



Configuring Ethernet Dataplane Loopback

Ethernet data plane loopback provides a means for remotely testing the throughput of an Ethernet port.

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Prerequisites for Ethernet Data Plane Loopback

- Ethernet loopback sessions are supported only of EFPs (service instances, Ethernet flow points, EVCs).
- Dot1q tags are not configured for default and untagged EFPs.
- Ethernet loopback sessions are supported on dot1q or QinQ or untagged and default EFPs.
- Internal loopback sessions configured must be within the 1 GB reserved bandwidth.
- Internal loopback can be launched even when the physical interface port state is down.

Restrictions for Ethernet Data Plane Loopback

- If the facility loopback is active on either Nile 0 or Nile 1, then only the Ingress QoS policy works on this facility. Egress QoS for facility loopback does not work due to the platform restriction.
- Facility loopback behavior on Gibraltar: Ingress and egress QoS policies on the EFP/TEFP gets bypassed. There is no support to bypass Ingress/Egress Port level policies as it works as configured.
- Data plane loopback on routed port infrastructure is *not* supported.

- Etype, src-mac, or llc-oui based loopback traffic filtering is *not* supported.
- Port-level QoS is not bypassed. The egress port shaper cannot be bypassed.
- Port shaper on the ingress port in both external and internal loopback cannot be bypassed.
- Ethernet loopback is not supported on a range of dot1q tags.
- Default EFP loopback is *not* supported in the shutdown state.
- Loopback sessions cannot be initiated on a port that is configured with SPAN or RSPAN.
- During Internal loopback, MAC swap is not supported for multicast or broadcast traffic.
- Only one Ethernet loopback (terminal or facility) session can be active on an EFP at any instance.
- Egress SPAN on the port and internal loopback on an EFP on the same port cannot be configured at the same time.
- Egress ACL is not supported on the EFP.
- A maximum number of 20 facility loopback sessions can be created per system, provided 16 sessions are with dot1q and 4 sessions are with dot1q and destination MAC address. This scale reduces if SPAN or RSPAN is configured.
- A maximum number of 12 terminal loopback sessions can be created per system, provided 8 sessions are with dot1q and 4 sessions are with dot1q and destination MAC address. This scale reduces if RSPAN or SADT is configured.
- Internal Ethernet Data Plane Loopback session can also be launched when the interface or port is in down state.
- We recommended to avoid performing any dynamic changes to the interface state when the Ethernet Data Plane Loopback (ELB) is configured on a port that is in the down state. There is a behavior change when interface is moved from up to down state, as internal ELB session will not be stopped or removed.
- Ethernet data plane Loopback is not supported with the XConnect service when the physical interface port state is down.
- Ethernet data plane Loopback will be affected on STP enabled interface.
- Dynamic addition of rewrite ingress tags with default EFP is not supported.
- Dynamic changes at EFP and interface level are not supported when Ethernet Data Plane Loopback is active.
- dot1q tag inclusion in the configuration for default and untagged EFP disables the Ethernet Data Plane Loopback.
- When loopback is configure for a default EFP on the interface, then all the traffic (ingressing) in this interface gets looped back.
- BFD flaps on enabling internal loopback and traffic looped back with line rate as both the traffic passes through the HPCT queue.
- If traffic is more than 650Mbps and if the packet size is less than a frame size of 64, then BFD and OSPF flaps are expected.

Information on 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. This feature allows for bidirectional or unidirectional throughput measurement, and on-demand/out-of-service (intrusive) operation during service turn-up. This feature supports two types of Ethernet loopback. RSP3 supports the following types of loopback from Cisco IOS XE Everest 16.5.1 release.

- Facility loopback (external)—Traffic loopback occurs at the Ingress interface. Traffic does not flow into the router for loopback.
- Terminal loopback (internal)—Traffic loopback occurs at the Egress interface. Traffic loopback occurs after the traffic flows into the router to the other interface.

QoS Support for Ethernet Data Plane Loopback

- Ingress QoS is bypassed in external loopback on service instances.
- Internal loopback sequence is as follows:
 - Ingress QoS
 - Egress QoS (egress port) (both, shaper and policer are supported).
 - Ingress QoS on ingress port and egress QoS on egress port (both, shaper and policer are supported) on the RSP3 module.
 - Ingress QoS on egress port and egress QoS on ingress port on the RSP3 module.
- All port-level and EFP-level QoS is applicable for internal Ethernet data plane loopback.
- For external Ethernet data plane loopback:
 - All port-level and EFP-level QoS is bypassed except for shaper.
 - Port-level shaper cannot be bypassed.

