



Y.1731 Performance Monitoring

This chapter describes how to configure the Y.1731 Performance Monitoring in Cisco IOS Software Release 15.2(4)S.

This chapter includes the following sections:

- [Understanding Y.1731 Performance Monitoring, page 52-1](#)
- [Configuring Y.1731 PM, page 52-4](#)

Understanding Y.1731 Performance Monitoring

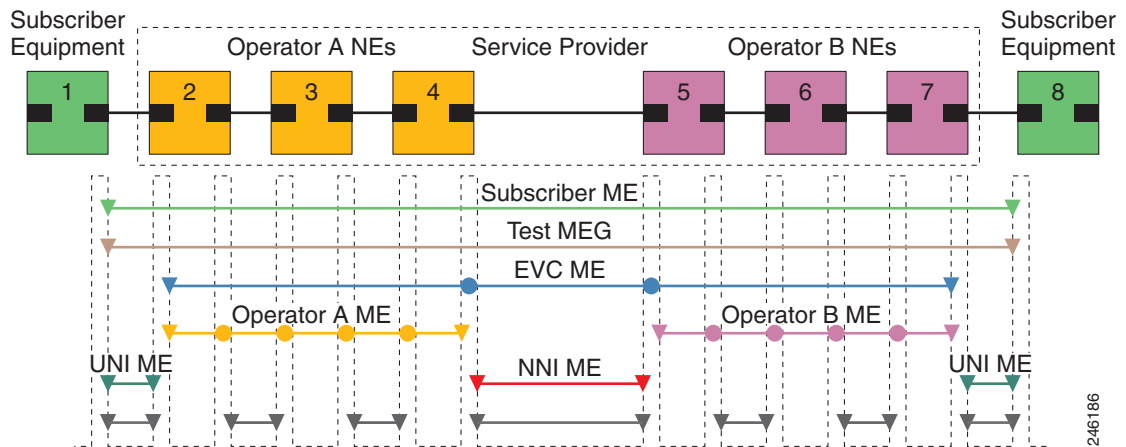
When service providers sell connectivity services to a subscriber, a Service Level Agreement (SLA) is reached between the buyer and seller of the service. The SLA defines the attributes offered by a provider and serves as a legal obligation on the service provider. As the level of performance required by subscribers increases, service providers need to monitor the performance parameters being offered. In order to capture the needs of the service providers, organizations have defined various standards such as IEEE 802.1ag and ITU-T Y.1731 that define the methods and frame formats used to measure performance parameters.

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. As per recommendations, the ME 3600X and ME3800X switches should be able to send, receive and process PM frames in intervals of 1000ms (1 frame per second) with the maximum recommended transmission period being 1000ms (1 frame per second) for any given service.

To measure SLA parameters such as frame delay or frame delay variation, a small number of synthetic frames are transmitted along with the service to the end point of the maintenance region, where the Maintenance End Point (MEP) responds to the synthetic frame. For a function such as connectivity fault management, the messages are sent less frequently, while performance monitoring frames are sent more frequently.

[Figure 52-1](#) illustrates Maintenance Entities (ME) and Maintenance End Points (MEP) typically involved in a point-to-point metro ethernet deployment for the Y.1731 standard.

Figure 52-1 A Point-to-Point Metro Ethernet Deployment with Typical Maintenance Entities and Maintenance Points



Following are the performance monitoring parameters:

- Connectivity
- Frame Delay and Frame Delay Variation
- Frame Loss Ratio and Availability

Connectivity

The first step to performance monitoring is verifying the connectivity. Continuity Check Messages (CCM) are best suited for connectivity verification, but is optimized for fault recovery operation. It is usually not accepted as a component of an SLA due to the timescale difference between SLA and Fault recovery. Hence, Connectivity Fault Management (CFM) and Continuity Check Database (CCDB) are used to verify connectivity. For more information on CFM see: [Configuring Ethernet OAM, CFM, and E-LMI](#), page 44-1

Frame Delay and Frame Delay Variation

Ethernet frame Delay Measurement (ETH-DM) is used for on-demand ethernet Operations, Administration & Maintenance (OAM) to measure frame delay and frame delay variation.

Ethernet frame delay and frame delay variation are measured by sending periodic frames with ETH-DM information to the peer MEP and receiving frames with ETH-DM information from the peer MEP. During the interval, each MEP measures the frame delay and frame delay variation.

Ethernet frame delay measurement also collects useful information, such as worst and best case delays, average delay, and average delay variation. Ethernet frame delay measurement supports hardware-based timestamping in the ingress direction. It provides a runtime display of delay statistics during a two-way delay measurement. Ethernet frame delay measurement records the last 100 samples collected per remote Maintenance End Point (MEP) or per CFM session.

These are the two methods of delay measurement, as defined by the ITU-T Y.1731 standard, One-way ETH-DM and Two-way ETH-DM. However only Two-way ETH-DM is supported on the switch.

