

# Troubleshoot Precision Time Protocol (PTP) on Catalyst 9000 Switches

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## Introduction

This document describes how to troubleshoot the Precision Time Protocol (PTP) on Catalyst 9000 switches.

## Prerequisites

### Requirements

Cisco recommends that you have knowledge of this topic:

- An understanding of the Precision Time Protocol (PTP)

### Components Used

The information in this document is based on Catalyst 9300, 9400, 9500, and 9600 switches.

<#root>

```
Cat9300#
```

```
show module
```

```
Switch  Ports   Model                Serial No.  MAC address  Hw Ver.    Sw Ver.
-----  -
1       65          C9300-48T           FCW2236C0WC 700b.4fa8.5280 V02        17.03.05
Cat9300#
```

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

## Conventions

For more information on document conventions, refer to [Cisco Technical Tips Conventions](#).

## Restrictions and Limitations

- PTP is not supported on Catalyst 9200 switches.
- PTP is not supported on Catalyst 9300 that are in Stackwise. For example, PTP is not supported if there are 2-8 switches in a stack.
- PTP is not supported on Catalyst 9400, 9500, or 9600 switches in Stackwise-Virtual.

For an exhaustive list of restrictions and limitations for PTP for the Catalyst 9000, review the PTP section of the *Layer 2 Configuration Guide* for the given platform and version.

[Support for Precision Time Protocol on Cisco Catalyst Switches FAQ](#)

## Terminology

Term	Definition
Grandmaster Clock (GMC)	Within a PTP domain, the grandmaster clock is the primary source of time for clock synchronization using PTP. The grandmaster clock usually has a very precise time source, such as a GPS or atomic clock. When the network does not require any external time reference and only needs to be synchronized internally, the grandmaster clock can free run.
Ordinary Clock (OC)	An ordinary clock is a PTP clock with a single PTP port. It functions as a node in a PTP network and can be selected by the BMCA as a master or slave within a subdomain. Ordinary clocks are the most common clock type on a PTP network because they are used as end nodes on a network that is connected to devices requiring synchronization. Ordinary clocks have various interface to external devices.
Boundary Clock (BC)	A boundary clock in a PTP network operates in place of a standard network switch or router. Boundary clocks have more than one PTP port, and each port provides access to a separate PTP communication path. Boundary clocks provide an interface between PTP domains. They intercept and process all PTP messages, and pass all other network traffic. The boundary clock uses the BMCA to select the best clock seen by any port. The selected port is then set as a slave. The master port synchronizes the clocks connected downstream, while the

	slave port synchronizes with the upstream master clock.
Transparent Clock (TC)	The role of transparent clocks in a PTP network is to update the time-interval field that is part of the PTP event message. This update compensates for switch delay and has an accuracy of within one picosecond. There are two types of transparent clocks:
End-to-end (E2E) transparent	Measures PTP event message transit time (also known as resident time) for SYNC and DELAY_REQUEST messages. This measured transit time is added to a data field (correction field) in the corresponding messages: <ul style="list-style-type: none"> <li>• The measured transit time of a SYNC message is added to the correction field of the corresponding SYNC or the FOLLOW_UP message.</li> <li>• The measured transit time of a DELAY_REQUEST message is added to the correction field of the corresponding DELAY_RESPONSE message.</li> </ul>
Peer-to-peer (P2P) transparent	Measures PTP event message transit time in the same way E2E transparent clocks do, as described above. In addition, P2P transparent clocks measure the upstream link delay. The upstream link delay is the estimated packet propagation delay between the upstream neighbor P2P transparent clock and the P2P transparent clock under consideration. These two times (message transit time and upstream link delay time) are both added to the correction field of the PTP event message, and the correction field of the message received by the slave contains the sum of all link delays. In theory, this is the total end-to-end delay (from master to slave) of the SYNC packet.

## PTP Clock Failure Synchronization

### General Failure Points

- Network congestion leading to PTP packets being buffered or dropped on interface (in transit) or control-plane policing (CoPP).
- Firewalls blocking PTP packets.
- Exhaustion of hardware resources such as CPU, Memory, or TCAM.
- Hardware or software limitation that prevents precise time measurement.

