

CFM-EOAM Command Reference

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action capabilities-conflict

To configure what action is taken on an interface when a capabilities-conflict event occurs, use the **action capabilities-conflict** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action capabilities-conflict {**disable** | **efd** | **error-disable-interface** | **log**}
no action capabilities-conflict {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a capabilities-conflict event occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action capabilities-conflict disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a capabilities-conflict event occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0:hostname(config-eoam)# action capabilities-conflict efd
```

The following example shows how to configure that the interface is put into the error-disable state when a capabilities-conflict event occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action capabilities-conflict error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a capabilities-conflict event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action capabilities-conflict log
```

action critical-event

To configure what action is taken on an interface when a critical-event notification is received from the remote Ethernet OAM peer, use the **action critical-event** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action critical-event {**disable** | **error-disable-interface** | **log**}
no action critical-event {**disable** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a critical-event notification is received.
error-disable-interface	Puts the interface into the error-disable state when a critical-event notification is received.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a critical-event notification is received. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a critical-event notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action critical-event disable
```

The following example shows how to configure that the interface is put into the error-disable state when a critical-event notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action critical-event error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a critical-event notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action critical-event log
```

action discovery-timeout

To configure what action is taken on an interface when a connection timeout occurs, use the **action discovery-timeout** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action discovery-timeout {**disable** | **efd error-disable-interface** | **log**}
no action discovery-timeout {**disable** | **efd error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a connection timeout occurs.
efd	Puts the line protocol into the down state for an interface when a connection timeout occurs. The state is removed when the session is re-established.
error-disable-interface	Puts the interface into the error-disable state when a connection timeout occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a connection timeout occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a connection timeout occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action discovery-timeout disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a connection timeout occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action discovery-timeout efd
```

The following example shows how to configure that the interface is put into the error-disable state when a connection timeout occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action discovery-timeout error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a connection timeout occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action discovery-timeout log
```

action dying-gasp

To configure what action is taken on an interface when a dying-gasp notification is received from the remote Ethernet OAM peer, use the **action dying-gasp** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action dying-gasp {**disable** | **error-disable-interface** | **log**}
no action dying-gasp {**disable** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a dying-gasp notification is received.
error-disable-interface	Puts the interface into the error-disable state when a dying-gasp notification is received.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a dying-gasp notification is received. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a dying-gasp notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action dying-gasp disable
```

The following example shows how to configure that the interface is put into the error-disable state when a dying-gasp notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action dying-gasp error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a dying-gasp notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action dying-gasp log
```

action high-threshold

To configure what action is taken on an interface when a high threshold is exceeded, use the **action high-threshold** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action high-threshold {**disable** | **error-disable-interface** | **log**}
no action high-threshold {**disable** | **error-disable-interface** | **log**}

Syntax Description

disable	(Interface Ethernet OAM configuration only) Performs no action on the interface when a high threshold is exceeded.
error-disable-interface	Puts the interface into the error-disable state when a high threshold is exceeded.
log	Creates a syslog entry when a high threshold is exceeded. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default is that no action is taken when a high threshold is exceeded.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that a syslog entry is created on the interface when a high threshold is exceeded.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action high-threshold log
```

The following example shows how to configure that the interface is put into the error-disable state when a high threshold is exceeded.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action high-threshold error-disable-interface
```

The following example shows how to configure that no action is taken when a high threshold is exceeded. This configuration overrides the Ethernet OAM profile configuration.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action high-threshold disable
```

action session-down

To configure what action is taken on an interface when an Ethernet OAM session goes down, use the **action session-down** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action session-down {**disable** | **efd** | **error-disable-interface** | **log**}
no action session-down {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when an Ethernet OAM session goes down.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action session-down disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when an Ethernet OAM session goes down.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0:hostname(config-eoam)# action session-down efd
```

The following example shows how to configure that the interface is put into the error-disable state when an Ethernet OAM session goes down.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action session-down error-disable-interface
```

The following example shows how to configure that a syslog entry is created when an Ethernet OAM session goes down. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action session-down log
```

action session-up

To configure what action is taken on an interface when an Ethernet OAM session is established, use the **action session-up** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action session-up {**disable** | **log**}
no action session-up {**disable** | **log**}

Syntax Description

disable	Performs no action on the interface when an Ethernet OAM session is established.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when an Ethernet OAM session is established. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when an Ethernet OAM session is established.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action session-up disable
```

The following example shows how to configure that a syslog entry is created when an Ethernet OAM session is established. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action session-up log
```

action uni-directional link-fault

To configure what action is taken on an interface when a link-fault notification is received from the remote Ethernet OAM peer, use the **action uni-directional link-fault** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action uni-directional link-fault {**disable** | **efd** | **error-disable-interface** | **log**}
no action uni-directional link-fault {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to create a syslog entry.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command only determines the action taken when a uni-directional link fault notification is received from the peer; it does not affect the action taken when a fault is detected locally.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a link-fault notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action uni-directional link-fault disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a link-fault notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action uni-directional link-fault efd
```

The following example shows how to configure that the interface is put into the error-disable state when a link-fault notification is received.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action uni-directional link-fault error-disable-interface
```

The following example shows how to configure that a syslog entry is created when a link-fault notification is received. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE 0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# action uni-directional link-fault log
```

action wiring-conflict

To configure what action is taken on an interface when a wiring-conflict event occurs, use the **action wiring-conflict** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of this command.

action wiring-conflict {**disable** | **efd** | **error-disable-interface** | **log**}
no action wiring-conflict {**disable** | **efd** | **error-disable-interface** | **log**}

Syntax Description

disable	Performs no action on the interface when a capabilities-conflict event occurs.
efd	Puts the line protocol into the down state for an interface when a capabilities-conflict event occurs. The state is removed when the first packet is received without a conflict.
error-disable-interface	Puts the interface into the error-disable state when a capabilities-conflict event occurs.
log	(Interface Ethernet OAM configuration only) Creates a syslog entry when a capabilities-conflict event occurs. This action is available only in interface Ethernet OAM configuration mode to override the OAM profile on a specific interface.

Command Default

The default action is to put the interface into error-disable state.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure that no action is performed on the interface when a wiring-conflict event occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action wiring-conflict disable
```

The following example shows how to configure putting the interface into the line-protocol-down state when a wiring-conflict event occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
```

```
RP/0/RP0:hostname(config-eoam)# action wiring-conflict efd
```

The following example shows how to configure that a syslog entry is created when a wiring-conflict event occurs.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# action wiring-conflict log
```

The following example shows how to configure that the interface is put into the error-disable state when a wiring-conflict event occurs. This configuration overrides the interface Ethernet OAM profile.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
(config-if-eoam)# action wiring-conflict error-disable-interface
```

aggregate

To configure the size and number of bins into which to aggregate the results of statistics collection, use the **aggregate** command in SLA profile statistics configuration mode.

aggregate { **bins** *count* **width** *width* | **none** }

Syntax Description

bins *count*	Number of bins. The range is 2 to 100.
width *width*	For delay and jitter measurements, the size of each bin in milliseconds (range 1-10000). For loss measurements, the size of each bin in percentage points (range 1-100). In addition, the width must be specified if the number of bins is at least 2, regardless of the type of measurement.
none	No aggregation is performed. All samples are stored individually.

Command Default

For delay measurements, all collected statistics are aggregated into one bin.

For loss measurements, the default is aggregation disabled.

Command Modes

SLA profile statistics configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

Changing the aggregation for a given metric clears all stored data for that metric.

For delay and jitter measurements, the first bin starts at 0, each bin covers a range of values defined by the specified width, except for the last bin which ends at infinity. For example, an aggregate bin count of 4 and a width of 20 for delay measurements yields 4 bins of statistics for these sample ranges:

- Bin 1—Samples with delay ranges 0 to < 20 ms.
- Bin 2—Samples with delay ranges greater than or equal to 20 and < 40 ms.
- Bin 3—Samples with delay ranges greater than or equal to 40 and < 60 ms.
- Bin 4—Samples with delay ranges 60 ms or greater (unbounded).

For synthetic loss measurements, the first bin starts at 0, each bin covers a range of values defined by the specified width, except for the last bin which ends at infinity. For example, an aggregate bin count of 4 and a width of 25 for loss measurements yields 4 bins of statistics for these sample ranges:

- Bin 1—Samples with loss ranges 0 to < 25 percentage points.
- Bin 2—Samples with loss ranges greater than or equal to 25 and < 50 percentage points.
- Bin 3—Samples with loss ranges greater than or equal to 50 and < 75 percentage points.
- Bin 4—Samples with loss ranges greater than or equal to 75 and <100 percentage points.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **aggregate** command:

```
RP/0/RP0:router(config-sla-prof-stat-cfg)# aggregate bins 4 width 20
```

ais transmission

To configure Alarm Indication Signal (AIS) transmission for a Connectivity Fault Management (CFM) domain service, use the **ais transmission** command in CFM domain service configuration mode. To disable AIS transmission in a CFM domain service, use the no form of this command.

ais transmission [**interval 1s** | **1m**] [**cos** *cos*]
no ais transmission [**interval 1s** | **1m**] [**cos** *cos*]

Syntax Description

interval	(Optional) Interval at which AIS packets are transmitted. Valid values are: • **1s** – Interval of 1 second • **1m** – Interval of 1 minute
cos *cos*	(Optional) Specifies the Class of Service (CoS) for the AIS packets. Valid values are 0 to 7.

Command Default

AIS transmission is disabled by default.

If **interval** is not specified, the default interval is 1 second.

IF **cos** is not specified, the default cos is 6.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command enables AIS for all MEPs in the service. AIS messages are triggered by the following events:

- Detection of a CCM defect.
- Detection of a missing peer MEP (when cross-check is configured).
- Receipt of AIS or LCK messages.
- Detection of interface down events (for down MEPs only).

AIS messages are transmitted in the opposite direction of CCMs and other CFM messages that are sent by the MEP. Therefore, up MEPs send AIS messages out of the interface, whereas down MEPs send AIS messages toward the bridging function.

In addition, AIS messages are sent at a higher maintenance level than other CFM messages sent by the MEP:

- If there is a higher-level MEP on the interface in the same direction (up MEP or down MEP), then the AIS messages are passed internally to this higher level MEP. In this case, no AIS messages are actually transmitted (unless the higher-level MEP is also in a service with AIS transmission configured).
- If there is a MIP on the interface, then AIS messages are sent at the level of the MIP.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure Alarm Indication Signal (AIS) transmission for a CFM domain service:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0:hostname(config-cfm-dmn-svc)# ais transmission interval 1m cos 7
```

ais transmission up

To configure Alarm Indication Signal (AIS) transmission on a Connectivity Fault Management (CFM) interface, use the **ais transmission up** command in interface CFM configuration mode. To disable AIS transmission on an interface, use the no form of this command.

ais transmission up [**interval 1s** | **1m**] [**cos** *cos*]
no ais transmission up [**interval 1s** | **1m**] [**cos** *cos*]

Syntax Description

interval	(Optional) Interval at which AIS packets are transmitted. Valid values are: • **1s** – Interval of 1 second • **1m** – Interval of 1 minute
cos *cos*	(Optional) Specifies the Class of Service (CoS) for the AIS packets. Valid values are 0 to 7.

Command Default

AIS transmission is disabled by default.

If **interval** is not specified, the default interval is 1 second.

IF **cos** is not specified, each MEP uses its own CoS value, inherited from the interface.

Command Modes

Interface CFM configuration (config-if-cfm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

AIS transmission packets for CFM can be configured only on interfaces with no down MEPs. AIS packets are transmitted only if a MIP exists on the interface and the line protocol state is down. AIS messages are transmitted up, toward the bridging function (same direction as an up MEP sends CCMs), and they are transmitted at the level of the MIP.

If AIS transmission is configured on an interface with any down MEPs, the configuration is ignored, and an error is displayed in the **show ethernet cfm configuration-errors** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure AIS transmission on a CFM interface.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/2
RP/0/RP0:hostname(config-if)# ethernet cfm
RP/0/RP0:hostname(config-if-cfm)# ais transmission up interval 1m cos 7
```

buckets size

To configure the size of the buckets in which statistics are collected, use the **buckets size** command in the appropriate mode.

buckets size *number* { **probes** }

Syntax Description

number	Specifies the size of each bucket. The number of probes that each buckets may contain. The range is 1 to 100.
probes	Buckets span multiple probes.

Command Default

None

Command Modes

SLA profile statistics configuration mode

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

A bucket represents a time period during which statistics are collected. All the results received during that time period are recorded in the corresponding bucket. If aggregation is enabled, each bucket has its own set of bins and counters, and only results received during the time period represented by the bucket are included in those counters.

There is a separate bucket for each probe. The time period is determined by how long the probe lasts. This command allows you to modify the size of buckets.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **buckets size** command:

```
RP/0/RP0:router(config-sla-prof-stat-cfg)# buckets size 100 probes
```

clear ethernet cfm ccm-learning-database location

To clear the Continuity Check Message (CCM) learning database, use the **clear ethernet cfm ccm-learning-database location** command in EXEC mode.

clear ethernet cfm ccm-learning-database location {**all***node-id*}

Syntax Description

all	Clears the CCM learning database for all interfaces.
node-id	Clears the CCM learning database for the designated node, entered in *r ack*/*slot*/*module* notation.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all the CFM CCM learning databases on all interfaces:

```
RP/0/RP0:hostname# clear ethernet cfm ccm-learning-database location all
```

clear ethernet cfm interface statistics

To clear the counters for an Ethernet CFM interface, use the **clear ethernet cfm interface statistics** command in exec mode.

clear ethernet cfm interface *interface-path-id* **statistics** [**location** {**all** | **location**}]
clear ethernet cfm interface statistics location {**all***node-id*}

Syntax Description

interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location	(Optional only when used with a specified interface) Clears MAC accounting statistics for a designated interface or for all interfaces.
all	Clears CFM counters for all interfaces.
node-id	Clears CFM counters for a specified interface, using *rack/slot* notation

Command Default

No default behavior or values

Command Modes

Exec

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all the CFM counters from all interfaces:

```
RP/0/RP0:hostname# clear ethernet cfm interface statistics location all
```

clear ethernet cfm local meps

To clear the counters for all MEPs or a specified MEP, use the **clear ethernet cfm local meps** command in EXEC mode.

clear ethernet cfm local meps {**all** | **domain** *domain-name* {**all** | **service** *service-name* {**all** | **mep-id** *id*}} | **interface** *interface-name* {**all** | **domain** *domain-name*}}

Syntax Description

all	Clears counters for all local MEPs.
domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
mep-id *id*	Maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *interface-name*	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The following counters are cleared:

- Number of continuity-check messages (CCMs) sent
- Number of CCMs received
- Number of CCMs received out of sequence
- Number of CCMs received, but discarded due to the **maximum-meps** limit
- Number of loopback messages (LBMs), used for CFM ping
- Number of loopback replies (LBRs), used for CFM ping, sent and received
- Number of LBRs received out of sequence
- Number of LBRs received with bad data (such as LBRs containing padding which does not match the padding sent in the corresponding LBM)
- Number of alarm indication signal (AIS) messages sent and received
- Number of lock (LCK) messages received

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear counters for all MEPs:

```
RP/0/RP0:hostname# clear ethernet cfm local meps all
```

clear ethernet cfm peer meps

To clear all peer MEPs or peer MEPs for a specified local MEP, use the **clear ethernet cfm peer meps** command in EXEC mode.

clear ethernet cfm peer meps {**all** | **domain** *domain-name* {**all** | **service** *service-name* {**all** | **local mep-id** *id*}} | **interface** *interface-name* {**all** | **domain** *domain-name*}}

all	Clears counters for all peer MEPs.
domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance end points belong.
local mep-id *id*	Local maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *interface-name*	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command removes all received CCMs and corresponding peer MEPs from the database (other than those configured with cross-check). The peer MEPs will be added again when the next CCM is received.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all peer MEPs:

```
RP/0/RP0:hostname# clear ethernet cfm peer meps all
```

clear ethernet cfm traceroute-cache

To remove the contents of the traceroute cache, use the **clear ethernet cfm traceroute-cache** command in EXEC mode.

clear ethernet cfm traceroute-cache {**all** | **domain** *domain-name* {**all** | **service** *service-name* {**all** | **mep-id** *id*}} | **interface** *interface-name* {**all** | **domain** *domain-name*}}

Syntax Description

domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance end points belong.
mep-id *id*	Maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *interface-name*	String of a maximum of 80 characters that identifies the Ethernet interface.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear all ethernet cfm traceroute-cache:

```
RP/0/RP0:hostname# clear ethernet cfm traceroute-cache all
```

clear ethernet lmi interfaces

To clear Ethernet LMI statistics on one or all interfaces, use the **clear ethernet lmi interfaces** command in EXEC configuration mode.

clear ethernet lmi interfaces {*type interface-path-id* | **all**}

Syntax Description

type	Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
all	Specifies clearing of LMI statistics for all Ethernet interfaces running the E-LMI protocol.

Command Default

None

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operation
ethernet-services	execute

The following example shows how to clear E-LMI statistics for Gigabit Ethernet interface 0/0/0/0:

```
RP/0/RP0:hostname# clear ethernet lmi interfaces TenGigE0/0/0/0
```

clear ethernet oam statistics

To clear the packet counters on Ethernet OAM interfaces, use the **clear ethernet oam statistics** command.

clear ethernet oam statistics [**interface** *type interface-path-id* | **location** *node-id* **all**]

Syntax Description

interface *type interface-path-id*	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location	Clears the statistics for a specific node. For more information about the syntax for the router, use the question mark (**?**) online help function.
node-id	Path ID of the node.
all	Clears the statistics for all nodes on the router.

Command Default

No parameters clears the packet counters on all Ethernet OAM interfaces.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	execute

Examples

The following example shows how to clear the packet counters on a specific interface:

```
RP/0/RP0:hostname# clear ethernet oam statistics interface TenGigE0/1/5/1
```

clear ethernet sla statistics all

To delete the contents of buckets containing SLA statistics collected by all operations probes, including on-demand operations, use the **clear ethernet sla statistics all** command in EXEC mode.

clear ethernet sla statistics all [**current** | **history**]

Syntax Description

all	Clears statistics for all operations.
history	Clears statistics for buckets which were earlier filled for all operations.
current	Clears statistics for buckets currently being filled for all operations.

Command Default

When **current** or **history** are not used, all buckets (current, old, new, half empty, and full) for all operations (including on-demand operations) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows hwot to use the **clear ethernet sla statistics all** command:

```
RP/0/RP0:router# clear ethernet sla statistics all
```

clear ethernet sla statistics on-demand

To delete the contents of buckets containing SLA statistics collected by on-demand probes, use the **clear ethernet sla statistics on-demand** command in EXEC mode.

clear ethernet sla statistics [**current** | **history**] **on-demand** { **all** | *id* } [**interface** *type R/S/I/P* **domain** [**all** | *domain_name*]] **target** [**all** | **mac address** *address* | **mep-id** *id* | **interface all** }

Syntax Description

current	(Optional) Clears statistics for all buckets currently being filled.
history	(Optional) Clears statistics for all full buckets.
on-demand all	Clears statistics for all on-demand operations.
on-demand *id*	Clears statistics for the on-demand operation of the specified number.
domain all	Clears statistics for on-demand operations for all domains.
domain *domain_name*	Clears statistics for on-demand operations for the specified domain.
target all	Clears statistics for on-demand operations targeted to all MEPs for the specified interface domain.
target mac address*address*	Clears statistics for on-demand operations targeted to the specified MAC address.
target mep-id	Clears statistcs for on-demand operations targeted to the specified MEP ID.
interface all	(Optional) Clears statistics for on-demand operations on all interfaces.

Command Default

When **current** or **history** are not used, all buckets for on-demand operations (current, old, new, half empty, and full) are cleared. This is equivalent to restarting the operation.

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

When you clear a bucket for a currently running probe, the remaining statistics are still collected and stored in that bucket.

Task ID

Task ID	Operation
ethernet-services	execute

Example

This example shows how to use the **clear ethernet sla statistics on-demand** command:

```
RP/0/RP0:router# clear ethernet sla statistics on-demand all
```

connection timeout

To configure the timeout value for an Ethernet OAM session, use the **connection timeout** command in Ethernet OAM configuration mode.

connection timeout *seconds*

Syntax Description

seconds	Connection timeout period in number of lost periodic information OAMPDUs. The range is 2 to 30.

Command Default

The default value is 5.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If no packets are received from the OAM peer in the specified connection timeout period which is measured in number of lost periodic Information OAMPDUs, then the OAM session is brought down, and the negotiation phase starts again.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure the connection timeout value of an Ethernet OAM session:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# connection timeout 20
```

continuity-check archive hold-time

To configure the time limit for how long peer maintenance-end-points (MEPs) are held in the continuity-check database after they have timed out (no more CCMs are received), use the **continuity-check archive hold-time** command in CFM domain service configuration mode. To return to the default value, use the no form of this command.

continuity-check archive hold-time *minutes*
no continuity-check archive hold-time *minutes*

Syntax Description

minutes	Time limit (in minutes) that peer MEPs are held in the continuity-check database before they are cleared. Range is 1 to 65535.

Command Default

The default is 100.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Peer MEPs appear in **show ethernet cfm peer meps** command display output after they timeout (no more continuity check messages (CCMs) are received).

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the time limit for how long continuity-check messages are held in the continuity-check archive:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# continuity-check archive hold-time 100
```

continuity-check interval

To enable continuity check and configure the time interval at which continuity-check messages are transmitted or to set the threshold limit for when a MEP is declared down, use the **continuity-check interval** command in CFM domain service configuration mode. To disable continuity check, use the **no** form of this command.

continuity-check interval *time* [**loss-threshold** *threshold*]
no continuity-check interval *time* [**loss-threshold** *threshold*]

Syntax Description

time	Interval at which continuity-check messages are transmitted. Valid values are: • 100ms: 100 milliseconds • 1s: 1 second • 10s: 10 seconds • 1m: 1 minute • 10m: 10 minutes
loss-threshold *threshold*	(Optional) Specifies the number of continuity-check messages that are lost before CFM declares that a MEP is down (unreachable). Range is 2 to 255. Used in conjunction with **interval**.

Command Default

Continuity check is off by default.

If **loss-threshold** is not specified, the default is 3.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to configure the time interval at which continuity-check messages are transmitted and set the threshold limit for when a MEP is declared down.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# continuity-check interval 100ms loss-threshold 10
```

continuity-check loss auto-traceroute

To configure automatic triggering of a traceroute when a MEP is declared down, use the **continuity-check loss auto-traceroute** command in CFM domain service configuration mode. To disable automatic triggering of a traceroute, use the no form of this command.

continuity-check loss auto-traceroute
no continuity-check loss auto-traceroute

This command has no keywords or arguments.

Command Default

Auto-trigger is off.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The results of the traceroute can be seen using the **show ethernet cfm traceroute-cache** command.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure automatic triggering of a traceroute when a MEP is declared down:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# continuity-check loss auto-traceroute
```

cos (CFM)

To configure the class of service (CoS) for all CFM packets generated by the maintenance end point (MEP) on an interface, use the **cos** command in interface CFM MEP configuration mode. To return to the default CoS, use the no form of this command.

cos *cos*
no cos *cos*

Syntax Description

cos	Class of Service for this MEP. The range is 0 to 7.

Command Default

When not configured, the default CoS value is inherited from the Ethernet interface.

Command Modes

Interface CFM MEP configuration (config-if-cfm-mep)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Configuring the class of service (CoS) on maintenance end points (MEPs) is supported on all Ethernet interfaces.

The specifed CoS value is used for all CFM messages transmitted by the MEP, except for the following:

- Loopback and Linktrace replies—These are transmitted using the CoS value received in the corresponding loopback or linktrace message.
- AIS messages—If a different CoS value is specified in the AIS configuration.

Note For Ethernet interfaces, the CoS is carried as a field in the VLAN tag. Therefore, CoS only applies to interfaces where packets are sent with VLAN tags. If the **cos (CFM)** command is specified for a MEP on an interface that does not have a VLAN encapsulation configured, an error message will be logged and no CFM packets will be sent.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the class of service (CoS) for a maintenance end point (MEP) on an interface.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/1
RP/0/RP0:hostname(config-if)# ethernet cfm mep domain Dm1 service Sv1 mep-id 1
RP/0/RP0:hostname(config-if-cfm-mep)# cos 7
```

debug ethernet cfm packets

To log debug messages about CFM packets that are sent or received by the Ethernet connectivity fault management (CFM) process, use the **debug ethernet cfm packets** command in EXEC mode.

debug ethernet cfm packets [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]] [**packet-type** {**ccm** | **linktrace** | **loopback**}] [**remote mac-address** *mac-address*] [**remote mep-id** *mep-id*] [**sent** | **received**] [**brief** | **full** | **hexdump**]
debug ethernet cfm packets [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]] [**packet-type** {**ais** | **ccm** | **delay-measurement** | **linktrace** | **loopback**}] [**remote mac-address** *mac-address*] [**remote mep-id** *mep-id*] [**sent** | **received**] [**brief** | **full** | **hexdump**]

Syntax Description

domain *domain-name*	(Optional) Filters packets for display by the specified CFM maintenance domain, where *domain-name* is a string of up to 80 characters.
service *service-name*	(Optional) Filters packets for display by the specified service name, where *service-name* is a string of up to 80 characters.
mep-id *mep-id*	(Optional) Filters packets for display by the specified maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *type interface-path-id*	(Optional) Filters packets for display by the specified physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
packet-type	(Optional) Filters packets for display by the specified packet type. The following packet types are valid: • **ais** • **ccm** • **delay-measurement** • **linktrace** • loopback
remote mac-address *mac-address*	(Optional) Filters packets for display by the specified MAC address.
remote mep-id *mep-id*	(Optional) Filters packets for display by the remote MEP properties.
sent	(Optional) Displays only sent packets.
received	(Optional) Displays only received packets.
brief	(Optional) Displays brief information about each packet.

full	(Optional) Displays a full decode of each packet.
hexdump	(Optional) Displays a full decode and hexadecimal output of each packet.

Command Default

If no parameters are specified, all CFM packets are debugged and logged.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines



Caution Enabling packet debugging without filters can have an adverse effect on the performance of the router. To avoid this, filters should always be specified to restrict the output to the domain, service, local MEP, interface, direction and packet type of interest.

Packets can be filtered for debugging by specifying any of the optional parameters.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows a sample output of the **debug ethernet cfm packets** command with a full decode and hexadecimal output for sent and received CCM packets:

```
RP/0/RP0:hostname# debug ethernet cfm packets hexdump

RP/0/RP0:hostname:May 29 14:15:39.621 : cfmd[150]: PKT-RX: TenGigE0/1/0/0 ingress: CCM
packet rcvd at level 2 for domain foo, service foo: length 91, src MAC 0001.0203.0402, dst
 MAC 0180.c200.0032: Packet processed successfully
RP/0/RP0:hostname:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Level 2, opcode CCM,
version 0, RDI bit unset, interval 10s, seq. num 1, remote MEP ID 16, flags 0x05, first TLV
 offset 70, 0 unknown TLVs
RP/0/RP0:hostname:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: MAID: MDID String 'dom4',
 SMAN String 'ser4'
RP/0/RP0:hostname:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Sender ID: Chassis ID
Local 'hpr', Mgmt Addr <none>
RP/0/RP0:hostname:May 29 14:15:39.621 : cfmd[150]: PKT-RX:   CCM: Port status: Up, interface
 status Up
RP/0/RP0:hostname:May 29 14:15:39.622 : cfmd[150]: PKT-RX:   Raw Frame:
RP/0/RP0:hostname:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x40010546 00000001 00100404
 646F6D34 02047365 72340000 00000000 00000000
RP/0/RP0:hostname:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x00000000 00000000 00000000
 00000000 00000000 00000000 00000000 00000000
RP/0/RP0:hostname:May 29 14:15:39.622 : cfmd[150]: PKT-RX:     0x00000000 00000000 00000200
 01020400 01010100 05030768 707200
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX: TenGigE0/1/0/0 egress: CCM packet
 sent at level 2 for domain foo, service foo: length 91, src MAC 0001.0203.0400, dst MAC
0180.c200.0032
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Level 2, opcode CCM,
version 0, RDI bit set, interval 10s, seq. num 16, remote MEP ID 1, flags 0x85, first TLV
```

```
offset 70, 0 unknown TLVs
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: MAID: MDID String 'foo',
 SMAN String 'foo'
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Sender ID: Chassis ID
Local 'ios', Mgmt Addr <none>
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   CCM: Port status: Up, interface
 status Up
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:   Raw Frame:
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x40018546 00000010 00010403
 666F6F02 03666F6F 00000000 00000000 00000000
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x00000000 00000000 00000000
 00000000 00000000 00000000 00000000 00000000
RP/0/RP0:hostname:May 29 14:15:43.625 : cfmd[150]: PKT-TX:     0x00000000 00000000 00000200
 01020400 01010100 05030769 6F7300
```

debug ethernet cfm protocol-state

To log debug messages about CFM state machines and protocol events, use the **debug ethernet cfm protocol-state** command in EXEC mode.

debug ethernet cfm protocol-state [**domain** *domain-name* [**service** *service-name* [**mep-id** *mep-id*]]] [**interface** *type interface-path-id* [**domain** *domain-name*]]

Syntax Description

domain *domain-name*	(Optional) Filters information for display by the specified CFM maintenance domain, where *domain-name* is a string of up to 80 characters.
service *service-name*	(Optional) Filters information for display by the specified service name, where *service-name* is a string of up to 80 characters.
mep-id *mep-id*	(Optional) Filters information for display by the specified maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *type interface-path-id*	(Optional) Filters information for display by the specified physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

If no parameters are specified, all CFM state machines and protocol events are debugged and logged.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Debug messages can be filtered by specifying any of the optional parameters.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows a sample output of the **debug ethernet cfm protocol-state** command.

```
RP/0/RP0:hostname# debug ethernet cfm protocol-state

RP/0/RP0:hostname:May 29 14:41:49.966 : cfmd[150]: CFM: Created 1 local MEPs in PM and
Engine
RP/0/RP0:hostname:May 29 14:41:49.967 : cfmd[150]: CFM: State changes notification for 1
EFPs
```

```
RP/0/RP0:hostname:May 29 14:42:14.143 : cfmd[150]: CFM: New remote MEP detected in domain
foo, service foo for local MEP ID 1 on interface TenGigE0/1/0/0; remote MEP ID 16, MAC
0001.0203.0402, errors: set: mismatched MAID; current: mismatched MAID;
RP/0/RP0:hostname:May 29 14:42:16.644 : cfmd[150]: CFM: Fault alarm notification for local
 MEP - domain: foo, service: foo, MEP ID: 1, interface: TenGigE0/1/0/0, defect: cross-connect
 CCM
RP/0/RP0:hostname:May 29 14:43:32.247 : cfmd[150]: CFM: Initiated exploratory linktrace to
 ffff.ffff.ffff from MEP in domain foo, service foo, MEP ID 1, interface TenGigE0/1/0/0
with ttl 64 and transaction ID 65537, reply-filtering Default and directed MAC None
May 29 14:43:49.155 : cfmd[150]: CFM: Remote MEP timed out in domain foo, service foo for
local MEP ID 1 on interface TenGigE0/1/0/0; remote MEP ID 16, MAC 0001.0203.0402, errors:
cleared: mismatched MAID; current: none
```

domain

To create and name a container for all domain configurations and enter the CFM domain configuration mode, use the **domain** command in CFM configuration mode. To remove the domain, use the no form of this command.

domain *domain-name* **level** *level-value* [**id null** [**dns** *dns-name*][**mac** *H.H.H*][**string** *string*]]
no domain *domain-name* **level** *level-value* [**id null** [**dns** *dns-name*][**mac** *H.H.H*][**string** *string*]]

Syntax Description

domain-name	Administrative name unique to this container, case sensitive ASCII string, up to 80 characters.
level *level-value*	The CFM protocol level of this domain. Range is 0 to 7.
id	(Optional) Maintenance domain identifier (MDID) used in conjunction with one of the following keywords to specify the MDID type and value: • null • **dns** *DNS-name* • **mac** *H.H.H* • **string** *string*
null	(Optional) Null value ID, used with the **id** keyword.
dns *DNS-name*	(Optional) DNS name, up to 43 characters in length, used with the **id** keyword.
mac *H.H.H*	(Optional) Hexadecimal MAC address, used with the **id** keyword.
string *string*	(Optional) Maintenance domain identifier (MDID) value, up to 43 characters in length, used with the **id** keyword. **Note** The domain name may be the used here as the maintenance domain identifier (MDID) if desired.

Command Default

If **id** is not specified, the domain name is used as the MDID.

Command Modes

CFM configuration (config-cfm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The level must be specified.

The maintenance domain identifier (MDID) is used as the first part of the maintenance association identifier (MAID) in CFM frames. If the MDID is not specified, the domain name is used as the MDID by default.

Multiple domains may be specified at the same level. If the MDID is specified as NULL, the MAID is constructed as a short maintenance association name.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create a domain and give it a domain name, level, and maintenance domain identifier (MDID):

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)#
```

efd

To enable Ethernet Fault Detection (EFD) on all down Maintenance End Points (MEPs) in a down MEPs service, use the **efd** command in CFM domain service configuration mode. To disable EFD, use the no form of this command.

efd {**protection-switching**}
no efd

Syntax Description

protection-switching	Enables protection switching, which causes high-priority notifications to be sent when peer MEPs specified for cross-check time out, or when CCMs are received with the RDI bit set. **Note** The high-priority notifications only apply to MEPs that are offloaded. In the case of non-offloaded MEPs, enabling protection switching has no effect, and the command only enables EFD.

Command Default

EFD is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

EFD can only be enabled for down MEPs within a down MEPs service.

If the **efd** command is issued when any MEP in the service has any of the following error conditions, the MEP will shut down the interface:

- The MEP appears cross-connected to another MAID.
- The MEP is receiving invalid CCMs, such as receiving its own MAC or MEP-ID.
- All peer MEPs are reporting a state other than UP via the Port Status TLV.
- A peer MEP is reporting a state other than UP in Interface Status TLV.
- When cross-check is configured, and a session with an expected MEP times out, EFD is triggered on the local MEP.
- No CCMs are received from a peer MEP appearing in the configured cross-check list.
- An RDI is being received from a peer MEP.
- The MEP is receiving an AIS/LCK.

The MEP will bring the interface back up when the error condition is no longer detected.



Note When an interface is shut down by a MEP using EFD, the MEP will continue to send and receive CCMs and other CFM messages.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to enable EFD:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain D1 level 1
RP/0/RP0:hostname(config-cfm-dmn)# service S1 down-meps
RP/0/RP0:hostname(config-cfm-dmn-svc)# efd
```

ethernet cfm (global)

To enter Connectivity Fault Management (CFM) configuration mode, use the **ethernet cfm (global)** command in global configuration mode.

ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter the CFM configuration mode.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)#
```

ethernet cfm (interface)

To enter interface CFM configuration mode, use the **ethernet cfm (interface)** command in interface configuration mode.

ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

No MEPs are configured on the interface.

Command Modes

Interface configuration (config-if)

Subinterface configuration (config-subif)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter interface CFM configuration mode:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/1
RP/0/RP0:hostname(config-if)# ethernet cfm
RP/0/RP0:hostname(config-if-cfm)#
```

ethernet lmi

To enable Ethernet Local Managment Interface (E-LMI) operation on an interface and enter interface Ethernet LMI configuration mode, use the **ethernet lmi** command in interface configuration mode. To disable Ethernet LMI and return to the default, use the **no** form of the command.

ethernet lmi
no ethernet lmi

Syntax Description

This command has no keywords or arguments.

Command Default

Ethernet LMI is disabled.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Ethernet LMI is supported only on physical Ethernet interfaces.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to enable Ethernet LMI on a Ten Gigabit Ethernet interface and enter Ethernet LMI configuration mode:

```
RP/0/RP0:hostname# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet lmi
RP/0/RP0:hostname(config-if-elmi)#
```

ethernet oam

To enable Ethernet Link OAM, with default values, on an interface and enter interface Ethernet OAM configuration mode, use the **ethernet oam** command in interface configuration mode. To disable Ethernet Link OAM, use the **no** form of this command.

ethernet oam
no ethernet oam

Syntax Description

This command has no keywords or arguments.

Command Default

When enabled on an interface, the Ethernet Link OAM default values apply.

Command Modes

Interface configuration (config-if)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

When you enable Ethernet Link OAM on an interface, the default Ethernet Link OAM values are applied to the interface. For the default Ethernet Link OAM values, see the related Ethernet Link OAM commands.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable Ethernet Link OAM and enter interface Ethernet OAM configuration mode.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/5/6
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)#
```

ethernet sla

To enter the Ethernet Service Level Agreement (SLA) configuration mode, use the **ethernet sla** command in Global Configuration mode.

ethernet sla

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values.

Command Modes

Global Configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to you the **ethernet sla** command:

```
RP/0/RP0:router(config)# ethernet sla
```

ethernet oam profile

To create an Ethernet Operations, Administration and Maintenance (EOAM) profile and enter EOAM configuration mode, use the **ethernet oam profile** command. To delete an EOAM profile, use the **no** form of this command.

ethernet oam profile *profile-name*
no ethernet oam profile *profile-name*

Syntax Description

profile-name	Text string name of the OAM profile. The maximum length is 32 bytes.

Command Default

No default behavior or values

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Before you can delete an EOAM profile, you must remove the profile from all interfaces to which it is attached.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to create an Ethernet OAM profile and enter Ethernet OAM configuration mode:

```
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)#
```

ethernet uni id

To specify a name for the Ethernet User-Network Interface (UNI) link, use the **ethernet uni id** command in interface configuration mode.

ethernet uni id *name*

Syntax Description

name	Maximum of 64 characters to identify the Ethernet UNI link.

Command Default

No name is specified for the Ethernet UNI link.

Command Modes

Interface (config-if)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The UNI name should be unique among all UNIs that are part of a given Ethernet Virtual Connection (EVC).

When the Ethernet Local Management Interface (E-LMI) protocol is running on the UNI, the name specified in the **ethernet uni id** command is advertised by E-LMI to the Customer Edge (CE) device. It is also carried in Ethernet Connectivity Fault Management (CFM) Continuity Check Messages (CCMs) if there is an Up MEP on the UNI, and passed to E-LMI on the peer MEP so that it can be advertised to the remote CE device.

Task ID

Task ID	Operation
interface	read, write

The following example shows how to configure the UNI name called "PE1-CustA-Slot0-Port0" on Ten Gigabit Ethernet interface 0/0/0/0:

```
RP/0/RP0:hostname(config)# interface TenGigE0/0/0/0
RP/0/RP0:hostname(config-if)# ethernet uni id PE1-CustA-Slot0-Port0
```

extension remote-uni disable

To disable transmission of the Cisco-proprietary Remote UNI Details information element in Ethernet LMI (E-LMI) STATUS messages, use the **extension remote-uni disable** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

extension remote-uni disable
no extension remote-uni disable

This command has no keywords or arguments.

Command Default

The Cisco-proprietary Remote UNI Details information element is sent in E-LMI STATUS messages.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Use the **extension remote-uni disable** command to have stricter conformance to the MEF 16 E-LMI specification for information elements in STATUS messages.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to disable transmission of the Cisco-proprietary Remote UNI Details information element:

```
RP/0/RP0:hostname# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet lmi
RP/0/RP0:hostname(config-if-elmi)# extension remote-uni disable
```

frame-seconds threshold

To configure the thresholds that trigger a frame-seconds error event, use the **frame-seconds threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame-seconds threshold low *threshold* [**high** *threshold*]
no frame-seconds threshold low *threshold* [**high** *threshold*]

Syntax Description

low *threshold*	Low threshold, in seconds, that triggers a frame-seconds error event. The range is 0 to 900.
high *threshold*	(Optional) High threshold, in seconds, that triggers a frame-seconds error event. The range is 1 to 900. The high threshold value can be configured only in conjunction with the low threshold value.

Command Default

The default value is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

When the low threshold is passed, a frame-seconds error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame-seconds error event:

```
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# link-monitor
RP/0/RP0:hostname(config-eoam-lm)# frame-seconds threshold low 10 high 900
```

frame-seconds window

To configure the window size for the OAM frame-seconds error event, use the **frame-seconds window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame-seconds window *window*
no frame-seconds window *window*

Syntax Description

window	Size of the window for a frame-seconds error in milliseconds. The range is 10000 to 900000.

Command Default

The default value is 60000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a frame-seconds error.

```
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# link-monitor
RP/0/RP0:hostname(config-eoam-lm)# frame-seconds window 900000
```

frame threshold

To configure the thresholds that triggers an Ethernet OAM frame error event, use the **frame threshold** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the threshold to the default value, use the **no** form of this command.

frame threshold low *threshold* [**high** *threshold*]
no frame threshold low *threshold* [**high** *threshold*]

Syntax Description

low *threshold*	Low threshold, in symbols, that triggers a frame error event. The range is 0 to 12000000.
high *threshold*	(Optional) High threshold, in symbols, that triggers a frame error event. The range is 0 range is 0 to 12000000. The high threshold value can be configured only in conjunction with the low threshold value.

Command Default

The default low threshold is 1.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

When the low threshold is passed, a frame error event notification is generated and transmitted to the OAM peer. Additionally, any registered higher level OAM protocols, such as Connectivity Fault Management (CFM), are also notified. When the high threshold is passed, the configured high threshold action is performed in addition to the low threshold actions. The high threshold is optional and is configurable only in conjunction with the low threshold.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the low and high thresholds that trigger a frame error event:

```
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# link-monitor
RP/0/RP0:hostname(config-eoam-lm)# frame threshold low 100 high 60000
```

frame window

To configure the frame window size of an OAM frame error event, use the **frame window** command in Ethernet OAM link monitor or interface Ethernet OAM link monitor configuration mode. To return the window size to the default value, use the **no** form of this command.

frame window *window*
no frame window *window*

Syntax Description

window	Size of the window for a frame error in seconds. The range is 1000 to 60000.

Command Default

The default value is 1000.

Command Modes

Ethernet OAM link monitor configuration (config-eoam-lm)

Interface Ethernet OAM link monitor configuration (config-if-eoam-lm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the window size for a frame error.

```
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# link-monitor
RP/0/RP0:hostname(config-eoam-lm)# frame window 60
```

hello-interval

To specify the time interval between hello packets for an Ethernet OAM session, use the **hello-interval** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of the command.

hello-interval {**100ms** | **1s**}
no hello-interval {**100ms** | **1s**}

Syntax Description

100ms	Specifies a 100-millisecond interval between hello packets.
1s	(Interface Ethernet OAM configuration mode only) Specifies a 1-second interval between hello packets. This is the default.

Command Default

The default is 1 second.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If a profile exists on the interface, setting the mode with this command overrides the mode setting in the profile on an interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to set the hello interval to 100 milliseconds on a Gigabit Ethernet interface:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/5/6
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# profile Profile_1
RP/0/RP0:hostname(config-if-eoam)# hello-interval 100ms
```

log ais

To configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received, use the **log ais** command in CFM domain service configuration mode. To disable AIS logging, use the no form of this command.

log ais
no log ais

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure AIS logging for a Connectivity Fault Management (CFM) domain service to indicate when AIS or LCK packets are received:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain D1 level 1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# log ais
```

log continuity-check errors

To enable logging of continuity-check errors, use the **log continuity-check errors** command in CFM domain service configuration mode. To disable logging of continuity-check errors, use the no form of this command.

log continuity-check errors
no log continuity-check errors

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The following types of continuity-check errors are logged:

- Incorrect level (cross-connect)
- Incorrect interval
- Incorrect MA-ID (cross-connect)
- Local MAC address received (loop)
- Local MEP-ID received (mis-config)
- Invalid source MAC received
- RDI received

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable logging of continuity check errors:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# log continuity-check errors
```

log continuity-check mep changes

To enable logging of peer maintenance-end-point (MEP) state changes, use the **log continuity-check mep changes** command in CFM domain service configuration mode. To disable logging of peer MEP state changes, use the no form of this command.

log continuity-check mep changes
no log continuity-check mep changes

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command enables logging of state changes that occur in MEPs for a particular service, such as:

- New peer MEP detected.
- Peer MEP time out (loss of continuity) detected.

Note If a Local MEP is receiving Wrong Level CCMs, then a transient timeout might occur when correct Level CCMs are received again.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable logging of continuity-check mep changes:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# log continuity-check mep changes
```

log crosscheck errors

To enable logging of crosscheck error events, use the **log crosscheck errors** command in CFM domain service configuration mode. To disable logging of crosscheck error events, use the no form of this command.

log crosscheck errors
no log crosscheck errors

Syntax Description

This command has no keywords or arguments.

Command Default

Logging is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command enables logging of crosscheck errors, such as:

- MEPs missing
- Additional peer MEPs detected

Note Crosscheck errors are only detected and logged when crosscheck is configured using the **mep crosscheck** and **mep-id** commands.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable logging of crosscheck errors:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# log crosscheck errors
```

log disable

To turn off syslog messages for Ethernet LMI (E-LMI) errors or events, use the **log disable** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

log {**errors** | **events**} **disable**
no log {**errors** | **events**} **disable**

Syntax Description

errors	Disables logging of E-LMI protocol and reliability errors.
events	Disables logging of significant E-LMI protocol events.

Command Default

E-LMI syslog messages are enabled for errors and events.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

To see statistics on E-LMI protocol and reliability errors and protocol events, use the **show ethernet lmi interfaces** command.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to disable logging of E-LMI protocol and reliability errors:

```
RP/0/RP0:hostname# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet lmi
RP/0/RP0:hostname(config-if-elmi)# log errors disable
```

The following example shows how to disable logging of E-LMI events:

```
RP/0/RP0:hostname# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet lmi
RP/0/RP0:hostname(config-if-elmi)# log events disable
```

log efd

To enable logging of Ethernet Fault Detection (EFD) state changes to an interface (such as when an interface is shut down or brought up via EFD), use the **log efd** command in CFM domain service configuration mode. To disable EFD logging, use the no form of this command.

log efd
no log efd

Syntax Description

This command has no keywords or arguments.

Command Default

EFD logging is disabled.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

When EFD logging is enabled, a syslog is generated whenever the EFD state of an interface changes.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable EFD logging:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain D1 level 1
RP/0/RP0:hostname(config-cfm-dmn)# service S1 down-meps
RP/0/RP0:hostname(config-cfm-dmn-svc)# log efd
```

maximum-meps

To configure the maximum number of maintenance end points (MEPs) for a service, use the **maximum-meps** command in CFM domain service configuration mode. To return to the default value, use the no form of this command.

maximum-meps *number*

Syntax Description

number	Maximum number of MEPs allowed for this service. The range is 2 to 8190.

Command Default

The default is 100.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command configures the maximum number of peer maintenance end points (MEPs). It does not limit the number of local MEPs. The configured **maximum-meps** *number* must be at least as great as the number of configured crosscheck MEPs.

The **maximum-meps** *number* limits the number of peer MEPs, for which local MEPs store continuity-check messages (CCMs). When the limit is reached, CCMs from any new peer MEPs are ignored, but CCMs from existing peer MEPs continue to be processed normally.

The **maximum-meps** *number* also limits the size of the CCM learning database.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to configure the maximum number of maintenance end points (MEPs) for a service:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# maximum-meps 4000
```

mep crosscheck

To enter CFM MEP crosscheck configuration mode, use the **mep crosscheck** command in CFM domain service configuration mode.

mep crosscheck

Syntax Description

This command has no keywords or arguments.

Command Default

Not configured, in which case no crosscheck is performed on the MEP.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enter CFM MEP crosscheck configuration mode:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# mep crosscheck
RP/0/RP0:hostname(config-cfm-xcheck)#
```

mep-id

To enable crosscheck on a maintenance end point (MEP), use the **mep-id** command in CFM MEP crosscheck configuration mode. To disable crosscheck on a MEP, use the **no** form of this command.

mep-id *mep-id-number* [**mac-address** *mac-address*]
no mep-id *mep-id-number* [**mac-address** *mac-address*]

Syntax Description

mac *mac-address*	(Optional) MAC address of the interface upon which the MEP resides, in standard hexadecimal format, hh:hh:hh:hh:hh:hh.

Command Default

Not configured, in which case no crosscheck is performed on the MEP.

Command Modes

CFM MEP crosscheck configuration (config-cfm-xcheck)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command enables Crosscheck on the maintenance end point (MEP) specified by the MEP ID number (*mep-id-number*). The range for MEP ID numbers is 1 to 8191. Crosscheck is enabled when the first crosscheck MEP is entered.

Repeat this command for every MEP that you want to include in the expected set of MEPs for crosscheck.

Crosscheck detects the following two additional defects for continuity-check messages (CCMs) on peer MEPs:

- Peer MEP missing—A crosscheck MEP is configured, but has no corresponding peer MEP from which to receive CCMs.
- Peer MEP unexpected—A peer MEP is sending CCMs, but no crosscheck MEP is configured for it.

Note If more than one local MEP is configured for a service, all the local MEPs must be included in the list of configured crosscheck MEPs.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to statically define a maintenance end point (MEP) under a service, so that it can be crosschecked.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# mep crosscheck
```

```
RP/0/RP0:hostname(config-cfm-xcheck)# mep-id 10
```

mep domain

To create a maintenance end point (MEP) on an interface, use the **mep domain** command in interface CFM configuration mode. To remove the MEP from the interface, use the **no** form of this command.

mep domain *domain-name* **service** *service-name* **mep-id** *id-number*
no mep domain *domain-name* **service** *service-name* **mep-id** *id-number*

Syntax Description

domain *domain-name*	Domain in which to create the maintenance end point (MEP).
service *service-name*	Operation service in which to create the maintenance end point (MEP).
mep-id *id-number*	Maintenance end points (MEP) identifier to assign to this MEP. The range is 1 to 8191.

Command Default

No MEPs are configured on the interface.

Command Modes

Interface CFM configuration (config-if-cfm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

CFM Maintenance end points (MEPs) are supported on all Ethernet interfaces and VLAN subinterfaces.

This command creates MEPs in the UP MEP state, unless the specified **service** is configured with MEPs in the DOWN MEP state.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to create a MEP using an ID of 1 on the CFM domain named DM1 and service named Sv1:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/1
RP/0/RP0:hostname(config-if)# ethernet cfm
RP/0/RP0:hostname(config-if-cfm)# mep domain Dm1 service Sv1 mep-id 1
```

mib-retrieval

To enable MIB retrieval in an Ethernet OAM profile or on an Ethernet OAM interface, use the **mib-retrieval** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return the interface to the default (disabled), use the **disable** keyword.

mib-retrieval [**disable**]

Syntax Description

disable	Disables MIB retrieval the Ethernet OAM interface.

Command Default

MIB retrieval is disabled by default.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

When MIB retrieval is enabled on an Ethernet OAM interface, the OAM client advertises support for MIB retrieval to the peer.

When MIB retrieval is disabled (the default), only the enable form of the **mib-retrieval** command is available in interface Ethernet OAM configuration mode. The **disable** keyword is provided to override the profile when needed.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable MIB retrieval on a Gigabit Ethernet interface:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/5/6
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# mib-retrieval
```

mip auto-create

To enable the automatic creation of Maintenance Intermediate Points (MIPs) in a cross-connect, use the **mip auto-create** command in CFM domain service configuration mode. To disable automatic creation of MIPs, use the **no** form of this command.

mip auto-create {**all** | **lower-mep-only**} {}
no mip auto-create {**all** | **lower-mep-only**}

Syntax Description

all	Enables automatic creation of MIPs on all interfaces.
lower-mep-only	[Optional] Enables automatic creation of MIPs only on interfaces with a MEP at a lower level.