How to Configure Ethernet Data Plane Loopback on Physical Interfaces

Enabling Ethernet Data Plane Loopback on Physical Interfaces

Table 1: Feature History

Feature Name	Release Information	Feature Description
EDPL support on dot1ad	Cisco IOS XE Cupertino 17.8.1	This feature enables configuration of Ethernet Data Plane Loopback on interfaces configured with 802.1ad encapsulation. This helps measure the interface throughput handling encapsulated traffic.

```
enable
configure terminal
interface gigabitEthernet 0/2/1
service instance 1 ethernet
encapsulation dot1ad 101 dot1q 100
bridge-domain 120
ethernet loopback permit external
end
```



Note ELB is supported using a MAC filter for UP-MEP session. If you are starting ELB without the MAC filter, the UP-MEP session will go DOWN.

Starting an Ethernet Data Plane Loopback Session on Physical Interfaces



Note To start a loopback for untagged and default EFPs, dot1q and second-dot1q are not needed. Dot1q is *not* applicable to start a loopback session on the RSP3 module.



Note By default the session would be running for 300 seconds unless you explicitly specify and automatically stops after the session time expiry.

```
enable
configure terminal
ethernet loopback start local interface gigabitEthernet 0/4/1 service instance 10 external
dot1q 10 cos 1 destination mac-address 0000.0000.0001 timeout none
end
This is an intrusive loopback and the packets matched with the service will not be able
```

```
to pass through.
Continue? (yes/[no]): yes
```

Dot1q and COS-based filtering is not supported on the RSP3 module.

```
enable
configure terminal
ethernet loopback start local interface gigabitEthernet 0/4/1 service instance 10 external
  destination mac-address 0000.0000.0001 timeout none
end
```

Configuration Examples

Example: Configuring External Loopback on Physical Interfaces

This example shows how to configure external (facility) loopback.

```
Router(config)# interface gigabitEthernet 0/4/1
Router(config-if)# service instance 1 ethernet
Router(config-if-srv)# encapsulation dot1q 120
Router(config-if-srv)# bridge-domain 120
Router(config-if-srv)# ethernet loopback permit external
```

This example shows external (facility) loopback on the Gigabit Ethernet 0/4/1 interface:

```
interface GigabitEthernet0/4/1
  no ip address
  negotiation auto
  service instance 10 ethernet
  encapsulation dot1q 10
  rewrite ingress tag pop 1 symmetric
  bridge-domain 10
  ethernet loopback permit external ===? For facility loopback
  !
end
```

This example below shows how to start external (facility) loopback on the router. A warning message is displayed. Type **yes** to continue.

```
Router# ethernet loopback start local interface gigabitEthernet 0/4/1 service instance 10
external dot1q 10 cos 1
  destination mac-address 0000.0000.0001 timeout none
```

This is an intrusive loopback and the packets matched with the service will not be able to pass through.

```
Continue? (yes/[no]): yes
```



Note Dot1q and COS-based filtering is not supported on the RSP3 module.

Example: Configuring Terminal Loopback on Physical Interfaces

This example shows how to configure internal (terminal) loopback.

```

Router(config)# interface gigabitEthernet 0/0/0
Router(config-if)# service instance 1 ethernet
Router(config-if-srv)# encapsulation dot1q 120
Router(config-if-srv)# bridge-domain 120
Router(config-if-srv)# ethernet loopback permit internal

```

This example shows internal (terminal) loopback on Gigabit Ethernet 0/0/0 interface:

```

interface TenGigabitEthernet0/0/0
no ip address
service instance 10 ethernet
encapsulation dot1q 10
rewrite ingress tag pop 1 symmetric
bridge-domain 10
ethernet loopback permit internal
!
end

```

Verifying Ethernet Data Plane Loopback

Example: Verifying Ethernet Dataplane Loopback on Physical Interfaces

Use the **show ethernet loopback {active | permitted} [interface interface number]** command.