#### Action to take:

[Check the Cat9k PTP FAQ Page](#)

### Specific Failure Points

#### Announce and Discovery

Symptom	Possible Cause
Ordinary Clock CPU does not process Announce Packets from GMC. Ordinary Clock does not send 'Delay Request' packet. Clocks fail to synchronize after PTP negotiation.	Grandmaster Clock not configured to send Announce packets. PTP Packets lost in transit. PTP packets dropped by Interface, Control-Plane, or ASIC. Misconfiguration that causes GMC to send incorrect PTP domain/profile or Ordinary Clock has

	incorrect domain/profile configured.
--	--------------------------------------

**Action(s) to take:**

Verify PTP Configurations and Status:

Perform an interface or control-plane EPC to verify Clock is receiving and sending PTP packets:

If EPC is not reliable, use the data collected by PTP debugs to verify what PTP values are being sent and received:

**Best Master Clock Algorithm (BMCA)**

Symptom	Possible Cause
Synchronization Failure Clock Ignoring or Rejecting PTP Messages from GMC Logging Errors Resync Attempts	Incompatible PTP versions between network devices and GMC. Inaccurate clock data in Announce packets. Clock instability caused by multiple Grand Master Clocks within the same domain.

**Action(s) to take:**

Rule out any transit clocks or boundary clocks that could be contributing to latency or inaccurate time keeping.

Rule out any hardware or software limitations on the platform that prevents precise time keeping.

Collect PTP Debugs and check for any errors.

**Grand Master Clock Selection**

Symptom	Possible Cause
	Best Master Clock Algorithm (BMCA) does not select the most accurate GMC. BMCA not calculating network delay. Mismatched priority settings.

**Action(s) to take:**

**Sync Message Exchange**

Symptom	Possible Cause
	Transparent Clock (TC) misconfiguration such as incorrect PTP profile or mode. Errors in delay calculation. Sync Message packet dropped in transit

	or on control-plane of OC.
--	----------------------------

**Action(s) to take:**

### **Delay Request and Response**

<b>Symptom</b>	<b>Possible Cause</b>
	Transparent Clocks not capable of calculating precise time stamps that leads to inaccurate delay calculation.Delay Request or Response packets received in an incorrect order, lost in transit, or dropped before control-plane

**Action(s) to take:**

### **Correction and Synchronization**

<b>Symptom</b>	<b>Possible Cause</b>
	Inaccurate time corrections and delay compensations calculated by clocks.Hardware or software limitations that lead to incorrect system clock adjustment that causes synchronization failure.

## **Action(s) to Take**

### **PTP Command Line Interface Show Commands**

Verify the PTP Mode, Profile, Identity, Domain, PTP-enabled Interfaces, and PTP Interfaces states:

```
<#root>
```

```
Cat9300#
```

```
show ptp clock
```

```
PTP CLOCK INFO  
PTP Device Type:
```

```
Unknown
```

```
PTP Device Profile:
```

```
Default Profile
```

```
Clock Identity:
```

```
0x70:B:4F:FF:FE:A8:52:80
```

```
Clock Domain:
```

```
0
```

Network Transport Protocol: 802.3

Number of PTP ports:

0

Cat9300#

An interface without PTP configurations remains in **Domain 0** and in the **INITIALIZING** state.

<#root>

Cat9300#

show ptp brief

Interface	Domain	PTP State
-----------	--------	-----------

GigabitEthernet1/0/1		
----------------------	--	--

0

INITIALIZING

This is the transitional phases of clock in End-to-End Transparent mode.

<#root>

Cat9300#

configuration terminal

Cat9300(config)#

interface twel/0/1

Cat9300(config-if)#

shut

Cat9300(config-if)#

no shut

Cat9300(config-if)#

end

%LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to down

Cat9300#

show ptp brief | i 1/0/1

Interface	Domain	PTP State
-----------	--------	-----------

TwentyFiveGigE1/0/1 8

**FAULTY**

%LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to up

Cat9300#

show ptp brief | i 1/0/1

Interface	Domain	PTP State
TwentyFiveGigE1/0/1	8	

**LISTENING**

%LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to up

Cat9300#

show ptp brief | i 1/0/1

Interface	Domain	PTP State
TwentyFiveGigE1/0/1	8	

**UNCALIBRATED**

Cat9300#

show ptp brief | i 1/0/1

Interface	Domain	PTP State
TwentyFiveGigE1/0/1	8	

**SLAVE**

<#root>

Cat9300#

show platform software fed switch active ptp debugs interface twel/0/1

Offload Monitor Data:

=====

Ofld sig cnt: 0, Ofld ts cnt: 0, Ofld miss cnt: 0, Ofld issue hit: 0

Sig (rd,wr)ptr: (0,0), Nif (rd,wr)ptr: (0,0)

Drop counters:

=====

ptp messages dropped due to qos drain count : 0

<#root>

Cat9300#

show platform software fed switch active ifm mappings

Interface

IF\_ID

Inst	Asic	Core	Port	SubPort	Mac	Cntx	LPN	GPN	Type	Active
TwentyFiveGigE1/0/1				0x9						
0	0	0	0	0	7	8	1	1	NRU	Y

<>

Cat9300#

show platform software fed switch active ptp if-id 0x009

Displaying port data for if\_id 9

=====

Port Mac Address 9C:54:16:AE:4C:81  
Port Clock Identity 9C:54:16:FF:FE:AE:4C:80  
Port number 1

