Troubleshoot Precision Time Protocol on Catalyst 9000 Switches

Contents

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:

- Precision Time Protocol (PTP)

Components Used

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

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 and Conventions.

Restrictions and Limitations

- PTP is not supported on Catalyst 9200 switches, but is supported on C9200CX switches starting 17.14.01.
- PTP is not supported on Catalyst 9300 switches that are in Stackwise deployment until 17.06.01.
- PTP is not supported on Catalyst 9400, 9500, or 9600 switches in Stackwise-Virtual until 17.10.01

Support for Precision Time Protocol on Cisco Catalyst Switches FAQ

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.

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:

	• The measured transit time of a SYNC message is added to the correction field of the corresponding SYNC or the FOLLOW_UP message. • The measured transit time of a DELAY_REQUEST message is added to the correction field of the corresponding DELAY_RESPONSE message.
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

Caused by:

- Network congestion leading to PTP packets being buffered or dropped on interface (in transit) or by 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

Review show command troubleshoot flow

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 ErrorsResync 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

Symptom	Possible Cause
	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

Symptom	Possible Cause
	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 twe1/0/1
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 twe1/0/1


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
%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 policy 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)

```
-------------------------------------------------------------------------------------------
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    Policer Accept   Policer Accept  Policer Drop  Policer Drop
  Index         Bytes           Frames         Bytes           Frames
---------------------------------------------------------------------
0          4052             48              0             0
1          3520420          10686           0             0

2          1966076          16634           0             0     <<< PTP packets share this Policier Inde


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  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       20
 Mac Address Table      TCAM         I        1024       21    2.05%        0        0        0       21
 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        1
 QOS ACL                TCAM         IO       5120       85    1.66%       28       38        0       19
 Security ACL           TCAM         IO       5120      129    2.52%       26       58        0       44
 Netflow ACL            TCAM         I         256        6    2.34%        2        2        0        2
 PBR ACL                TCAM         I        1024       22    2.15%       16        6        0        0
 Netflow ACL            TCAM         O         768        6    0.78%        2        2        0        2
 Flow SPAN ACL          TCAM         IO       1024       13    1.27%        3        6        0        4

Control Plane          TCAM         I         512      282   55.08%      130      106        0       46

 Tunnel Termination     TCAM         I         512       18    3.52%        8       10        0        0
 Lisp Inst Mapping      TCAM         I        2048        1    0.05%        0        0        0        1
 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        O         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        O        1024        0    0.00%        0        0        0
 Macsec SPD           TCAM        I         256        2    0.78%        0        0        0
```

