command.

You can configure the switch either to snoop on IGMP queries and PIM/DVMRP packets or to listen to CGMP self-join or proxy-join packets. By default, the switch snoops on PIM/DVMRP packets on all VLANs. To learn of multicast router ports through only CGMP packets, use the **ip igmp snooping vlan vlan-id mrouter learn cgmp** global configuration command. When this command is entered, the router listens to only CGMP self-join and CGMP proxy-join packets and to no other CGMP packets. To learn of multicast router ports

through only PIM-DVMRP packets, use the **ip igmp snooping vlan vlan-id mrouter learn pim-dvmrp** global configuration command.

If you want to use CGMP as the learning method and no multicast routers in the VLAN are CGMP proxy-enabled, you must enter the **ip cgmp router-only** command to dynamically access the router.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping vlan** *vlan-id* **mrouter learn** {**cgmp** | **pim-dvmrp** }
3. **end**
4. **show ip igmp snooping**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping vlan** *vlan-id* **mrouter learn** {**cgmp**	**pim-dvmrp** } **Example:** `Switch(config)# ip igmp snooping vlan 1 mrouter learn cgmp`	Specifies the multicast router learning method: • **cgmp—**Listens for CGMP packets. This method is useful for reducing control traffic. • **pim-dvmrp—**Snoops on IGMP queries and PIM-DVMRP packets. This is the default. **Note** To return to the default learning method, use the **no ip igmp snooping vlan** *vlan-id* **mrouter learn cgmp** global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**show ip igmp snooping** **Example:** `Switch# show ip igmp snooping`	Verifies the configuration.

	Command or Action	Purpose
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Example: Configuring IGMP Snooping Using CGMP Packets, on page 46

Configuring a Multicast Router Port

To add a multicast router port (add a static connection to a multicast router), use the **ip igmp snooping vlan mrouter** global configuration command on the switch.

Note Static connections to multicast routers are supported only on switch ports.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id*
3. **end**
4. **show ip igmp snooping mrouter** [**vlan** *vlan-id*]
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id* **Example:** `Switch(config)# ip igmp snooping vlan 5`	Specifies the multicast router VLAN ID and the interface to the multicast router. • The VLAN ID range is 1 to 1001 and 1006 to 4094. • The interface can be a physical interface or a port channel. The port-channel range is 1 to 128.

	Command or Action	Purpose
	`mrouter interface gigabitethernet1/0/1`	**Note** To remove a multicast router port from the VLAN, use the **no ip igmp snooping vlan** *vlan-id* **mrouter interface** *interface-id* global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**show ip igmp snooping mrouter** [**vlan** *vlan-id*] **Example:** `Switch# show ip igmp snooping mrouter vlan 5`	Verifies that IGMP snooping is enabled on the VLAN interface.
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Example: Enabling a Static Connection to a Multicast Router, on page 46

Configuring a Host Statically to Join a Group

Hosts or Layer 2 ports normally join multicast groups dynamically, but you can also statically configure a host on an interface.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping vlan** *vlan-id* **static** *ip_address* **interface** *interface-id*
3. **end**
4. **show ip igmp snooping groups**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping vlan** *vlan-id* **static** *ip_address* **interface** *interface-id* **Example:** `Switch(config)# ip igmp snooping vlan 105 static 230.0.0.1 interface gigabitethernet1/0/1`	Statically configures a Layer 2 port as a member of a multicast group: • *vlan-id* is the multicast group VLAN ID. The range is 1 to 1001 and 1006 to 4094. • *ip-address* is the group IP address. • *interface-id* is the member port. It can be a physical interface or a port channel (1 to 128). **Note** To remove the Layer 2 port from the multicast group, use the **no ip igmp snooping vlan** *vlan-id* **static** *mac-address* **interface** *interface-id* global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**show ip igmp snooping groups** **Example:** `Switch# show ip igmp snooping groups`	Verifies the member port and the IP address.
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Joining a Multicast Group, on page 15
Example: Statically Configuring a Host on a Port, on page 46

Enabling IGMP Immediate Leave

When you enable IGMP Immediate Leave, the switch immediately removes a port when it detects an IGMP Version 2 leave message on that port. You should only use the Immediate-Leave feature when there is a single receiver present on every port in the VLAN.

Note Immediate Leave is supported only on IGMP Version 2 hosts. IGMP Version 2 is the default version for the switch.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping vlan** *vlan-id* **immediate-leave**
3. **end**
4. **show ip igmp snooping vlan** *vlan-id*
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping vlan** *vlan-id* **immediate-leave** **Example:** `Switch(config)# ip igmp snooping vlan 21 immediate-leave`	Enables IGMP Immediate Leave on the VLAN interface. **Note** To disable IGMP Immediate Leave on a VLAN, use the **no ip igmp snooping vlan** *vlan-id* **immediate-leave** global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**show ip igmp snooping vlan** *vlan-id* **Example:** `Switch# show ip igmp snooping vlan 21`	Verifies that Immediate Leave is enabled on the VLAN interface.

	Command or Action	Purpose
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Immediate Leave , on page 17
Example: Enable Immediate Leave on a VLAN, on page 47

Configuring the IGMP Leave Timer

Follow these guidelines when configuring the IGMP leave timer:

- You can configure the leave time globally or on a per-VLAN basis.
- Configuring the leave time on a VLAN overrides the global setting.
- The default leave time is 1000 milliseconds.
- The IGMP configurable leave time is only supported on hosts running IGMP Version 2. IGMP version 2 is the default version for the switch.
- The actual leave latency in the network is usually the configured leave time. However, the leave time might vary around the configured time, depending on real-time CPU load conditions, network delays and the amount of traffic sent through the interface.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping last-member-query-interval** *time*
3. **ip igmp snooping vlan** *vlan-id* **last-member-query-interval** *time*
4. **end**
5. **show ip igmp snooping**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping last-member-query-interval** *time* **Example:** `Switch(config)# ip igmp snooping last-member-query-interval 1000`	Configures the IGMP leave timer globally. The range is 100 to 32768 milliseconds. The default is 1000 seconds. **Note** To globally reset the IGMP leave timer to the default setting, use the **no ip igmp snooping last-member-query-interval** global configuration command.
Step 3	**ip igmp snooping vlan** *vlan-id* **last-member-query-interval** *time* **Example:** `Switch(config)# ip igmp snooping vlan 210 last-member-query-interval 1000`	(Optional) Configures the IGMP leave time on the VLAN interface. The range is 100 to 32768 milliseconds. **Note** Configuring the leave time on a VLAN overrides the globally configured timer. **Note** To remove the configured IGMP leave-time setting from the specified VLAN, use the **no ip igmp snooping vlan** *vlan-id* **last-member-query-interval** global configuration command.
Step 4	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping** **Example:** `Switch# show ip igmp snooping`	(Optional) Displays the configured IGMP leave time.
Step 6	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Configurable-Leave Timer, on page 17

Configuring TCN-Related Commands

Controlling the Multicast Flooding Time After a TCN Event

You can control the time that multicast traffic is flooded after a topology change notification (TCN) event by using the **ip igmp snooping tcn flood query count** global configuration command. This command configures the number of general queries for which multicast data traffic is flooded after a TCN event. Some examples of TCN events are when the client changed its location and the receiver is on same port that was blocked but is now forwarding, and when a port went down without sending a leave message.