PTP Version 2

domain\_value 8  
Profile Type: : DEFAULT  
Clock Mode : TRANSPARENT CLOCK E2E

Delay mechanism: End-to-End

port\_enabled: TRUE  
ptt\_port\_enabled: TRUE

Port state: : SLAVE

sync\_seq\_num 52439  
delay\_req\_seq\_num 0

ptp vlan is valid : TRUE  
ptp vlan id 10

port mode 2  
tag native vlan : FALSE

num sync messages transmitted 0  
num followup messages transmitted 0  
num sync messages received 4434  
num followup messages received 4434  
num delay requests transmitted 0  
num delay responses received 0  
num delay requests received 0  
num delay responses transmitted 0

<#root>

Cat9300#

show platform software fed switch active ptp domain



Displaying data for domain number 8

=====

Profile Type : DEFAULT  
Profile State: enabled

Clock Mode : TRANSPARENT CLOCK E2E  
Delay Mechanism: : END-TO-END  
PTP clock : 1970-1-1 1:45:13

mean\_path\_delay 0 nanoseconds  
Transport Method : 802.3  
Message general ip dscp : 59  
Message event ip dscp : 47

<#root>

Cat9300#

show platform software fed switch active ptp auto-calibrate

PTP Auto Calibration:

PTP auto\_calibration status : FALSE

<#root>

C9300-4c80#

ptp calibrate interface twe1/0/1 speed all

%SYS-5-CONFIG\_P: Configured programmatically by process PTP protocol engine from console as vty0  
%PTP\_RP\_MODULE-6-PTP\_AUTO\_CALIBRATION\_COMPLETE: PTP auto calibration on the interface TwentyFiveGigE1/0/1  
%SYS-5-CONFIG\_P: Configured programmatically by process PTP protocol engine from console as vty0

## Check Platform Resources

### Check Interfaces

A non-zero value for input drops, output drops, or CRC errors in the path of the PTP packets causes failures.

<#root>

Cat9300#

show interfaces twe1/0/1 human-readable

```

TwentyFiveGigE1/0/1 is up, line protocol is up (connected)
Hardware is Twenty Five Gigabit Ethernet, address is 9c54.16ae.4c81 (bia 9c54.16ae.4c81)
MTU 1500 bytes, BW 10000000 Kbit/sec, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive not set
Full-duplex, 10Gb/s, link type is auto, media type is SFP-10GBase-CX1
input flow-control is on, output flow-control is unsupported
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:00, output 00:00:00, output hang never
Last clearing of "show interface" counters never

```

```
Input queue: 0/2000/0/0 (size/max/drops/flushes); Total output drops: 0
```

```

Queueing strategy: fifo
Output queue: 0/40 (size/max)
5 minute input rate 3.0 kilobits , 5 pps
5 minute output rate 0 bits/sec, 0 packets/sec
 26,497 packets input, 1,955,114 bytes, 0 no buffer
  Received 26,477 broadcasts (26,476 multicasts)
   0 runts, 0 giants, 0 throttles

```

```
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
```

```

 0 watchdog, 26,476 multicast, 0 pause input
 0 input packets with dribble condition detected
 947 packets output, 124,533 bytes, 0 underruns
  Output 17 broadcasts (917 multicasts)
 0 output errors, 0 collisions, 3 interface resets
 2 unknown protocol drops
 0 babbles, 0 late collision, 0 deferred
 0 lost carrier, 0 no carrier, 0 pause output
 0 output buffer failures, 0 output buffers swapped out

```

## Check Control-plane Policing

PTP packets are processed through the Low Latency Queue. PTP traffic shares the policier index with other network traffic types so it is best to verify there are no incrementing drops on the control-plane.

```
<#root>
```

```
Cat9300#
```

```
show platform hardware fed switch active qos queue stats internal cpu policier
```

### CPU Queue Statistics

```
=====
```

```
(default) (set)
```

```
Queue
```

```
Queue
```

```
QId PlcIdx Queue Name Enabled Rate Rate
```

```
Drop(Bytes)
```

Drop(Frames)

