



Configuring Ethernet CFM and Y.1731 Performance Monitoring on Layer 3 Interfaces

This chapter provides procedures for configuring the network interface device functionality, Ethernet data plane loopback, IEEE connectivity fault management, and Y.1731 performance monitoring, and contains the following sections:

- [Configuring a Network Interface Device on the L3 Interface, page 29](#)
- [Ethernet Data Plane Loopback, page 32](#)
- [CFM Support on Routed Port and Port MEP, page 38](#)
- [Support for Y.1731 Performance Monitoring on a Routed Port \(L3 Subinterface\), page 54](#)

Configuring a Network Interface Device on the L3 Interface

Configuring a Network Interface Device (NID) enables support for the NID functionality on the router without including a NID hardware in the network. This feature combines the Customer-Premises Equipment (CPE) and the NID functionality into a physical device. The following are the advantages of configuring the NID functionality:

- Eliminates a physical device.
- Supports both the managed CPE feature set and the NID requirements.



Note

This feature is supported only if you have purchased the DATA technology package functionality (*datak9*) licensing package. For more information about managing software activation licenses on the Cisco ISR and Cisco ISR G2 platforms, see http://www.cisco.com/en/US/docs/routers/access/sw_activation/SA_on_ISR.html.

Configuring the NID

The following steps describe how to configure the NID:

SUMMARY STEPS

Step 1 **enable**

- Step 2 **configure terminal**
- Step 3 **interface gigabitethernet slot/port**
- Step 4 **port-tagging**
- Step 5 **encapsulation dot1q vlan-id**
- Step 6 **set cos cos-value**
- Step 7 **end**

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router>enable	Enables the privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router#configure terminal	Enters the global configuration mode.
Step 3	interface gigabitethernet slot/port Example: Router(config)#interface gigabitethernet 0/2	Specifies an interface and enters the interface configuration mode.
Step 4	port-tagging Example: Router(config-if)#port-tagging	Inserts the VLAN ID into a packet header to identify which Virtual Local Area Network (VLAN) the packet belongs to.
Step 5	encapsulation dot1q vlan-id Example: Router(config-if-port-tagging)#encapsulation dot1q 10	Defines the encapsulation format as IEEE 802.1Q (dot1q), and specifies the VLAN identifier.
Step 6	set cos cos-value Example: Router(config-if-port-tagging)#set cos 6	Sets the Layer 2 class of service (CoS) value to an outgoing packet end.
Step 7	end Example: Router(config-if-port-tagging)#end	Exits the interface configuration mode.

Configuration Example

This configuration example shows how to configure the NID:

```
Router>enable
Router#configure terminal
Router(config)#interface gigabitethernet 0/2
Router(config-if)#port-tagging
Router(config-if-port-tagging)#encapsulation dot1q 10
Router(config-if-port-tagging)#set cos 6
Router(config-if-port-tagging)#end
```

Verifying the NID Configuration

Use the following commands to verify the port tagging sessions:

- **show run int**
- **ping**

Use the **show run int** command to display the port tagging sessions:

```
Router#show run int gi0/2
Building configuration...
Current configuration : 10585 bytes
!
interface GigabitEthernet0/2
  no ip address
  duplex auto
  speed auto
  port-tagging
    encapsulation dot1q 10
    set cos 6
  exit
end
!
interface GigabitEthernet0/2.1101
  encapsulation dot1Q 100
  ip address 132.1.101.4 255.255.255.0
!
interface GigabitEthernet0/2.1102
  encapsulation dot1Q 100
  ip address 132.1.102.4 255.255.255.0
!
```

Use the **ping** command to verify the connectivity with port tagging configured:

```
Router#ping 132.1.101.3
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 132.1.101.3, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/4 ms
router#
```

Troubleshooting the NID Configuration

Table 1 lists the debug commands to troubleshoot the issues pertaining to the NID functionality.

The Cisco IOS Master Command List at

http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html provides more information about these commands.

**Caution**

Because debugging output is assigned high priority in the CPU process, it can diminish the performance of the router or even render it unusable. For this reason, use debug commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff.

**Note**

Before you run any of the debug commands listed in the following table, ensure that you run the **logging buffered debugging** command, and then turn off console debug logging using the **no logging console** command.

Table 1 debug Commands for NID Configuration

debug Command	Purpose
debug ethernet nid configuration	Enables debugging of configuration-related issues.
debug ethernet nid packet egress	Enables debugging of packet processing (VLAN tag push) on the egress side.
debug ethernet nid packet ingress	Enables debugging of packet processing (VLAN tag pop) on the ingress side.

Ethernet Data Plane Loopback

The Ethernet Data Plane Loopback feature provides a means for remotely testing the throughput of an Ethernet port. You can verify the maximum rate of frame transmission with no frame loss.

**Note**

This feature is supported only if you have purchased the DATA technology package functionality (*datak9*) licensing package. For more information about managing software activation licenses on the Cisco ISR and Cisco ISR G2 platforms, see http://www.cisco.com/en/US/docs/routers/access/sw_activation/SA_on_ISR.html.

**Note**

Internal Ethernet data plane loopback is not supported.

Restrictions for Configuring External Ethernet Data Plane Loopback

Follow the guidelines and take note of the restrictions listed here when configuring Ethernet data plane loopback on a Layer 3 interface:

- Only external loopback (packets coming from the wire side) on the L3 dot1q subinterface and (untagged) main interface are supported.
- To perform a MAC swap, the destination address and source address must be swapped for the packets that are looped back. If the destination address is broadcast or multicast, the MAC address is used as the source address for the packets that are looped back.
- Loopback operations are supported at line rate.
- Untagged frames are not supported on a subinterface. However, the frames for *dot1q* and *qinq* are supported on a subinterface.

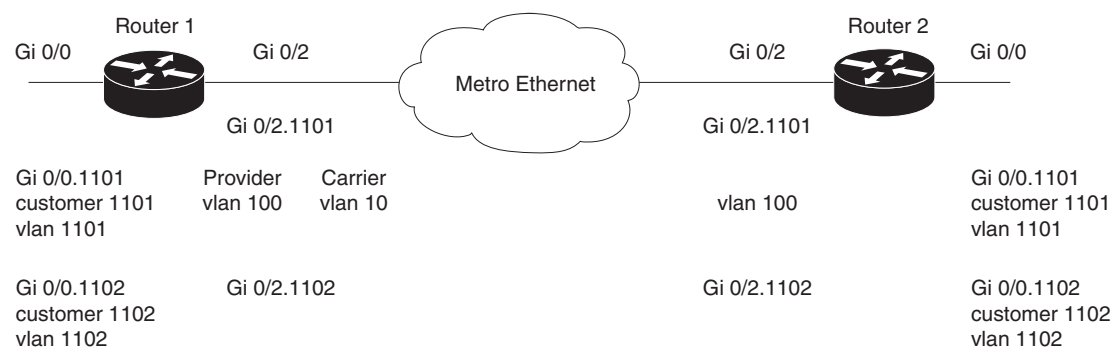
- *dot1ad* is not supported on the main interface. However, untagged frames are supported on the main interface.
- Single VLAN is supported as a filtering option for a subinterface, but VLAN list and VLAN range are not supported.
- Only MAC address is supported as a filtering option for the main interface.
- For the filtering option, the destination MAC cannot be combined with inner VLAN or outer VLAN.
- There is no support for L3 and L4 loopback. Source and destination IP address or source and destination ports will not be swapped.
- Connectivity Fault Management (CFM) packets are transparent to the data plane loopback configuration and cannot be looped back.
- Packets coming from the other side of the wire where loopback is configured and having the same destination MAC address are dropped.
- The broadcast and multicast IP addresses of the broadcast and multicast IP frames that are received cannot be used as the source IP address of the frame when it is sent back to the initiator. In such a case, the IP address of the subinterface is used as the source IP address of the frame when it is sent back to the initiator.