If you set the TCN flood query count to 1 by using the **ip igmp snooping tcn flood query count** command, the flooding stops after receiving 1 general query. If you set the count to 7, the flooding continues until 7 general queries are received. Groups are relearned based on the general queries received during the TCN event.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping tcn flood query count** *count*
3. **end**
4. **show ip igmp snooping**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp snooping tcn flood query count** *count* **Example:** `Switch(config)# ip igmp snooping tcn flood query count 3`	Specifies the number of IGMP general queries for which the multicast traffic is flooded. The range is 1 to 10. By default, the flooding query count is 2. **Note** To return to the default flooding query count, use the **no ip igmp snooping tcn flood query count** global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.

	Command or Action	Purpose
Step 4	**show ip igmp snooping** **Example:** `Switch# show ip igmp snooping`	Verifies the TCN settings.
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Recovering from Flood Mode

When a topology change occurs, the spanning-tree root sends a special IGMP leave message (also known as global leave) with the group multicast address 0.0.0.0. However, when you enable the **ip igmp snooping tcn query solicit** global configuration command, the switch sends the global leave message whether or not it is the spanning-tree root. When the router receives this special leave, it immediately sends general queries, which expedite the process of recovering from the flood mode during the TCN event. Leaves are always sent if the switch is the spanning-tree root regardless of this configuration command. By default, query solicitation is disabled.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping tcn query solicit**
3. **end**
4. **show ip igmp snooping**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.

	Command or Action	Purpose
Step 2	**ip igmp snooping tcn query solicit** **Example:** `Switch(config)# ip igmp snooping tcn query solicit`	Sends an IGMP leave message (global leave) to speed the process of recovering from the flood mode caused during a TCN event. By default, query solicitation is disabled. **Note** To return to the default query solicitation, use the **no ip igmp snooping tcn query solicit** global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**show ip igmp snooping** **Example:** `Switch# show ip igmp snooping`	Verifies the TCN settings.
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Disabling Multicast Flooding During a TCN Event

When the switch receives a TCN, multicast traffic is flooded to all the ports until 2 general queries are received. If the switch has many ports with attached hosts that are subscribed to different multicast groups, this flooding might exceed the capacity of the link and cause packet loss. You can use the **ip igmp snooping tcn flood** interface configuration command to control this operation function.

SUMMARY STEPS

1. **configure terminal**
2. **interface** *interface-id*
3. **no ip igmp snooping tcn flood**
4. **end**
5. **show ip igmp snooping**
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**interface** *interface-id* **Example:** `Switch(config)# interface gigabitethernet 1/0/1`	Specifies the interface to be configured, and enters interface configuration mode.
Step 3	**no ip igmp snooping tcn flood** **Example:** `Switch(config-if)# no ip igmp snooping tcn flood`	Disables the flooding of multicast traffic during a spanning-tree TCN event. By default, multicast flooding is enabled on an interface. **Note** To re-enable multicast flooding on an interface, use the **ip igmp snooping tcn flood** interface configuration command.
Step 4	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 5	**show ip igmp snooping** **Example:** `Switch# show ip igmp snooping`	Verifies the TCN settings.
Step 6	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Snooping Querier

Follow these guidelines when configuring the IGMP snooping querier:

- Configure the VLAN in global configuration mode.

- Configure an IP address on the VLAN interface. When enabled, the IGMP snooping querier uses the IP address as the query source address.
- If there is no IP address configured on the VLAN interface, the IGMP snooping querier tries to use the configured global IP address for the IGMP querier. If there is no global IP address specified, the IGMP querier tries to use the VLAN switch virtual interface (SVI) IP address (if one exists). If there is no SVI IP address, the switch uses the first available IP address configured on the switch. The first IP address available appears in the output of the **show ip interface** privileged EXEC command. The IGMP snooping querier does not generate an IGMP general query if it cannot find an available IP address on the switch.
- The IGMP snooping querier supports IGMP Versions 1 and 2.
- When administratively enabled, the IGMP snooping querier moves to the nonquerier state if it detects the presence of a multicast router in the network.
- When it is administratively enabled, the IGMP snooping querier moves to the operationally disabled state under these conditions:
  - IGMP snooping is disabled in the VLAN.
  - PIM is enabled on the SVI of the corresponding VLAN.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp snooping querier**
3. **ip igmp snooping querier address** *ip_address*
4. **ip igmp snooping querier query-interval** *interval-count*
5. **ip igmp snooping querier tcn query** [**count** *count* | **interval** *interval*]
6. **ip igmp snooping querier timer expiry** *timeout*
7. **ip igmp snooping querier version** *version*
8. **end**
9. **show ip igmp snooping vlan** *vlan-id*
10. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.

	Command or Action	Purpose
Step 2	**ip igmp snooping querier** **Example:** `Switch(config)# ip igmp snooping querier`	Enables the IGMP snooping querier.
Step 3	**ip igmp snooping querier address** *ip_address* **Example:** `Switch(config)# ip igmp snooping querier address 172.16.24.1`	(Optional) Specifies an IP address for the IGMP snooping querier. If you do not specify an IP address, the querier tries to use the global IP address configured for the IGMP querier. **Note** The IGMP snooping querier does not generate an IGMP general query if it cannot find an IP address on the switch.
Step 4	**ip igmp snooping querier query-interval** *interval-count* **Example:** `Switch(config)# ip igmp snooping querier query-interval 30`	(Optional) Sets the interval between IGMP queriers. The range is 1 to 18000 seconds.
Step 5	**ip igmp snooping querier tcn query** [**count** *count* | **interval** *interval*] **Example:** `Switch(config)# ip igmp snooping querier tcn query interval 20`	(Optional) Sets the time between Topology Change Notification (TCN) queries. The count range is 1 to 10. The interval range is 1 to 255 seconds.
Step 6	**ip igmp snooping querier timer expiry** *timeout* **Example:** `Switch(config)# ip igmp snooping querier timer expiry 180`	(Optional) Sets the length of time until the IGMP querier expires. The range is 60 to 300 seconds.
Step 7	**ip igmp snooping querier version** *version* **Example:** `Switch(config)# ip igmp snooping querier version 2`	(Optional) Selects the IGMP version number that the querier feature uses. Select 1 or 2.
Step 8	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.