- The following example displays the loopback capabilities per interface. The output shows internal (terminal) loopback has been permitted on Ten Gigabit Ethernet 0/0/0 interface and external (facility) loopback has been permitted on Gigabit Ethernet 0/4/1 interface.

```
Router# show ethernet loopback permitted
```

```

-----
Interface                               SrvcInst Direction
Dot1q/Dot1ad(s)                         Second-Dot1q(s)
-----
Te0/0/0                                  10              Internal
10
Gi0/4/1                                  10              External
10

```

- This example shows all active sessions on the router.

```
Router# show ethernet loopback active
```

```

=====
Loopback Session ID      : 1
Interface                 : GigabitEthernet0/4/1
Service Instance         : 10
Direction                 : External
Time out(sec)            : none
Status                    : on
Start time                : 10:31:09.539 IST Mon Aug 26 2013
Time left                 : N/A
Dot1q/Dot1ad(s)          : 10
Second-dot1q(s)          :
Source Mac Address       : Any
Destination Mac Address  : 0000.0000.0001
Ether Type                : Any
Class of service         : 1
Llc-oui                   : Any

```

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

- This example shows how to stop the sessions on the router.

```
Router# ethernet loopback stop local interface GigabitEthernet
0/4/1 id 1
```

Information on Enhanced Ethernet Data Plane Loopback

Table 2: Feature History

Feature Name	Release	Description
Enhanced Ethernet Data Plane Loopback	Cisco IOS XE Bengaluru 17.4.1	The Ethernet data plane loopback feature is enhanced to avoid control packets getting dropped. The enhancement supports internal shaper configuration, when terminal ELB session is activated or deactivated to rate the limit the ELB session traffic. The enhancement is applicable only on internal loopback.

The Ethernet data plane loopback feature is enhanced to avoid control packets getting dropped, besides the ELB traffic drop. If terminal ELB is configured on 1 GB interface, then other priority traffic like BFD is dropped due to congestion.

The enhancement supports internal shaper configuration, when terminal ELB session is activated or deactivated to limit the rate for ELB session traffic.

Restrictions

- After starting EDPL, even if you remove ELB_SHAPE from EFP, then EDPL continues to run.
- Do not modify the ELB_SHAPE directly.
 - Use the platform command to make any changes in ELB_SHAPE PM.
 - If you directly modify the ELB_SHAPE PM, then the shaper is applied based on the updated values that are defined under ELB_SHAPE.
- If you remove ELB_SHAPE PM from the global config accidentally, then you must remove the **platform edpl_internal_shaper xxx** platform command and reapply.
- For any change to the EDPL parameters, we recommended you to perform the following:
 1. Deactivate or Stop the EDPL session.
 2. Do the required configuration changes.
 3. Activate or Start the EDPL session.

Do not dynamically change or delete the EDPL shaper or the interface bandwidth.

- In an xconnect scenario, when the interface goes down, the xconnect goes down, but EDPL remains active. Hence, you must stop the EDPL session and start back the EDPL session, after the xconnect is UP.

Configuring Ethernet Data Plane Loopback Session

Procedure

Step 1

enable

Example:

```
Device> enable
```

Enables privileged EXEC mode.

- Enter your password if prompted.

Step 2

configure terminal

Example:

```
Device# configure terminal
```

Enters global configuration mode.

Step 3

configure EDPL shaper

Example:

```
Device# platform edpl_internal_shaper 600000000
```

Enables EDPL shaper.

Step 4

interface GigabitEthernet

Example:

```
Device(config)# interface GigabitEthernet 0/0/9
Device(config-if)# service instance 1401 ethernet
Device(config-if-srv)# encapsulation dot1q 1401
Device(config-if-srv)# rewrite ingress tag pop 1 symmetric
Device(config-if-srv)# ethernet loopback permit internal
Device(config-if-srv)# end
```

Configures internal loopback on the interface.

Step 5

ethernet loopback start local

Example:

```
Device# ethernet loopback start local interface GigabitEthernet 0/0/9 service instance 1401
internal dot1q 1401 timeout none
```


Starts EDPL loopback session.