Configuring External Ethernet Data Plane Loopback

Configuring external Ethernet data plane loopback is permitted on a Layer 3 main interface and subinterfaces.

Figure 1 represents a sample topology to configure Ethernet data plane loopback.

Figure 1 Sample Topology



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The following steps show how to configure external Ethernet data plane loopback on a subinterface using single and double tagging. (The procedure to configure external Ethernet data plane loopback on the main interface is similar to this procedure.)

SUMMARY STEPS

-
- Step 1 **enable**
 - Step 2 **configure terminal**
 - Step 3 **interface gigabitethernet slot/port.sub-port**
 - Step 4 **encapsulation dot1q vlan-id**

or

encapsulation dot1q *vlan-id* **second-dot1q** *inner vlan-id*Step 5 **ethernet loopback permit external**Step 6 **end**

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router>enable	Enables the privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router#configure terminal	Enters the global configuration mode.
Step 3	interface gigabitethernet <i>slot/port.sub-port</i> Example: Router(config)#interface gigabitethernet 0/2.1101	Specifies the subinterface and enters the subinterface configuration mode.
Step 4	encapsulation dot1q <i>vlan-id</i> or encapsulation dot1q <i>vlan-id</i> second-dot1q <i>inner vlan-id</i> Example: Router(config-subif)#encapsulation dot1q 100 or Router(config-subif)#encapsulation dot1q 100 second-dot1q 1101	Defines the encapsulation format as IEEE 802.1Q (dot1q), and specifies the VLAN identifier. For double tagging, use the second-dot1q keyword and the <i>inner vlan-id</i> argument to specify the VLAN tag.
Step 5	ethernet loopback permit external Example: Router(config-subif)#ethernet loopback permit external	Configures Ethernet external loopback on the subinterface.
Step 6	end Example: Router(config-subif)#end	Exits the subinterface configuration mode.

To start Ethernet data plane loopback, run the following command:

	Command	Purpose
Step 1	<pre> ethernet loopback start local interface gigabitethernet <i>slot/port.sub-port</i> external timeout none Example: Router#ethernet loopback start local interface gigabitethernet 0/2.1101 external timeout none </pre>	<p>Starts Ethernet external loopback on a subinterface.</p> <p>Enter timeout as <i>none</i> to have no time out period for the loopback.</p>

To stop Ethernet data plane loopback, perform the following steps:

	Command	Purpose
Step 1	<pre> ethernet loopback stop local interface gigabitethernet <i>slot/port.sub-port id session-id</i> Example: Router#ethernet loopback stop local interface gigabitethernet 0/2.1101 id 1 </pre>	<p>Stops Ethernet external loopback on a subinterface.</p> <p>Enter the value of the loopback session ID to specify the loopback session that you want to stop.</p>
Step 2	<pre> show ethernet loopback active Example: Router#show ethernet loopback active </pre>	<p>Displays information to verify if the loopback session has ended.</p>

Configuration Examples for Ethernet Data Plane Loopback

This example shows how to configure Ethernet data plane loopback using single tagging:

```

Router>enable
Router#configure terminal
Router(config)#interface gigabitethernet 0/2.1101
Router(config-subif)#encapsulation dot1q 100
Router(config-subif)#ethernet loopback permit external
Router(config-subif)#end

```

This example shows how to configure Ethernet data plane loopback using double tagging:

```

Router>enable
Router#configure terminal
Router(config)#interface gigabitethernet 0/2.1101
Router(config-subif)#encapsulation dot1q 100 second-dot1q 1101
Router(config-subif)#ethernet loopback permit external
Router(config-subif)#end

```

This example shows how to start an Ethernet data plane loopback:

```

Router#ethernet loopback start local interface gigabitethernet 0/2.1101 external timeout none

```

This is an intrusive loopback and the packets matched with the service will not be able to pass through. Continue? (yes/[no]):
Enter yes to continue.

This example shows how to stop an Ethernet data plane loopback:

```
Router#ethernet loopback stop local interface gigabitethernet 0/2.1101 id 1
Router#*Oct 21 10:16:17.887: %E_DLB-6-DATAPLANE_LOOPBACK_STOP: Ethernet Dataplane Loopback
Stop on interface GigabitEthernet0/2 with session id 1
Router#show ethernet loopback active
Total Active Session(s): 0
Total Internal Session(s): 0
Total External Session(s): 0
```

Verifying the Ethernet Data Plane Loopback Configuration

Use the following commands to verify the Ethernet data plane loopback configuration:

- **show ethernet loopback permitted**
- **show ethernet loopback active**

Use the **show ethernet loopback permitted** command to view the loopback capabilities per interface:

```
Router#show ethernet loopback permitted
-----
Interface                               SvcInst Direction
Dot1q/Dot1ad(s)                          Second-Dot1q(s)
-----
Gi0/2.1101                               N/A      External
100                                       1101
```

Use the **show ethernet loopback active** command to display the summary of the active loopback sessions on a subinterface:

```
Router#show ethernet loopback active
Loopback Session ID      : 1
Interface                 : GigabitEthernet0/2.1101
Service Instance         : N/A
Direction                 : External
Time out(sec)            : none
Status                    : on
Start time                : *10:17:46.930 UTC Mon Oct 21 2013
Time left                 : N/A
Dot1q/Dot1ad(s)          : 100
Second-dot1q(s)          : 1101
Source Mac Address       : Any
Destination Mac Address  : Any
Ether Type                : Any
Class of service         : Any
Llc-oui                   : Any
```

```
Total Active Session(s): 1
Total Internal Session(s): 0
Total External Session(s): 1
```

Use the **show ethernet loopback active** command to display the summary of the active loopback sessions on the main interface:

```
Router#show ethernet loopback permitted
Loopback Session ID      : 1
Interface                 : GigabitEthernet0/2
```



```

Service Instance      : N/A
Direction            : External
Time out(sec)        : none
Status               : on
Start time           : *10:14:23.507 UTC Mon Oct 21 2013
Time left            : N/A
Dot1q/Dot1ad(s)     : 1-100
Second-dot1q(s)     : 1-1101
Source Mac Address   : Any
Destination Mac Address : Any
Ether Type           : Any
Class of service     : Any
Llc-oui              : Any

```

```

Total Active Session(s): 1
Total Internal Session(s): 0
Total External Session(s): 1

```

Troubleshooting the Ethernet Data Plane Loopback Configuration

Table 2 lists the debug commands to troubleshoot issues pertaining to the Ethernet Data Plane Loopback feature.