Index	Rate	Category	Enabled	Configured	Actual	Drop	Drop
0	11	DOT1X Auth	Yes	1000	1000	0	0
1	1	L2 Control	Yes	2000	2000	0	0
2	14	Forus traffic	Yes	4000	4000	0	0
3	0	ICMP GEN	Yes	600	600	0	0
4	2	Routing Control	Yes	5400	5400	0	0
5	14	Forus Address resolution	Yes	4000	4000	0	0
6	0	ICMP Redirect	Yes	600	600	0	0
7	16	Inter FED Traffic	Yes	2000	2000	0	0
8	4	L2 LVX Cont Pack	Yes	1000	1000	0	0
9	19	EWLC Control	Yes	13000	13000	0	0
10	16	EWLC Data	Yes	2000	2000	0	0
11	13	L2 LVX Data Pack	Yes	1000	1000	0	0
12	0	BROADCAST	Yes	600	600	0	0
13	10	Openflow	Yes	200	200	0	0
14	13	Sw forwarding	Yes	1000	1000	0	0
15	8	Topology Control	Yes	13000	13000	0	0
16	12	Proto Snooping	Yes	2000	2000	0	0
17	6	DHCP Snooping	Yes	400	400	0	0
18	13	Transit Traffic	Yes	1000	1000	0	0
19	10	RPF Failed	Yes	200	200	0	0
20	15	MCAST END STATION	Yes	2000	2000	0	0
21	13	LOGGING	Yes	1000	1000	0	0
22	7	Punt Webauth	Yes	1000	1000	0	0
23	18	High Rate App	Yes	13000	13000	0	0
24	10	Exception	Yes	200	200	0	0
25	3	System Critical	Yes	1000	1000	0	0
26	10	NFL SAMPLED DATA	Yes	200	200	0	0
27	2	Low Latency	Yes	5400	5400	0	0 <<< Queue for PTP tra
28	10	EGR Exception	Yes	200	200	0	0
29	5	Stackwise Virtual OOB	Yes	8000	8000	0	0
30	9	MCAST Data	Yes	400	400	0	0
31	3	Gold Pkt	Yes	1000	1000	0	0

\* NOTE: CPU queue policer rates are configured to the closest hardware supported value

CPU Queue Policer Statistics

Policer Index	Policer Accept Bytes	Policer Accept Frames	Policer Drop Bytes	Policer Drop Frames
0	4052	48	0	0
1	3520420	10686	0	0
2	1966076	16634	0	0 <<< PTP packets share this Polici
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	2937088	45892	0	0
9	0	0	0	0
10	1770	15	0	0
11	0	0	0	0
12	0	0	0	0

13	20246	191	0	0
14	24918	252	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0

Second Level Policer Statistics

```
=====
```

20	8423584	73212	0	0
21	50986	506	0	0

Policer Index Mapping and Settings

```
-----
```

Level-2	:	Level-1	(default)	(set)
PlcIndex	:	PlcIndex	rate	rate
20	:	1 2 8	13000	13000
21	:	0 4 7 9 10 11 12 13 14 15	6000	6000

```
=====
```

Second Level Policer Config

```
=====
```

level-1	level-2		level-2	
QId	PlcIdx	Queue Name	Enabled	
0	11	21	DOT1X Auth	Yes
1	1	20	L2 Control	Yes
2	14	21	Forus traffic	Yes
3	0	21	ICMP GEN	Yes
4	2	20	Routing Control	Yes
5	14	21	Forus Address resolution	Yes
6	0	21	ICMP Redirect	Yes
7	16	-	Inter FED Traffic	No
8	4	21	L2 LVX Cont Pack	Yes
9	19	-	EWLC Control	No
10	16	-	EWLC Data	No
11	13	21	L2 LVX Data Pack	Yes
12	0	21	BROADCAST	Yes
13	10	21	Openflow	Yes
14	13	21	Sw forwarding	Yes
15	8	20	Topology Control	Yes
16	12	21	Proto Snooping	Yes
17	6	-	DHCP Snooping	No
18	13	21	Transit Traffic	Yes
19	10	21	RPF Failed	Yes
20	15	21	MCAST END STATION	Yes
21	13	21	LOGGING	Yes
22	7	21	Punt Webauth	Yes
23	18	-	High Rate App	No
24	10	21	Exception	Yes
25	3	-	System Critical	No
26	10	21	NFL SAMPLED DATA	Yes
27	2	20	Low Latency	Yes
28	10	21	EGR Exception	Yes
29	5	-	Stackwise Virtual OOB	No
30	9	21	MCAST Data	Yes
31	3	-	Gold Pkt	No

<>

## Check CPU and Memory

<#root>

Cat9300#

show platform resources

\*\*State Acronym: H - Healthy, W - Warning, C - Critical

Resource	Usage	Max	Warning	Critical	State
Control Processor	1.28%	100%	90%	95%	H
DRAM	3566MB(47%)	7575MB	85%	90%	H
TMPFS	1001MB(13%)	7575MB	40%	50%	H

show processes cpu sorted | ex 0.00

show cpu history

show processes memory sorted

## Check TCAM

<#root>

Cat9300#

show platform hardware fed switch active fwd-asic resource tcam utilization

Codes: EM - Exact\_Match, I - Input, O - Output, IO - Input & Output, NA - Not Applicable

CAM Utilization for ASIC [0]