- **Two-way ETH-DM:**

Each MEP transmits frames with ETH-DM request information to its peer MEP and receives frames with ETH-DM reply information from its peer MEP. Two way frame delay and frame delay variation is measured using DMM and DMR frame.

These are the pre-requisites for 1DM measurements:

- The clocks of the two concerned end-points must be synchronized accurately and precisely. This is achieved through IEEE 1588-2002.
- There is no auto-session create supported on the peer or the receiver. You need to configure an receive-only session.
- You must configure all the create sessions on the receiver's datapath. These are passive listener sessions.

Frame Loss Ratio and Availability

Ethernet Synthetic Loss Measurement (ETH-SLM) is used to collect counter values applicable for ingress and egress synthetic frames where the counters maintain a count of transmitted and received synthetic frames between a pair of MEPs.

ETH-SLM transmits synthetic frames with ETH-SLM information to a peer MEP and similarly receives synthetic frames with ETH-SLM information from the peer MEP. Each MEP performs frame loss measurements which contribute to unavailable time. A near-end frame loss refers to frame loss associated with ingress data frames. Far-end frame loss refers to frame loss associated with egress data frames. Both near-end and far-end frame loss measurements contribute to near-end severely errored seconds and far end severely errored seconds which together contribute to unavailable time. ETH-SLM is measured using SLM and SLR frames.

There are two methods of frame loss measurement defined by the ITU-T Y.1731 standard, ETH-LM and ETH-SLM. Only Single-ended ETH-SLM is supported:

- **Single-ended ETH-SLM:** Each MEP transmits frames with the ETH-SLM request information to its peer MEP and receives frames with ETH-SLM reply information from its peer MEP to carry out synthetic loss measurements.

ETH-SLM can be performed on a proactive or on-demand basis. On-demand ETH-SLM allows users without configuration access to perform real-time troubleshooting of Ethernet Services. On-Demand ETH-SLM supports two modes:

- **Direct Mode.**
In direct mode the operations start and run immediately.
- **Referenced.**
In referenced mode the exec command references a previously configured operation.

DMMv1 and SLM probes are supported in continuous and burst mode.

Supported Interfaces

Y.1731 PM supports these interfaces:

- SLM, DMM and DMMv1 support on EVC BD OFM
- SLM, DMM and DMMv1 support on PC EVC BD OFM
- SLM, DMM and DMMv1 support on EVC Xconnect OFM
- SLM, DMM and DMMv1 support on PC EVC Xconnect OFM

- SLM, DMM and DMMv1 support on EVC BD IFM
- SLM, DMM and DMMv1 support on PC EVC BD IFM
- SLM, DMM and DMMv1 support on EVC Xconnect IFM
- SLM, DMM and DMMv1 support on PC EVC Xconnect IFM

**Note**

PM is supported in the EVC and CFM configurations mentioned above, with both Dot1q and QinQ encapsulations available on the EVC.

Restrictions and Usage Guidelines

Follow these restrictions and usage guidelines when you configure Y.1731 PM on the switch:

- Y.1731 PM is not supported on these interfaces:
 - mLACP
 - Switchport Upward facing MEP and Downward facing MEP
 - Port MEPs
 - L2VFI
- SNMP is supported as a read only object, although CLI and system-logging is supported. The reaction syslogs can be converted to traps using the Syslog Traps MIB
- Frame Throughput measurements are not supported
- Clock synchronization is not mandatory for Two-way Delay Measurement

These are the restrictions for PM support on Port-channel:

- Adding or deleting a member link renders the session invalid.
- PM is not supported on manual PC EVC Load balancing configuration (UNI LAG).

Configuring Y.1731 PM

Configuring Two-Way Delay Measurement

To configure a Two-Way Delay Measurement, complete these steps:

	Command	Purpose
Step 1	enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal	Enters global configuration mode.
Step 3	ip sla <i>n</i>	Enables the IP SLA configuration.

	Command	Purpose
Step 4	ethernet y1731 delay {DMM DMMv1} burst domain <i>domain</i> {{vlan evc} <i>value</i> }{mpid mac-address} <i>value</i> cos <i>value</i> source {mpid mac-address} <i>value</i>	Configures a two-way delay measurement on the sender. <ul style="list-style-type: none"> • burst - Specifies the number of frames to be sent in the cycle. • evc - Specifies the ethernet virtual circuit identifier • vlan - Specifies the VLAN. • cos - Specifies the class of service. The values ranges between 0 and 7. • mpid - Specifies the destination MP ID. The values ranges between 1 and 8191. • mac-address - Specifies the destination mac-address. • source - Specifies the source MP ID or mac-address.
Step 5	frame {interval offset size} <i>value</i>	Configures Y.1731 frame parameters such as: <ul style="list-style-type: none"> • interval - Specifies the number of intervals. • offset - Specifies the frame offset to be used for calculations. The values ranges between 1 and 10. • size - Specifies the frame size. The values ranges between 64 and 384.
Step 6	history {interval} <i>value</i>	Configures Y.1731 history parameters such as: <ul style="list-style-type: none"> • interval - Specifies the number of intervals. The number of intervals ranges between 1 and 10.
Step 7	aggregate {interval} <i>value</i>	Configures Y.1731 aggregation parameters such as: <ul style="list-style-type: none"> • interval - Specifies the number of intervals. The aggregation period in seconds ranges between 1 and 65535.
Step 8	distribution {delay delay-variation} {one-way two-way} <i>value</i>	Configures Y.1731 distribution parameters such as: <ul style="list-style-type: none"> • delay - Specifies delay distribution parameters. • delay-variation - Specifies delay-variation distribution parameters. • one-way - Specifies one-way distribution parameters. • two-way - Specifies two-way distribution parameters.
Step 9	clock sync	Checks whether the clocks are synchronized on the sender and receiver.
Step 10	max-delay <i>value</i>	Configures the maximum delay in milliseconds. The value ranges between 1 and 65535.
Step 11	owner <i>value</i>	Specifies the operation owner.
Step 12	exit	Exits the Y.1731 submode and enters the global configuration mode.