	Command or Action	Purpose
Step 9	**show ip igmp snooping vlan** *vlan-id* **Example:** `Switch# show ip igmp snooping vlan 30`	(Optional) Verifies that the IGMP snooping querier is enabled on the VLAN interface. The VLAN ID range is 1 to 1001 and 1006 to 4094.
Step 10	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Snooping and Switch Stacks, on page 18
Example: Setting the IGMP Snooping Querier Source Address, on page 47
Example: Setting the IGMP Snooping Querier Maximum Response Time, on page 47
Example: Setting the IGMP Snooping Querier Timeout, on page 47
Example: Setting the IGMP Snooping Querier Feature, on page 48

Disabling IGMP Report Suppression

Note IGMP report suppression is supported only when the multicast query has IGMPv1 and IGMPv2 reports. This feature is not supported when the query includes IGMPv3 reports.

IGMP report suppression is enabled by default. When it is enabled, the switch forwards only one IGMP report per multicast router query. When report suppression is disabled, all IGMP reports are forwarded to the multicast routers.

SUMMARY STEPS

1. **configure terminal**
2. **no ip igmp snooping report-suppression**
3. **end**
4. **show ip igmp snooping**
5. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**no ip igmp snooping report-suppression** **Example:** `Switch(config)# no ip igmp snooping report-suppression`	Disables IGMP report suppression. **Note** To re-enable IGMP report suppression, use the **ip igmp snooping report-suppression** global configuration command.
Step 3	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.
Step 4	**show ip igmp snooping** **Example:** `Switch# show ip igmp snooping`	Verifies that IGMP report suppression is disabled.
Step 5	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Report Suppression, on page 18

Configuring IGMP Profiles

To configure an IGMP profile, use the **ip igmp profile** global configuration command with a profile number to create an IGMP profile and to enter IGMP profile configuration mode. From this mode, you can specify the parameters of the IGMP profile to be used for filtering IGMP join requests from a port. When you are in IGMP profile configuration mode, you can create the profile by using these commands:

- **deny—**Specifies that matching addresses are denied; this is the default.
- **exit—**Exits from igmp-profile configuration mode.

- **no—**Negates a command or returns to its defaults.
- **permit—**Specifies that matching addresses are permitted.
- **range—**Specifies a range of IP addresses for the profile. You can enter a single IP address or a range with a start and an end address.

The default is for the switch to have no IGMP profiles configured. When a profile is configured, if neither the **permit** nor **deny** keyword is included, the default is to deny access to the range of IP addresses.

SUMMARY STEPS

1. **configure terminal**
2. **ip igmp profile** *profile number*
3. **permit** | **deny**
4. **range** *ip multicast address*
5. **end**
6. **show ip igmp profile** *profile number*
7. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**ip igmp profile** *profile number* **Example:** `Switch(config)# ip igmp profile 3`	Assigns a number to the profile you are configuring, and enters IGMP profile configuration mode. The profile number range is 1 to 4294967295. **Note** To delete a profile, use the **no ip igmp profile** *profile number* global configuration command.
Step 3	**permit** | **deny** **Example:** `Switch(config-igmp-profile)# permit`	(Optional) Sets the action to permit or deny access to the IP multicast address. If no action is configured, the default for the profile is to deny access.
Step 4	**range** *ip multicast address* **Example:** `Switch(config-igmp-profile)# range 229.9.9.0`	Enters the IP multicast address or range of IP multicast addresses to which access is being controlled. If entering a range, enter the low IP multicast address, a space, and the high IP multicast address. You can use the **range** command multiple times to enter multiple addresses or ranges of addresses. **Note** To delete an IP multicast address or range of IP multicast addresses, use the **no range** *ip multicast address* IGMP profile configuration command.

	Command or Action	Purpose
Step 5	**end** **Example:** `Switch(config-igmp-profile)# end`	Returns to privileged EXEC mode.
Step 6	**show ip igmp profile** *profile number* **Example:** `Switch# show ip igmp profile 3`	Verifies the profile configuration.
Step 7	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Example: Configuring IGMP Profiles, on page 48

Applying IGMP Profiles

To control access as defined in an IGMP profile, use the **ip igmp filter** interface configuration command to apply the profile to the appropriate interfaces. You can apply IGMP profiles only to Layer 2 access ports; you cannot apply IGMP profiles to routed ports or SVIs. You cannot apply profiles to ports that belong to an EtherChannel port group. You can apply a profile to multiple interfaces, but each interface can have only one profile applied to it.

SUMMARY STEPS

1. **configure terminal**
2. **interface** *interface-id*
3. **ip igmp filter** *profile number*
4. **end**
5. **show running-config interface** *interface-id*
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**interface** *interface-id* **Example:** `Switch(config)# interface gigabitethernet1/0/1`	Specifies the physical interface, and enters interface configuration mode. The interface must be a Layer 2 port that does not belong to an EtherChannel port group.
Step 3	**ip igmp filter** *profile number* **Example:** `Switch(config-if)# ip igmp filter 321`	Applies the specified IGMP profile to the interface. The range is 1 to 4294967295. **Note** To remove a profile from an interface, use the **no ip igmp filter** *profile number* interface configuration command.
Step 4	**end** **Example:** `Switch(config-if)# end`	Returns to privileged EXEC mode.
Step 5	**show running-config interface** *interface-id* **Example:** `Switch# show running-config interface gigabitethernet1/0/1`	Verifies the configuration.
Step 6	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Example: Applying IGMP Profile, on page 48

Setting the Maximum Number of IGMP Groups

You can set the maximum number of IGMP groups that a Layer 2 interface can join by using the **ip igmp max-groups** interface configuration command.

Use the **no** form of this command to set the maximum back to the default, which 208.

This restriction can be applied to Layer 2 ports only; you cannot set a maximum number of IGMP groups on routed ports or SVIs. You also can use this command on a logical EtherChannel interface but cannot use it on ports that belong to an EtherChannel port group.

SUMMARY STEPS

1. **configure terminal**
2. **interface** *interface-id*
3. **ip igmp max-groups** *number*
4. **end**
5. **show running-config interface** *interface-id*
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**interface** *interface-id* **Example:** `Switch(config)# interface gigabitethernet1/0/2`	Specifies the interface to be configured, and enters interface configuration mode. The interface can be a Layer 2 port that does not belong to an EtherChannel group or a EtherChannel interface.
Step 3	**ip igmp max-groups** *number* **Example:** `Switch(config-if)# ip igmp max-groups 20`	Sets the maximum number of IGMP groups that the interface can join. The range is 0 to 4294967294. The default is 208. **Note** To remove the maximum group limitation and return to the default of no maximum, use the **no ip igmp max-groups** interface configuration command.
Step 4	**end** **Example:** `Switch(config-if)# end`	Returns to privileged EXEC mode.