Command Default

None

Command Modes

CFM domain service configuration (config-cfm-dmn-svc) mode

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The MIP auto-creation feature is configured only for services associated with cross-connects.

Unlike MEPs, MIPs are not explicitly configured on each interface. MIPs are created automatically according to the algorithm specified in the CFM 802.1ag standard. For each interface, the algorithm, in brief, operates in this manner:

- The cross-connect for the interface is found, and all services associated with that cross-connect are considered for MIP auto-creation.
- The level of the highest-level MEP on the interface is found. From among the services considered above, the service in the domain with the lowest level that is higher than the highest MEP level is selected. If there are no MEPs on the interface, the service in the domain with the lowest level is selected.
- The MIP auto-creation configuration for the selected service is examined to determine whether a MIP should be created.



Note Configuring a MIP auto-creation policy for a service does not guarantee that a MIP will automatically be created for that service. The policy is only considered if that service is first selected by the algorithm.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

This example shows how to enable the automatic creation of MIPs for all interfaces in a cross connect:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# mip auto-create all
```

mode (Ethernet OAM)

To configure the Ethernet OAM mode on an interface, use the **mode** command in Ethernet OAM or interface Ethernet OAM configuration mode. To return to the default, use the **no** form of the command.

mode {**active** | **passive**}

Syntax Description

passive	Specifies that the interface operates in passive mode, where it cannot initiate the discovery process, generate a retrieval PDU.
active	(Interface Ethernet OAM configuration only) Specifies that the interface operates in active mode to initiate processes and make requests.

Command Default

The default is active.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If a profile exists on the interface, setting the mode with this command overrides the mode setting in the profile on an interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable Ethernet OAM passive mode on a Ten Gigabit Ethernet interface:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/5/6
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# profile Profile_1
RP/0/RP0:hostname(config-if-eoam)# mode passive
```

packet size

To configure the minimum size (in bytes) for outgoing probe packets, including padding when necessary, use the **packet size** command in SLA profile probe configuration mode.

packet size *bytes*

Syntax Description

bytes	Minimum size of the packet including padding when necessary. The range is 1 to 9000 bytes. This value refers to the total frame size including the Layer 2 or Layer 3 packet header.

Command Default

The minimum packet size is not configured. When a minimum packet size is configured and padding is required, the default padding is all 0s.

Command Modes

SLA profile probe configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

For supported packet types, this configuration determines the minimum size of all outgoing SLA probe packets, including the size to which they are padded. The amount of padding that is added to a packet depends on the type of frame that is sent and the amount of data in the frame.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **packet size** command:

```
RP/0/RP0:router(config-sla-prof-pb)# packet size 9000
```

priority

To configure the priority of outgoing SLA probe packets, use the **priority** command in SLA profile probe configuration mode.

priority *priority_level*

Syntax Description

priority_level	Priority level. The range is 0 to 7.

Command Default

No default behavior or values.

Command Modes

SLA profile probe configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

The default priority for all CFM operation types is the Class of Service (CoS) priority for the egress interface. SLA operations that are configured on Maintenance End Points (MEPs) do not use the Class of Service (CoS) settings that are configured independently on Maintenance End Points (MEPs). Use this command to change the priority level of SLA probe packets.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **priority** command:

```
RP/0/RP0:router(config-sla-prof-pb)# priority 7
```

probe

To enter SLA profile probe configuration mode, use the **probe** command in SLA profile configuration mode.

probe

Syntax Description This command has no keywords or arguments.

Command Default No default behavior or values.

Command Modes SLA profile configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines Each profile may optionally have 1 probe submode.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **probe** command:

```
RP/0/RP0:router(config-sla-prof)# probe
```

ping ethernet cfm

To send Ethernet connectivity fault management (CFM) loopback messages to a maintenance end point (MEP) or MAC address destination from the specified source MEP, and display a summary of the responses, use the **ping ethernet cfm** command in EXEC mode.

ping ethernet cfm domain *domain-name* **service** *service-name* {**mac-address** *mac* | **mep-id** *id*} **source** [**mep-id** *source-id*] **interface** *interface-path-id* [**cos** *cos-val*] [**count** *n*] [**frame-size** *size*] [**data-pattern** *hex*] [**interval** *seconds*] [**timeout** *time*]

Syntax Description

domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the maintenance points reside. **Note** For more information about the syntax, use the question mark (**?**) online help function.
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
mac-address *mac*	6-byte ID number of the MAC address of the destination MEP.
mep-id *id*	Maintenance end point (MEP) ID number of the destination MEP. The range for MEP ID numbers is 1 to 8191.
source	Source information.
mep-id *source-id*	(Optional) Maintenance end point (MEP) ID number of the source MEP. The range for MEP ID numbers is 1 to 8191.
interface *interface-path-id*	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
cos *cos-val*	(Optional) Class of Service (CoS) value that identifies the class of traffic of the source MEP. The valid values are from 0 to 7.
count *n*	(Optional) Number of pings as an integer value. The default is 5.
frame-size *size*	(Optional) Size, as an integer, of the ping frames. Frames are padded to read the specified size. The default is 0 (no padding)
data-pattern *hex*	(Optional) Hexadecimal value to be used as the data pattern for padding within a ping frame, when padding is required due to the **frame-size** configuration. The default is 0.

interval *seconds*	(Optional) Specifies, in seconds, the time between pings. The *n* argument is entered in seconds. The default is 1 second.
timeout *time*	(Optional) Timeout, in seconds, for the ping packet. The default is 2.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Before you can use this command, a local MEP must be configured for the domain and the interface.

The command displays the following infomation:

- Number of loopback message being sent
- Timeout period
- Domain name
- Domain level
- Service name
- Source MEP ID
- Interface
- Target MAC address
- MEP ID – If no MEP ID is specified, “No MEP ID specified” is displayed.
- Running time for the current ping operation to complete



Note The remaining information is not displayed until the current ping operation is complete. If the user interrupts the operation during this time (by pressing control-C), the prompt is returned and no further information is displayed. However, all loopback messages continue to be sent.

- Success rate of responses received – displayed as a percentage followed by the actual number of responses
- The round trip time minimum/maximum/average in milliseconds
- Out-of-sequence responses – displayed as a percentage followed by the actual number of out-of-sequence responses when at least one response is received. An out-of-sequence response occurs if the first response does not correspond with the first message sent, or a subsequent response is not the expected next response after a previously received response.
- Bad data responses – displayed as a percentage followed by the actual number of bad data responses when at least one response is received. A bad data response occurs if the padding data in the response does not match the padding data that in the sent message. This can only happen if the sent message is padded using the **frame-size** option.
- Received packet rate – displayed in packets per second when at least two responses are received. This approximate rate of response is the time between the first response received and the last response received, divided by the total number of responses received.

Task ID

Task ID	Operations
basic-services	execute
ethernet-services	execute

Examples

The following example shows how to send an Ethernet CFM loopback message:

```
RP/0/RP0:hostname# ping ethernet cfm domain D1 service S1 mep-id 16 source
interface TenGigE0/0/0/0

Type escape sequence to abort.
Sending 5 CFM Loopbacks, timeout is 2 seconds -
Domain foo (level 2), Service foo
Source: MEP ID 1, interface TenGigEt0/0/0/0
Target: 0001.0002.0003 (MEP ID 16):
  Running (5s) ...
Success rate is 60.0 percent (3/5), round-trip min/avg/max = 1251/1349/1402 ms
Out-of-sequence: 0.0 percent (0/3)
Bad data: 0.0 percent (0/3)
Received packet rate: 1.4 pps
```

polling-verification-timer

To set or disable the Metro Ethernet Forum (MEF) T392 Polling Verification Timer (PVT) for Ethernet Local Management Interface (E-LMI) operation, use the **polling-verification-timer** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

polling-verification-timer {*interval* | **disable**}
no polling-verification-timer {*interval* | **disable**}

Syntax Description

interval	Number of seconds in the range 5 to 30. The default is 15.
disable	Turns off the timer.

Command Default

The T392 Polling Verification Timer is set to 15 seconds.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The PVT specifies the allowable time between transmission of a STATUS message and receipt of a STATUS ENQUIRY from the Customer Edge (CE) device before recording an error. If the PVT expiration time is reached on consecutive packets for the number of times specified by the **status-counter** command without a STATUS ENQUIRY being received, the E-LMI protocol status is changed to Down.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to set the MEF Polling Verification Timer for E-LMI to 30 seconds:

```
RP/0/RP0:hostname# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet lmi
RP/0/RP0:hostname(config-if-elmi)# polling-verification-timer 30
```

profile (EOAM)

To attach an Ethernet OAM profile to an interface, use the **profile** command in interface Ethernet OAM configuration mode. To remove the profile from the interface, use the no form of this command.

profile *name*
no profile *name*

Syntax Description

name	Text name of the Ethernet OAM profile to attach to the interface.

Command Default

No profile is attached.

Command Modes

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

When an Ethernet OAM profile is attached to an interface using this command, all of the parameters configured for the profile are applied to the interface.

Individual parameters that are set by the profile configuration can be overridden by configuring them directly on the interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to attach an Ethernet OAM profile to a Ten Gigabit Ethernet interface.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/5/6
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# profile Profile_1
```

profile

To create an SLA operation profile and enter the SLA profile configuration mode, use the **profile** command in SLA configuration mode.

profile *profile_name* **type** { **cfm-delay-measurement** | **cfm-loopback** | **cfm-synthetic-loss-measurement** }

Syntax Description

profile_name	Profile name, case-sensitive string up to 31 characters in length. The name *all*cannot be used.
type	Specifies the type of packets sent by operations in this profile. Valid types are: • **cfm-delay-measurement** : CFM delay measurement packets • **cfm-loopback** : CFM loopback packets • **cfm-synthetic-loss-measurement** : CFM synthetic loss measurement packets

Command Default

No default behavior or values

Command Modes

Ethernet SLA configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

Each profile is uniquely identified by its name. Changing the packet **type** for the profile removes all stored data from the profile and is equivalent to deleting the profile and creating a new profile.

Note You can configure the Ethernet SLA profile to use Y.1731 DMM frames. The restriction of 150 configured Ethernet SLA operations for each CFM MEP is removed not only for profiles using DMM frames, but also for profiles using the other supported Y.1731 frame types, such as loopback measurement and synthetic loss measurement.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to configure an SLA operation profile and enter the SLA profile configuration mode:

```
RP/0/RP0:router(config-sla)# profile  p1  type  cfm-delay-measurement
```

require-remote

To require that certain features are enabled before an OAM session can become active, or to disable a requirement that is part of an active OAM profile, use the **require-remote** command in Ethernet OAM configuration or interface Ethernet OAM configuration mode. To remove the configuration and return to the default, use the **no** form of this command.

require-remote {**mode** {**active** | **passive**} | **mib-retrieval** | [**disabled**]}
no require-remote {**mode** {**active** | **passive**} | **mib-retrieval** | [**disabled**]}

Syntax Description

mode {**active** | **passive**}	Requires that active or passive mode is configured on the peer device before the OAM profile can become active.
mib-retrieval	Requires that MIB-retrieval is configured on the peer device before the OAM profile can become active.
disabled	(Optional—Interface Ethernet OAM configuration only) Overrides the Ethernet OAM profile configuration for this option and disables the feature at the specified interface.

Command Default

No default behavior or values

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The **disabled** keyword is available only when you are configuring Ethernet OAM on an interface, and is used to override the configuration that is part of an active OAM profile.

The **disabled** keyword does not remove the configuration of the command. Use the **no** form of this command to do that.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to require that specific features are enabled before an OAM session can become active

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# require-remote mode active
RP/0/RP0:hostname(config-eoam)# require-remote mib-retrieval
```

The following example shows how to disable requirements on a particular interface that is part of an active OAM profile:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/6/5/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# require-remote mode active disabled
RP/0/RP0:hostname(config-if-eoam)# require-remote mib-retrieval disabled
```

schedule

To schedule an operation probe in a profile, use the **schedule** command in SLA profile configuration mode.

Hourly Scheduling

schedule every number { hours | minutes} { for duration { **seconds** | **minutes** | **hours** }

Daily Scheduling

schedule every day [at hh:mm] { for duration { **seconds** | **minutes** | **hours** | **days** }

Weekly Scheduling

schedule every week at hh:mm { for duration { **seconds** | **minutes** | **hours** | **days** | **week** }

Syntax Description

every number (hours | minutes}	Schedules a probe every specified number of hours or minutes , for the specified duration .
every day [at hh:mm]	Schedules a probe every day at the scheduled time for a specified duration.
every week at hh:mm	Schedules a probe one day per week, on the specified day , at the specified time (hh:mm), for the specified duration .
day	Day of the week.
hh:mm [ss]	Time of day in 24-hour format.
for duration	Duration of the probe. The valid values are: • 1 week • 1 day • 1 to 3600 seconds • 1 to 1440 minutes • 1 to 24 hours
number	Number of hours or minutes. The values are: • For hours, acceptable values are the factors of 24: 1, 2, 3, 4, 6, 8, 12 • For minutes, acceptable values are the factors of 1440 up to 90: 1, 2, 3, 4, 5, 6, 8, 9, 10, 12, 15, 16, 18, 20, 24, 30, 32, 36, 40, 45, 48, 60, 80, 90

Command Default

The default is every hour.

Command Modes

SLA profile configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

Schedules are optional, but a profile may contain only one schedule.

The **for** duration option must be specified if (and only if) the probe is configured to send multiple packets (or bursts of packets), using the **send packet every** or **send burst every** configuration of the **send (SLA)** command. If the **send (SLA)** command is not configured for the probe, or if **send burst once** is configured, the **for** duration option must not be used. If it is used in those cases, an error is returned.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **schedule** command for weekly scheduling:

```
RP/0/RP0:router(config-sla-prof)# schedule every week on Wednesday at 23:30 for 1 hour
```

send

To configure the number and timing of packets sent by a probe in an operations profile, use the **send** command in SLA profile probe configuration mode.

send { **burst** | **packet** } { **every** *number* { **seconds** | **minutes** | **hours** } } | **once** }
packet count *packets* **interval** *number* { **seconds** | **milliseconds** }

Syntax Description

burst every *number*	Sends a burst of packets every specified number of seconds, minutes, or hours, where number is in the following range: • 1–3600 seconds • 1–1440 minutes • 1–168 hours
burst once	Sends a single burst one time.
packet count *packets*	Specifies the number of packets in each burst. The range is 2 to 600.
interval *number*	Specifies the time interval (in seconds or milliseconds) between each packet in a burst, where number is in the following range: • 1–30 seconds • 50–10000 milliseconds in multiples of 50 milliseconds
packet every *number*	Sends one packet every specified number of milliseconds, seconds, minutes, or hours, where number is in the following range: • 1–3600 seconds • 1–1440 minutes • 1–168 hours • 50–10000 milliseconds in multiples of 50 milliseconds
packet once	Sends a single packet one time.

Command Default

If the operation is configured to measure jitter or data packet loss, the default is to send a single burst of 2 packets with a second interval between the packets.

If the operation is configured to measure synthetic packet loss, the default is to send a single burst of 10 packets with a 100 millisecond interval between the packets.

If the operation does not calculate jitter, data, or synthetic packet loss, the default is to send a single packet one time.

Command Modes

SLA profile probe configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

The minimum **interval** supported is platform and packet-type dependent, so certain a configuration may cause an error even if it falls within the specified limits. In the case of Ethernet SLA, the shortest interval for packet types not used for synthetic loss measurement is 100ms.

When **burst once** is sent, a single burst is sent at the start of the probe. If the schedule defines a duration for the probe, a configuration warning is flagged. The same is true if the default is in effect.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **send** command:

```
RP/0/RP0:router(config-sla-prof-pb)# send burst every 60 seconds packet count 30 interval
1 second
```

statistics

To enable the collection of Ethernet Service Level Agreement (SLA) statistics, and enter the SLA profile statistics configuration mode, use the **statistics measure** command in SLA profile configuration mode.

statistics measure { **round-trip-delay** | **round-trip-jitter** }

Syntax Description

round-trip-delay	CFM delay measurement and CFM loopback profile types only) Enables the collection of statistics that measure the delay in the round trip of a packet.
round-trip-jitter	(CFM delay measurement and CFM loopback profile types only) Enables the collection of statistics that measure the amount of delay variance in the round trip of a packet.

Command Default

No statistics are collected

Command Modes

SLA profile configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

For statistics to be collected, at least one statistics entry must be present in each profile. To measure more than one type of statistic, this command may be configured more than once in a single profile.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

This example shows how to use the **statistics measure** command:

```
RP/0/RP0:router(config-sla-prof)# statistics measure round-trip-delay
```

service

To associate a service with a domain and enter CFM domain service configuration mode, use the **service** command in CFM domain configuration mode. To remove a service from a domain, use the **no** form of this command.

service *service-name* {**down-meps** | **xconnect group** *xconnect-group-name***p2p** *xconnect-name* | }} [**id** [**icc-based** *icc-string umc-string*] | |[**string** *text*] | [**number** *number*] | [**vlan-id** *id-number*] | [**vpn-id** *oui-vpnid*]]
no service *service-name* {**down-meps** | **xconnect group** *xconnect-group-name* **p2p** *xconnect-name* | }} [**id** [**icc-based** *icc-string umc-string*] | |[**string** *text*] | [**number** *number*] | [**vlan-id** *id-number*] | [**vpn-id** *oui-vpnid*]]

Syntax Description

service-name	Administrative name for the service. Case sensitive ASCII string up to 80 characters. Used in conjunction with one of the following service types: • **down-meps** • xconnect
down-meps	Specifies that all MEPs are down and no MIPs are permitted.
xconnect	Specifies the use of a cross connect. Used in conjunction with **group** and p2p. **Note** When **xconnect** is specified, all MEPs are up and MIPs are permitted.
group *xconnect-group-name*	Specifies the name of the cross connect group.
p2p *xconnect-name*	Specifies the name of the point-to-point cross connect and enters the Ethernet CFM domain service mode.
mp2mp *xconnect-name*	Specifies the name of the multipoint-to-multipoint cross connect and enters the Ethernet CFM domain service mode.
ce-id *ce-id-value*	Specifies the local Customer Edge (CE) identifier.
remote-ce-id *remote-ce-id-value*	Specifies the remote Customer Edge (CE) identifier.
id	(Optional) Service identifier. Valid service identifiers are: • **icc-based** *icc-string umc-string*—ITU-based Carrier Code format, with the total ICC and Unique MEG ID Code (UMC) string length no greater than 13 characters. • **number** *number*—Number from 0 to 65535.

Command Modes

CFM domain configuration (config-cfm-dmn)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The Short MA Name is the second part of the Maintenance Assoication Identifier (MAID) in CFM frames.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to specify that all MEPs are down and no MIPs are permitted, and enter CFM domain service configuration mode.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service Serv_1 down-meps
RP/0/RP0:hostname(config-cfm-dmn-svc)#
```

The following example shows how to associate a p2p cross connect service to a domain and enter CFM domain service configuration mode.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain Domain_One level 1 id string D1
RP/0/RP0:hostname(config-cfm-dmn)# service Cross_Connect_1 xconnect group XG1 p2p X1
RP/0/RP0:hostname(config-cfm-dmn-svc)#
```

show efd interface

To display all interfaces that are shut down because of Ethernet Fault Detection (EFD), or to display whether a specific interface is shut down because of EFD, use the **show efd interface** command.

show efd interface [*type interface-path-id*]

Syntax Description

type	(Optional) Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the show interfaces command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (?) online help function.

Command Default

If no parameters are specified, all interfaces that are shut down because of EFD are displayed.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If this command is issued when no EFD errors are detected, the system displays the following message:

```
< date time >
No matching interfaces with EFD-shutdown triggered
```

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display all interfaces that are shut down because of Ethernet Fault Detection (EFD):

```
RP/0/RP0:hostname# show efd interfaces

Server VLAN MA
==============
Interface         Clients
------------------------
TenGigE0/0/0/0.0  CFM
```

show ethernet sla configuration-errors

To display information about errors that are preventing configured Ethernet Service Level Agreement (SLA) operations from becoming active, as well as any warnings that have occurred, use the **show ethernet sla configuration-errors** command in EXEC mode.

show ethernet sla configuration-errors [**domain** *domain_name*] [**interface** *type R/S/I/P*] [**profile** *profile_name*]

Syntax Description

domain *domain_name*	Displays information for the specified domain, where domain-name is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface *type R/S/I/P*	Displays information for the specified interface.
profile *profile_name*	Displays information for the specified profile.

Command Default

No default behavior or values

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
ethernet-services	read

Example

This example shows how to use the **show ethernet sla configuration-errors** command:

```
RP/0/RP0:router# show ethernet sla configuration-errors
```

show ethernet sla operations

To display information about configured Ethernet Service Level Agreement (SLA) operations, use the **show ethernet sla operations** command in EXEC mode.

show ethernet sla operations [**detail**] [**domain** *domain_name*] [**interface** *type R/S/I/P* [**on-demand all**] [**profile** { *profile_name* | **all** }]

Syntax Description

detail	Displays detailed information.
domain *domain_name*	Displays information for the specified domain, where domain-name is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface *type R/S/I/P*	Displays information for the specified interface.
profile *profile_name*	Displays information for the specified profile.
profile all	Displays information for all the profile names.
on-demand all	Displays information for all on-demand operations.

Command Default

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
ethernet-services	read

Example

This example shows how to use the **show ethernet sla operations** command:

```
RP/0/RP0:router# show ethernet sla operations
```

show ethernet sla statistics

To display the contents of buckets containing Ethernet Service Level Agreement (SLA) metrics collected by probes, use the **show ethernet sla statistics** command in EXEC mode.

show ethernet sla statistics [**current** | **history**] [**detail**] [**domain** *domain_name*] [**interface** *type R/S/I/P*] [**on-demand all**] [**profile** { *profile_name* | **all** }] [**statistic** *stat_type*]

Syntax Description

current	(Optional) Displays the content of buckets currently being filled.
history	(Optional) Displays the content of all full buckets.
domain *domain_name*	Displays information for the specified domain, where domain-name is a string of a maximum of 80 characters that identifies the domain where the SLA operation is configured.
interface *type R/S/I/P*	Displays information for the specified interface.
profile *profile_name*	Displays information for bucket for the specified profile.
profile all	Displays information for all the buckets for the specified profile names.
on-demand all	Displays information for all on-demand operations.
statistic *stat_type*	Displays only the specified type of statistic. The valid values are: • **round-trip-delay** —Displays only round-trip delay. • **round-trip-jitter** —Displays only round-trip jitter.

Command Default

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
ethernet-services	read

Example

This example shows how to use the **show ethernet sla statistics** command:

```
RP/0/RP0:router# show ethernet sla statistics
```

```
// Delay measurement
RP/0/RP0:ios#show ethernet sla statistics Fri Jan 17 10:09:06.855 UTC
Source: Interface FortyGigE0/5/0/9.1, Domain d1
Destination: Target MEP-ID 1
================================================================================
Profile 'p', packet type 'cfm-delay-measurement'
Scheduled to run every 1min first at 00:00:26 UTC for 1min

Round Trip Delay
~~~~~~~~~~~~~~~~
1 probes per bucket

Bucket started at 10:05:16 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 2; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                   Misordered: 1 (50.0%); Duplicates: 0 (0.0%)
    Result count: 2
    Min: 0.762ms; Max: 0.883ms; Mean: 0.822ms; StdDev: 0.060ms

    Results suspect due to a probe starting mid-way through a bucket

Bucket started at 10:05:26 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 12; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                   Misordered: 0 (0.0%); Duplicates: 0 (0.0%)
    Result count: 12
    Min: 0.599ms; Max: 0.785ms; Mean: 0.705ms; StdDev: 0.046ms

Bucket started at 10:06:26 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 12; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                   Misordered: 0 (0.0%); Duplicates: 0 (0.0%)
    Result count: 12
    Min: 0.598ms; Max: 0.850ms; Mean: 0.724ms; StdDev: 0.064ms

Bucket started at 10:07:26 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 12; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                   Misordered: 0 (0.0%); Duplicates: 0 (0.0%)
    Result count: 12
    Min: 0.599ms; Max: 0.849ms; Mean: 0.741ms; StdDev: 0.072ms


//Synthetic Loss Measurement
Source: Interface FortyGigE0/5/0/9.1, Domain d1
Destination: Target MEP-ID 1
================================================================================
Profile 'q', packet type 'cfm-synthetic-loss-measurement'
Scheduled to run every 1min first at 00:00:26 UTC for 1min Frame Loss Ratio calculated every
 1min

One-way Frame Loss (Dest->Source)
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
1 probes per bucket

Bucket started at 10:08:17 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 9; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                   Misordered: 1 (11.1%); Duplicates: 0 (0.0%)
    Result count: 1
    Min: 0.000%; Max: 0.000%; Mean; 0.000%; StdDev: 0.000%; Overall: 0.000%

    Results suspect due to a probe starting mid-way through a bucket
    Results suspect as FLR calculations are based on a low packet count

Bucket started at 10:08:26 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 60; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                   Misordered: 0 (0.0%); Duplicates: 0 (0.0%)
    Result count: 1
```

```
    Min: 0.000%; Max: 0.000%; Mean; 0.000%; StdDev: 0.000%; Overall: 0.000%

Bucket started at 10:09:26 UTC Fri 17 January 2020 lasting 1min
    Pkts sent: 60; Lost: 0 (0.0%); Corrupt: 0 (0.0%);
                  Misordered: 0 (0.0%); Duplicates: 0 (0.0%)
    Result count: 1
    Min: 0.000%; Max: 0.000%; Mean; 0.000%; StdDev: 0.000%; Overall: 0.000%
```

show ethernet cfm ccm-learning-database

To display the Continuity Check Message (CCM) learning database, use the **show ethernet cfm ccm-learning-database** command in EXEC configuration mode.

show ethernet cfm ccm-learning-database [**location** *node-id*]

Syntax Description

location *node-id*	(Optional) Displays the CFM CCM learning database for the designated node. The *node-id* argument is entered in the *rack*/*slot*/*module* notation.

Command Default

All CFM ccm-learning-databases on all interfaces are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

The CCM Learning Database is populated by MEPs and MIPs that have received continuity-check messages (CCMs). The information in the CCM Learning Database is used to reply to traceroutes when no applicable entries are found in the main MAC learning table.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display all the CFM CCM learning databases on all interfaces:

```
RP/0/RP0:hostname# show ethernet cfm ccm-learning-database

Location 0/0/RP0:

Domain/Level           Service              Source MAC     Interface
---------------------- -------------------- -------------- ------------------
foo/2                  foo                  0001.0203.0401 Te0/0/0/0
foo/2                  foo                  0001.0203.0402 PW

Location 0/1/RP0:

Domain/Level           Service              Source MAC     Interface
---------------------- -------------------- -------------- ------------------
foo/2                  foo                  0001.0203.0401 XC ID: 0xff000002
```

Table 1: show ethernet cfm ccm-learning-database Field Descriptions

Domain/Level	The domain name and the level of the domain for the maintenance point that received the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages received by maintenance points in this domain.

Service	The name of the service for the maintenance point that received the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages received by maintenance points in this domain.
Source MAC	Source MAC address in the CCM that caused this entry to be created. This entry will be used to respond to traceroute messages targeted at this MAC address.
Interface	The interface through which the CCM entered the router. This will be one of the following: • An interface or sub-interface name • A pseudowire identification (neighbor address and PW ID) • PW – Indicates the CCM was received through the PW in a cross-connect • XC ID – the internal cross-connect ID value, indicating that the CCM was received through an interface that no longer exists, or is no longer in L2 mode.

show ethernet cfm configuration-errors

To display information about errors that are preventing configured CFM operations from becoming active, as well as any warnings that have occurred, use the **show ethernet cfm configuration-errors** command in EXEC mode.

show ethernet cfm configuration-errors [**domain** *domain-name*] [**interface** *type interface-path-id*]

Syntax Description

domain *domain-name*	(Optional) Displays information about the specified CFM domain name.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router.

Command Default

All CFM configuration errors on all domains are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display all the CFM configuration errors on all domains:

```
RP/0/RP0:hostname# show ethernet cfm configuration-errors

Domain fig (level 5), Service bay
 * An Up MEP is configured for this domain on interface TenGigEt0/1/2/3.234 and an Up MEP
is also configured for domain blort, which is at the same level (5).
 * A MEP is configured on interface TenGigE0/3/2/1.1 for this domain/service, which has CC
 interval 100ms, but the lowest interval supported on that interface is 1s.
```

show ethernet cfm interfaces ais

To display the information about interfaces that are currently transmitting Alarm Indication Signal (AIS), use the **show ethernet cfm interfaces ais** command in EXEC mode.

show ethernet cfm interfaces [*type interface-path-id*] **ais** [**location** *node-id*]

Syntax Description

type	(Optional) Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location *node-id*	(Optional) Displays information about the node location specified as *rack* / *slot* / *module*. Location cannot be specified if you configure an interface type.

Command Default

If no parameters are specified, information for all AIS interfaces is displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Note The **location** keyword cannot be specified if an interface has been specified.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to display the information published in the Interface AIS table:

```
RP/0/RP0:hostname# show ethernet cfm interfaces ais

Defects (from at least one peer MEP):
 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
```

```
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down              D - Local port down

                                 Trigger                  Transmission
                        AIS      ---------    Via    ---------------------------
Interface (State)       Dir   L  Defects  Levels   L  Int  Last started  Packets
----------------------- ---   -  -------  -------  -  ---  ------------ --------
Te0/1/0/0.234 (Up)      Dn    5  RPC      6        7  1s   01:32:56 ago     5576
Te0/1/0/0.567 (Up)      Up    0  M        2,3      5  1s   00:16:23 ago      983
Te0/1/0/1.1 (Dn)        Up       D                7  60s  01:02:44 ago     3764
TE0/1/0/2 (Up)          Dn    0  RX       1!
```

Table 2: show ethernet cfm interfaces ais Field Descriptions

Interface (State)	The name and state of the interface.
AIS dir	The direction that the AIS packets are transmitted, up or down.
Trigger L	The level of the lowest MEP that is transmitting AIS.The field is blank if there are no down MEPs on the interface, and AIS is being transmitted due to configuration on the interface itself.
Trigger Defects	Defects detected by the lowest MEP transmitting AIS.
Via Levels	The levels of any MEPs on the interface that are receiving AIS from a lower MEP, and potentially re-transmitting the signal. If the highest MEP is not re-transmitting the signal, the list of levels is ended using an exclamation point.
Transmission L	The level at which AIS is being transmitted outside of the interface, via a MIP. The field is blank if this is not occurring.
Transmission Int	The interval at which AIS is being transmitted outside of the interface via a MIP. The field is blank if this is not occurring.
Transmission last started	If AIS is being transmitted outside of the interface, the time that the signal started. The field is blank if this is not occurring.
Transmission packets	If AIS is being transmitted outside of the interface, the number of packets sent by the transmitting MEP since it was created or since its counters were last cleared. The field is blank if this is not occurring.

show ethernet cfm interfaces statistics

To display the per-interface counters for Ethernet Connectivity Fault Management (CFM), use the **show ethernet cfm interfaces statistics** command in EXEC mode.

show ethernet cfm interfaces [*type interface-path-id*] **statistics** [**location** *node-id*]

Syntax Description

type	(Optional) Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location *node-id*	(Optional) Displays information about the node location specified as *rack* / *slot* / *module*. Location cannot be specified if you configure an interface type.

Command Default

All CFM counters from all interfaces are displayed.

Command Modes

EXEC

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Note The location cannot be specified if a particular interface is specified.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows all the CFM counters on all interfaces:

```
RP/0/RP0:hostname# show ethernet cfm interfaces statistics
Location 0/1/RP0:

Interface              Malformed   Dropped Last Malformed Reason
-----------------      --------- --------- ---------------------
Te0/1/0/3.185                  0         0
Te0/1/0/7.185                  0         0
```

```
Te0/1/0/7.187                  0         0


RP/0/RP0:hostname# show ethernet cfm interfaces statistics
Location 0/0/RP0:

Interface              Malformed   Dropped Last Malformed Reason
-----------------      --------- --------- ---------------------
Te100/0/0/0                   10         2 Packet malformed - SLM is too short or too long
Te100/0/0/3                    4         1 Host: Packet malformed - invalid source MAC
address
                                           Satellite: Packet malformed - the format of one
 or more timestamps is invalid
```

Table 3: show ethernet cfm statistics Field Descriptions

Interface	Name of the interface.
Malformed	Number of packets that have been received at this interface that have been found to be non-compliant with the packet formats specified in IEEE 802.1ag and ITU-T Y.1731.
Dropped	Number of valid (well-formed) packets that have been received at this interface, that have been dropped in software. Packets may be dropped for the following reasons: • Packet has an unknown operation code, and reached a MEP. • Packet dropped at a MEP because it has a lower CFM level than the MEP. • Packet could not be forwarded because the interface is STP blocked. • Packet could not be forwarded because it is destined for this interface.
Last Malformed Reason	Operation code for the last malformed packet received, and the reason that it was found to be malformed. If no malformed packets have been received, this field is blank.

show ethernet cfm local maintenance-points

To display a list of local maintenance points, use the **show ethernet cfm local maintenance-points** command in EXEC mode.

show ethernet cfm local maintenance-points [**domain** *domain-name* [**service** *service-name*] | **interface** *type interface-path-id*] [**mep** | **mip**]

Syntax Description

domain *domain-name*	(Optional) Displays information about the specified domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service *service-name*	(Optional) Displays information about the specified service, where *service-name* is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
mep	(Optional) Displays information about maintenance end points (MEPs).
mip	(Optional) Displays information about maintenance intermediate points (MIPs).