	Command	Purpose
Step 13	<code>ip sla schedule n {life ageout recurring start-time} value start-time start time</code>	<p>Schedules the two way delay measurement on the sender.</p> <ul style="list-style-type: none"> • Life - Specifies the period time to execute in seconds. • Ageout - Specifies the period time to keep the entry when inactive. • Recurring - Specifies the probe to be scheduled automatically every day. • Start-time - Specifies the time to start the entry. The options available are: <ul style="list-style-type: none"> - after - hh:mm - hh:mm:ss - now - pending
Step 14	<code>exit</code>	Exits the global configuration mode.

Configuration Example

The following example configures a two way frame delay measurement

```
Switch# enable
Switch# configure terminal
Switch(config)# ip sla 1
Switch(config-ip-sla)# ethernet y1731 delay DMM domain ifm_400 evc e1 mpid 401 cos 4
source mpid 1
Switch(config-sla-y1731-delay)# history interval 5
Switch(config-sla-y1731-delay)# aggregate interval 60
Switch(config-sla-y1731-delay)#exit
Switch(config)#ip sla schedule 1 start-time after 00:00:30
Switch(config)#exit
```

Configuring Single Ended Synthetic Loss Measurement

To configure single ended synthetic loss measurement, complete these steps:



Note

Before you begin, configure the command **monitor loss counter [priority cos range]** under the EVC CFM sub-config mode for those interfaces that require loss monitoring.

	Command	Purpose
Step 1	<code>enable</code>	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	<code>configure terminal</code>	Enters global configuration mode.

	Command	Purpose
Step 3	<code>ip sla n</code>	Enables the IP SLA configuration.
Step 4	<code>ethernet y1731 loss SLM domain domain</code> <code>{ {vlan evc} value } {mpid mac-address}</code> <code>value cos value source {mpid </code> <code>mac-address} value</code>	Configures single ended frame loss measurement on the sender. <ul style="list-style-type: none"> • evc - Specifies the ethernet virtual circuit identifier • vlan - Specifies the VLAN. • cos - Specifies the class of service. The values ranges between 0 and 7. The cos value 7 is for aggregated cos and is used when LMM is configured for routed port sub interface. • mpid - Specifies the destination MP ID. The values ranges between 1 and 8191. • mac-address - Specifies the destination mac-address. • source - Specifies the source MP ID or mac-address.
Step 5	<code>aggregate {interval} value</code>	Configures the Y.1731 aggregation parameters such as: <ul style="list-style-type: none"> • interval - Specifies the number of intervals. The aggregation period in seconds ranges between 1 and 65535.
Step 6	<code>frame consecutive value</code>	Specifies number of consecutive measurements to be used to determine availability or unavailability status.
Step 7	<code>frame consecutive loss-ratio value</code>	Specifies the number of frames over which to calculate frame-loss ratio.
Step 8	<code>owner value</code>	Specifies the operation owner.
Step 9	<code>exit</code>	Exits the Y.1731 submodule and enters the global configuration mode.
Step 10	<code>exit</code>	Exits the global configuration mode.
Step 11	<code>ip sla n</code>	Enables the IP SLA configuration.

	Command	Purpose
Step 12	ethernet y1731 loss SLM [burst] domain domain {{vlan evc} value}{mpid mac-address} value cos value source {mpid mac-address} value	Configures single ended frame loss measurement on the sender. <ul style="list-style-type: none"> • burst - Specifies the number of frames to be sent in the cycle. • evc - Specifies the ethernet virtual circuit identifier • vlan - Specifies the VLAN. • cos - Specifies the class of service. The values ranges between 0 and 7. The cos value 7 is for aggregated cos and is used when LMM is configured for routed port sub interface. • mpid - Specifies the destination MP ID. The values ranges between 1 and 8191. • mac-address - Specifies the destination mac-address. • source - Specifies the source MP ID or mac-address.
Step 13	frequency seconds	Configures the frequency of the burst cycles in seconds. The range is 1 to 900.
Step 14	aggregate {interval} burst-cycles value	Configures the Y.1731 aggregation parameters such as: <ul style="list-style-type: none"> interval - Specifies the number of intervals. The aggregation period in seconds ranges between 1 and 65535. burst-cycles - Specifies number of burst-cycles.
Step 15	frame consecutive value	Specifies number of consecutive measurements to be used to determine availability or unavailability status.