	Command or Action	Purpose
Step 5	**show running-config interface** *interface-id* **Example:** `Switch# show running-config interface gigabitethernet1/0/1`	Verifies your entries.
Step 6	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Configuring the IGMP Throttling Action

After you set the maximum number of IGMP groups that a Layer 2 interface can join, you can configure an interface to replace the existing group with the new group for which the IGMP report was received by using the **ip igmp max-groups action replace** interface configuration command. Use the **no** form of this command to return to the default, which is to drop the IGMP join report.

Follow these guidelines when configuring the IGMP throttling action:

- This restriction can be applied only to Layer 2 ports. You can use this command on a logical EtherChannel interface but cannot use it on ports that belong to an EtherChannel port group.
- When the maximum group limitation is set to the default (no maximum), entering the **ip igmp max-groups action** {**deny** | **replace**} command has no effect.
- If you configure the throttling action and set the maximum group limitation after an interface has added multicast entries to the forwarding table, the forwarding-table entries are either aged out or removed, depending on the throttling action.
  - If you configure the throttling action as **deny**, the entries that were previously in the forwarding table are not removed but are aged out. After these entries are aged out and the maximum number of entries is in the forwarding table, the switch drops the next IGMP report received on the interface.
  - If you configure the throttling action as **replace**, the entries that were previously in the forwarding table are removed. When the maximum number of entries is in the forwarding table, the switch replaces a randomly selected entry with the received IGMP report.

    To prevent the switch from removing the forwarding-table entries, you can configure the IGMP throttling action before an interface adds entries to the forwarding table.

SUMMARY STEPS

1. **configure terminal**
2. **interface** *interface-id*
3. **ip igmp max-groups action** {**deny** | **replace**}
4. **end**
5. **show running-config interface** *interface-id*
6. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**interface** *interface-id* **Example:** `Switch(config)# interface gigabitethernet 1/0/1`	Specifies the physical interface to be configured, and enters interface configuration mode. The interface can be a Layer 2 port that does not belong to an EtherChannel group or an EtherChannel interface. The interface cannot be a trunk port.
Step 3	**ip igmp max-groups action** {**deny**	**replace**} **Example:** `Switch(config-if)# ip igmp max-groups action replace`	When an interface receives an IGMP report and the maximum number of entries is in the forwarding table, specifies the action that the interface takes: • **deny—**Drops the report. • **replace—**Replaces the existing group with the new group for which the IGMP report was received. **Note** To return to the default action of dropping the report, use the **no ip igmp max-groups action** interface configuration command.
Step 4	**end** **Example:** `Switch(config-if)# end`	Returns to privileged EXEC mode.
Step 5	**show running-config interface** *interface-id* **Example:** `Switch# show running-config interface gigabitethernet1/0/1`	Verifies your entries.

	Command or Action	Purpose
Step 6	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

IGMP Filtering and Throttling Overview, on page 18

Monitoring IGMP Snooping

Displaying IGMP Snooping Information

You can display IGMP snooping information for dynamically learned and statically configured router ports and VLAN interfaces. You can also display MAC address multicast entries for a VLAN configured for IGMP snooping.

Table 8: Commands for Displaying IGMP Snooping Information

Command	Purpose
show ip igmp snooping [**vlan** *vlan-id* [detail]]	Displays the snooping configuration information for all VLANs on the switch or for a specified VLAN. (Optional) Enter **vlan** *vlan-id* to display information for a single VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
show ip igmp snooping groups [**count** |**dynamic** [**count**] | **user** [**count**]]	Displays multicast table information for the switch or about a specific parameter: • **count—**Displays the total number of entries for the specified command options instead of the actual entries. • **dynamic—**Displays entries learned through IGMP snooping. • **user—**Displays only the user-configured multicast entries.

Command	Purpose
show ip igmp snooping groups vlan *vlan-id* [*ip_address* | **count** | **dynamic** [**count**] | **user**[**count**]]	Displays multicast table information for a multicast VLAN or about a specific parameter for the VLAN: • *vlan-id*—The VLAN ID range is 1 to 1001 and 1006 to 4094. • **count**—Displays the total number of entries for the specified command options instead of the actual entries. • **dynamic**—Displays entries learned through IGMP snooping. • *ip_address*—Displays characteristics of the multicast group with the specified group IP address. • **user**—Displays only the user-configured multicast entries.
show ip igmp snooping mrouter [**vlan** *vlan-id*]	Displays information on dynamically learned and manually configured multicast router interfaces. **Note** When you enable IGMP snooping, the switch automatically learns the interface to which a multicast router is connected. These are dynamically learned interfaces. (Optional) Enter **vlan** *vlan-id* to display information for a single VLAN.
show ip igmp snooping querier [**vlan** *vlan-id*] **detail**	Displays information about the IP address and receiving port of the most-recently received IGMP query message in the VLAN and the configuration and operational state of the IGMP snooping querier in the VLAN.

Displaying IGMP Filtering and Throttling Configuration

You can display IGMP profile characteristics, and you can display the IGMP profile and maximum group configuration for all interfaces on the switch or for a specified interface. You can also display the IGMP throttling configuration for all interfaces on the switch or for a specified interface.

Table 9: Commands for Displaying IGMP Filtering and Throttling Configuration

Command	Purpose
show ip igmp profile [*profile number*]	Displays the specified IGMP profile or all the IGMP profiles defined on the switch.

Command	Purpose
show running-config [**interface** *interface-id*]	Displays the configuration of the specified interface or the configuration of all interfaces on the switch, including (if configured) the maximum number of IGMP groups to which an interface can belong and the IGMP profile applied to the interface.