Command Default

All maintenance points from all interfaces are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read

Examples

This example shows how to display maintenance points:

```
RP/0/RP0:hostname# show ethernet cfm local maintenance-points

Domain/Level         Service             Interface         Type    ID   MAC
```

```
-------------------- ------------------- ----------------- ------- ---- --------
bar/0                bar                 Te0/0/0/0         Dn MEP    1 03:04:00
baz/4                baz                 Te0/0/0/1.1       MIP         03:04:01
baz/4                baz                 Te0/0/0/2         MIP         03:04:02
foo/?                foo                 Te0/0/0/3         MEP       1 03:04:03!
qux/2                qux                 Te0/0/0/1.1       Up MEP   10 03:04:01
qux/2                qux                 Te0/0/0/2         Up MEP   11 03:04:02
```

Table 4: show ethernet cfm local maintenance-points Field Descriptions

Domain/Level	The domain name and the level of the domain. If the domain is not configured globally, a question mark (?) is displayed for the Level.
Service	The name of the service.
Interface	The interface containing the maintenance point.
Type	The type of maintenance point: • MIP • Up MEP • Down MEP • MEP–If the MEP belongs to a service that is not configured globally, the type cannot be determined and just MEP is displayed.
ID	The configured MEP ID. **Note** Since MIPs do not have an ID, this column is blank for MIPs.
MAC	The last 3 octets of the interface MAC address. **Note** The first three octets are typically the Cisco OUI.
Note If the MEP has a configuration error, a exclamation point (!) is displayed at the end of the line in the display output.	

show ethernet cfm local meps

To display information about local maintenance end points (MEPs), use the **show ethernet cfm local meps** command in EXEC mode.

show ethernet cfm local meps [**domain** *domain-name* [**service** *service-name* [**mep-id** *id*]] | **interface** *type interface-path-id* [**domain** *domain-name*]] [**errors** [**detail** | **verbose**] | **detail** | **verbose**]

Syntax Description

domain *domain-name*	(Optional) Displays information about the specified CFM domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service *service-name*	(Optional) Displays information about the specified service, where *service-name* is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
mep-id *id*	(Optional) Displays information about the specified MEP, where *id* is a number of a local maintenance end point (MEP). The range is 1 to 8191.
errors	(Optional) Displays information about peer MEPs with errors.
detail	(Optional) Displays detailed information.
verbose	(Optional) Displays detailed information, plus counters for each type of CFM packet.

Command Default

Brief information is displayed for all local MEPs.

Command Modes

EXEC

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

All MEPs are displayed in the **show ethernet cfm local meps** command output, unless they have configuration errors.

Task ID

Task ID	Operations
ethernet-services	read

Examples

Example 1: show ethernet cfm local meps Command

This example shows sample output of the default statistics for local MEPs without any filtering:

```
RP/0/RP0:hostname# show ethernet cfm local meps

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)             Dir MEPs/Err RD Defects AIS
----- -------------------------      --- -------- -- ------- ---
  100 Te1/1/0/1.234 (Up)            Up     0/0   N  A       L7

Domain fred (level 5), Service barney
   ID Interface (State)             Dir MEPs/Err RD Defects AIS
----- -------------------------      --- -------- -- ------- ---
    2 Te0/1/0/0.234 (Up)            Up     3/2   Y  RPC     L6

RP/0/RP0:hostname# show ethernet cfm local meps

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)             Dir MEPs/Err RD Defects AIS
----- -------------------------      --- -------- -- ------- ---
  100 Te1/1/0/1.234 (Up)            Up     0/0   N  A

Domain fred (level 5), Service barney
   ID Interface (State)             Dir MEPs/Err RD Defects AIS
----- -------------------------      --- -------- -- ------- ---
    2 Te0/1/0/0.234 (Up)            Up     3/2   Y  RPC
```

Table 5: show ethernet cfm local meps Field Descriptions

ID	Configured MEP ID of the MEP.
Interface (State)	Interface that the MEP is configured under, and the state of the interface. The states are derived from the interface state, the Ethernet Link OAM interworking state, and the Spanning Tree Protocol (STP) state. The following states are reported: • Up – Interface Up, Ethernet Link OAM Up, STP Up • Down – Interface Down or Admin Down • Blkd – Interface Up, Ethernet Link OAM Up, STP Blocked • Otherwise, the interface state.

Dir	Direction of the MEP.
RD	Remote Defect. Y (yes) indicates that a remote defect is detected on at least one peer MEP. In which case, the RDI bit is set in outgoing CCM messages. Otherwise, N (no).
MEPs	Total number of peer MEPs sending CCMs to the local MEP.
Err	Number of peer MEPs for which at least one error has been detected.
Defects	Types of errors detected. Each error is listed as a single character. Multiple errors are listed if they are from the same MEP. Possible errors are listed at the top of the display output of the command.
AIS	Alarm Indication Signal. If AIS is configured for the service, the configured level is displayed when an alarm is signaled. If AIS is not configured for the service, or if no alarm is currently signaled, this field is blank.

Example 2: show ethernet cfm local meps Command Filtered by Domain and Service

```
RP/0/RP0:hostname# show ethernet cfm local meps domain foo service bar

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)             Dir MEPs/Err RD Defects AIS
----- -------------------------      --- -------- -- ------- ---
  100 Te1/1/0/1.234 (Up)              Up     0/0   N  A       L7

RP/0/RP0:hostname# show ethernet cfm local meps domain foo service bar

 A - AIS received                I - Wrong interval
 R - Remote Defect received      V - Wrong Level
 L - Loop (our MAC received)     T - Timed out (archived)
 C - Config (our ID received)    M - Missing (cross-check)
 X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
 P - Peer port down

Domain foo (level 6), Service bar
   ID Interface (State)             Dir MEPs/Err RD Defects AIS
----- -------------------------      --- -------- -- ------- ---
  100 Te1/1/0/1.234 (Up)              Up     0/0   N  X
```

Example 3: show ethernet cfm local meps detail Command

This example shows sample output of detailed statistics for local MEPs:



Note The Discarded CCMs field is not displayed when the number is zero (0). It is unusual for the count of discarded CCMs to be anything other than zero, since CCMs are only discarded when the limit on the number of peer MEPs is reached. The Peer MEPs field is always displayed, but the counts are always zero when continuity check is not enabled.

```
RP/0/RP0:hostname# show ethernet cfm local meps detail

Domain foo (level 6), Service bar
Up MEP on TenGigE0/1/0/0.234, MEP-ID 100
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  No
  AIS generation enabled:  Yes (level: 7, interval: 1s)
  Sending AIS:             Yes (started 01:32:56 ago)
  Receiving AIS:           Yes (from lower MEP, started 01:32:56 ago)

Domain fred (level 5), Service barney
Up MEP on TenGigE0/1/0/0.234, MEP-ID 2
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 3 up, 2 with errors, 0 timed out (archived)
  Cross-check defects: 0 missing, 0 unexpected

  CCM generation enabled:  Yes (Remote Defect detected: Yes)
  CCM defects detected:    R - Remote Defect received
                           P - Peer port down
                           C - Config (our ID received)
  AIS generation enabled:  Yes (level: 6, interval: 1s)
  Sending AIS:             Yes (to higher MEP, started 01:32:56 ago)
  Receiving AIS:           No

RP/0/RP0:hostname# show ethernet cfm local meps detail

Domain foo (level 5), Service bar
Down MEP on TenGigE0/1/0/0.123, MEP-ID 20
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 1 up, 0 with errors, 0 timed out (archived)
  Cross-check errors: 0 missing, 0 unexpected

  CCM generation enabled:  Yes, 10ms
                           CCM processing offloaded to high-priority software
  AIS generation enabled:  No
  Sending AIS:             No
  Receiving AIS:           No
```

Example 4: show ethernet cfm local meps verbose Command

This example shows sample output of detailed statistics for local MEPs:

```
RP/0/RP0:hostname# show ethernet cfm local meps verbose

Domain foo (level 6), Service bar
Up MEP on TenGigE0/1/0/0.234, MEP-ID 100
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  No
  AIS generation enabled:  Yes (level: 7, interval: 1s)
  Sending AIS:             Yes (started 01:32:56 ago)
  Receiving AIS:           Yes (from lower MEP, started 01:32:56 ago)
  EFD triggered:           No
```

```
  Packet        Sent      Received
  ------  ----------  ----------------------------------------------------
  AIS           5576             0
  SLM              0            11
  SLR             11             0
  DMM              0             6
  DMR              5             0

Domain fred (level 5), Service barney
Up MEP on TenGigE0/1/0/0.234, MEP-ID 2
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 3 up, 2 with errors, 0 timed out (archived)
  Cross-check errors: 0 missing (0 auto), 0 unexpected

  CCM generation enabled:  Yes, 1s (Remote Defect detected: Yes)
                             CCM processing offloaded to software
  CCM defects detected:    R - Remote Defect received
                           P - Peer port down
                           C - Config (our ID received)
  AIS generation enabled:  Yes (level: 6, interval: 1s)
  Sending AIS:             Yes (to higher MEP, started 01:32:56 ago)
  Receiving AIS:           No

  Packet        Sent      Received
  ------  ----------  ------------------------------------------------------------
  CCM          12345         67890  (out of seq: 6, discarded: 10)
  LBM              5             0
  LBR              0             5  (out of seq: 0, with bad data: 0)
  AIS              0         46910
  LMM              3             4
  LMR              5             3

Domain gaz (level 4), Service baz
Up MEP on Standby Bundle-Ether 1, MEP-ID 3
================================================================================
  Interface state: Up      MAC address: 6655.4433.2211
  Peer MEPs: 1 up, 0 with errors, 0 timed out (archived)

  CCM generation enabled:  Yes, 1s (Remote Defect detected: No)
                             CCM processing offloaded to software
)
                           Sending disabled on local standby MEP
  CCM defects detected:    Defects below ignored on local standby MEP
                           I - Wrong interval
                           V - Wrong level

  AIS generation enabled:  No
  Sending AIS:             No
  Receiving AIS:           No

  Packet        Sent      Received
  ------  ----------  ------------------------------------------------------------
  CCM              0         67890  (out of seq: 6, discarded: 10)
  LBM              0             1
  LBR              0             2  (out of seq: 0, with bad data: 0)
  AIS              0             3
  LCK              -             4

Domain bar (level 3), Service boz
Down MEP on TenGigE102/1/0/0.345, MEP-ID 200
================================================================================
  Interface state: Up      MAC address: 1122.3344.5566
  Peer MEPs: 0 up, 0 with errors, 0 timed out (archived)
```

```
CCM generation enabled:  No
AIS generation enabled:  No
Sending AIS:             No
Receiving AIS:           No

No packets sent/received
```

show ethernet cfm peer meps

To display information about maintenance end points (MEPs) for peer MEPs, use the **show ethernet cfm peer meps** command in EXEC mode.

show ethernet cfm peer meps [**domain** *domain-name* [**service** *service-name* [**local mep-id** *id* [**peer** {**mep-id** *id* | **mac-address** *H . H . H*}]]] | **interface** *type interface-path-id* [**domain** *domain-name* [**peer** {**mep-id** *id* | **mac-address** *H . H . H*}]]] [**cross-check** [**missing** | **unexpected**] | **errors**] [**detail**]

Syntax Description

cross-check	(Optional) Displays information about peer MEPs with cross-check errors.
detail	(Optional) Displays detailed information.
domain *domain-name*	(Optional) Displays information about a CFM domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
errors	(Optional) Displays information about peer MEPs with errors.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
local mep-id *id*	(Optional) Displays information about a local MEP, where *id* is the number of the MEP.
missing	(Optional) Displays information about peer MEPs that are missing.
peer mep-id *id*	(Optional) Displays information about a peer MEP, where *id* is the number of the MEP.
peer mac-address *H.H.H*	(Optional) Displays information about a peer MEP, where *H.H.H* is the hexadecimal address of the MEP.
service *service-name*	(Optional) Displays information about a CFM service, where *service-name* is a string of a maximum of 154 characters that identifies the maintenance association to which the maintenance points belong.
unexpected	(Optional) Displays information about unexpected peer MEPs.

Command Default

Peer MEPs for all domains are displayed.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines



Note If a Local MEP is receiving Wrong Level CCMs, and if the Remote MEP has its CCM processing offloaded, then the last CCM cannot be displayed.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows sample output of MEPs detected by a local MEP:

```
RP/0/RP0:hostname# show ethernet cfm peer meps

Flags:
> - Ok                          I - Wrong interval
R - Remote Defect received      V - Wrong level
L - Loop (our MAC received)     T - Timed out
C - Config (our ID received)    M - Missing (cross-check)
X - Cross-connect (wrong MAID)  U - Unexpected (cross-check)
* - Multiple errors received

Domain dom3 (level 5), Service ser3
Down MEP on TenGigE0/0/0/0 MEP-ID 1
================================================================================
St     ID MAC Address    Port    Up/Downtime   CcmRcvd SeqErr   RDI Error
-- ----- -------------- ------- ------------ --------- ------ ----- -----
V      10 0001.0203.0403 Up      00:01:35            2      0     0     2

Domain dom4 (level 2), Service ser4
Down MEP on TenGigEt0/0/0/0 MEP-ID 1
================================================================================
St     ID MAC Address    Port    Up/Downtime   CcmRcvd SeqErr   RDI Error
-- ----- -------------- ------- ------------ --------- ------ ----- -----
 >     20 0001.0203.0402 Up      00:00:03            4      1     0     0
 >     21 0001.0203.0403 Up      00:00:04            3      0     0     0

Domain dom5 (level 2), Service dom5
```

Table 6: show ethernet cfm peer meps Field Descriptions

St	Status: one or two characters, representing the states listed at the top of the output.
ID	Peer MEP ID
MAC address	Peer MAC Address. If this entry is a configured cross-check MEP, with no MAC address specified, and no CCMs are currently being received from a peer MEP with a matching MEP ID, then this field is blank.

Port	Port state of the peer, based on the Port Status and Interface Status TLVs. If no TLVs or CCMs have been received, this field is blank. Otherwise, the port status is displayed—unless it is Up. If the port status is Up, then the interface status is displayed.
Up/Downtime	Time since the peer MEP last came up or went down. If CCMs are currently being received, it is the time since the peer MEP last came up, which is the time since the first CCM was received. If CCMs are not currently being received, it is the time since the peer MEP last went down, which is the time since the loss threshold was exceeded and a loss of continuity was detected.
CcmRcvd	Total number of CCMs received from this peer MEP.
SeqErr	Number of CCMs received out-of-sequence.
RDI	Number of CCMs received with the RDI bit set.
Error	Number of CCMs received with CCM defects, such as: • Invalid level error • Maintenance Association Identifier (MAID) error • Interval error • Received with out MEP ID error • Invalid source MAC error

This example shows sample detailed output of MEPs detected by a local MEP:

```
RP/0/RP0:hostname# show ethernet cfm peer meps detail

Domain dom3 (level 5), Service ser3
Down MEP on TenGigE0/0/0/0 MEP-ID 1
================================================================================
Peer MEP-ID 10, MAC 0001.0203.0403
   CFM state: Wrong level, for 00:01:34
   Port state: Up
   CCM defects detected:    V - Wrong Level
   CCMs received: 5
     Out-of-sequence:             0
     Remote Defect received:      5
     Wrong Level:                 0
     Cross-connect (wrong MAID):  0
     Wrong Interval:              5
     Loop (our MAC received):     0
     Config (our ID received):    0
Last CCM received
     Level: 4, Version: 0, Interval: 1min
     Sequence number: 5, MEP-ID: 10
     MAID: String: dom3, String: ser3
     Port status: Up, Interface status: Up


Domain dom4 (level 2), Service ser4
Down MEP on TenGigE0/0/0/0 MEP-ID 1
================================================================================
Peer MEP-ID 20, MAC 0001.0203.0402
```

```
   CFM state: Ok, for 00:00:04
   Received CCM handling offloaded to software
   Port state: Up
   CCMs received: 7
     Out-of-sequence:             1
     Remote Defect received:      0
     Wrong Level:                 0
     Cross-connect (wrong MAID):  0
     Wrong Interval:              0
     Loop (our MAC received):     0
 Config (our ID received):    0
Last CCM received
     Level: 2, Version: 0, Interval: 10s
     Sequence number: 1, MEP-ID: 20
     MAID: String: dom4, String: ser4
     Chassis ID: Local: ios; Management address: 'Not specified'
     Port status: Up, Interface status: Up

Peer MEP-ID 21, MAC 0001.0203.0403
   CFM state: Ok, for 00:00:05
   Port state: Up
   CCMs received: 6
     Out-of-sequence:             0
     Remote Defect received:      0
     Wrong Level:                 0
     Cross-connect (wrong MAID):  0
     Wrong Interval:              0
     Loop (our MAC received):     0
     Config (our ID received):    0
Last CCM received 00:00:05 ago:
     Level: 2, Version: 0, Interval: 10s
     Sequence number: 1, MEP-ID: 21
     MAID: String: dom4, String: ser4
     Port status: Up, Interface status: Up


Domain dom5 (level 2), Service ser5
Up MEP on Standby Bundle-Ether 1 MEP-ID 1
================================================================================
Peer MEP-ID 600, MAC 0001.0203.0401
   CFM state: Ok (Standby), for 00:00:08, RDI received
   Port state: Down
   CCM defects detected:    Defects below ignored on local standby MEP
                            I - Wrong Interval
                            R - Remote Defect received
   CCMs received: 5
     Out-of-sequence:             0
     Remote Defect received:   5
 Wrong Level:                 0
     Cross-connect W(wrong MAID): 0
     Wrong Interval:              5
     Loop (our MAC received):     0
     Config (our ID received):    0
   Last CCM received 00:00:08 ago:
     Level: 2, Version: 0, Interval: 10s
     Sequence number: 1, MEP-ID: 600
     MAID: DNS-like: dom5, String: ser5
     Chassis ID: Local: ios; Management address: 'Not specified'
     Port status: Up, Interface status: Down

Peer MEP-ID 601, MAC 0001.0203.0402
   CFM state: Timed Out (Standby), for 00:15:14, RDI received
   Port state: Down
   CCM defects detected:    Defects below ignored on local standby MEP
```

```
                        I - Wrong Interval
                        R - Remote Defect received
                        T - Timed Out
                        P - Peer port down
CCMs received: 2
  Out-of-sequence:             0
  Remote Defect received:      2
  Wrong Level:                 0
  Cross-connect (wrong MAID):  0
  Wrong Interval:              2
  Loop (our MAC received):     0
  Config (our ID received):    0
Last CCM received 00:15:49 ago:
  Level: 2, Version: 0, Interval: 10s
  Sequence number: 1, MEP-ID: 600
  MAID: DNS-like: dom5, String: ser5
  Chassis ID: Local: ios; Management address: 'Not specified'
  Port status: Up, Interface status: Down
```

Table 7: show ethernet cfm peer meps detail Field Descriptions

CFM state	State of the peer MEP, how long it has been up or down, and whether the RDI bit was set in the last received CCM. The following possible states are shown if CCMs are currently being received: • Missing • Timed out—No CCMs have been received for the loss time • Ok • Indication of a defect
Port state	Port state of the peer, based on the Port Status and Interface Status TLVs. If no TLVs or CCMs have been received, this field is blank. Otherwise, the port status is displayed—unless it is Up. If the port status is Up, then the interface status is displayed.