Example: Configuring Ethernet Loopback Active

The following example shows the activated and running EDPL session:

```
Router# show ethernet loopback active

Load for five secs: 5%/1%; one minute: 6%; five minutes: 6%
Time source is NTP, 18:18:23.680 IST Wed Aug 26 2020

=====
Loopback Session ID      : 1
Interface                 : GigabitEthernet0/0/9
Service Instance         : 1401
Direction                 : Internal
Time out(sec)            : none
Status                    : on
Start time                : 18:17:58.360 IST Wed Aug 26 2020
Time left                 : N/A
Dot1q/Dot1ad(s)          : 1401
Second-dot1q(s)          :
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) : 1
Total External Session(s) : 0
```

To deactivate an EDPL session.

```
Router# ethernet loopback stop local interface gigabitEthernet 0/0/9 id 1

003846: Aug 26 18:40:56.528 IST: %E_DLB-6-DATAPLANE_LOOPBACK_STOP: Ethernet Dataplane
Loopback Stop on interface GigabitEthernet0/0/9 service instance 1401 with session id 1
```

Example: Configuring Ethernet Data Plane Loopback Session

The following example shows the global shaper configuration:



Note If the interface bandwidth is less than the shaper value, then EDPL does not get started. You can refer to the syslogs.

```
Interface bandwidth 400Mb, shaper value 600Mb

platform edpl_internal_shaper 600000000

interface GigabitEthernet0/0/9
 bandwidth 400000
```

```

service instance 1401 ethernet
  encapsulation dot1q 1401
  rewrite ingress tag pop 1 symmetric
  xconnect 192.211.92.3 1401 encapsulation mpls
  ethernet loopback permit internal
!
```

```

Router# ethernet loopback start local interface gigabitEthernet 0/0/9 service instance 1401
internal dot1q 1401 timeout none
```

This is an intrusive loopback and the packets matched with the service will not be able to pass through. Continue? (yes/[no]): yes
 QoS Configuration failed !!! Shaper value is greater than interface speed

Failed to config EDPL shaper, EDPL not activated !!!

Use Cases or Deployment Scenarios

ELB is Supported with MAC Filter for UP-MEP Session

In the following scenario, ELB is supported using a MAC filter for UP-MEP session. If you starting ELB with out MAC filter, the UP-MEP session will go DOWN.

```

enable
configure terminal
service instance 800 ethernet 800
encapsulation dot1q 800
service-policy input <NAME>
xconnect 10.0.0.2 880 encapsulation mpls
cfm mep domain <NAME> mpid 200
cos 7
ethernet loopback permit external
ethernet loopback permit internal
```

```

Router#ethernet loopback start local interface gi0/0/0 service instance 800 internal dot1q
800 destination mac-address f078.1685.313f timeout none
```

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

```

Router#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
-----
220  CCI                      f078.1685.313f     Up    Up
0    CCI                      Gi0/0/0:(10.0.0.2, 880)
-    800                      XCON N/A           800
     800                      0s
     MPID: 200 Domain: CCI MA: 800
```

Total Remote MEPs: 1

Support for Ethernet Data Plane Loopback on Bundle Interface

Table 3: Feature History

Feature Name	Release Information	Feature Description
Support for Ethernet Data Plane Loopback on Bundle Interface	Cisco IOS XE Cupertino 17.8.1	<p>This feature enables ethernet data plane loopback on bundle interfaces. You can also configure the feature when the router is not physically connected and the port is in down state.</p> <p>This feature is only applicable on internal or terminal loopback in up or down state.</p>

Bundle interface or a link bundle is a group of one or more ports that are aggregated together and treated as a single link. This allows you to group multiple point-to-point links together into one logical link and provide higher bidirectional bandwidth, redundancy, and load balancing between two routers. A virtual interface is assigned to the bundled link. The component links can be dynamically added and deleted from the virtual interface. The virtual interface is treated as a single interface on which you can configure an IP address and other software features used by the link bundle. Packets sent to the link bundle are forwarded to one of the links in the bundle.

Bundle interfaces increase bandwidth availability, because traffic is forwarded over all available members of the bundle. Therefore, traffic can if one of the links within a bundle fails. can without interrupting packet flow. The ethernet dataplane loopback feature configured on bundle interfaces provides a methodology to verify the maximum rate of frame transmission with no frame loss.