The Cisco IOS Master Command List at

http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html provides more information about these commands.



Caution

Because debugging output is assigned high priority in the CPU process, it can diminish the performance of the router or even render it unusable. For this reason, use debug commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff.



Note

Before you run any of the debug commands listed in the following table, ensure that you run the **logging buffered debugging** command, and then turn off console debug logging using the **no logging console** command.

Table 2 *debug Commands for Ethernet Data Plane Loopback Configuration*

debug Command	Purpose
debug elb-pal-pd all	Displays all the debugging information about the Ethernet data plane loopback configuration.
debug elb-pal-pd error	Displays debugging information about Ethernet data plane loopback configuration errors.
debug elb-pal-pd event	Displays debugging information about Ethernet data plane loopback configuration changes.

CFM Support on Routed Port and Port MEP

IEEE Connectivity Fault Management (CFM) is an end-to-end per-service Ethernet-layer Operations, Administration, and Maintenance (OAM) protocol. CFM includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet metropolitan-area networks (MANs) and WANs.



Note

This feature is supported only if you have purchased the DATA technology package functionality (*datak9*) licensing package. For more information about managing software activation licenses on the Cisco ISR and Cisco ISR G2 platforms, see http://www.cisco.com/en/US/docs/routers/access/sw_activation/SA_on_ISR.html.

Restrictions for Configuring Ethernet CFM

- A specific domain must be configured. If it is not, an error message is displayed.
- Multiple domains (different domain names) having the same maintenance level can be configured. However, associating a single domain name with multiple maintenance levels is not permitted.

Configuring Ethernet CFM (Port MEP)

Complete these steps to configure and enable Ethernet CFM on a port Maintenance End Point (MEP):

SUMMARY STEPS

-
- Step 1 **enable**
 - Step 2 **configure terminal**
 - Step 3 **ethernet cfm ieee**
 - Step 4 **ethernet cfm global**
 - Step 5 **ethernet cfm domain** *domain-name* **level** *value*
 - Step 6 **service** *service-name* **port**
 - Step 7 **continuity-check interval** *value*
 - Step 8 **end**
 - Step 9 **configure terminal**
 - Step 10 **interface gigabitethernet** *slot/port*
 - Step 11 **ethernet cfm mep domain** *domain-name* **mpid** *mpid-value* **service** *service-name*
 - Step 12 **end**

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router>enable	Enables the privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router#configure terminal	Enters the global configuration mode.
Step 3	ethernet cfm ieee Example: Router(config)#ethernet cfm ieee	Enables the IEEE version of CFM.
Step 4	ethernet cfm global Example: Router(config)#ethernet cfm global	Enables CFM processing globally on the router.
Step 5	ethernet cfm domain domain-name level value Example: Router(config-ecfm)#ethernet cfm domain carrier level 2	Defines a CFM maintenance domain at a specified level, and enters the Ethernet CFM configuration mode. level can be any value from 0 to 7.
Step 6	service service-name port Example: Router(config-ecfm)#service carrier port	Creates a service on the interface and sets the <i>config-ecfm-srv</i> submode.
Step 7	continuity-check interval value Example: Router(config-ecfm-srv)#continuity-check interval 100m	Enables sending continuity check messages at the set interval.
Step 8	end Example: Router(config-ecfm-srv)#end	Returns the router to the privileged EXEC mode.
Step 9	configure terminal Example: Router#configure terminal	Enters the global configuration mode.

	Command	Purpose
Step 10	interface gigabitethernet <i>slot/port</i> Example: Router(config)#interface gigabitethernet 0/2	Specifies an interface and enters the interface configuration mode.
Step 11	ethernet cfm mep domain <i>domain-name</i> mpid <i>mpid-value</i> service <i>service-name</i> Example: Router(config-if)#ethernet cfm mep domain carrier mpid 44 service carrier	Sets a port to a maintenance domain and defines it as an MEP. Note The values for domain and service must be the same as the values configured for CFM.
Step 12	end Example: Router(config-if-ecfm-mep)#end	Returns the router to the privileged EXEC mode.

Configuration Example for Ethernet CFM (Port MEP)

This example shows how to configure Ethernet CFM on a port MEP:

```
Router>enable
Router#configure terminal
Router(config)#ethernet cfm ieee
Router(config)#ethernet cfm global
Router(config-ecfm)#ethernet cfm domain carrier level 2
Router(config-ecfm)#service carrier port
Router(config-ecfm-srv)#continuity-check interval 100m
Router(config-ecfm-srv)#end
Router#configure terminal
Router(config)#interface gigabitethernet 0/2
Router(config-if)#ethernet cfm mep domain carrier mpid 44 service carrier
Router(config-if-ecfm-mep)#end
```

Verifying the Ethernet CFM Configuration on a Port MEP

Use the following commands to verify Ethernet CFM configured on a port MEP:

- **show ethernet cfm domain**
- **show ethernet cfm maintenance-points local**
- **show ethernet cfm maintenance-points remote**
- **ping ethernet mpid** *mpid-value* **domain** *domain-name* **service** *service-name* **cos** *value*
- **traceroute ethernet mpid** *mpid-value* **domain** *domain-name* **service** *service-name*
- **show ethernet cfm error configuration**

Use the **show ethernet cfm domain** command to view details about CFM maintenance domains:

```
Router#show ethernet cfm domain carrier
Domain Name: carrier
Level: 2
Total Services: 1
```

```

Services:
  Type Id  Dir CC CC-int Static-rmep Crosscheck MaxMEP Source  MA-Name
  Port none Dwn Y 100ms Disabled Disabled 100 Static carrier
Router#

```

Use the **show ethernet cfm maintenance-points local** command to view the MEPs that are configured locally on a router. The following is a sample output of the **show ethernet cfm maintenance-points local** command:

```

Router#show ethernet cfm maintenance-points local
Local MEPs:
-----
MPID Domain Name                               Lvl  MacAddress      Type  CC
Ofld Domain Id                               Dir  Port            Id
      MA Name                                 SrvcInst        Source
      EVC name
-----
44   carrier                                   2    5657.a844.04fa  Port  Y
No   carrier                                   Down  Gi0/2          none
      carrier                                   N/A   N/A            Static
      N/A
-----
Total Local MEPs: 1

Local MIPs: None

```

Use the **show ethernet cfm maintenance-points remote** command to display information about remote maintenance point domains or levels. In the following example, carrier, Provider, and customer are the maintenance point domains that are configured.