CCM defects detected	Types of CCM defects that have been detected. The possible defects are: • Remote Defect re ceived—The last CCM received from the peer had the RDI bit set. • Loop (our MAC received)—CCMs were received from a peer with the same MAC address as the local MEP. • Config (our ID received)—CCMs were received from a peer with the same MEP ID as the local MEP. • Cross-connect (wrong MAID)—The last CCM received from the peer contained a domain/service identified that did not match the locally configured domain/service identifier. • Peer port down—The last CCM received from the peer contained an Interface Status indicating that the interface on the peer was not up. • Wrong interval—The last CCM received contained a CCM interval that did not match the locally configured CCM interval. • Wrong level—The last CCM received was for a lower level than the level of the local MEP. • Timed out—No CCMs have been received within the loss time. • Missing (cross-check)—Cross-check is configured and lists this peer MEP, but no CCMs have been received within the loss time. • Unexpected (cross-check)—Cross check is configured for this service and does not list this peer MEP, but CCMs have been received from it within the loss time.
CCMs received	Number of CCMs received in total, by defect type.
Last CCM received	How long ago the last CCM was received, and a full decode of its contents. Any unknown TLVs are displayed in hexadecimal.
Offload status	Offload status of received CCM handling.

show ethernet cfm traceroute-cache

To display the contents of the traceroute cache, use the **show ethernet cfm traceroute-cache** command in EXEC mode.

{**show ethernet cfm traceroute-cache** [[**domain** *domain-name*] [**service** *service-name*] [**local mep-id** *id*] [**transaction-id** *id*]] | **interface** *type interface-path-id* [[**domain** *domain-name*] [**transaction-id** *id*]] [**exploratory** | **targeted**] [**status** {**complete** | **incomplete**}] [**detail**]}

Syntax Description

domain *domain-name*	(Optional) Displays information about a CFM domain, where *domain-name* is a string of a maximum of 80 characters that identifies the domain in which the maintenance points reside.
service *service-name*	(Optional) Displays information about a CFM service, where *service-name* is a string of a maximum of 80 characters that identifies the maintenance association to which the maintenance points belong.
local mep-id *id*	(Optional) Displays information for the specified local maintenance end point (MEP). The range for MEP ID numbers is 1 to 8191.
transaction-id *id*	(Optional) Displays information for the specified transaction.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
exploratory	(Optional) Displays information for exploratory traceroutes.
targeted	(Optional) Displays information for traceroutes that are not exploratory, but explicitly mapped.
status	(Optional) Displays status information.
complete	(Optional) Displays status information for traceroutes that have received all replies.
incomplete	(Optional) Displays status information for traceroutes that are still receiving replies.
detail	(Optional) Displays detailed information.

Command Default

Shows output for the default traceroute.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

Use the **show ethernet cfm traceroute-cache** command to display the contents of the traceroute cache; for example, to see the maintenance intermediate points (MIPs) and maintenance end points (MEPs) of a domain as they were discovered. The data is historic. The traceroute cache stores entries from previous traceroute operations.

In the output, the traceroutes sourced from each local MEP are listed. The heading for the local MEP contains the domain name and level, service name, MEP ID and interface name.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows sample output for the **show ethernet cfm traceroute-cache** command:

```
RP/0/RP0:hostname# show ethernet cfm traceroute-cache

Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface TenGigE0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop Hostname/Last            Ingress MAC/name       Egress MAC/Name        Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 ios                      0001.0203.0400 [Down]                         FDB
      0000-0001.0203.0400    Te0/0/0/0
  2 abc                                             0001.0203.0401 [Ok]    FDB
      ios                                           Not present
  3 bcd                      0001.0203.0402 [Ok]                           Hit
      abc                    Te0/0
Replies dropped: 0


Traceroutes in domain foo (level 2), service foo
Source: MEP-ID 1, interface TenGigE0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:03:31 to 0001.0203.0403,
TTL 64, Trans ID 1:

Hop Hostname/Last            Ingress MAC/name       Egress MAC/Name        Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 abc                      0001.0203.0401 [Ok]                           FDB
      0000-0001.0203.0400    Not present
  2 bob                      0001.0203.0402 [Ok]                           MPDB
      abc                    Te0/1/0/2.3
  3 cba                                             0001.0203.0403 [Ok]    Hit
      bob                                           Te0/2/0/3.45
Replies dropped: 0


Traceroute at 2009-05-18 12:15:47 to 0001.0203.0409,
TTL 64, Trans ID 3, automatic:
00:00:05 remaining
```

```
Traceroute at 2009-05-18 12:20:10 explore to ffff.ffff.ffff,
TTL 64, Trans ID 4, Timeout auto, Reply Filter Default:

Hop               Hostname/Last            Ingr/Egr MAC/name               Relay
----------------- ------------------------ -------- ---------------------- -----
1                 abc                      Ingress  0015.0000.323f [Ok]    FDB
                    0000-0001.0203.0400             Te0/0/0/0.1
 2                abc                      Egress   0015.0000.323e [Ok]    FDB
                    abc                             Te0/1/0/0.1
  3               0002-0016.eeee.1234      Ingress  0016.eeee.1234 [Ok]    FDB
                    abc                             Te0/4.23
   4              0000-0016.eeee.4321      Egress   0016.eeee.4321 [Ok]    FDB
                    0002-0016.eeee.1234             Te1/2.23
    5             rtr                      Ingress  0015.0000.f123 [Ok]    FDB
                    0002-00.16.eeee.4321            Te0/0/0/0
 2                abc                      Egress   0015.0000.323d [Ok]    FDB
                    abc                             Te0/1/0/1.1
  3               pe2                      Ingress  0017.0000.cf01 [Ok]    FDB
                    abc                             Te0/0/2/0/1.450
   4              pe2                      Egress   0017.0000.cf01 [Ok]    Drop
                    pe2                             Te0/0/0/0.451
   4              pe2                      Egress   0017.0000.cf01 [Ok]    FDB
                    pe2                             Te0/0/0/1.452
    5             ce2                      Ingress  0015.0000.8830 [Ok]    FDB
                    pe2                             Te0/1/0/0
Replies dropped: 0
```

Table 8: show ethernet cfm traceroute-cache Field Descriptions

Field	Description
Traceroute at	Date and time the traceroute was started.
to	Destination MAC address.
explore to	(Exploratory traceroutes) MAC address of the target for the exploratory traceroute.
TTL	Initial Time To Live used for the traceroute operation.
Trans ID	Transaction ID
Timeout	(Exploratory traceroutes) If no timeout was configured, “Timeout auto” is shown.
Reply Filter	(Exploratory traceroutes) Type of filter.
automatic	Indicates that the traceroute was triggered automatically (for example, as a result of a peer MEP exceeding the loss threshold, or if Continuity-Check Auto-traceroute is configured).
00:00:00 remaining	If the traceroute is in progress, the time remaining until it completes.
No replies received	Traceroute has completed but no replies were received.
Replies dropped	Number of replies dropped.
FDB only	Indicates FDB-only was configured for a standard traceroute.

Field	Description
Hop	Number of hops between the source MEP and the Maintenance Point that sent the reply. (Exploratory traceroutes) The display is indented by an extra character as the hop increases, so that the tree of responses can be seen.
Hostname/Last	On the first line, the hostname of the Maintenance Point that sent the reply. On the second line, the hostname of the previous Maintenance Point in the path. If either of the hostnames is unknown, the corresponding Egress ID is displayed instead.
Ingr/Egr	(Exploratory traceroutes) Indicates whether the reply is for an ingress or egress interface, but never both.
Ingress MAC/Name	If the reply includes information about the ingress interface, then the first line displays the ingress interface MAC address and the ingress action. The ingress interface name, if known, is displayed on the second line.
Egress MAC/Name	If the reply includes information about the egress interface, then the first line displays the egress interface MAC address and the egress action. The egress interface name, if known, is displayed on the second line.
MAC/Name	(Exploratory traceroutes) The MAC address of the interface from which the reply was sent, and the ingress/egress action, are displayed on the first line. If the interface name was present in the reply, it is displayed on the second line.
Relay	Type of relay action performed. For standard traceroutes, the possible values are: • Hit—The target MAC address was reached. • FDB—The target MAC address was found in the Filtering Database (the MAC learning table on the switch) and will be forwarded by the interface. • MPDB—The target MAC address was found in the MP Database (the CCM Learning database on the switch). In addition, “MEP” is displayed on the second line if a terminal MEP was reached. For exploratory traceroutes, the possible values are: • Hit—The target MAC address was reached. • FDB—The target MAC address was found in the Filtering Database and will be forwarded at this interface. • Flood—The target MAC address was not found in the Filtering database, and will be flooded at this interface. • Drop—The target MAC address will not be forwarded at this interface.

The following example shows sample output for the **show ethernet cfm traceroute-cache detail** command:

```
RP/0/RP0:hostname# show ethernet cfm traceroute-cache domain bar detail

Traceroutes in domain bar (level 4), service bar
Source: MEP-ID 1, interface TenGigE0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop Hostname                 Ingress MAC            Egress MAC             Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 ios                      0001.0203.0400 [Down]                         FDB
        Level: 4, version: 0, Transaction ID: 2
        TTL: 63, Relay Action: RlyFDB
        Forwarded, Terminal MEP not reached
        Last egress ID: 0000-0001.0203.0400
        Next egress ID: 0000-0001.0203.0400
        Ingress interface:
          Action: IngDown, MAC: 0001.0203.0400
          ID: Local: Te0/0/0/0
        Hostname: Local: ios, address Not specified

  2 abc                                                0001.0203.0401 [Ok]   FDB
        Level: 4, version: 0, Transaction ID: 2
        TTL: 62, Relay Action: RlyFDB
        Forwarded, Terminal MEP not reached
        Last egress ID: 0000-0001.0203.0400
        Next egress ID: 0000-0001.0203.0401
        Egress interface:
          Action: EgOk, MAC: 0001.0203.0401
          ID: Not present
        Hostname: Local: abc, address Not specified

  3 bcd                      0001.0203.0402 [Ok]                           Hit
        Level: 4, version: 0, Transaction ID: 2
        TTL: 61, Relay Action: RlyHit
        Not Forwarded, Terminal MEP not reached
        Last egress ID: 0000-0001.0203.0401
        Next egress ID: Not Forwarded
        Ingress interface:
          Action: IngOk, MAC: 0001.0203.0402
          ID: Local: TenGigE0/0
        Hostname: Local: bcd, address Not specified

Replies dropped: 0


Traceroute at 2009-05-18 12:30:10 explore to ffff.ffff.ffff from 0204.0608.0a0c,
TTL 255, Trans ID 5, Timeout auto, Reply Filter Spanning Tree:

Hop Hostname                           Ingr/Egr MAC                    Relay
--- ---------------------------------- -------- ---------------------- -----
  1 0000-0015.0000.fffe                Ingress  0015.0000.fffe [Ok]    FDB
        Level: 2, version: 0, Transaction ID: 5
        TTL: 254, Relay Action: RlyFDB
        Forwarded, Terminal MEP not reached
        Next-Hop Timeout: 5 seconds
        Delay Model: Logarithmic
        Last egress ID: 0000-0002.0002.0002
        Next egress ID: 0000-0015.0000.fffe
        Ingress interface:
          Action: ELRIngOk, MAC: 0015.0000.fffe
          ID: Local: Te0/0/0/0.1
```

```
2 0001-0030.0000.fffd                    Egress   0030.0000.fffd [Ok]    Drop
       Level: 2, version: 0, Transaction ID: 5
       TTL: 253, Relay Action: RlyDrop
       Not Forwarded, Terminal MEP not reached
       Next-Hop Timeout: 5 seconds
       Delay Model: Logarithmic
       Last egress ID: 0000-0015.0000.fffe
       Next egress ID: 0030-0000.0000.fffd
       Egress interface:
         Action: ELREgrOk, MAC: 0030.0000.fffd
         ID: Local: Te0/1/0/1.2
```

show ethernet lmi interfaces

To display Ethernet Local Management Interface (E-LMI) information for an interface, including protocol status and error and event statistics, use the **show ethernet lmi interfaces** command in EXEC configuration mode.

show ethernet lmi interfaces [*type interface-path-id*][**brief** | **detail**]
show ethernet lmi interfaces [**brief** | **detail**][**location** *location*]

Syntax Description

brief	(Optional) Displays summary information about the E-LMI protocol status, number of EVCs and errors, and CE-VLAN/EVC map type.
detail	(Optional) Displays the configured and operational state of E-LMI on the interface, with counts for reliability and protocol errors and elapsed time since various events have occurred, including details about subinterfaces and EVC status.
type	(Optional) Interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
location *location*	(Optional) Displays E-LMI information for the designated node. The *location* argument is entered in the *rack*/*slot*/*module* notation. **Note** The location cannot be specified when you specify an interface type.

Command Default

The output displays the configured and operational state of E-LMI on the interface, with counts for reliability and protocol errors and elapsed time since various events have occurred since the protocol was enabled on the interface or counters were cleared.

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If Protocol Errors are seen in the output, then the CE device is sending packets to the PE device, but the PE does not understand those packets. This suggests an incorrect implementation of the E-LMI protocol on the

CE side, or corruption of the packets on the path between the CE and PE. E-LMI packets have a strictly defined structure in the MEF 16 standard, and any deviation from that results in a protocol error. The PE will not respond to any packets that are malformed and result in a protocol error.

The Reliability Error counters can indicate that messages are being lost between the PE and CE devices. The timers in the last block of the output should indicate that messages are being sent and received by the PE device. Consider the following actions when these Reliability Errors occur:

- Status Enq Timeouts—If this counter is continuously incrementing, it indicates that the Polling Timer on the CE is configured to a greater value than the PVT configuration on the PE. Status Enquiry messages will be sent less frequently than the PVT expects them and PVT timeouts occur. Be sure that the value of the PVT (specified by the **polling-verification-timer** command on the PE) is greater than the Polling Timer value on the CE device.
- Invalid Sequence Number—Indicates that messages from the PE are not being received by the CE. Be sure that the correct interface on the CE device is connected to the corresponding E-LMI interface on the PE device, so that communication can take place. Verify that both interfaces are Up.
- Invalid Report Type—This error can occur under the following conditions:
  - If the protocol is in the process of a status update and an "E-LMI Check" type of STATUS ENQUIRY is received by the PE, then the PE ignores the ENQUIRY and records an error.
  - If the protocol is not in the process of a status update and a "Full Status Continued" type of STATUS ENQUIRY is received by the PE, then the PE ignores the ENQUIRY and records an error.



Note If the protocol is in the process of a status update and a "Full Status" type of STATUS ENQUIRY is received by the PE, then the PE restarts the status update but does not record any error.