Table	Subtype	Dir	Max	Used	%Used	V4	V6	MPLS	Other
Mac Address Table	EM	I	32768	20	0.06%	0	0	0	2
Mac Address Table	TCAM	I	1024	21	2.05%	0	0	0	2
L3 Multicast	EM	I	8192	0	0.00%	0	0	0	0
L3 Multicast	TCAM	I	512	9	1.76%	3	6	0	0
L2 Multicast	EM	I	8192	0	0.00%	0	0	0	0
L2 Multicast	TCAM	I	512	11	2.15%	3	8	0	0
IP Route Table	EM	I	24576	12	0.05%	11	0	1	0
IP Route Table	TCAM	I	8192	25	0.31%	12	10	2	0
QOS ACL	TCAM	IO	5120	85	1.66%	28	38	0	1
Security ACL	TCAM	IO	5120	129	2.52%	26	58	0	4
Netflow ACL	TCAM	I	256	6	2.34%	2	2	0	0
PBR ACL	TCAM	I	1024	22	2.15%	16	6	0	0
Netflow ACL	TCAM	O	768	6	0.78%	2	2	0	0
Flow SPAN ACL	TCAM	IO	1024	13	1.27%	3	6	0	0
<b>Control Plane</b>	<b>TCAM</b>	<b>I</b>	<b>512</b>	<b>282</b>	<b>55.08%</b>	<b>130</b>	<b>106</b>	<b>0</b>	<b>46</b>
Tunnel Termination	TCAM	I	512	18	3.52%	8	10	0	0
Lisp Inst Mapping	TCAM	I	2048	1	0.05%	0	0	0	0
Security Association	TCAM	I	256	4	1.56%	2	2	0	0
CTS Cell Matrix/VPN Label	EM	O	8192	0	0.00%	0	0	0	0

CTS Cell Matrix/VPN									
Label	TCAM	0	512	1	0.20%	0	0	0	
Client Table	EM	I	4096	0	0.00%	0	0	0	
Client Table	TCAM	I	256	0	0.00%	0	0	0	
Input Group LE	TCAM	I	1024	0	0.00%	0	0	0	
Output Group LE	TCAM	0	1024	0	0.00%	0	0	0	
Macsec SPD	TCAM	I	256	2	0.78%	0	0	0	

## Platform Tools

### Perform an Embedded Packet Capture (EPC)

#### Configuring an EPC

```
<#root>
```

```
Cat9300#monitor capture tac [
```

```
interface
```

```
|
```

```
control-plane
```

```
] [
```

```
in
```

```
|
```

```
out
```

```
|
```

```
both
```

```
] [
```

```
match
```

```
|
```

```
access-list
```

```
] buffer size 100
```

---

**Note:** Check the Network Management Configuration Guide for a given platform/version for more configuration options for EPC.

---

## Verify Rx PTP Packets at Interface Level

```
<#root>
```

```
Cat9300#
```

```
monitor capture tac interface twel/0/1 in match any buffer size 100
```

```
Cat9300#
```

```
monitor capture tac start
```

```
Started capture point : tac  
%BUFCAP-6-ENABLE: Capture Point tac enabled.  
C9300-4c80#
```

```
monitor capture stop
```

Capture statistics collected at software:

Capture duration - 3 seconds  
Packets received - 28  
Packets dropped - 0  
Packets oversized - 0

Bytes dropped in asic - 0

Capture buffer exists till exported or cleared

Stopped capture point : tac

%BUFCAP-6-DISABLE: Capture Point tac disabled.

C9300-4c80#

```
show monitor capture tac buffer brief | i PTP
```

```
 2  0.032858 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
12  1.032894 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
15  2.032831 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
28  3.033414 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
```

## Verify Rx Packets arrive at Control-Plane

<#root>

Cat9300#

```
monitor capture cpu control-plane in match any buffer size 100
```

Cat9300#

```
monitor capture cpu start
```

Started capture point : cpu

Cat9300#

\*Sep 28 14:05:28.375: %BUFCAP-6-ENABLE: Capture Point cpu enabled.

Cat9300#

## Verify Tx PTP Packets at Control-Plane Level

This would indicate the Cisco IOS-XE software and CPU is generating Rx PTP Packets.

Note: An ingress EPC on a next hop switch or SPAN/RSPAN is more reliable to validate a local ordinary clock is sending out PTP packets.

Note: CPU-Generated packets such as '' are not be seen on egress with an EPC configured on a physical interface, a documented limitation of the EPC tool.