On router 1:

```

Router1#show ethernet cfm maintenance-points remote
-----
MPID  Domain Name                               MacAddress      IfSt  PtSt
  Lvl  Domain ID                               Ingress
  RDI  MA Name                                 Type Id        SrvcInst
      EVC Name                                 Age
      Local MEP Info
-----
43   carrier                                   5657.a86c.fa92  Up    N/A
  2   carrier                                   Gi0/2
  -   carrier                                   Port none      N/A
      N/A                                         0s
      MPID: 44 Domain: carrier MA: carrier
33   Provider                                   5657.a86c.fa92  Up    Up
  5   Provider                                   Gi0/2.100
  -   Provider                                   Vlan 100      N/A
      N/A                                         0s
      MPID: 34 Domain: Provider MA: Provider
3101 customer                                   5657.a86c.fa92  Up    Up
  7   customer                                   Gi0/2.1101
  -   customer1101                               S,C 100,1101  N/A
      N/A                                         0s
      MPID: 4101 Domain: customer MA: customer1101
3102 customer                                   5657.a86c.fa92  Up    Up
  7   customer                                   Gi0/2.1102
  -   customer1102                               S,C 100,1102  N/A
      N/A                                         0s
      MPID: 4102 Domain: customer MA: customer1102

```

Total Remote MEPs: 4

Use the **show ethernet cfm maintenance-points remote** command to view the details of a remote maintenance point domain:

On router 1:

```
Router1#show ethernet cfm maintenance-points remote domain carrier service carrier
-----
MPID  Domain Name                MacAddress                IfSt  PtSt
  Lvl  Domain ID                    Ingress
  RDI  MA Name                      Type Id                  SrvcInst
      EVC Name                      Age
      Local MEP Info
-----
43    carrier                    5657.a86c.fa92          Up    Up
  2    carrier                    Gi0/2
  -    carrier                    S,C 100,1101           N/A
      N/A
      MPID: 44 Domain: carrier MA: carrier
Total Remote MEPs: 1
```

On router 2:

```
Router2#show ethernet cfm maintenance-points remote domain carrier service carrier
-----
MPID  Domain Name                MacAddress                IfSt  PtSt
  Lvl  Domain ID                    Ingress
  RDI  MA Name                      Type Id                  SrvcInst
      EVC Name                      Age
      Local MEP Info
-----
44    carrier                    5657.g945.04fa          Up    Up
  2    carrier                    Gi0/2
  -    carrier                    S,C 100,1101           N/A
      N/A
      MPID: 43 Domain: carrier MA: carrier
```

Use the **ping** command to verify if Loopback Messages (LBM) and Loopback Replies (LBR) are successfully sent and received between the routers:

```
Router1#ping ethernet mpid 44 domain carrier service carrier cos 5
Type escape sequence to abort.
Sending 5 Ethernet CFM loopback messages to 5657.a86c.fa92, timeout is 5 seconds:!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
Router1#
```

Use the **traceroute** command to send the Ethernet CFM traceroute messages:

```
Router#traceroute ethernet mpid 44 domain carrier service carrier
Type escape sequence to abort. TTL 64. Linktrace Timeout is 5 seconds
Tracing the route to 5657.a86c.fa92 on Domain carrier, Level 2, service carrier
Traceroute sent via Gi0/2
```

```
B = Intermediary Bridge
! = Target Destination
* = Per hop Timeout
```

```
-----
          MAC          Ingress          Ingr Action  Relay Action
Hops  Host          Forwarded  Egress          Egr Action  Previous Hop
-----
```

```
! 1
5657.a86c.fa92 Gi0/2 IngOk RlyHit:MEP
Not Forwarded 5657.g945.04fa
Router#
```

Configuring Ethernet CFM (Single-Tagged Packets)

Complete these steps to configure and enable Ethernet CFM for single-tagged packets:

SUMMARY STEPS

-
- Step 1 **enable**
 - Step 2 **configure terminal**
 - Step 3 **ethernet cfm ieee**
 - Step 4 **ethernet cfm global**
 - Step 5 **ethernet cfm domain** *domain-name* **level** *level-id*
 - Step 6 **service** *service-name* **vlan** *vlan-id* **direction** **down**
 - Step 7 **continuity-check**
 - Step 8 **interface** **gigabitethernet** *slot/port*
 - Step 9 **ethernet cfm mep domain** *domain-name* **mpid** *value* **service** *service-name*
 - Step 10 **interface** **gigabitethernet** *slot/port.subinterface*
 - Step 11 **encapsulation** **dot1q** *vlan-id*
 - Step 12 **end**

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router>enable	Enables the privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router#configure terminal	Enters the global configuration mode.
Step 3	ethernet cfm ieee Example: Router(config)#ethernet cfm ieee	Enables the IEEE version of CFM.
Step 4	ethernet cfm global Example: Router(config)#ethernet cfm global	Enables CFM processing globally on the router.

	Command	Purpose
Step 5	ethernet cfm domain <i>domain-name</i> level <i>value</i> Example: Router(config)#ethernet cfm domain customer level 7	Defines a CFM maintenance domain at a specified level, and enters the Ethernet CFM configuration mode. level can be any value from 0 to 7.
Step 6	service <i>service-name</i> vlan <i>vlan-id</i> direction <i>down</i> Example: Router(config-ecfm)#service customer1101 vlan 100 direction down	Enters the CFM service configuration mode. vlan —Specifies the VLAN.
Step 7	continuity-check Example: Router(config-ecfm-srv)#continuity-check	Enables sending continuity check messages.
Step 8	interface gigabitethernet <i>slot/port</i> Example: Router(config-ecfm-srv)#interface gigabitethernet 0/2	Specifies an interface and enters the interface configuration mode.
Step 9	ethernet cfm mep domain <i>domain-name</i> mpid <i>mpid-value</i> service <i>service-name</i> Example: Router(config-if)#ethernet cfm mep domain customer mpid 100 service customer1101	Sets a port to a maintenance domain and defines it as an MEP. Note The values for domain and service must be the same as the values that were configured for CFM.
Step 10	interface gigabitethernet <i>slot/port.subinterface</i> Example: Router(config-if-ecfm-mep)#interface gigabitethernet 0/2.1	Specifies a subinterface and enters the subinterface configuration mode.
Step 11	encapsulation dot1q <i>vlan-id</i> Example: Router(config-subif)#encapsulation dot1q 100	Defines the encapsulation format as IEEE 802.1Q (dot1q), and specifies the VLAN identifier.
Step 12	end Example: Router(config-subif)#end	Returns the router to the privileged EXEC mode.