Prior to Cisco IOS XE Cupertino 17.8.1, you could only configure ethernet data plane loopback on the physical interfaces.

Starting with Cisco IOS XE Cupertino 17.8.1, you can also configure ethernet data plane loopback feature on the bundle interfaces. But, you can only configure internal or terminal loopback in up or down state.

This feature is only supported on Cisco RSP2 module.

Scenario: Support for Ethernet Dataplane Loopback on Link Down Port

Consider a scenario when you need to configure ethernet dataplane loopback feature before the router is physically connected. Thus, you need to configure the feature when the port link is down. Starting with Cisco IOS XE Cupertino 17.8.1, you can configure the terminal or internal ethernet dataplane loopback feature even when the router is not physically connected and the link is down. But, as this feature is not supported on external or facility loopback, you cannot configure external loopback feature when the port link is down.

A port channel bundles individual interfaces into a group to provide increased bandwidth and redundancy. Previously, the internal ethernet dataplane loopback was not supported on the port channel interface. Starting with Cisco IOS XE Cupertino 17.8.1, you can now configure internal loopback on the port channel interface even when the interface is down.

Restrictions for Ethernet Dataplane Loopback on Bundle Interface

- The internal ethernet dataplane loopback feature is only available with service instance for port channel interface. It is not available when you configure MPLS or IP or Layer 3 on port channel interface.
- At least one member link must be added to the port channel interface for ethernet dataplane loopback.
- External ethernet loopback session on port channel interface is *not* supported.
- This feature will only function for traffic flow on first member of the port channel.
- You cannot configure the feature when the bundle members are in suspended state.
- The maximum traffic performance of terminal loopback is 1GBPS.

Configure Ethernet Dataplane Loopback Start Session on Bundle Interface

1. Activate Loopback on the EFP

To activate terminal loopback on the EFP:

```
interface Po1
  no ip address
  service instance 10 ethernet
    encapsulation dot1q 10
    rewrite ingress tag pop 1 symmetric
    bridge-domain 10
  ethernet loopback permit internal === For Terminal Loopback
!
```

2. Start Loopback Session

To start a terminal loopback session on bundle interface:

```
R11#ethernet loopback start local in po1 ser ins 2 inte dot1q 2 destination mac-address
3333.0001.0003 tim non
```

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

Configure Ethernet Dataplane Loopback Stop Session on Bundle Interface

1. Stop Loopback Session

To stop a terminal loopback session on a bundle interface:

```
R2#ethernet loopback stop local interface po1 id 1
```

2. Deactivate Loopback Session on the EFP

To stop the terminal loopback session in the EFP:

```
interface Po1
  no ip address
  service instance 10 ethernet
    encapsulation dot1q 10
    rewrite ingress tag pop 1 symmetric
    bridge-domain 10
  no ethernet loopback permit internal
```

Verification of Ethernet Dataplane Loopback Configuration on Bundle Interface

Use the **show ethernet loopback active** command to display all active sessions on the router.

```
R11#show ethernet loopback active
=====
Loopback Session ID      : 1
Interface                : Port-channel1
Service Instance        : 2
Direction               : Internal
Time out(sec)           : none
Status                   : on
Start time               : 10:35:16.940 IST Fri Dec 17 2021
Time left                : N/A
Dot1q/Dot1ad(s)         : 2
Second-dot1q(s)         :
Source Mac Address       : Any
Destination Mac Address  : 3333.0001.0003
Ether Type               : Any
Class of service         : Any
Llc-oui                  : Any

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

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/mcl/allreleasemcl/all-book.html

Standards and RFCs

Standard/RFC	Title
No specific Standards and RFCs are supported by the features in this document.	—

MIBs

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

Technical Assistance

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

Feature Information for Ethernet Dataplane Loopback

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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

Table 4: Feature Information for Ethernet Dataplane Loopback

Feature Name	Releases	Feature Information
Ethernet Dataplane Loopback	Cisco IOS XE Release 3.14.0S	This feature was introduced on the Cisco ASR 920 Series Aggregation Services Router (ASR-920-12CZ-A, ASR-920-12CZ-D, ASR-920-4SZ-A, ASR-920-4SZ-D, ASR-920-10SZ-PD, ASR-920-24SZ-IM, ASR-920-24SZ-M, ASR-920-24TZ-M) .