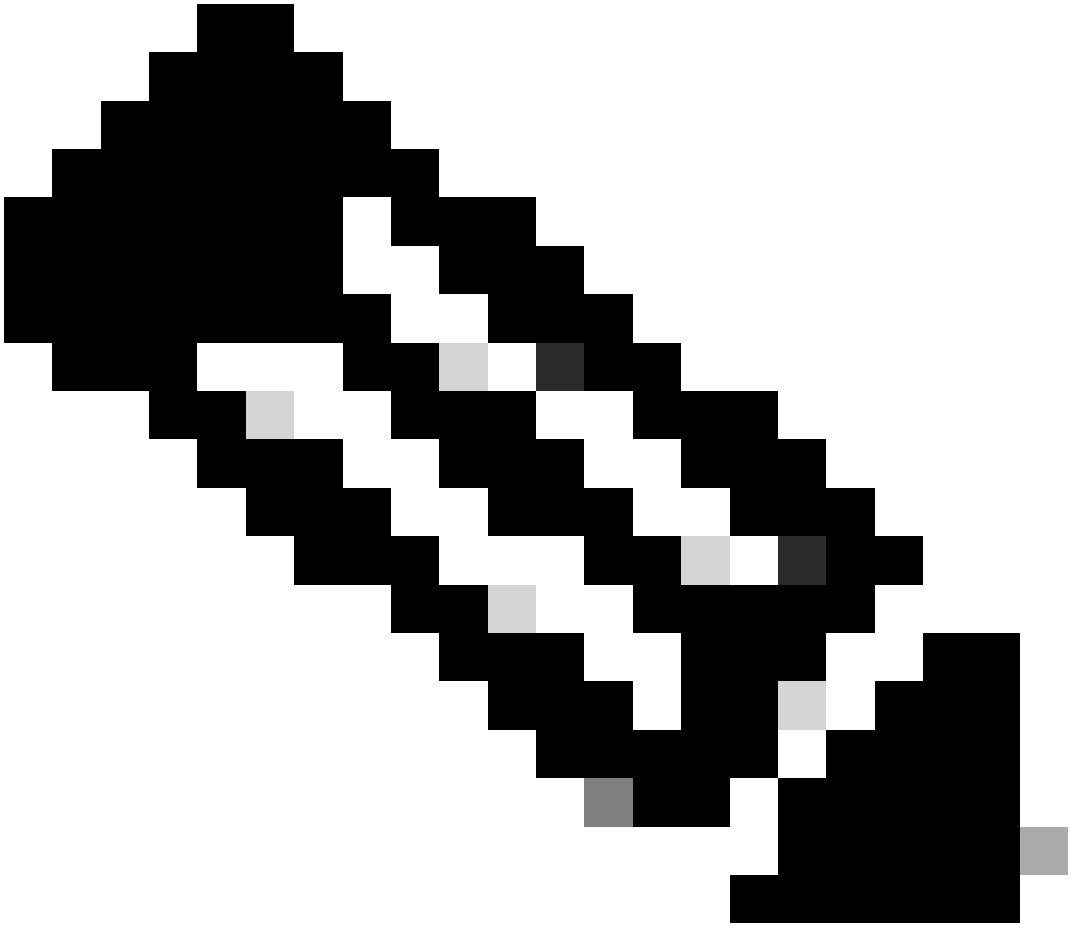
Platform Tools

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 twe1/0/1 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
```

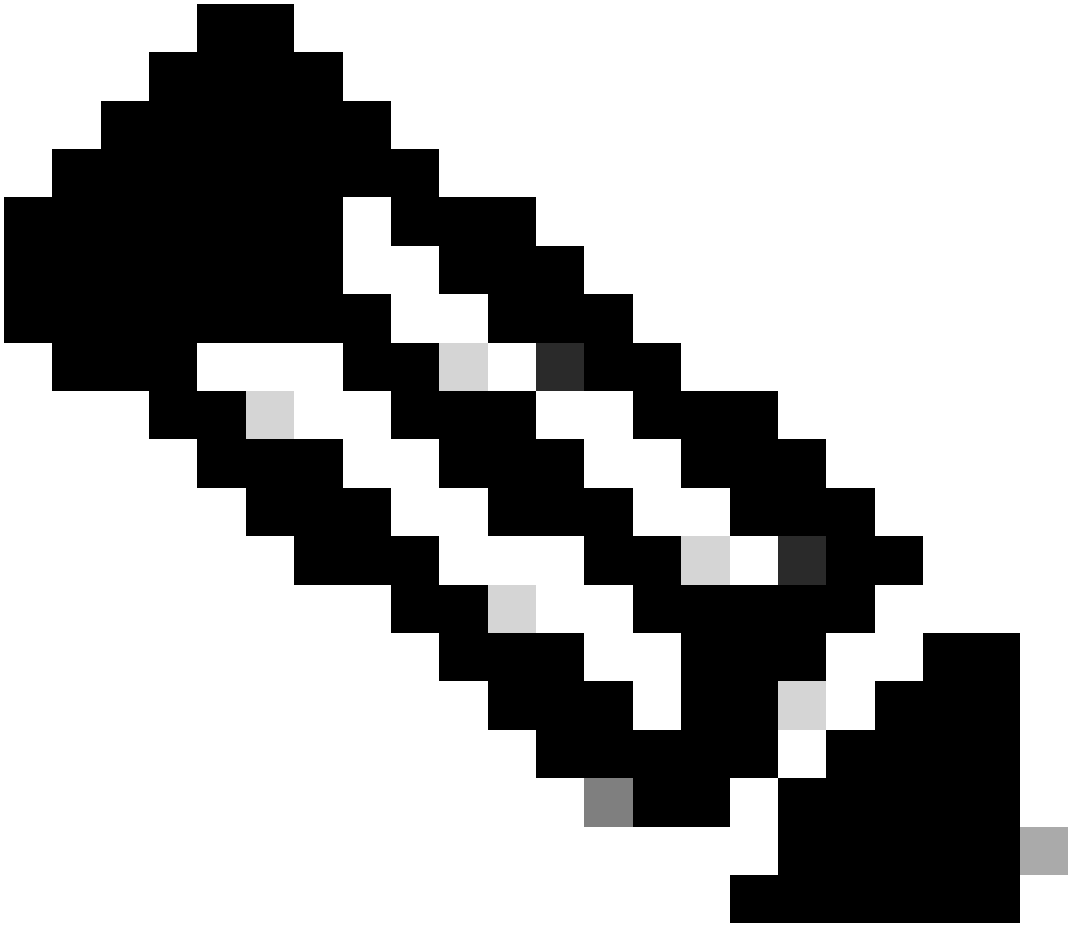
```
Cat9300#
```