Configuration Examples for IGMP Snooping

Example: Configuring IGMP Snooping Using CGMP Packets

This example shows how to configure IGMP snooping to use CGMP packets as the learning method:

```
Switch# configure terminal
Switch(config)# ip igmp snooping vlan 1 mrouter learn cgmp
Switch(config)# end
```

Related Topics

Setting the Snooping Method, on page 22

Example: Enabling a Static Connection to a Multicast Router

This example shows how to enable a static connection to a multicast router:

```
Switch# configure terminal
Switch(config)# ip igmp snooping vlan 200 mrouter interface gigabitethernet1/0/2
Switch(config)# end
```

Related Topics

Configuring a Multicast Router Port, on page 24

Example: Statically Configuring a Host on a Port

This example shows how to statically configure a host on a port:

```
Switch# configure terminal
Switch(config)# ip igmp snooping vlan 105 static 224.2.4.12 interface gigabitethernet1/0/1
Switch(config)# end
```

Related Topics

Configuring a Host Statically to Join a Group, on page 25

Joining a Multicast Group, on page 15

Example: Enable Immediate Leave on a VLAN

This example shows how to enable IGMP Immediate Leave on VLAN 130:

```
Switch# configure terminal
Switch(config)# ip igmp snooping vlan 130 immediate-leave
Switch(config)# end
```

Related Topics

Enabling IGMP Immediate Leave, on page 27
Immediate Leave , on page 17

Example: Setting the IGMP Snooping Querier Source Address

This example shows how to set the IGMP snooping querier source address to 10.0.0.64:

```
Switch# configure terminal
Switch(config)# ip igmp snooping querier 10.0.0.64
Switch(config)# end
```

Related Topics

Configuring the IGMP Snooping Querier, on page 33
IGMP Snooping and Switch Stacks, on page 18

Example: Setting the IGMP Snooping Querier Maximum Response Time

This example shows how to set the IGMP snooping querier maximum response time to 25 seconds:

```
Switch# configure terminal
Switch(config)# ip igmp snooping querier query-interval 25
Switch(config)# end
```

Related Topics

Configuring the IGMP Snooping Querier, on page 33
IGMP Snooping and Switch Stacks, on page 18

Example: Setting the IGMP Snooping Querier Timeout

This example shows how to set the IGMP snooping querier timeout to 60 seconds:

```
Switch# configure terminal
Switch(config)# ip igmp snooping querier timeout expiry 60
Switch(config)# end
```

Related Topics

Configuring the IGMP Snooping Querier, on page 33
IGMP Snooping and Switch Stacks, on page 18

Example: Setting the IGMP Snooping Querier Feature

This example shows how to set the IGMP snooping querier feature to Version 2:

```
Switch# configure terminal
Switch(config)# ip igmp snooping querier version 2
Switch(config)# end
```

Related Topics

Configuring the IGMP Snooping Querier, on page 33
IGMP Snooping and Switch Stacks, on page 18

Example: Configuring IGMP Profiles

This example shows how to create IGMP profile 4 allowing access to the single IP multicast address and how to verify the configuration. If the action was to deny (the default), it would not appear in the **show ip igmp profile** output display.

```
Switch(config)# ip igmp profile 4
Switch(config-igmp-profile)# permit
Switch(config-igmp-profile)# range 229.9.9.0
Switch(config-igmp-profile)# end
Switch# show ip igmp profile 4
IGMP Profile 4
    permit
    range 229.9.9.0 229.9.9.0
```

Related Topics

Configuring IGMP Profiles, on page 37

Example: Applying IGMP Profile

This example shows how to apply IGMP profile 4 to a port:

```
Switch(config)# interface gigabitethernet1/0/2
Switch(config-if)# ip igmp filter 4
Switch(config-if)# end
```

Related Topics

Applying IGMP Profiles, on page 39

Example: Setting the Maximum Number of IGMP Groups

This example shows how to limit to 25 the number of IGMP groups that a port can join:

```
Switch(config)# interface gigabitethernet1/0/2
Switch(config-if)# ip igmp max-groups 25
Switch(config-if)# end
```

Related Topics

Setting the Maximum Number of IGMP Groups

Where to Go Next for IGMP Snooping

You can configure the following:

- Multicast VLAN Registration

Additional References

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	*Catalyst 2960-X Switch IGMP Snooping Command Reference*

Standards and RFCs

Standard/RFC	Title
RFC 1112	*Host Extensions for IP Multicasting*
RFC 2236	*Internet Group Management Protocol, Version 2*

MIBs

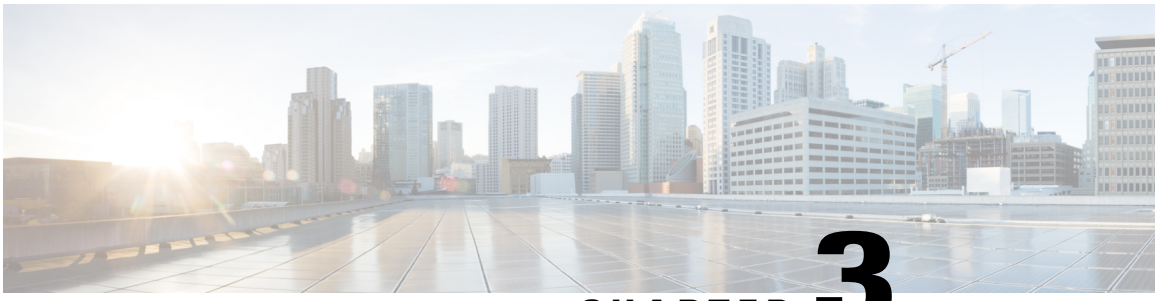
MIB	MIBs Link
All supported MIBs for this release.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature History and Information for IGMP Snooping

Release	Modification
Cisco IOS 15.0(2)EX	This feature was introduced.



CHAPTER 3

Configuring Multicast VLAN Registration

- Finding Feature Information, page 51
- Prerequisites for MVR, page 51
- Restrictions for MVR, page 52
- Information About Multicast VLAN Registration, page 52
- How to Configure MVR, page 55
- Monitoring MVR, page 60
- Configuration Examples for MVR, page 61
- Where to Go Next for MVR, page 62
- Additional References, page 62
- Feature History and Information for MVR, page 63

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for MVR

The following are the prerequisites for Multicast VLAN Registration (MVR):

- To use MVR, the switch must be running the LAN Base image.

Restrictions for MVR

The following are restrictions for MVR:

- Only Layer 2 ports participate in MVR. You must configure ports as MVR receiver ports.
- Only one MVR multicast VLAN per switch or switch stack is supported.
- Receiver ports can only be access ports; they cannot be trunk ports. Receiver ports on a switch can be in different VLANs, but should not belong to the multicast VLAN.
- The maximum number of multicast entries (MVR group addresses) that can be configured on a switch (that is, the maximum number of television channels that can be received) is 256.
- MVR multicast data received in the source VLAN and leaving from receiver ports has its time-to-live (TTL) decremented by 1 in the switch.
- Because MVR on the switch uses IP multicast addresses instead of MAC multicast addresses, alias IP multicast addresses are allowed on the switch. However, if the switch is interoperating with Catalyst 3550 or Catalyst 3500 XL switches, you should not configure IP addresses that alias between themselves or with the reserved IP multicast addresses (in the range 224.0.0.xxx).
- Do not configure MVR on private VLAN ports.
- MVR is not supported when multicast routing is enabled on a switch. If you enable multicast routing and a multicast routing protocol while MVR is enabled, MVR is disabled, and you receive a warning message. If you try to enable MVR while multicast routing and a multicast routing protocol are enabled, the operation to enable MVR is cancelled, and you receive an error message
- MVR data received on an MVR receiver port is not forwarded to MVR source ports.
- MVR does not support IGMPv3 messages.
- The switch supports homogeneous stacking and mixed stacking. Mixed stacking is supported only with the Catalyst 2960-S switches. A homogenous stack can have up to eight stack members, while a mixed stack can have up to four stack members. All switches in a switch stack must be running the LAN Base image.