<#root>

Cat9300#

```
monitor capture cpu control-plane out match any buffer size 100
```

Cat9300#

```
monitor capture cpu start
```



## Collect PTP Debugs

Debug	Purpose
autocalibration	
bmc	Displays what interface is selected for
messages	

### autocalibration debug

<#root>

```
21:41:12.543: %LINK-5-CHANGED: Interface TwentyFiveGigE1/0/1, changed state to administratively down
21:41:13.542: %LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to down
21:41:13.543: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to down
1:41:29.714:
```

```
Autocalibration: No autocalibration is progress (status - 0) or linkup interface TwentyFiveGigE1/0/1 di
```

```
21:41:30.118: %SYS-5-CONFIG_I: Configured from console by console
21:41:31.714: %LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to down
21:41:35.821: %LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to up
21:41:37.824: %LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to up
21:41:37.824:
```

```
Autocalibration: No autocalibration is progress (status - 0) or linkup interface TwentyFiveGigE1/0/1 di
```

```
21:41:38.849: Autocalibration: No autocalibration is progress (status - 0) or linkup interface Vlan10 d
21:41:39.849: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up
```

### bmc debug

<#root>

```
21:41:12.543: %LINK-5-CHANGED: Interface TwentyFiveGigE1/0/1, changed state to administratively down
21:41:13.542: %LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to down
21:41:13.543: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to down
21:41:30.118: %SYS-5-CONFIG_I: Configured from console by console
21:41:31.714: %LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to down
21:41:35.821: %LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to up
21:41:37.824: %LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to up
21:41:39.849: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up
```

```
21:41:40.277: Set gmc interface: TwentyFiveGigE1/0/1 <<<
```

### messages debug

<#root>

Cat9300#

```
clear logging
```

```
Cat9300#
```

```
conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Clear logging buffer [confirm]
```

```
Cat9300(config)#
```

```
Cat9300(config)#
```

```
int twe1/0/1
```

```
Cat9300(config-if)#
```

```
shut
```

```
Cat9300(config-if)#
```

```
end
```

```
Cat9300#
```

```
Cat9300#
```

```
debug ptp messages
```

```
PTP Messages debugging is on
```

```
Cat9300#
```

```
Cat9300#
```

```
conf t
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Cat9300(config)#
```

```
interface twe1/0/1
```

```
Cat9300(config-if)#
```

```
no shut
```

```
Cat9300(config-if)#
```

```
end
```

```
Cat9300#
```

```
Cat9300#
```

```
show ptp bri | i 1/0/1
```

```
TwentyFiveGigE1/0/1          8
```

```
FAULTY
```

```
Cat9300#
```

```
show ptp bri | i 1/0/1
```

```
TwentyFiveGigE1/0/1          8
```

```
LISTENING
```

Cat9300#

show ptp bri | i 1/0/1

TwentyFiveGigE1/0/1 8

UNCALIBRATED

Cat9300#

show ptp bri | i 1/0/1

TwentyFiveGigE1/0/1 8

SLAVE

Cat9300#

undebug all

All possible debugging has been turned off

Cat9300#

Cat9300#

show logging

<>

Log Buffer (131072 bytes):

21:59:06.980: %LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to down

21:59:07.826: %SYS-5-CONFIG\_I: Configured from console by console

21:59:11.271: %LINK-3-UPDOWN: Interface TwentyFiveGigE1/0/1, changed state to up

21:59:12.976: Cisco IOS-FMAN-PTP:retrieve interface: Twe1/0/1 iif\_id: 9(fmanrp\_ptp\_port\_data\_update) p

local data sent by clock

if\_hdl = 9  
mac address =

9c54.16ae.4c81

<<< similar to local clock identity

domain\_value = 8

port\_number = 1  
port\_state = 4  
port\_enabled = 1  
ptt\_port\_enabled = 1  
delete\_flag = False

21:59:12.976: ####ptp\_port\_data PTP\_SHIM\_TDL\_MSG####:

message@ptp\_port\_data: {  
ptp\_port\_data@ptp\_port\_data: {  
if\_hdl@U32:9

domain\_value@U8:8

clk\_identity[0]@U8:156

```

clk_identity[1]@U8:84
clk_identity[2]@U8:22
clk_identity[3]@U8:255
clk_identity[4]@U8:254
clk_identity[5]@U8:174
clk_identity[6]@U8:76
clk_identity[7]@U8:128
intf_mac@tdl_mac_addr: {
    mac[0]@U8:156
    mac[1]@U8:84
    mac[2]@U8:22
    mac[3]@U8:174
    mac[4]@U8:76
    mac[5]@U8:129
}
port_number@U8:1
sync_interval_96_32@U64:5
sync_interval_31_0@U32:57005
pdelay_req_avg_interval@U8:0
port_state@U8**MSG 00030 TRUNCATED**
**MSG 00030 CONTINUATION #01**:4
port_enabled@U8:1
ptt_port_enabled@U8:1
sync_interval@I8:0
delay_req_interval@I8:0
pdelay_req_interval@I8:0
ptp_vlan_id@U16:10
ptp_vlan_id_valid@tdl_boolean:TDL_TRUE
port_mode@U8:2
tag_native_vlan@tdl_boolean:TDL_FALSE
ip_addr@U32:168430083
transport_protocol@U8:3
virtual_slot@U8:0
virtual_port@U16:0
peer_clk_ip@U32:0
vrf_id@U32:0
clk_idty_port_num@U16:1
ptp_dest_mac_non_forwardable@tdl_boolean:TDL_FALSE
}
cfg_action@cfg_action:MCP_CFG_ACTION_NONE
}