```
monitor capture cpu start
```

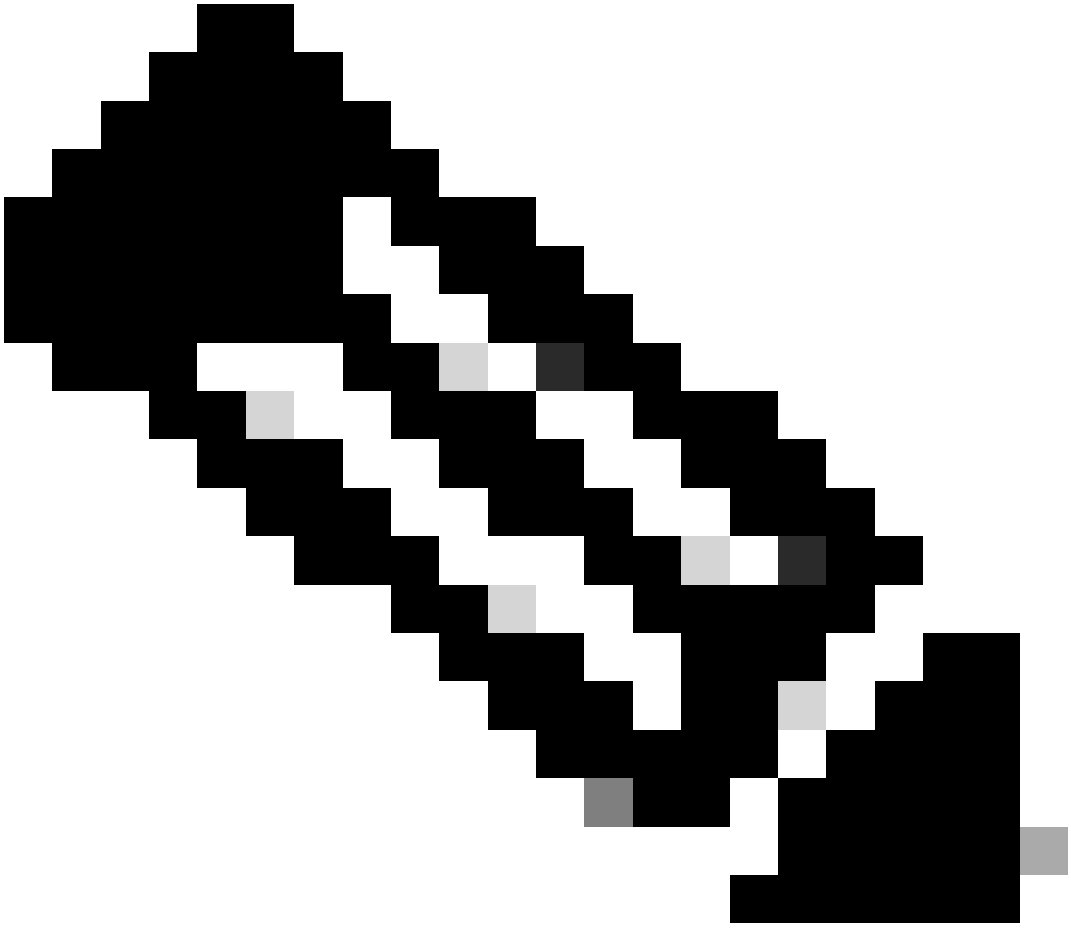
```
Started capture point : cpu
Cat9300#
*Sep 28 14:05:28.375: %BUFCAP-6-ENABLE: Capture Point cpu enabled.
Cat9300#
```

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 the 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 dow
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 dow
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

21:59:13.273:

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

21:59:13.846:

received message on TwentyFiveGigE1/0/1 <<<

21:59:13.846:

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

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

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 twe1/0/1 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 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

Cisco bug ID	Title Cisco bug ID
Cisco bug ID CSCvg24999	Switch crashes on ptp mode p2ptransparent.
Cisco bug ID CSCwf81913	PTP stops working on Catalyst switches, ports going into status uncalibrated.
Cisco bug ID CSCwa49052	PTP Offset & Mean Path delay can stuck on the bad switches and can never increment.Cisco bug ID
Cisco bug ID CSCvu73652	C9300 - PTP event messages with source port unequal 319 dropped. Cisco bug ID
Cisco bug ID CSCwc35946	Inconsistent CLI Options When Changing Between 8275.1, 802.1AS, and Default PTP Profile.
Cisco bug ID CSCwc00050	Unable to Change PTP Mode via Web UI

Related Information

- **Cisco Technical Support & Downloads**