Note MVR can coexist with IGMP snooping on a switch.

Information About Multicast VLAN Registration

Multicast VLAN Registration (MVR) is designed for applications using wide-scale deployment of multicast traffic across an Ethernet ring-based service-provider network (for example, the broadcast of multiple television channels over a service-provider network). MVR allows a subscriber on a port to subscribe and unsubscribe to a multicast stream on the network-wide multicast VLAN. It allows the single multicast VLAN to be shared in the network while subscribers remain in separate VLANs. MVR provides the ability to continuously send multicast streams in the multicast VLAN, but to isolate the streams from the subscriber VLANs for bandwidth and security reasons.

MVR and IGMP

MVR assumes that subscriber ports subscribe and unsubscribe (join and leave) these multicast streams by sending out IGMP join and leave messages. These messages can originate from an IGMP version-2-compatible host with an Ethernet connection. Although MVR operates on the underlying method of IGMP snooping, the two features operate independently of each other. One can be enabled or disabled without affecting the behavior of the other feature. However, if IGMP snooping and MVR are both enabled, MVR reacts only to join and leave messages from multicast groups configured under MVR. Join and leave messages from all other multicast groups are managed by IGMP snooping.

The switch CPU identifies the MVR IP multicast streams and their associated IP multicast group in the switch forwarding table, intercepts the IGMP messages, and modifies the forwarding table to include or remove the subscriber as a receiver of the multicast stream, even though the receivers might be in a different VLAN from the source. This forwarding behavior selectively allows traffic to cross between different VLANs.

Modes of Operation

You can set the switch for compatible or dynamic mode of MVR operation:

- In compatible mode, multicast data received by MVR hosts is forwarded to all MVR data ports, regardless of MVR host membership on those ports. The multicast data is forwarded only to those receiver ports that MVR hosts have joined, either by IGMP reports or by MVR static configuration. IGMP reports received from MVR hosts are never forwarded from MVR data ports that were configured in the switch.
- In dynamic mode, multicast data received by MVR hosts on the switch is forwarded from only those MVR data and client ports that the MVR hosts have joined, either by IGMP reports or by MVR static configuration. Any IGMP reports received from MVR hosts are also forwarded from all the MVR data ports in the host. This eliminates using unnecessary bandwidth on MVR data port links, which occurs when the switch runs in compatible mode.

Switch Stacks

Only one MVR multicast VLAN per switch or switch stack is supported.

Receiver ports and source ports can be on different switches in a switch stack. Multicast data sent on the multicast VLAN is forwarded to all MVR receiver ports across the stack. When a new switch is added to a stack, by default it has no receiver ports.

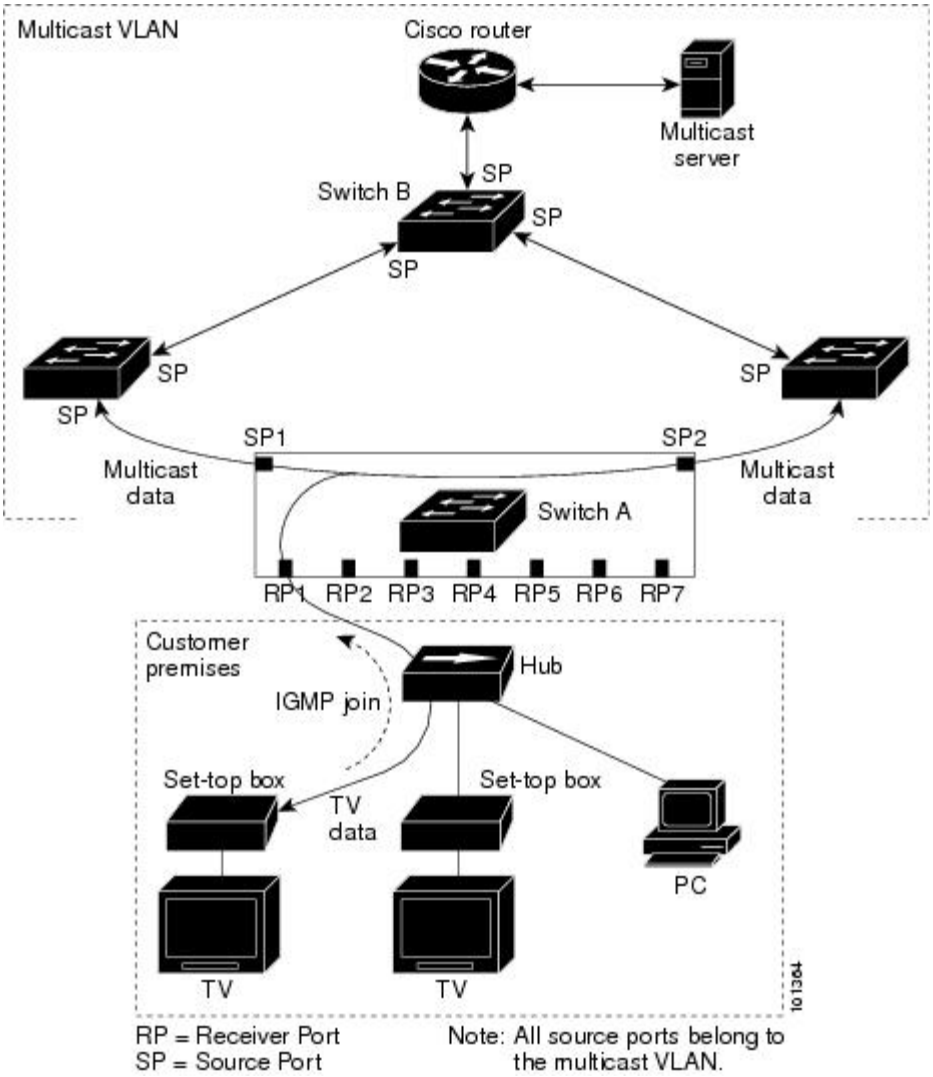
If a switch fails or is removed from the stack, only those receiver ports belonging to that switch will not receive the multicast data. All other receiver ports on other switches continue to receive the multicast data.

MVR in a Multicast Television Application

In a multicast television application, a PC or a television with a set-top box can receive the multicast stream. Multiple set-top boxes or PCs can be connected to one subscriber port, which is a switch port configured as an MVR receiver port.

The following is an example configuration.