Configuration Example for Ethernet CFM (Single-Tagged Packets)

This example shows how to configure Ethernet CFM for single-tagged packets:

```

Router>enable
Router#configure terminal
Router(config)#ethernet cfm ieee
Router(config)#ethernet cfm global
Router(config)#ethernet cfm domain customer level 7
Router(config-ecfm)#service customer1101 vlan 100 direction down
Router(config-ecfm-srv)#continuity-check
Router(config)#interface gigabitethernet 0/2
Router(config-if)#ethernet cfm mep domain customer mpid 100 service customer1101
Router(config-if-ecfm-mep)#interface gigabitethernet 0/2.1
Router(config-subif)#encapsulation dot1q 100
Router(config-subif)#end

```

Verifying the Ethernet CFM Configuration for Single-Tagged Packets

Use the following commands to verify Ethernet CFM configured for single-tagged packets:

- **show ethernet cfm domain**
- **show ethernet cfm maintenance-points local**
- **show ethernet cfm maintenance-points remote**
- **show ethernet cfm error configuration**

Use the **show ethernet cfm domain** command to display the maintenance point domains configured in the network. In the following example, customer, enterprise, and carrier maintenance point domains are configured:

```

Router#show ethernet cfm domain
Domain Name: customer
Level: 7
Total Services: 1
  Services:
  Type Id  Dir CC CC-int Static-rmep Crosscheck MaxMEP Source MA-Name
  Vlan 100 Dwn Y 10s Disabled Disabled 100 Static customer1101

Domain Name: enterprise
Level: 6
Total Services: 1
  Services:
  Type Id  Dir CC CC-int Static-rmep Crosscheck MaxMEP Source MA-Name
  Vlan 110 Dwn Y 10s Disabled Disabled 100 Static custservice

Domain Name: carrier
Level: 2
Total Services: 1
  Services:
  Type Id  Dir CC CC-int Static-rmep Crosscheck MaxMEP Source MA-Name
  Vlan 200 Dwn Y 10s Disabled Disabled 100 Static carrier
Router#

```

Use the **show ethernet cfm maintenance-points local** command to view the local MEPs. The following is a sample output of the **show ethernet cfm maintenance-points local** command:

```

Router#show ethernet cfm maintenance-points local
-----
MPID Domain Name                               Lvl  MacAddress      Type  CC
Ofld Domain Id                                Dir   Port            Id
      MA Name                                   SvcInst         Source
      EVC name
-----
100 customer                                   7     70ca.9b4d.a400 Vlan  Y

```

```

No    customer                               Down  Gi0/2           100
      customer1101                          N/A      N/A           Static
      N/A
400   enterprise                             6      70ca.9b4d.a400 Vlan I
No    enterprise                             Down  Gi0/1           110
      custservice                            N/A      N/A           Static
      N/A
44    carrier                               2      70ca.9b4d.a400 Vlan N
No    carrier                               Down  Gi0/2           200
      carrier                                N/A      N/A           Static
      N/A

```

Total Local MEPs: 3

Local MIPs: None

Router#

Use the **show ethernet cfm maintenance-points remote** command to display information about remote maintenance point domains or levels.

The following example displays the continuity check messages exchanged between remote MEPs:

On router 1:

```
Router1#show ethernet cfm maintenance-points remote
```

```

-----
MPID Domain Name          MacAddress          IfSt          PtSt
  Lvl Domain              Ingress
  RDI MA                  Type Id            SrvcInst
  EVC Name                Age
  Local MEP Info
-----
110 customer              70ca.9b4d.a400    Up            Up
  7 customer              Gi0/2
  - customer1101         Vlan 100          N/A
  N/A                    12s
  MPID: 100 Domain: customer MA: customer1101

410 enterprise            70ca.9b4d.a400    Up            Up
  6 enterprise            Gi0/1
  - custservice           Vlan 110          N/A
  N/A                    12s
  MPID: 400 Domain: enterprise MA: custservice

43  carrier              70ca.9b4d.a400    Up            Up
  2 carrier              Gi0/2
  - carrier              Vlan 200          N/A
  N/A                    12s
  MPID: 44 Domain: carrier MA: carrier

```

Total Remote MEPs: 3

Router1#

On router 2:

```
Router2#show ethernet cfm maintenance-points remote
```

```

-----
MPID Domain Name          MacAddress          IfSt          PtSt
  Lvl Domain              Ingress
  RDI MA                  Type Id            SrvcInst
  EVC Name                Age
  Local MEP Info
-----

```

```

100 customer          0026.99f7.0b41      Up                Up
 7 customer          Gi0/2
- customer1101      Vlan 100            N/A
  N/A                2s
  MPID: 110 Domain: customer MA: customer1101

400 enterprise       0026.99f7.0b41      Up                Up
 6 enterprise       Gi0/1
- custservice       Vlan 110            N/A
  N/A                2s
  MPID: 410 Domain: enterprise MA: custservice

44 carrier          0026.99f7.0b41      Up                Up
 2 carrier          Gi0/2
- carrier           Vlan 200            N/A
  N/A                2s
  MPID: 43 Domain: carrier MA: carrier

```

```

Total Remote MEPS: 3
Router2#

```

Use the **show ethernet cfm error configuration** command to view Ethernet CFM configuration errors (if any). The following is a sample output of the **show ethernet cfm error configuration** command:

```

Router#show ethernet cfm error configuration
-----
CFM Interface      Type Id      Level  Error type
-----
Gi0/2              S,C  100        5      CFMLeak

```

Configuring Ethernet CFM (Double-Tagged Packets)

Complete these steps to configure and enable Ethernet CFM for double-tagged packets:

SUMMARY STEPS

-
- Step 1 **enable**
 - Step 2 **configure terminal**
 - Step 3 **ethernet cfm ieee**
 - Step 4 **ethernet cfm global**
 - Step 5 **ethernet cfm domain *domain-name* level *value***
 - Step 6 **service *service-name* vlan *vlan-id* inner-vlan *inner-vlan-id* direction down**
 - Step 7 **continuity-check**
 - Step 8 **interface gigabitethernet *slot/port***
 - Step 9 **ethernet cfm mep domain *domain-name* mpid *mpid-value* service *service-name***
 - Step 10 **interface gigabitethernet *slot/port.subinterface***
 - Step 11 **encapsulation dot1q *vlan-id* second-dot1q *inner vlan-id***
 - Step 12 **end**

DETAILED STEPS

	Command	Purpose
Step 1	enable Example: Router>enable	Enables the privileged EXEC mode. Enter your password when prompted.
Step 2	configure terminal Example: Router#configure terminal	Enters the global configuration mode.
Step 3	ethernet cfm ieee Example: Router(config)#ethernet cfm ieee	Enables the IEEE version of CFM.
Step 4	ethernet cfm global Example: Router(config)#ethernet cfm global	Enables CFM processing globally on the router.
Step 5	ethernet cfm domain domain-name level <i>0 to 7</i> Example: Router(config-ecfm)#ethernet cfm domain customer level 7	Defines a CFM maintenance domain at a specified level, and enters Ethernet CFM configuration mode. level can be any value from 0 to 7.
Step 6	service service-name vlan vlan-id inner-vlan inner vlan-id direction down Example: Router(config-ecfm)#service customer1101 vlan 100 inner-vlan 30 direction down	Enters the CFM service configuration mode. The following are the parameters: <ul style="list-style-type: none"> • vlan—Specifies the VLAN. • inner-vlan—The inner-vlan keyword and the <i>inner vlan-id</i> argument specify the VLAN tag for double-tagged packets.
Step 7	continuity-check Example: Router(config-ecfm-srv)#continuity-check	Enables sending continuity check messages.
Step 8	interface gigabitethernet slot/port Example: Router(config-ecfm-srv)#interface gigabitethernet 0/2	Specifies an interface and enters the interface configuration mode.

