CHAPTER 8

Configuring PTP

Finding Feature Information

Your software release may not support all the features documented in this chapter. 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 Configuring PTP

- To use this feature, the switch must be PTP-capable. Refer to your switch release notes.

Restrictions for Configuring PTP

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

Information About Configuring PTP

Precision Time Protocol

The IEEE 1588 standard describes the use of PTP for fault-tolerant synchronization of network real-time clocks.

The clocks in a PTP network are organized into a master-slave hierarchy. The grandmaster clock is called the Best Master Clock (BMC), and is the root of the master-slave clock hierarchy. PTP uses the BMC algorithm to identify the master clock for synchronization.

The master clock is a time source on the network that can be synchronized to a highly accurate time source such as a Global Positioning System (GPS) clock. The slaves are the other network devices that synchronize their clocks to the master clock. The parent is the clock to which the member-slave clocks synchronize. Timing messages between the master and slave clocks ensure continued synchronization.

Synchronization behavior depends on the PTP clock setting mode that you configure on the switch. The mode can be boundary, end-to-end transparent, or forward:

- A switch clock in boundary mode participates in the selection of the most accurate master clock. If more accurate clocks are not detected, that switch clock becomes the master clock. If a more accurate clock is found among the slave clocks, then the switch synchronizes to that clock and becomes a slave clock. After initial synchronization, the switch and the connected devices exchange timing messages to correct the changes caused by clock offsets and network delays.
- A switch clock in end-to-end transparent mode synchronizes all switch ports with the master clock. This switch does not participate in master clock selection and uses the default PTP clock mode on all ports.
- A switch clock in forward mode allows incoming PTP packets to pass-through the switch as normal multicast traffic.

When the switch is in PTP forward mode, PTP configuration is not available except when changing PTP mode to another mode. You can only configure per-port PTP when the switch is in boundary mode.

How to Configure PTP

- Default PTP Settings, page 8-2
- Setting Up PTP, page 8-3

Default PTP Settings

By default, PTP is enabled on all the Fast Ethernet and Gigabit Ethernet ports on the base switch module. The default PTP mode on all ports is end-to-end transparent.

Table 8-1 Default PTP Settings

Feature	Default Setting
PTP boundary mode	Disabled.
PTP forward mode	Disabled.
PTP end-to-end transparent mode	Enabled.
PTP priority 1 and PTP priority 2	Default priority number is 128.
PTP announce interval	2 seconds.
PTP announce receipt time out	3 messages.
PTP delay request interval	32 seconds.
PTP sync interval	1 second.
PTP sync limit	500000000 nanoseconds.

Setting Up PTP

	Command	Purpose
Step 1	**configure terminal**	Enters global configuration mode.
Step 2	**interface** *interface-id*	Enters interface configuration mode.
Step 3	**ptp** {**announce** {**interval** *value* | **timeout** *value*} | **delay-req interval** *value* | **enable** | **sync** {**interval** *value* | **limit** *value*}}	Specifies the settings for the timing messages. These options are available only when the switch is in boundary mode. • **announce interval** *value*—Sets the time to send announce messages. The range is 0 to 4 seconds. The default is 1 (2 seconds). • **announce timeout** *value*— Sets the time to announce timeout messages. The range is 2 to 10 seconds. The default is 3 (8 seconds). • **delay-req interval** *value*—Sets the time for slave devices to send delay request messages when the port is in the master clock state. The range is -1 second to 6 seconds. The default is 5 (32 seconds). • **enable**—Enables PTP on the port base module. • **sync interval** *value*—Sets the time to send synchronization messages. The range is –1 second to 1 second. The default is 1 second. • **sync limit** *value*—Sets the maximum clock offset value before PTP attempts to resynchronize. The range is from 50 to 500000000 nanoseconds. The default is 500000000 nanoseconds.
Step 4	**end**	Returns to privileged EXEC mode.
Step 5	**show running-config**	Verifies your entries.
Step 6	**copy running-config startup-config**	(Optional) Saves your entries in the configuration file.

Monitoring and Maintaining the PTP Configuration

Table 8-2 Commands for Displaying the PTP Configuration

Command	Purpose
show ptp clock	Displays the PTP clock properties.
show ptp foreign-master-record	Displays the PTP foreign master data set.
show ptp parent	Displays the parent and grandmaster clock properties.
show ptp port	Displays all the PTP port properties.
show ptp port FastEthernet *interface*	Displays the PTP FastEthernet properties on the specified port.
show ptp port GigabitEthernet *interface*	Displays the PTP Gigabit Ethernet properties on the specified port.
show ptp time-property	Displays the PTP time properties.

Troubleshooting the PTP Configuration

Table 8-3 Commands for Troubleshooting the PTP Configuration

Command	Purpose
debug ptp bmc	Enables debugging of the PTP Best Master Clock Algorithm.
debug ptp clock-correction	Enables debugging of PTP clock correction.
debug ptp collision	Enables debugging of PTP source collision.
debug ptp error	Enables debugging of PTP errors.
debug ptp event	Enables debugging of PTP state event.
debug ptp messages	Enables debugging of PTP messages.
debug ptp transparent-clock	Enables debugging of the PTP transparent clock.

Additional References

The following sections provide references related to switch administration:

Related Documents

Related Topic	Document Title
Cisco IE 2000 commands	*Cisco IE 2000 Switch Command Reference*, Release15.0(1)EY
Cisco IOS basic commands	*Cisco IOS Configuration Fundamentals Command Reference*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
—	To locate and download MIBs using Cisco IOS XR software, use the Cisco MIB Locator found at the following URL and choose a platform under the Cisco Access Products menu: http://cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	http://www.cisco.com/techsupport