	Command	Purpose
Step 16	ip sla reaction-configuration <i>operation-number</i> {react {unavailableDS unavailableSD} {loss-ratioDS loss-ratioSD}[threshold-type {average [number-of-measurements] consecutive [occurrences] immediate}] [threshold-value upper-threshold lower-threshold]}	Configures proactive threshold monitoring for frame loss measurements.
Step 17	ip sla schedule <i>n</i> {life ageout recurring start-time} <i>value</i> <i>start-time</i> <i>start time</i>	Schedules the single ended frame loss measurement on sender. <ul style="list-style-type: none"> • Life - Specifies the length of time to execute in seconds. • Ageout - Specifies the length of time to keep the entry when inactive. • Recurring - Specifies automatic scheduling every day. • Start-time - Specifies the time to start the entry. The options available are: <ul style="list-style-type: none"> - after - hh:mm - hh:mm:ss - now - pending

Configuration Example

This example displays the configuration of single ended frame loss measurement:

```
Switch# enable
Switch# configure terminal
Switch(config)# ip sla 1
Switch(config-ip-sla)# ethernet y1731 loss SLM domain r3 vlan 10 mpid 3 cos 1 source mpid
1
Switch(config-sla-y1731-loss)# aggregate interval 35
Switch(config-sla-y1731-loss)# frame consecutive 4
Switch(config-sla-y1731-loss)# frame consecutive loss-ratio 7
Switch(config-sla-y1731-loss)# exit
Switch(config-ip-sla)# exit
Switch(config)# ip sla 2
Switch(config-ip-sla)# ethernet y1731 loss SLM burst domain r3 vlan 10 mpid 3 cos 2 source
mpid 1
Switch(config-sla-y1731-loss)# frequency 20
Switch(config-sla-y1731-loss)# aggregate interval burst-cycles 6
Switch(config-sla-y1731-loss)# frame consecutive 4
Switch(config-sla-y1731-loss)# exit
Switch(config-ip-sla)# exit
Switch(config-ip-sla)# exit
Switch(config-ip-sla)# ip sla reaction-configuration 1 react loss-ratioSD threshold-type
immediate threshold-value 55 50
```

```
Switch(config-ip-sla)# ip sla reaction-configuration 2 react loss-ratioDS threshold-type
immediate threshold-value 55 50
Switch(config-ip-sla)# exit
Switch(config)# ip sla schedule 1 life forever start-time now
Switch(config)# ip sla schedule 2 life forever start-time now
Switch(config)# exit
```

Configuring On-Demand Operations

Configuring a Direct On-Demand Operation

To configure a direct on-demand operation, complete these steps:


Note

Before you begin, configure the command **monitor loss counter [priority cos range]** under the EVC CFM sub-config mode for those interfaces that require loss monitoring.

	Command	Purpose
Step 1	enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	ip sla on-demand ethernet {DMMv1 SLM} domain domain-name {evc evc-id vlan vlan-id} {mpid target-mp-id mac-address target-address} cos cos {source {mpid source-mp-id mac-address source-address}} {continuous [interval milliseconds] burst [interval milliseconds] [number number-of-frames] [frequency seconds]} [size bytes] aggregation seconds {duration seconds max number-of-packets}	Creates and runs an on-demand operation in direct mode. <ul style="list-style-type: none"> To create and run concurrent on-demand operations, configure this command using the DMMv1 keyword. Statistical output is posted on the console after the operation is finished. Repeat this step for each on-demand operation to be run. After an on-demand operation is finished, and the statistics handled, the operation is deleted.

Configuring a Referenced On-Demand Operation

To configure a referenced on-demand operation, complete these steps:


Note

Before you begin, configure the command **monitor loss counter [priority cos range]** under the EVC CFM sub-config mode for those interfaces that require loss monitoring. Single-ended and concurrent Ethernet delay, or delay variation, and frame loss operations to be referenced must be configured. See [Configuring Y.1731 PM, page 52-4](#)

	Command	Purpose
Step 1	enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	ip sla on-demand ethernet [dmmv1 slm] operation number {duration seconds max number-of-packets}	Creates and runs a pseudo operation of the operation being referenced, in the background. <ul style="list-style-type: none"> Statistical output is posted on the console after the operation is finished. Repeat this step for each on-demand operation to be run.