	Command	Purpose
Step 9	<pre> ethernet cfm mep domain <i>domain-name</i> mpid <i>mpid-value</i> service <i>service-name</i> Example: Router(config-if)#ethernet cfm mep domain customer mpid 100 service customer1101 </pre>	<p>Sets a port to a maintenance domain and defines it as an MEP.</p> <p>Note The values for domain and service must be the same as the values configured for CFM.</p> <p>MPID—Specifies the maintenance endpoint identifier.</p>
Step 10	<pre> interface gigabitethernet <i>slot/port.subinterface</i> Example: Router(config-if-ecfm-mep)#interface gigabitethernet 0/2.1101 </pre>	<p>Specifies a subinterface and enters the subinterface configuration mode.</p>
Step 11	<pre> encapsulation dot1q <i>vlan-id</i> second-dot1q <i>inner vlan-id</i> Example: Router(config-subif)#encapsulation dot1q 100 second-dot1q 30 </pre>	<p>Defines the encapsulation format as IEEE 802.1Q (dot1q), and specifies the VLAN identifier.</p> <p>Use the second-dot1q keyword and the <i>inner vlan-id</i> argument to specify the VLAN tag.</p>
Step 12	<pre> end Example: Router(config-subif)#end </pre>	<p>Returns the router to the privileged EXEC mode.</p>

Configuration Example for Ethernet CFM (Double-Tagged Packets)

This example shows how to configure Ethernet CFM for double-tagged packets:

```

Router>enable
Router#configure terminal
Router(config)#ethernet cfm ieee
Router(config)#ethernet cfm global
Router(config-ecfm)#ethernet cfm domain customer level 7
Router(config-ecfm)#service customer1101 vlan 100 inner-vlan 30 direction down
Router(config-ecfm-srv)#continuity-check
Router(config-ecfm-srv)#interface gigabitethernet 0/2
Router(config-if)#ethernet cfm mep domain customer mpid 100 service customer1101
Router(config-if-ecfm-mep)#interface gigabitethernet 0/2.1101
Router(config-subif)#encapsulation dot1q 100 second-dot1q 30
Router(config-subif)#end

```

Verifying the Ethernet CFM Configuration for Double-Tagged Packets

Use the following commands to verify Ethernet CFM configured for double-tagged packets:

- **show ethernet cfm maintenance-points local**
- **show ethernet cfm maintenance-points remote**
- **ping ethernet mpid** *mpid-value* **domain** *domain-name* **service** *service-name* **cos** *value*
- **traceroute ethernet mpid** *mpid-value* **domain** *domain-name* **service** *service-name*
- **show ethernet cfm error configuration**

Use the **show ethernet cfm maintenance-points local** command to view the local MEPs. The following is a sample output of the **show ethernet cfm maintenance-points local** command:

```
Router#show ethernet cfm maintenance-points local
-----
MPID Domain Name      MacAddress           IfSt           PtSt
  Lvl Domain ID      Ingress
  RDI MA Name         Type Id             SrvcInst
    EVC Name                               Age
    Local MEP Info
-----
100 customer          8843.e154.6f01      Up             Up
  7 customer          Gi0/2.1101
-  customer1101      S, C 100, 30        N/A
  N/A                               58s
  MPID: 100 Domain: customer MA: customer1101
Router#
```

Use the **show ethernet cfm maintenance-points remote** command to display the remote maintenance point domains. In the following example, customer, carrier, and enterprise are the maintenance point domains that are configured:

On router 1:

```
Router1#show ethernet cfm maintenance-points remote
-----
MPID Domain Name      MacAddress           IfSt           PtSt
  Lvl Domain ID      Ingress
  RDI MA Name         Type Id             SrvcInst
    EVC Name                               Age
    Local MEP Info
-----
110 customer          8843.e154.6f01      Up             Up
  7 customer          Gi0/2.1101
-  customer1101      S, C 100, 30        N/A
  N/A                               58s
  MPID: 100 Domain: customer MA: customer1101

43 carrier           8843.e154.6f01      Up             Up
  2 carrier           Gi0/2.2
-  carrier           S, C 50, 20         N/A
  N/A                               58s
  MPID: 44 Domain: carrier MA: carrier

410 enterprise       8843.e154.6f01      Up             Up
  6 enterprise       Gi0/1.1
-  custservice       S, C 200, 70        N/A
  N/A                               58s
  MPID: 400 Domain: enterprise MA: custservice
Router1#
```

On router 2:

```
Router2#show ethernet cfm maintenance-points remote
-----
MPID Domain Name      MacAddress           IfSt           PtSt
  Lvl Domain ID      Ingress
  RDI MA Name         Type Id             SrvcInst
    EVC Name                               Age
    Local MEP Info
-----
```

```

100 customer          0026.99f7.0b41      Up                Up
 7 customer          Gi0/2.1101
- customer1101      S, C 100, 30        N/A
N/A                                                         40s
MPID: 110 Domain: customer MA: customer1101

44 carrier           0026.99f7.0b41      Up                Up
 2 carrier           Gi0/2.2
- carrier           S, C 50, 20         N/A
N/A                                                         40s
MPID: 43 Domain: carrier MA: carrier

400 enterprise       0026.99f7.0b41      Up                Up
 6 enterprise       Gi0/1.1
- custservice       S, C 200, 70        N/A
N/A                                                         40s
MPID: 410 Domain: enterprise MA: custservice

```

Router2#

Use the **ping** command to verify if Ethernet CFM loopback messages are successfully sent and received between the routers:

```

Router#ping ethernet mpid 100 domain customer service customer1101 cos 5
Type escape sequence to abort.
Sending 5 Ethernet CFM loopback messages to 8843.e154.6f01, timeout is 5 seconds:!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/1/1 ms
Router#

```

Use the **traceroute** command to send the Ethernet CFM traceroute messages:

```

Router#traceroute ethernet mpid 100 domain customer service customer1101
Type escape sequence to abort. TTL 64. Linktrace Timeout is 5 seconds
Tracing the route to 8843.e154.6f01 on Domain customer, Level 7, service customer1101,
vlan 100 inner-vlan 30
Traceroute sent via Gi0/2.1101

```

```

B = Intermediary Bridge
! = Target Destination
* = Per hop Timeout

```

```

-----
Hops  Host                MAC                Ingress            Ingr Action  Relay Action
      Host                Forwarded          Egress            Egr Action    Previous Hop
-----
! 1   8843.e154.6f01      Gi0/2.1101      IngOk            RlyHit:MEP
      Not Forwarded                5657.a86c.fa92

```

Use the **show ethernet cfm error configuration** command to view Ethernet CFM configuration errors (if any). The following is a sample output of the **show ethernet cfm error configuration** command:

```

Router#show ethernet cfm error configuration
-----
CFM Interface      Type  Id      Level  Error type
-----
Gi0/2              S,C   100,30  5      CFMLeak
Gi0/2              S,C   100,30  1      CFMLeak

```

Troubleshooting Ethernet CFM Configuration

[Table 3](#) lists the debug commands to troubleshoot issues pertaining to the Ethernet CFM configuration. The Cisco IOS Master Command List at

http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html provides more information about these commands.