Figure 3: Multicast VLAN Registration Example



In this example configuration, DHCP assigns an IP address to the set-top box or the PC. When a subscriber selects a channel, the set-top box or PC sends an IGMP report to Switch A to join the appropriate multicast. If the IGMP report matches one of the configured IP multicast group addresses, the switch CPU modifies the hardware address table to include this receiver port and VLAN as a forwarding destination of the specified multicast stream when it is received from the multicast VLAN. Uplink ports that send and receive multicast data to and from the multicast VLAN are called MVR source ports.

When a subscriber changes channels or turns off the television, the set-top box sends an IGMP leave message for the multicast stream. The switch CPU sends a MAC-based general query through the receiver port VLAN. If there is another set-top box in the VLAN still subscribing to this group, that set-top box must respond within the maximum response time specified in the query. If the CPU does not receive a response, it eliminates the receiver port as a forwarding destination for this group.

Without Immediate Leave, when the switch receives an IGMP leave message from a subscriber on a receiver port, it sends out an IGMP query on that port and waits for IGMP group membership reports. If no reports

are received in a configured time period, the receiver port is removed from multicast group membership. With Immediate Leave, an IGMP query is not sent from the receiver port on which the IGMP leave was received. As soon as the leave message is received, the receiver port is removed from multicast group membership, which speeds up leave latency. Enable the Immediate-Leave feature only on receiver ports to which a single receiver device is connected.

MVR eliminates the need to duplicate television-channel multicast traffic for subscribers in each VLAN. Multicast traffic for all channels is only sent around the VLAN trunk once—only on the multicast VLAN. The IGMP leave and join messages are in the VLAN to which the subscriber port is assigned. These messages dynamically register for streams of multicast traffic in the multicast VLAN on the Layer 3 device. The access layer switch, Switch A, modifies the forwarding behavior to allow the traffic to be forwarded from the multicast VLAN to the subscriber port in a different VLAN, selectively allowing traffic to cross between two VLANs.

IGMP reports are sent to the same IP multicast group address as the multicast data. The Switch A CPU must capture all IGMP join and leave messages from receiver ports and forward them to the multicast VLAN of the source (uplink) port, based on the MVR mode.

Default MVR Configuration

Table 10: Default MVR Configuration

Feature	Default Setting
MVR	Disabled globally and per interface
Multicast addresses	None configured
Query response time	0.5 second
Multicast VLAN	VLAN 1
Mode	Compatible
Interface (per port) default	Neither a receiver nor a source port
Immediate Leave	Disabled on all ports

How to Configure MVR

Configuring MVR Global Parameters

You do not need to set the optional MVR parameters if you choose to use the default settings. If you do want to change the default parameters (except for the MVR VLAN), you must first enable MVR.

Note For complete syntax and usage information for the commands used in this section, see the command reference for this release.

SUMMARY STEPS

1. **configure terminal**
2. **mvr**
3. **mvr group** *ip-address* [*count*]
4. **mvr querytime** *value*
5. **mvr vlan** *vlan-id*
6. **mvr mode** {**dynamic** | **compatible**}
7. **end**
8. Use one of the following:
   - **show mvr**
   - **show mvr members**
9. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**mvr** **Example:** `Switch (config)# mvr`	Enables MVR on the switch.
Step 3	**mvr group** *ip-address* [*count*] **Example:** `Switch(config)# mvr group 228.1.23.4`	Configures an IP multicast address on the switch or use the *count* parameter to configure a contiguous series of MVR group addresses (the range for *count* is 1 to 256; the default is 1). Any multicast data sent to this address is sent to all source ports on the switch and all receiver ports that have elected to receive data on that multicast address. Each multicast address would correspond to one television channel. **Note** To return the switch to its default settings, use the **no mvr** [**mode** | **group** *ip-address* | **querytime** | **vlan**] global configuration commands.

	Command or Action	Purpose
Step 4	**mvr querytime** *value* **Example:** `Switch(config)# mvr querytime 10`	(Optional) Defines the maximum time to wait for IGMP report memberships on a receiver port before removing the port from multicast group membership. The value is in units of tenths of a second. The range is 1 to 100, and the default is 5 tenths or one-half second.
Step 5	**mvr vlan** *vlan-id* **Example:** `Switch(config)# mvr vlan 22`	(Optional) Specifies the VLAN in which multicast data is received; all source ports must belong to this VLAN. The VLAN range is 1 to 1001 and 1006 to 4094. The default is VLAN 1.
Step 6	**mvr mode** {**dynamic** | **compatible**} **Example:** `Switch(config)# mvr mode dynamic`	(Optional) Specifies the MVR mode of operation: • **dynamic—**Allows dynamic MVR membership on source ports. • **compatible—**Is compatible with Catalyst 3500 XL and Catalyst 2900 XL switches and does not support IGMP dynamic joins on source ports. The default is **compatible** mode. **Note** To return the switch to its default settings, use the **no mvr** [**mode** | **group** *ip-address* | **querytime** | **vlan**] global configuration commands.
Step 7	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.

Step 8	Use one of the following:
	• **show mvr**
	• **show mvr members**
	
	Example:
	
	`Switch# show mvr`
	
	or
	
	`Switch# show mvr members`
		Verifies the configuration.

Step 9	**copy running-config startup-config** **Example:** `Switch# copy running-config`	(Optional) Saves your entries in the configuration file.

	Command or Action	Purpose
	`startup-config`	

Related Topics

Example: Configuring MVR Global Parameters, on page 61

Configuring MVR Interfaces

SUMMARY STEPS

1. **configure terminal**
2. **mvr**
3. **interface** *interface-id*
4. **mvr type** {**source** | **receiver**}
5. **mvr vlan** *vlan-id* **group** [*ip-address*]
6. **mvr immediate**
7. **end**
8. Use one of the following:
   - **show mvr**
   - **show mvr interface**
   - **show mvr members**
9. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Switch# configure terminal`	Enters the global configuration mode.
Step 2	**mvr** **Example:** `Switch (config)# mvr`	Enables MVR on the switch.