Configuration Examples for On-Demand Operations

[On-Demand Operation in Direct Mode, page 52-11](#)

[On-Demand Operation in Referenced Mode, page 52-12](#)

On-Demand Operation in Direct Mode

```
Switch# ip sla on-demand ethernet SLM domain xxx vlan 10 mpid 3 cos 1 source mpid 1
continuous aggregation 35 duration 38
```

```
Loss Statistics for Y1731 Operation 2984884426
Type of operation: Y1731 Loss Measurement
Latest operation start time: *20:17:41.535 PST Wed May 16 2012
Latest operation return code: OK
Distribution Statistics:
```

```
Interval 1
Start time: *20:17:41.535 PST Wed May 16 2012
End time: *20:18:16.535 PST Wed May 16 2012
Number of measurements initiated: 35
Number of measurements completed: 35
Flag: OK
```

```
Forward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps forward:
Min - *20:18:10.586 PST Wed May 16 2012
Max - *20:18:10.586 PST Wed May 16 2012
```

```
Backward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps backward:
Min - *20:18:10.586 PST Wed May 16 2012
Max - *20:18:10.586 PST Wed May 16 2012
```

```

Loss Statistics for Y1731 Operation 2984884426
Type of operation: Y1731 Loss Measurement
Latest operation start time: *20:17:41.535 PST Wed May 16 2012
Latest operation return code: OK
Distribution Statistics:

```

```

Interval 1
Start time: *20:17:41.535 PST Wed May 16 2012
End time: *20:18:16.535 PST Wed May 16 2012
Number of measurements initiated: 35
Number of measurements completed: 35
Flag: OK

```

```

Forward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
  Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps forward:
  Min - *20:18:10.586 PST Wed May 16 2012
  Max - *20:18:10.586 PST Wed May 16 2012

```

```

Backward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
  Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps backward:
  Min - *20:18:10.586 PST Wed May 16 2012
  Max - *20:18:10.586 PST Wed May 16 2012

```

On-Demand Operation in Referenced Mode

```

Device(config-term)# ip sla 11
Device(config-ip-sla)# ethernet y1731 loss SLM domain xxx vlan 10 mpid 3 cos 1 source mpid
1
Device(config-sla-y1731-loss)#end
Device# ip sla on-demand ethernet slm 11 duration 38

```

```

Loss Statistics for Y1731 Operation 2984884426
Type of operation: Y1731 Loss Measurement
Latest operation start time: *20:17:41.535 PST Wed May 16 2012
Latest operation return code: OK
Distribution Statistics:

```

```

Interval 1
Start time: *20:17:41.535 PST Wed May 16 2012
End time: *20:18:16.535 PST Wed May 16 2012
Number of measurements initiated: 35
Number of measurements completed: 35
Flag: OK

```

```

Forward
Number of Observations 3
Available indicators: 0

```

```

Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
  Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps forward:
  Min - *20:18:10.586 PST Wed May 16 2012
  Max - *20:18:10.586 PST Wed May 16 2012
Backward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
  Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps backward:
  Min - *20:18:10.586 PST Wed May 16 2012
  Max - *20:18:10.586 PST Wed May 16 2012
Loss Statistics for Y1731 Operation 2984884426
Type of operation: Y1731 Loss Measurement
Latest operation start time: *20:17:41.535 PST Wed May 16 2012
Latest operation return code: OK
Distribution Statistics:

Interval 1
Start time: *20:17:41.535 PST Wed May 16 2012
End time: *20:18:16.535 PST Wed May 16 2012
Number of measurements initiated: 35
Number of measurements completed: 35
Flag: OK

Forward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
  Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps forward:
  Min - *20:18:10.586 PST Wed May 16 2012
  Max - *20:18:10.586 PST Wed May 16 2012
Backward
Number of Observations 3
Available indicators: 0
Unavailable indicators: 3
Tx frame count: 30
Rx frame count: 30
  Min/Avg/Max - (FLR % ): 0:9/000.00%/0:9
Cumulative - (FLR % ): 000.00%
Timestamps backward:
  Min - *20:18:10.586 PST Wed May 16 2012
  Max - *20:18:10.586 PST Wed May 16 2012

```

Verifying the Frame Delay and Synthetic Loss Measurement Configurations

- To verify configuration of SLM use this command in privileged EXEC mode:

```
Switch# show run | b ip sla
```

```

ip sla 102
ethernet y1731 loss SLM domain PROVIDER_DOMAIN_VLAN evc domain_vlan101@101 mpid 101 cos 2
source mpid 102
aggregate interval 20
ip sla 103
ethernet y1731 loss SLM burst domain PROVIDER_DOMAIN_VLAN evc domain_vlan101@101 mpid 101
cos 2 source mpid 102
frequency 20
availability algorithm static-window
ip sla schedule 103 start-time now
ip sla enable reaction-alerts
!
!
!
control-plane
!
!
line con 0
password lab
login
line vty 0 4
password lab
login