**Caution**

Because debugging output is assigned high priority in the CPU process, it can diminish the performance of the router or even render it unusable. For this reason, use debug commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff.

**Note**

Before you run any of the debug commands listed in the following table, ensure that you run the **logging buffered debugging** command, and then turn off console debug logging using the **no logging console** command.

Table 3 *debug Commands for Ethernet CFM Configuration*

debug Command	Purpose
debug ethernet cfm all	Enables all Ethernet CFM debug messages.
debug ethernet cfm diagnostic	Enables low-level diagnostic debugging of Ethernet CFM general events or packet-related events.
debug ethernet cfm error	Enables debugging of Ethernet CFM errors.
debug ethernet cfm packets	Enables debugging of Ethernet CFM message packets.
debug cfmpal all	Enables debug messages for all Ethernet CFM platform events.
debug cfmpal api	Displays debug messages for all Ethernet CFM platform API events.
debug cfmpal common	Displays debug messages for all Ethernet CFM platform common events.
debug cfmpal cfmpal	Enables debugging of all Ethernet CFM platform events.
debug cfmpal epl	Enables debugging of all Ethernet CFM platform endpoint list (EPL) events.
debug cfmpal isr	Enables debugging of all Ethernet CFM platform interrupt service request (ISR) events.

Support for Y.1731 Performance Monitoring on a Routed Port (L3 Subinterface)

Y.1731 Performance Monitoring (PM) provides a standard Ethernet PM function that includes measurement of Ethernet frame delay, frame delay variation, frame loss, and frame throughput measurements specified by the ITU-T Y-1731 standard and interpreted by the Metro Ethernet Forum (MEF) standards group.



Note

This feature is supported only if you have purchased the DATA technology package functionality (*datak9*) licensing package. For more information about managing software activation licenses on the Cisco ISR and Cisco ISR G2 platforms, see http://www.cisco.com/en/US/docs/routers/access/sw_activation/SA_on_ISR.html.

Frame Delay

Ethernet frame delay measurement is used to measure frame delay and frame delay variations. Ethernet frame delay is measured using the Delay Measurement Message (DMM) method.

Restrictions for Configuring Two-Way Delay Measurement

Follow the guidelines and restrictions listed here when you configure two-way delay measurement:

- Y.1731 PM measurement works only for a point-to-point network topology.
- The granularity of the clock for delay measurement is in seconds and nanoseconds.
- CFM Y.1731 packets work with a maximum of two VLAN tags. The expected behavior is not observed with more VLAN tags. Also, CFM Y.1731 packets do not work with untagged cases.

Configuring Two-Way Delay Measurement



The following steps show how to configure two-way delay measurement. Both single and double tagging methods are included in the steps listed below.

SUMMARY STEPS

-
- Step 1 **enable**
 - Step 2 **configure terminal**
 - Step 3 **ip sla *operation number***
 - Step 4 **ethernet y1731 delay *DMM domain value* vlan *vlan-id* mpid *value* cos *value* source mpid *value***
or
ethernet y1731 delay *DMM domain value* vlan *vlan-id* inner-vlan *inner vlan-id* mpid *value* cos *value* source mpid *value*
 - Step 5 **aggregate interval *seconds***
 - Step 6 **exit**
 - Step 7 **ip sla schedule *operation number* start-time {*start time* | *now*}**

Step 8 **end**

DETAILED STEPS

	Command	Purpose
Step 1	<p>enable</p> <p>Example: Router> enable</p>	<p>Enables the privileged EXEC mode.</p> <p>Enter your password when prompted.</p>
Step 2	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	<p>Enters the global configuration mode.</p>
Step 3	<p>ip sla operation number</p> <p>Example: Router(config)# ip sla 1101</p>	<p>Enables the IP SLA configuration.</p> <p><i>operation-number</i>—The IP SLA operation you want to configure.</p>
Step 4	<p>ethernet y1731 delay DMM domain value vlan vlan-id mpid value cos value source mpid value</p> <p>or</p> <p>ethernet y1731 delay DMM domain value vlan vlan-id inner-vlan inner vlan-id mpid value cos value source mpid value</p> <p>Example: Router(config-ip-sla)# ethernet y1731 delay DMM domain customer vlan 100 mpid 3101 cos 1 source mpid 4101</p> <p>or</p> <p>Router(config-ip-sla)# ethernet y1731 delay DMM domain customer vlan 100 inner-vlan 1101 mpid 3101 cos 1 source mpid 4101</p>	<p>Configures a two-way delay measurement.</p> <p>Note Both single tagging and double tagging are supported.</p> <p>The following are the parameters:</p> <ul style="list-style-type: none"> delay—Specifies the delay distribution parameter. <p> Note DMM is the only supported delay distribution parameter.</p> <ul style="list-style-type: none"> vlan—Specifies the VLAN. inner-vlan—The inner-vlan keyword and the <i>inner vlan-id</i> argument specify the VLAN tag for double-tagged packets. cos—Specifies the CoS. The value can be any number between 0 and 7. <p> Note For double-tagged packets, the cos value corresponds to the value specified for the outer tag.</p> <ul style="list-style-type: none"> mpid—Specifies the destination MPID. source—Specifies the source MPID.
Step 5	<p>aggregate interval seconds</p> <p>Example: Router(config-sla-y1731-delay)# aggregate interval 30</p>	<p>Configures the Y.1731 aggregation parameter, where aggregate interval refers to the interval at which the packets are sent.</p> <p><i>seconds</i>—Specifies the length of time, in seconds.</p>

	Command	Purpose
Step 6	exit Example: Router(config-sla-y1731-delay)# exit	Exits the router configuration mode.
Step 7	ip sla schedule <i>operation number</i> life { <i>value</i> <i>forever</i> } start-time <i>value</i> Example: Router(config)#ip sla schedule 1101 life forever start-time now	Schedules the two-way delay measurement. <ul style="list-style-type: none"> life—Specifies a period of time (in seconds) to execute. The value can also be set as <i>forever</i>. start-time—Specifies the time at which to start the entry. The options available are <i>after</i>, <i>hh:mm</i>, <i>hh:mm:ss</i>, <i>now</i>, and <i>pending</i>.
Step 8	end Example: Router(config)#end	Exits the router configuration mode and returns to the privileged EXEC mode.