```

21:59:13.273:

%LINEPROTO-5-UPDOWN: Line protocol on Interface TwentyFiveGigE1/0/1, changed state to up <<<

21:59:13.846: dst mac 1 (cond1)

21:59:13.846:

received message on TwentyFiveGigE1/0/1 <<<

21:59:13.846:

PTP message received, intf: TwentyFiveGigE1/0/1, type: ANNOUNCE

```

21:59:14.329: Cisco IOS-FMAN-PTP:retrieve interface: Twe1/0/1 iif_id: 9(fmanrp_ptp_port_data_update) p
    if_hdl = 9
    mac address = 9c54.16ae.4c81
    domain_value = 8
    port_number = 1
    port_state = 8
    port_enabled = 1
    ptt_port_enabled = 1

```

delete\_flag = False

21:59:14.329: #####ptp\_port\_data PTP\_SHIM\_TDL\_MSG####:

```
message@ptp_port_data: {
  ptp_port_data@ptp_port_data: {
    if_hdl@U32:9
    domain_value@U8:8
    clk_identity[0]@U8:156
    clk_identity[1]@U8:84
    clk_identity[2]@U8:22
    clk_identity[3]@U8:255
    clk_identity[4]@U8:254
    clk_identity[5]@U8:174
    clk_identity[6]@U8:76
    clk_identity[7]@U8:128
    intf_mac@tdl_mac_addr: {
      mac[0]@U8:156
      mac[1]@U8:84
      mac[2]@U8:22
      mac[3]@U8:174
      mac[4]@U8:76
      mac[5]@U8:129
    }
    port_number@U8:1
    sync_interval_96_32@U64:5
    sync_interval_31_0@U32:57005
    pdelay_req_avg_interval@U8:0
    port_state@U8:**MSG 00031 TRUNCATED**
**MSG 00031 CONTINUATION #01**:  
8
    port_enabled@U8:1
    ptt_port_enabled@U8:1
    sync_interval@I8:0
    delay_req_interval@I8:0
    pdelay_req_interval@I8:0
    ptp_vlan_id@U16:10
    ptp_vlan_id_valid@tdl_boolean:TDL_TRUE
    port_mode@U8:2
    tag_native_vlan@tdl_boolean:TDL_FALSE
    ip_addr@U32:168430083
    transport_protocol@U8:3
    virtual_slot@U8:0
    virtual_port@U16:0
    peer_clk_ip@U32:0
    vrf_id@U32:0
    clk_idty_port_num@U16:1
    ptp_dest_mac_non_forwardable@tdl_boolean:TDL_FALSE
  }
  cfg_action@cfg_action:MCP_CFG_ACTION_NONE
}
```

21:59:14.845: dst mac 1 (cond1)

21:59:14.846: received message on TwentyFiveGigE1/0/1

21:59:14.846: PTP message received, intf: TwentyFiveGigE1/0/1, type: ANNOUNCE

21:59:15.845: dst mac 1 (cond1)

21:59:15.845: received message on TwentyFiveGigE1/0/1

21:59:15.845: PTP message received, intf: TwentyFiveGigE1/0/1, type: ANNOUNCE

21:59:15.976: %LINEPROTO-5-UPDOWN: Line protocol on Interface Vlan10, changed state to up

21:59:16.775:

```
Set gmc interface: TwentyFiveGigE1/0/1 <<<
```

21:59:16.776: Cisco IOS-FMAN-PTP:

instance\_conf data:

```
instance_id = 0
    profile_type = 0
    profile_domain = 8

clock_mode = 3
    enable = 1
    is_gm = 0

    clocksource = 160
        gm_capable = 1
        gm_present = 1
    neighbor_prop_delay_threshold = 800 ns
    transport_protocol = 3
    delay_mech = 1
    scm_module_num = 1
    delete_flag = False
```

```
21:59:16.776: ####ptp_domain_config PTP_SHIM_TDL_MSG####:
message@ptp_domain_config: {
  ptp_domain_cfg@ptp_domain_cfg: {
    value@U8:0
    profile_type@U8:0
    enable@U8:1
    is_gm@U8:0
    priority2@U8:8
    clocksource@U8:160
    gm_capable@U8:1
    neighbor_prop_delay_threshold@U64:800
    clock_mode@U8:3
    pdelay_mechanism@U8:0
    gm_present@U8:1
    delay_mech@U8:1
    transport_protocol@U8:3
    master_module_num@U32:1
  }
  cfg_action@cfg_action:MCP_CFG_ACTION_NONE
}
```

Cat9300#

## Perform a Show Platform Forward (SPF)

Run this tool if PTP packets are seen arriving at interface but not punted to the control plane.