```

Switch# show ip sla configuration

```

IP SLAs Infrastructure Engine-III
Entry number: 102
Owner:
Tag:
Operation timeout (milliseconds): 0
Ethernet Y1731 Loss Operation
Frame Type: SLM
Domain: PROVIDER_DOMAIN_VLAN
Evc: domain_vlan101@101
Target Mpid: 101
Source Mpid: 102
CoS: 2
Request size (Padding portion): 64
Frame Interval: 1000
Schedule:
Operation frequency (seconds): 20 (not considered if randomly scheduled)
Next Scheduled Start Time: Pending trigger
Group Scheduled : FALSE
Randomly Scheduled : FALSE
Life (seconds): 3600
Entry Ageout (seconds): never
Recurring (Starting Everyday): FALSE
Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 0
Statistics Parameters
Aggregation Period: 20
Frame consecutive: 10
Frame consecutive loss-ratio: 10
Availability algorithm: sliding-window
History
Number of intervals: 2

Entry number: 103
Owner:
Tag:
Operation timeout (milliseconds): 0
Ethernet Y1731 Loss Operation
Frame Type: SLM
Domain: PROVIDER_DOMAIN_VLAN

```

```

Evc: domain_vlan101@101
Target Mpid: 101
Source Mpid: 102
CoS: 2
Request size (Padding portion): 64
Frame Interval: 1000
Frame Burst Number: 10
Schedule:
Operation frequency (seconds): 20 (not considered if randomly scheduled)
Next Scheduled Start Time: Start Time already passed
Group Scheduled : FALSE
Randomly Scheduled : FALSE
Life (seconds): 3600
Entry Ageout (seconds): never
Recurring (Starting Everyday): FALSE
Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 0
Statistics Parameters
Aggregate interval burst-cycles: 1
Frame consecutive: 10
Frame consecutive loss-ratio: 10
Availability algorithm: static-window
History
Number of intervals: 2

```

- To verify and monitor the frame delay and frame delay variation measurement configuration, use this command in privileged EXEC mode:

```

Switch# show ip sla statistics n
Delay Statistics for      Operation n
Type of operation: Y1731 Delay Measurement
Latest operation start time: *21:37:08.895 PST Thu Aug 20 2009
Latest operation return code:
Distribution Statistics:
Interval <n>
  Start time:
  Elapsed/End time:
  Number of measurements initiated: <x>
  Number of measurements completed: <x>
  Flag: OK
  Delay:
    Max/Avg/Min forward: x/y/z      -> Min is only shown if clocks are in sync
    Max/Avg/Min backward: x/y/z     -> Only for two-way
    Max/Avg/Min: x/y/z             -> Only for two-way
    Timestamps forward: Max - 21:37:08.895 PST Thu Aug 20 2009/Min - 21:37:08.995 PST Thu
    Aug 20 2009
    Timestamps backward: Max - xxx/Min - yyy
    Timestamps: Max - xxx/Min - yyy
  Bucket Forward:
    Bucket Range: 0-9 ms:
      Total observations: <x>
    Bucket Range: 10-19 ms:
      Total observations: <x>
    Bucket Range: 20-29 ms:
      Total observations: <x>
    Bucket Range: 30-39 ms:
      Total observations: <x>
  Delay Variance
    Max/Avg/Min forward: x/y/z      -> Min is only shown if clocks are in sync
    Max/Avg/Min backward: x/y/z     -> Only for two-way
    Max/Avg/Min: x/y/z             -> Only for two-way
  Bucket Forward:
    Bucket Range: 0-9 ms:
      Total observations: <x>

```

```

Bucket Range: 10-19 ms:
  Total observations: <x>
Bucket Range: 20-29 ms:
  Total observations: <x>
Bucket Range: 30-39 ms:
  Total observations: <x>
Operation time to live: Forever

```

- To display all details of frame delay and frame delay variation measurements, use the **show ip sla statistics detail** command.

Switch# show ip sla statistics detail

```

IPSLAs Latest Operation Statistics
IPSLA operation id: 3
Delay Statistics for Y1731 Operation 3
Type of operation: Y1731 Delay Measurement
Latest operation start time: *00:00:00.000 PST Mon Jan 1 1900
Latest operation return code: OK
Distribution Statistics:
Interval 1
  Type: Delay
  Start time: *00:00:00.000 PST Mon Jan 1 1900
  Elapsed/End time: *00:00:00.000 PST Mon Jan 1 1900
  Number of measurements initiated: 0
  Number of measurements completed: 0
  Flag: OK

```

Delay:

```

Max/Avg/Min TwoWay: 140116936/140116944/140116952
Timestamps TwoWay: Max - *00:00:00.000 PST Mon Jan 1 1900/Min - *00:00:00.000 PST Mon Jan 1 1900

```

Bucket forward:

```

Bucket Range: 0-4999 microsecond
  Total observations: 0
Bucket Range: 5000-9999 microsecond
  Total observations: 0
Bucket Range: 10000-14999 microsecond
  Total observations: 0
Bucket Range: 15000-19999 microsecond
  Total observations: 0
Bucket Range: 20000-24999 microsecond
  Total observations: 0
Bucket Range: 25000-29999 microsecond
  Total observations: 0
Bucket Range: 30000-34999 microsecond
  Total observations: 0
Bucket Range: 35000-39999 microsecond
  Total observations: 0
Bucket Range: 40000-44999 microsecond
  Total observations: 0
Bucket Range: 45000--2 microsecond
  Total observations: 0