	Command or Action	Purpose
Step 3	**interface** *interface-id* **Example:** `Switch(config)# interface gigabitethernet1/0/2`	Specifies the Layer 2 port to configure, and enter interface configuration mode.
Step 4	**mvr type** {**source** | **receiver**} **Example:** `Switch(config-if)# mvr type receiver`	Configures an MVR port as one of these: • **source—**Configures uplink ports that receive and send multicast data as source ports. Subscribers cannot be directly connected to source ports. All source ports on a switch belong to the single multicast VLAN. • **receiver—**Configures a port as a receiver port if it is a subscriber port and should only receive multicast data. It does not receive data unless it becomes a member of the multicast group, either statically or by using IGMP leave and join messages. Receiver ports cannot belong to the multicast VLAN. The default configuration is as a non-MVR port. If you attempt to configure a non-MVR port with MVR characteristics, the operation fails. **Note** To return the interface to its default settings, use the **no mvr** [**type** | **immediate** | **vlan** *vlan-id* | **group**] interface configuration commands.
Step 5	**mvr vlan** *vlan-id* **group** [*ip-address*] **Example:** `Switch(config-if)# mvr vlan 22 group 228.1.23.4`	(Optional) Statically configures a port to receive multicast traffic sent to the multicast VLAN and the IP multicast address. A port statically configured as a member of a group remains a member of the group until statically removed. **Note** In compatible mode, this command applies to only receiver ports. In dynamic mode, it applies to receiver ports and source ports. Receiver ports can also dynamically join multicast groups by using IGMP join and leave messages.
Step 6	**mvr immediate** **Example:** `Switch(config-if)# mvr immediate`	(Optional) Enables the Immediate-Leave feature of MVR on the port. **Note** This command applies to only receiver ports and should only be enabled on receiver ports to which a single receiver device is connected.
Step 7	**end** **Example:** `Switch(config)# end`	Returns to privileged EXEC mode.

	Command or Action	Purpose

Step 8	Use one of the following:
	• **show mvr**
	• **show mvr interface**
	• **show mvr members**
	Example:
	`Switch# show mvr interface`
	`Port Type Status Immediate Leave`
	`---- ---- ------- ---------------`
	`Gi1/0/2 RECEIVER ACTIVE/DOWN ENABLED`
		Verifies the configuration.

Step 9	**copy running-config startup-config** **Example:** `Switch# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Related Topics

Example: Configuring MVR Interfaces, on page 62

Monitoring MVR

You can monitor MVR for the switch or for a specified interface by displaying the following MVR information.

Table 11: Commands for Displaying MVR Information

Command	Purpose
show mvr	Displays MVR status and values for the switch—whether MVR is enabled or disabled, the multicast VLAN, the maximum (256) and current (0 through 256) number of multicast groups, the query response time, and the MVR mode.

Command	Purpose
show mvr interface [*interface-id*] [**members** [**vlan** *vlan-id*]]	Displays all MVR interfaces and their MVR configurations. When a specific interface is entered, displays this information: • Type—Receiver or Source • Status—One of these states: ◦ Active means the port is part of a VLAN. ◦ Up/Down means that the port is forwarding or nonforwarding. ◦ Inactive means that the port is not part of any VLAN. • Immediate Leave—Enabled or Disabled If the **members** keyword is entered, displays all multicast group members on this port or, if a VLAN identification is entered, all multicast group members on the VLAN. The VLAN ID range is 1 to 1001 and 1006 to 4094.
show mvr members [*ip-address*]	Displays all receiver and source ports that are members of any IP multicast group or the specified IP multicast group IP address.

Configuration Examples for MVR

Example: Configuring MVR Global Parameters

This example shows how to enable MVR, configure the group address, set the query time to 1 second (10 tenths), specify the MVR multicast VLAN as VLAN 22, and set the MVR mode as dynamic:

```
Switch(config)# mvr
Switch(config)# mvr group 228.1.23.4
Switch(config)# mvr querytime 10
Switch(config)# mvr vlan 22
Switch(config)# mvr mode dynamic
Switch(config)# end
```

Related Topics

Configuring MVR Global Parameters, on page 55

Example: Configuring MVR Interfaces

This example shows how to configure a port as a receiver port, statically configure the port to receive multicast traffic sent to the multicast group address, configure Immediate Leave on the port, and verify the results.

```
Switch(config)# mvr
Switch(config)# interface gigabitethernet1/0/2
Switch(config-if)# mvr type receiver
Switch(config-if)# mvr vlan 22 group 228.1.23.4
Switch(config-if)# mvr immediate
Switch(config)# end
Switch# show mvr interface

Port Type Status Immediate Leave
---- ---- ------- ---------------
Gi1/0/2 RECEIVER ACTIVE/DOWN ENABLED
```

Related Topics

Configuring MVR Interfaces, on page 58

Where to Go Next for MVR

You can configure the following:

- IGMP Snooping

Additional References

Related Documents

Related Topic	Document Title
For complete syntax and usage information for the commands used in this chapter.	*Catalyst 2960-X Switch IGMP Snooping Command Reference*

Standards and RFCs

Standard/RFC	Title
—	—

MIBs

MIB	MIBs Link
All supported MIBs for this release.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/support

Feature History and Information for MVR

Release	Modification
Cisco IOS 15.0(2)EX	This feature was introduced.

INDEX

A

address aliasing 14

C

compatible mode 53
configurable leave timer, IGMP 17

D

default configuration 19, 20, 55
  IGMP filtering 20
  IGMP snooping 19
  IGMP throttling 20
  MVR 55
dynamic mode 53

F

feature information 50
  IGMP snooping 50

G

global leave, IGMP 31

I

IGMP 15, 17, 18, 28, 30, 31, 32, 36, 53
  configurable leave timer 17, 28
    described 17
  configurable leave timer 17, 28
    enabling 28
  flooded multicast traffic 30, 31, 32
    controlling the length of time 30
IGMP *(continued)*
  flooded multicast traffic *(continued)*
    disabling on an interface 32
    global leave 31
    recovering from flood mode 31
  join messages 15
  leaving multicast group 17
  queries 15
  report suppression 18, 36
    described 18
    disabling 36
IGMP filtering 18, 20
  default configuration 20
  described 18
IGMP groups 41, 42
  configuring filtering 42
  setting the maximum number 41
IGMP Immediate Leave 27, 28
  configuration guidelines 28
  enabling 27
IGMP profile 37, 39
  applying 39
  configuration mode 37
IGMP snooping 14, 17, 18, 19, 20, 21, 33
  and address aliasing 14
  and stack changes 18
  default configuration 19
  definition 14
  enabling and disabling 20
  global configuration 20
  Immediate Leave 17
  in the switch stack 18
  querier 33
    configuration guidelines 33
    configuring 33
  VLAN configuration 21
IGMP throttling 18, 20, 42, 45
  configuring 42
  default configuration 20
  described 18
  displaying action 45

Immediate Leave, IGMP 17
described 17

J

join messages, IGMP 15

M

monitoring 45
multicast router interfaces 45
multicast groups 15, 17, 25
joining 15
leaving 17
static joins 25
multicast router interfaces, monitoring 45
multicast router ports, adding 24
multicast television application 53
MVR 52, 55
default configuration 55
described 52
MVR interfaces 58
MVR parameters 55

Q

queries, IGMP 15

R

report suppression, IGMP 18, 36
described 18
disabling 36
restrictions 13, 52
IGMP snooping 13
RFC 14
1112, IP multicast and IGMP 14

S

stack changes, effects on 18
IGMP snooping 18
stacks 53