Configuration Examples for Two-Way Delay Measurement

This example shows how to configure two-way delay measurement using single tagging:

```
router>enable
router#configure terminal
router(config)#ip sla 1101
router(config-ip-sla)#ethernet y1731 delay DMM domain customer vlan 100 mpid 3101 cos 1
router(config-sla-y1731-delay)#aggregate interval 30
router(config-sla-y1731-delay)#exit
router(config)#ip sla schedule 1102 life forever start-time now
router(config)#end
```

This example shows how to configure two-way delay measurement using double tagging:

```
router>enable
router#configure terminal
router(config)#ip sla 1101
router(config-ip-sla)#ethernet y1731 delay DMM domain customer vlan 100 inner-vlan 1101 mpid 3101 cos 1 source mpid 4101
router(config-sla-y1731-delay)#aggregate interval 30
router(config-sla-y1731-delay)#exit
router(config)#ip sla schedule 1101 life forever start-time now
router(config)#end
```

Verifying Two-Way Delay Measurement Configuration

Use the following commands to verify the performance-monitoring sessions:

- **show run | sec ip sla**
- **show ip sla summary**
- **show ip sla statistics** *entry-number*
- **show ip sla configuration** *entry-number*
- **show ethernet cfm pm session summary**
- **show ethernet cfm pm session detail** *session-id*

- **show ethernet cfm pm session db *session-id***

The following are the sample outputs of the commands listed above:

```
Router#show run | sec ip sla
ip sla auto discovery
ip sla 1101
  ethernet y1731 delay DMM domain customer vlan 100 inner-vlan 1101 mpid 3101 cos
  1 source mpid 4101
ip sla schedule 1101 life forever start-time now
```

```
Router#show ip sla summary
```

IPSLAs Latest Operation Summary

Codes: * active, ^ inactive, ~ pending

ID	Type	Destination	Stats (ms)	Return Code	Last Run
*1101	y1731-delay	Domain:customer V - lan:100 CVlan:110 1 Mpid:3101		OK	27 seconds ago

```
Router#show ip sla statistics
```

IPSLAs Latest Operation Statistics

IPSLA operation id: 1101

Delay Statistics for Y1731 Operation 1101

Type of operation: Y1731 Delay Measurement

Latest operation start time: *10:43:12.930 UTC Mon Oct 21 2013

Latest operation return code: OK

Distribution Statistics:

Interval

Start time: *10:43:12.930 UTC Mon Oct 21 2013

Elapsed time: 15 seconds

Number of measurements initiated: 7

Number of measurements completed: 7

Flag: OK

```
Router#show ip sla configuration 1101
```

IP SLAs Infrastructure Engine-III

Entry number: 1101

Owner:

Tag:

Operation timeout (milliseconds): 5000

Ethernet Y1731 Delay Operation

Frame Type: DMM

Domain: customer

Vlan: 100

CVlan: 1101

Target Mpid: 3101

Source Mpid: 4101

CoS: 1

Max Delay: 5000

Request size (Padding portion): 64

Frame Interval: 1000

Clock: Not In Sync

Threshold (milliseconds): 5000

Schedule:

Operation frequency (seconds): 30 (not considered if randomly scheduled)

Next Scheduled Start Time: Start Time already passed

Group Scheduled : FALSE

Randomly Scheduled : FALSE

Life (seconds): Forever

Entry Ageout (seconds): never

```

    Recurring (Starting Everyday): FALSE
    Status of entry (SNMP RowStatus): Active
Statistics Parameters
  Frame offset: 1
  Distribution Delay Two-Way:
    Number of Bins 10
    Bin Boundaries: 5000,10000,15000,20000,25000,30000,35000,40000,45000,-1
  Distribution Delay-Variation Two-Way:
    Number of Bins 10
    Bin Boundaries: 5000,10000,15000,20000,25000,30000,35000,40000,45000,-1
  Aggregation Period: 30
History
  Number of intervals: 2

```

```
Router#show ethernet cfm pm session summary
```

```

Number of Configured Session : 150
Number of Active Session: 2
Number of Inactive Session: 148
Router#

```

```
Router(config)#show ethernet cfm pm session detail 0
```

```

Session ID: 0
Sla Session ID: 1101
Level: 7
Service Type: S,C
Service Id: 100,1101
Direction: Down
Source Mac: 5352.a824.04fr
Destination Mac: 5067.a87c.fa92
Session Version: 0
Session Operation: Proactive
Session Status: Active
MPID: 4101
Tx active: yes
Rx active: yes
RP monitor Tx active: yes
RP monitor Rx active: yes
Timeout timer: stopped
Last clearing of counters: *00:00:00.000 UTC Mon Jan 1 1900
DMMs:
  Transmitted: 117
DMRs:
  Rcvd: 117
1DMs:
  Transmitted: 0
  Rcvd: 0
LMs:
  Transmitted: 0
LMRs:
  Rcvd: 0
VSMs:
  Transmitted: 0
VSRs:
  Rcvd: 0
SLMs:
  Transmitted: 0
SLRs:
  Rcvd: 0
Test ID 0
Router1#

```

```
Router#show ethernet cfm pm session db 0
```

```
-----
TX Time FWD          RX Time FWD

```

```

          TX Time BWD                      RX Time BWD                      Frame Delay
          Sec:nSec                        Sec:nSec                        Sec:nSec
-----
Session ID: 0
*****
3591340722:930326034                    3591340663:866791722
3591340663:866898528                    3591340722:930707484                    0:274644
*****
3591340723:927640626                    3591340664:864091056
3591340664:864182604                    3591340723:927976302                    0:244128
*****
3591340724:927640626                    3591340665:864091056
3591340665:864167346                    3591340724:927961044                    0:244128
*****
3591340725:927671142                    3591340666:864121572
3591340666:864213120                    3591340725:928006818                    0:244128
*****
3591340726:927655884                    3591340667:864106314
3591340667:864197862                    3591340726:927991560                    0:244128
*****
3591340727:927732174                    3591340668:864167346
3591340668:864533538                    3591340727:928327236                    0:228870
*****
3591340728:927655884                    3591340669:864121572
3591340669:864197862                    3591340728:928006818                    0:274644
*****
3591340729:927671142                    3591340670:864121572
3591340670:864197862                    3591340729:927991560                    0:244128
*****

```

Troubleshooting Two-Way Delay Measurement Configuration

Table 4 lists the debug commands to troubleshoot issues pertaining to the two-way delay measurement configuration. The Cisco IOS Master Command List at

http://www.cisco.com/en/US/docs/ios/mcl/allreleasemcl/all_book.html provides more information about these commands.



Caution

Because debugging output is assigned high priority in the CPU process, it can diminish the performance of the router or even render it unusable. For this reason, use debug commands only to troubleshoot specific problems or during troubleshooting sessions with Cisco technical support staff.



Note

Before you run any of the debug commands listed in the following table, ensure that you run the **logging buffered debugging** command, and then turn off console debug logging using the **no logging console** command.

Table 4 *debug Commands for Two-Way Delay Measurement Configuration*

debug Command	Purpose
debug epmpal all	Enables debugging of all Ethernet performance monitoring (PM) events.
debug epmpal api	Enables debugging of Ethernet PM API events.

Table 4 debug Commands for Two-Way Delay Measurement Configuration (continued)

debug Command	Purpose
debug epmpal rx	Enables debugging of Ethernet PM packet-receive events.
debug epmpal tx	Enables debugging of Ethernet PM packet-transmit events.