```

Bucket backward:

```

Bucket Range: 0-4999 microsecond
  Total observations: 0
Bucket Range: 5000-9999 microsecond
  Total observations: 0
Bucket Range: 10000-14999 microsecond
  Total observations: 0
Bucket Range: 15000-19999 microsecond
  Total observations: 0

```



```
Bucket Range: 20000-24999 microsecond
Total observations: 0
Bucket Range: 25000-29999 microsecond
Total observations: 0
Bucket Range: 30000-34999 microsecond
Total observations: 0
Bucket Range: 35000-39999 microsecond
Total observations: 0
Bucket Range: 40000-44999 microsecond
Total observations: 0
Bucket Range: 45000--2 microsecond
Total observations: 0
```

Bucket TwoWay:

```
Bucket Range: 0-0 microsecond
Total observations: 0
Bucket Range: 1-1 microsecond
Total observations: 0
Bucket Range: 2-2 microsecond
Total observations: 0
Bucket Range: 3-3 microsecond
Total observations: 0
Bucket Range: 4--2 microsecond
Total observations: 0
```

Delay Variance:

```
Max/Avg backward positive: 140116936/140116944
Timestamp backward positive: Max - *00:00:00.000 PST Mon Jan 1 1900
Max/Avg backward negative: 140116936/140116944
Timestamp backward negative: Max - *00:00:00.000 PST Mon Jan 1 1900
Max/Avg TwoWay positive: 140116936/140116944
Timestamp TwoWay positive: Max - *00:00:00.000 PST Mon Jan 1 1900
Max/Avg TwoWay negative: 140116936/140116944
Timestamp TwoWay negative: Max - *00:00:00.000 PST Mon Jan 1 1900
```

Bucket forward positive:

```
Bucket Range: 0-4999 microsecond
Total observations: 0
Bucket Range: 5000-9999 microsecond
Total observations: 0
Bucket Range: 10000-14999 microsecond
Total observations: 0
Bucket Range: 15000-19999 microsecond
Total observations: 0
Bucket Range: 20000-24999 microsecond
Total observations: 0
Bucket Range: 25000-29999 microsecond
Total observations: 0
Bucket Range: 30000-34999 microsecond
Total observations: 0
Bucket Range: 35000-39999 microsecond
Total observations: 0
Bucket Range: 40000-44999 microsecond
Total observations: 0
Bucket Range: 45000--2 microsecond
Total observations: 0
```

Bucket forward negative:

```
Bucket Range: 0-4999 microsecond
Total observations: 0
Bucket Range: 5000-9999 microsecond
Total observations: 0
Bucket Range: 10000-14999 microsecond
```

```
Total observations: 0
Bucket Range: 15000-19999 microsecond
Total observations: 0
Bucket Range: 20000-24999 microsecond
Total observations: 0
Bucket Range: 25000-29999 microsecond
Total observations: 0
Bucket Range: 30000-34999 microsecond
Total observations: 0
Bucket Range: 35000-39999 microsecond
Total observations: 0
Bucket Range: 40000-44999 microsecond
Total observations: 0
Bucket Range: 45000--2 microsecond
Total observations: 0

Bucket backward positive:
Bucket Range: 0-4999 microsecond
Total observations: 0
Bucket Range: 5000-9999 microsecond
Total observations: 0
Bucket Range: 10000-14999 microsecond
Total observations: 0
Bucket Range: 15000-19999 microsecond
Total observations: 0
Bucket Range: 20000-24999 microsecond
Total observations: 0
Bucket Range: 25000-29999 microsecond
Total observations: 0
Bucket Range: 30000-34999 microsecond
Total observations: 0
Bucket Range: 35000-39999 microsecond
Total observations: 0
Bucket Range: 40000-44999 microsecond
Total observations: 0
Bucket Range: 45000--2 microsecond
Total observations: 0

Bucket backward negative:
Bucket Range: 0-4999 microsecond
Total observations: 0
Bucket Range: 5000-9999 microsecond
Total observations: 0
Bucket Range: 10000-14999 microsecond
Total observations: 0
Bucket Range: 15000-19999 microsecond
Total observations: 0
Bucket Range: 20000-24999 microsecond
Total observations: 0
Bucket Range: 25000-29999 microsecond
Total observations: 0
Bucket Range: 30000-34999 microsecond
Total observations: 0
Bucket Range: 35000-39999 microsecond
Total observations: 0
Bucket Range: 40000-44999 microsecond
Total observations: 0
Bucket Range: 45000--2 microsecond
Total observations: 0

Bucket TwoWay positive:
Bucket Range: 0-4999 microsecond
Total observations: 0
Bucket Range: 5000-9999 microsecond
```

```

Total observations: 0
Bucket Range: 10000-14999 microsecond
Total observations: 0
Bucket Range: 15000-19999 microsecond
Total observations: 0
Bucket Range: 20000-24999 microsecond
Total observations: 0
Bucket Range: 25000-29999 microsecond
Total observations: 0
Bucket Range: 30000-34999 microsecond
Total observations: 0
Bucket Range: 35000-39999 microsecond
Total observations: 0
Bucket Range: 40000-44999 microsecond
Total observations: 0
Bucket Range: 45000--2 microsecond
Total observations: 0

```

- To display the same outputs as the latest statistics detail command, use the **show ip sla history interval *n*** command. The number displayed is the number of intervals configured.