<#root>

1. Configure ingress EPC on PTP enabled interface.

2. View buffer output and filter for PTP and make note of PTP packet number.

Cat9300#

```
show monitor capture tac buffer brief
```

| i PTP

2

0.032858 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message

<<<

```
12 1.032894 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
15 2.032831 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
28 3.033414 74:8f:c2:dc:b0:63 -> 01:1b:19:00:00:00 PTPv2 82 Announce Message
```

3. Export buffer to .pcap on Switch's flash.

Cat9300-4c80#

```
monitor capture tac export location flash:/ptp-cpu.pcap
```

4. Execute the SPF command and make note of interface where PTP packets are expected to ingress and ref

Cat9300#

```
show platform hardware fed switch active forward interface twel1/0/1 pcap flash:ptp-cpu.pcap number 2 dat
```

Show forward is running in the background. After completion, syslog can be generated.

4. View Forward/Drop decision

Cat9300#

```
show platform hardware fed switch active forward last summary
```

Input Packet Details:

###[ Ethernet ]###

```
dst          = 01:1b:19:00:00:00
src=74:8f:c2:dc:b0:63
```

```
type         = 0x8100
###[ 802.1Q ]###
prio         = 0
id           = 0
```

```
vlan         = 10
```

```
type         = 0x88f7
###[ Raw ]###
```

```
load         = '0B 02 00 40 08 00 00 08 00 00 00 00 00 00 00 00 00 00 00 00 00 00 74 8F C2 FF FE DC B0 6
```

Ingress:

```
Port          : TwentyFiveGigE1/0/1
```

```
Global Port Number : 1
Local Port Number  : 1
Asic Port Number   : 0
Asic Instance      : 0
```

```
Vlan          : 10
```

```
Mapped Vlan ID    : 5
STP Instance      : 3
BlockForward      : 0
```

```

BlockLearn          : 0
L3 Interface        : 38
  IPv4 Routing      : enabled
  IPv6 Routing      : enabled
  Vrf Id            : 0
Adjacency:
  Station Index     : 172
  Destination Index : 21151
  Rewrite Index     : 1
  Replication Bit Map : 0xa ['localCpu', 'remoteCpu']

```

**Decision:**

```

Destination Index   : 21151 [DI_CPUQ_LOW_LATENCY]
  Rewrite Index     : 1      [RI_CPU]
  Dest Mod Index    : 0      [IGR_FIXED_DMI_NULL_VALUE]
  CPU Map Index     : 0      [CMI_NULL]

```

```

Forwarding Mode     : 0      [Bridging]
  Replication Bit Map :      ['localCpu', 'remoteCpu']

Winner              :      CPPMAC LOOKUP2
Qos Label           : 65
SGT                  : 0
DGTID               : 0

```

**Egress:**

```

Possible Replication :
  Port               : CPU_Q_LOW_LATENCY <<< This should be the forwarding decision to this CPU

Output Port Data    :
  Port               : CPU
  Asic Instance     : 0

```

```

CPU Queue           :      27 [CPU_Q_LOW_LATENCY]
  Unique RI         : 0
  Rewrite Type      : 0      [Unknown]

```

```

Mapped Rewrite Type : 17      [CPU_ENCAP]
  Vlan               : 10
  Mapped Vlan ID    : 5

```

\*\*\*\*\*

C9300-4c80#

## Perform a Packet Tracer (PT)

### PTP Caveats on Catalyst 9000

ID	Title Cisco bug ID
<a href="#">Cisco bug ID CSCvg24999</a>	Switch crashes on ptp mode p2ptransparent.



<a href="#">Cisco bug ID CSCwf81913</a>	PTP stops working on Catalyst switches, ports going into status uncalibrated.
<a href="#">Cisco bug ID CSCwa49052</a>	PTP Offset & Mean Path delay can stuck on the bad switches and can never increment.Cisco bug ID
<a href="#">Cisco bug ID CSCvu73652</a>	C9300 - PTP event messages with source port unequal 319 dropped. Cisco bug ID
<a href="#">Cisco bug ID CSCwc35946</a>	Inconsistent CLI Options When Changing Between 8275.1, 802.1AS, and Default PTP Profile.
<a href="#">Cisco bug ID CSCwc00050</a>	Unable to Change PTP Mode via Web UI

## Related Information

- [Cisco Technical Support & Downloads](#)