Output for Loss Measurement:

```

Switch# show ip sla history 1 interval-statistics
Loss Statistics for Y1731 Operation 1
Type of operation: Y1731 Loss Measurement
Latest operation start time: *09:46:16.225 UTC Fri Nov 26 2010
Latest operation return code: OK
Distribution Statistics:

Interval 1
Start time: *09:46:16.225 UTC Fri Nov 26 2010
End time: *09:48:16.221 UTC Fri Nov 26 2010
Number of measurements initiated: 12006
Number of measurements completed: 12000
Flag: OK

Forward
Number of Observations 11999
Timestamps forward:
  Max - *09:47:20.252 UTC Fri Nov 26 2010/   Min - *09:48:16.221 UTC Fri Nov 26 2010
Tx frame count: 30000
Rx frame count: 20000
Available indicators: 11999
Unavailable indicators: 0
Max/Avg/Min - (FLR % ): 1:3/2.78%/0:0

Backward
Number of Observations 11999
Timestamps backward:
  Max - *09:48:16.221 UTC Fri Nov 26 2010/   Min - *09:48:16.221 UTC Fri Nov 26 2010
Tx frame count: 10000
Rx frame count: 10000
Available indicators: 11999
Unavailable indicators: 0
Max/Avg/Min - (FLR % ): 0:0/0.0%/0:0

```

Output for Delay Measurement:

```

Switch#show ip sla history 10 interval-statistics
Delay Statistics for Y1731 Operation 10
Type of operation: Y1731 Delay Measurement
Latest operation start time: 10:58:30.144 PDT Tue Jan 4 2011
Latest operation return code: Timeout
Distribution Statistics:

```

Interval 1
 Start time: 10:58:30.144 PDT Tue Jan 4 2011
 End time: 10:59:05.140 PDT Tue Jan 4 2011
 Number of measurements initiated: 33
 Number of measurements completed: 34
 Flag: OK

Delay:
 Number of TwoWay observations: 34
 Max/Avg/Min TwoWay: 113364/100499/100099 (microsec)
 Time of occurrence TwoWay:
 Max - 10:59:05.140 PDT Tue Jan 4 2011
 Min - 10:58:40.076 PDT Tue Jan 4 2011

Bin TwoWay:

Bin Range (microsec)	Total observations
0 - < 5000	0
5000 - < 10000	0
10000 - < 15000	0
15000 - < 20000	0
20000 - < 25000	0
25000 - < 30000	0
30000 - < 35000	0
35000 - < 40000	0
40000 - < 45000	0
45000 - < 4294967295	34

Delay Variance:
 Number of TwoWay positive observations: 19
 Max/Avg TwoWay positive: 13256/706 (microsec)
 Time of occurrence TwoWay positive:
 Max - 10:59:05.140 PDT Tue Jan 4 2011
 Number of TwoWay negative observations: 14
 Max/Avg TwoWay negative: 86/11 (microsec)
 Time of occurrence TwoWay negative:
 Max - 10:58:40.076 PDT Tue Jan 4 2011

Bin TwoWay positive:

Bin Range (microsec)	Total observations
0 - < 5000	18
5000 - < 10000	0
10000 - < 15000	1
15000 - < 20000	0
20000 - < 25000	0
25000 - < 30000	0
30000 - < 35000	0
35000 - < 40000	0
40000 - < 45000	0
45000 - < 4294967295	0

Bin TwoWay negative:

Bin Range (microsec)	Total observations
0 - < 5000	14
5000 - < 10000	0
10000 - < 15000	0
15000 - < 20000	0
20000 - < 25000	0
25000 - < 30000	0
30000 - < 35000	0
35000 - < 40000	0
40000 - < 45000	0

45000 - < 4294967295 0

- To display the performance monitoring session summary, use the **show ethernet cfm pm session summary** command.

```
Switch# show ethernet cfm pm session summary
Number of Configured Session : 1
Number of Active Session: 1
Number of Inactive Session: 0
```

Troubleshooting

These troubleshooting scenarios apply to the Y.1731 performance monitoring configurations:

Problem	Solution
When the IP SLA sessions do not come up.	Use the debug commands: <ul style="list-style-type: none"> debug ethernet cfm pm events [session <session id>] debug ethernet cfm pm error [session <session id>] debug ethernet cfm pm diagnostic debug ethernet cfm pm ipc [session <session id>] debug ethernet cfm pm packet [session <session id>]