Task ID

Task ID	Operation
ethernet-services	read

The following example shows sample output for the default form of the command:

```
RP/0/RP0:hostname# show ethernet lmi interfaces
Interface: TenGigE0/0/0/0
  Ether LMI Link Status: Up
  UNI Id: PE1-CustA-Slot1-Port0
  Line Protocol State: Up
  MTU: 1500 (2 PDUs reqd. for full report)
  CE-VLAN/EVC Map Type: Bundling (1 EVC)
  Configuration: Status counter 4, Polling Verification Timer 15 seconds
  Last Data Instance Sent: 1732
  Last Sequence Numbers: Sent 128, Received 128

  Reliability Errors:
    Status Enq Timeouts                19 Invalid Sequence Number            0
    Invalid Report Type                 0

  Protocol Errors:
    Malformed PDUs                      0 Invalid Protocol Version           0
    Invalid Message Type                0 Out of Sequence IE                 0
    Duplicated IE                       0 Mandatory IE Missing               0
```

```
  Invalid Mandatory IE                0 Invalid non-Mandatory IE           0
  Unrecognized IE                     0 Unexpected IE                      0

Full Status Enq Rcvd     00:00:10 ago   Full Status Sent      00:00:10 ago
PDU Rcvd                 00:00:00 ago   PDU Sent              00:00:00 ago
LMI Link Status Changed  10:00:00 ago   Last Protocol Error      never
Counters cleared            never
```

Table 9: show ethernet lmi interfaces Field Descriptions

Field	Description
Interface:	Name of the interface running the E-LMI protocol.
Ether LMI Link Status:	Status of the E-LMI protocol on the interface. Possible values are Up, Down, or Unknown (PVT disabled).
UNI Id:	Name of the UNI as configured by the **ethernet uni id** command. This output field does not appear if the UNI ID is not configured.
Line Protocol State:	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
MTU (*x* PDUs reqd for full report)	Maximum Transmission Unit of the interface and the number (*x*) of E-LMI PDUs of that size required to send one full status report.
CE-VLAN/EVC Map Type: *type* (*x* EVCs)	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible valued for *type* are Bundling, All to One Bundling, or Service Multiplexing with no bundling. The number *x* of EVCs in the map are displayed in parentheses.
Configuration: Status counter	Value of the MEF N393 Status Counter as configured by the **status-counter** command.
Polling Verification Timer	Value of the MEF T392 Polling Verification Timer (in seconds) as configured by the **polling-verification-timer** command. Displays "disabled" if the PVT is turned off.
Last Data Instance Sent:	Current value of the Data Instance.
Last Sequence Numbers: Sent *x*, Received *y*	Values of the last sent (*x*) and received (*y*) sequence numbers as reported in sent PDUs.

Field	Description
Reliability Errors:	Number of times the specified types of reliability errors have occurred since the protocol was enabled on the interface or counters were cleared: • Status Enq Timeouts—Increments every time the Polling Verification Timer (PVT) expires. • Invalid Report Type—Increments if the Report Type is not appropriate to the protocol's current state. There are four Report Types defined by the E-LMI Standard, and only three of them can appear in Status Enquiry messages that the PE receives. These are: E-LMI Check, Full Status and Full Status Continued. • Invalid Sequence Number—Increments whenever the received sequence number in a Status Enquiry from the CE does not match the last sent sequence number in the PE response. Indicates that messages from the PE are not being received by the CE. The PE continues to respond with the requested Report Type. For more information about possible actions, see the "Usage Guidelines" section.
Protocol Errors: (Malformed PDUs, Invalid Message Type, Duplicated IE, and others)	Number of times the specified types of protocol errors have occurred since the protocol was enabled on the interface or counters were cleared.
Full Status Enq Rcvd, PDU Rcvd, LMI Link Status Changed, Counters cleared, Full Status Sent, PDU Sent, and Last Protocol Error.	Elapsed time (hrs:mins:secs ago) since the specified events last occurred or counters were cleared. Displays "never" if the event has not occurred since the protocol was enabled on the interface or counters were cleared.

The following example shows sample output for the **show ethernet lmi interfaces brief** form of the command:

```
RP/0/RP0:hostname# show ethernet lmi interfaces brief
                     ELMI   LineP      #            CE-VLAN/
Interface            State  State      EVCs  Errors EVC Map
-------------------------------------------------------------------------------
Te0/0/0/0            Up     Up            3      19 Multiplexing, no bundling
Te0/0/0/1            Down   Admin-down    1       0 All to One Bundling
```

Table 10: show ethernet lmi interfaces brief Field Descriptions

Field	Description
Interface	Name of the interface running the E-LMI protocol.

Field	Description
ELMI State	Status of the E-LMI protocol. Possible values are Up, Down, or N/A if the Polling Verification Timer is disabled.
LineP State	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
# EVCs	Total number of EVCs in the CE-VLAN/EVC map.
Errors	Total number of reliability and protocol errors encountered since the protocol was enabled on the interface or counters were cleared.
CE-VLAN/EVC Map	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible values are Bundling, All to One Bundling, or Multiplexing, no bundling.

The following example shows sample output for the **show ethernet lmi interfaces detail** form of the command:

```
RP/0/RP0:hostname #show ethernet lmi interfaces detail
Interface: TenGigE0/0/0/0
  Ether LMI Link Status: Up
  UNI Id: PE1-CustA-Slot1-Port0
  Line Protocol State: Up
  MTU: 1500 (2 PDUs reqd. for full report)
  CE-VLAN/EVC Map Type: Bundling (1 EVC)
  Configuration: Status counter 4, Polling Verification Timer 15 seconds
  Last Data Instance Sent: 1732
  Last Sequence Numbers: Sent 128, Received 128

  Reliability Errors:
    Status Enq Timeouts                 19 Invalid Sequence Number             0
    Invalid Report Type                  0

  Protocol Errors:
    Malformed PDUs                       0 Invalid Protocol Version            0
    Invalid Message Type                 0 Out of Sequence IE                  0
    Duplicated IE                        0 Mandatory IE Missing                0
    Invalid Mandatory IE                 0 Invalid non-Mandatory IE            0
    Unrecognized IE                      0 Unexpected IE                       0

  Full Status Enq Rcvd     00:00:10 ago   Full Status Sent      00:00:10 ago
  PDU Rcvd                 00:00:00 ago   PDU Sent              00:00:00 ago
  LMI Link Status Changed  10:00:00 ago   Last Protocol Error      never
  Counters cleared            never

  Sub-interface: TenGigE0/0/0/0.1
    VLANs: 1,10,20-30, default, untagged/priority tagged
    EVC Status: New, Partially Active
    EVC Type: Multipoint-to-Multipoint
    OAM Protocol: CFM
      CFM Domain: Global (level 5)
      CFM Service: CustomerA
    Remote UNI Count: Configured = 2, Active = 1

    Remote UNI Id                                                    Status
```

```
-------------                                                  ------
PE2-CustA-Slot2-Port2                                          Up
PE2-CustA-Slot3-Port3                                          Unreachable
```

Table 11: show ethernet lmi interfaces detail Field Descriptions

Field	Description
Interface:	Name of the interface running the E-LMI protocol.
Ether LMI Link Status:	Status of the E-LMI protocol on the interface. Possible values are Up, Down, or Unknown (PVT disabled).
UNI Id:	Name of the UNI as configured by the **ethernet uni id** command. This output field does not appear if the UNI ID is not configured.
Line Protocol State:	Status of the interface line protocol. Possible values are Up, Down, or Admin-Down.
MTU (*x* PDUs reqd for full report)	Maximum Transmission Unit of the interface and the number (*x*) of E-LMI PDUs of that size required to send one full status report.
CE-VLAN/EVC Map Type: *type* (*x* EVCs)	Map type, which describes how CE VLAN IDs are mapped to specific EVCs. Possible valued for *type* are Bundling, All to One Bundling, or Service Multiplexing with no bundling. The number *x* of EVCs in the map are displayed in parentheses.
Configuration: Status counter	Value of the MEF N393 Status Counter as configured by the **status-counter** command.
Polling Verification Timer	Value of the MEF T392 Polling Verification Timer (in seconds) as configured by the **polling-verification-timer** command. Displays "disabled" if the PVT is turned off.
Last Data Instance Sent:	Current value of the Data Instance.
Last Sequence Numbers: Sent *x*, Received *y*	Values of the last sent (*x*) and received (*y*) sequence numbers as reported in sent PDUs.
Reliability Errors: (Status Enq Timeouts, Invalid Report Type, and Invalid Sequence Number)	Number of times the specified types of reliability errors have occurred since the protocol was enabled on the interface or counters were cleared.
Protocol Errors: (Malformed PDUs, Invalid Message Type, Duplicated IE, and others)	Number of times the specified types of protocol errors have occurred since the protocol was enabled on the interface or counters were cleared.

Field	Description
Full Status Enq Rcvd, PDU Rcvd, LMI Link Status Changed, Counters cleared, Full Status Sent, PDU Sent, and Last Protocol Error.	Elapsed time (hrs:mins:secs ago) since the specified events last occurred or counters were cleared. Displays "never" if the event has not occurred since the protocol was enabled on the interface or counters were cleared.
Subinterface:	Name of the subinterface corresponding to the EVC.
VLANs:	VLAN traffic on the interface that corresponds to the EFPs encapsulation, with the following possible values: • Numbers of the matching VLAN IDs **Note** If Q-in-Q encapsulation is configured, only the outer tag is displayed. • default—Indicates that Default tagging is configured, or the encapsulation specifies to match "any." • none—No matches for the configured encapsulation have occurred on the interface. • untagged/priority—Traffic is either untagged or has priority tagging. **Note** If the message "EVC omitted from Full Status due to encapsulation conflict" is displayed above the VLAN output, a misconfiguration has occurred with two or more EFPs having a conflicting encapsulation.
EVC Status:	State of the EVC, with the following possible values: • Active—E-LMI is operational for this EVC. • Inactive—All of the remote UNIs are unreachable or down. • New—The EVC has not yet been reported to the CE device. • Not yet known—E-LMI is still waiting to receive the status from CFM. This condition should not persist for more than a few seconds. • Partially Active—One or more of the remote UNIs is unreachable or down.
EVC Type:	Type of the EVC, with the following possible values: "Point-to-Point," "Multipoint-to-Multipoint," or "EVC type not yet known."

Field	Description
OAM Protocol:	The OAM protocol from which the EVC status and type are derived. Possible values are either "CFM" or "None."
CFM Domain:	Name of the CFM domain for this EVC.
CFM Service:	Name of the CFM service for this EVC.
Remote UNI Count: Configured = *x*, Active = *y*	Number of configured or expected remote UNIs (*x*) and the number of active remote UNIs (*y*) within the EVC.
Remote UNI Id:	ID of each remote UNI, including both configured and active remote UNIs where these two sets are not identical. If the number of configured and active remote UNIs is zero, no table is displayed. **Note** Where no ID is configured for a remote UNI using the **ethernet uni id** command, then the CFM remote MEP ID is displayed, for example, "<Remote UNI Reference Id: *x*>"
Status	Status of each remote UNI, with the following possible values: "Up," "Down," "Admin Down," "Unreachable (a configured remote UNI is not active or missing)," or "Unknown (a remote UNI is active but not reporting its status)."

show ethernet oam configuration

To display the current active Ethernet OAM configuration on an interface, use the **show ethernet oam configuration** command.

show ethernet oam configuration [**interface** *type interface-path-id*]

Syntax Description

interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	(Optional) Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

If no parameters are specified, the configurations for all Ethernet OAM interfaces is displayed.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command displays the Ethernet OAM configuration information for all interfaces, or a specified interface.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display Ethernet OAM configuration information for a specific interface:

```
RP/0/RP0:hostname# show ethernet oam configuration interface TenGigE0/4/0/0
Thu Aug  5 21:54:34.050 DST
TenGigE0/4/0/0:
  Hello interval:                                        1s
  Link monitoring enabled:                                N
  Remote loopback enabled:                                N
  Mib retrieval enabled:                                  N
  Uni-directional link-fault detection enabled:           N
  Configured mode:                                   Active
  Connection timeout:                                     5
  Symbol period window:                                   0
  Symbol period low threshold:                            1
  Symbol period high threshold:                        None
  Frame window:                                        1000
  Frame low threshold:                                    1
  Frame high threshold:                                None
```

```
  Frame period window:                                  1000
  Frame period low threshold:                              1
  Frame period high threshold:                          None
  Frame seconds window:                                60000
  Frame seconds low threshold:                             1
  Frame seconds high threshold:                         None
  High threshold action:                                None
  Link fault action:                                     Log
  Dying gasp action:                                     Log
  Critical event action:                                 Log
  Discovery timeout action:                              Log
  Capabilities conflict action:                          Log
  Wiring conflict action:                      Error-Disable
  Session up action:                                     Log
  Session down action:                                   Log
  Remote loopback action:                                Log
  Require remote mode:                                Ignore
  Require remote MIB retrieval:                            N
  Require remote loopback support:                         N
  Require remote link monitoring:                          N
```

The following example shows how to display the configuration for all EOAM interfaces:

```
RP/0/RP0:hostname# show ethernet oam configuration
Thu Aug  5 22:07:06.870 DST
TenGigE0/4/0/0:
  Hello interval:                                       1s
  Link monitoring enabled:                               N
  Remote loopback enabled:                               N
  Mib retrieval enabled:                                 N
  Uni-directional link-fault detection enabled:          N
  Configured mode:                                  Active
  Connection timeout:                                    5
  Symbol period window:                                  0
  Symbol period low threshold:                           1
  Symbol period high threshold:                       None
  Frame window:                                       1000
  Frame low threshold:                                   1
  Frame high threshold:                               None
  Frame period window:                                1000
  Frame period low threshold:                            1
  Frame period high threshold:                        None
  Frame seconds window:                              60000
  Frame seconds low threshold:                           1
  Frame seconds high threshold:                       None
  High threshold action:                              None
  Link fault action:                                   Log
  Dying gasp action:                                   Log
  Critical event action:                               Log
  Discovery timeout action:                            Log
  Capabilities conflict action:                        Log
  Wiring conflict action:                    Error-Disable
  Session up action:                                   Log
  Session down action:                                 Log
  Remote loopback action:                              Log
  Require remote mode:                              Ignore
  Require remote MIB retrieval:                          N
  Require remote loopback support:                       N
  Require remote link monitoring:                        N
```

show ethernet oam discovery

To display the currently configured OAM information of Ethernet OAM sessions on interfaces, use the **show ethernet oam discovery**.

show ethernet oam discovery [**brief** | **interface** *type* *interface-path-id* [**remote**]]

Syntax Description

brief	Displays minimal, currently configured OAM information in table form.
interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router.
remote	(Optional) Retrieves and displays information from a remote device, as if the command was run on the remote device.

Command Default

Displays detailed information for Ethernet OAM sessions on all interfaces.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display the minimal, currently configured OAM information for Ethernet OAM sessions on all interfaces:

```
RP/0/RP0:hostname# show ethernet oam discovery brief

Sat Jul  4 13:52:42.949 PST
Flags:
    M - MIB Retrieval support
    U - Unidirectional detection support
    * - data is unavailable

Local                  Remote         Remote
Interface              MAC Address    Vendor Mode    Capability
---------------------- -------------- ------ ------- ----------
Te0/1/5/1              0010.94fd.2bfa 00000A Active  L
Te0/1/5/2              0020.95fd.3bfa 00000B Active  M
Te0/1/6/1              0030.96fd.6bfa 00000C Passive L R
```

The following example shows how to display detailed, currently configured OAM information for the Ethernet OAM session on a specific interface:

```
RP/0/RP0:hostname# show ethernet oam discovery interface TenGigE0/1/5/1

Sat Jul  4 13:56:49.967 PST
TenGigE0/1/5/1:
Local client
------------
  Administrative configuration:
    PDU revision:                       1
    Mode:                          Active
    Unidirectional support:             N
    Link monitor support:               N
    Remote loopback support:            N
    MIB retrieval support:              N
    Maximum PDU size:                1500
    Mis-wiring detection key:        5E9D

Operational status:
    Port status:               Active send
    Loopback status:                 None
    Interface mis-wired:                N

Remote client
-------------
  MAC address:              0030.96fd.6bfa
  Vendor (OUI):          00.00.0C (Cisco)

  Administrative configuration:
    PDU revision:                       5
    Mode:                          Passive
    Unidirectional support:             N
    Link monitor support:               N
    Remote loopback support:            N
    MIB retrieval support:              N
    Maximum PDU size:                1500
```

show ethernet oam interfaces

To display the current state of Ethernet OAM interfaces, use the **show ethernet oam interfaces** command.

show ethernet oam interfaces [**interface** *type* *interface-path-id*]

Syntax Description

interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.

Command Default

No parameters displays the current state for all Ethernet OAM interfaces.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display the current state for all Ethernet OAM interfaces:

```
RP/0/RP0:hostname# show ethernet oam interfaces
TenGigE0/0/0/0
In REMOTE_OK state
Local MWD key: 80081234
Remote MWD key: 8F08ABCC
EFD triggered: Yes (link-fault)
```

Table 12: show ethernet oam interfaces Field Descriptions

Field	Description
In *type* state	The possible discovery state *type* values are: • ACTIVE_SEND_LOCAL—The interface is configured in active mode (the default), but no Information PDUs have been received from the peer (except possibly link-fault PDUs). Information PDUs are sent. • FAULT—A local unidirectional link fault has been detected. Link-fault PDUs are sent. • INACTIVE—The interface is down. • PASSIVE_WAIT—The interface is configured in passive mode (**mode passive** command) but no Information PDUs have been received from the peer (except possibly link-fault PDUs). No PDUs are sent. • REMOTE—(Also known as SEND_LOCAL_REMOTE). Information PDUs are being sent and received, but the local device is not satisfied with the remote peer's capabilities (for example, because there is a 'require-remote' configuration and the peer does not have the required capabilities). • REMOTE_OK—(Also known as SEND_LOCAL_REMOTE_OK). Information PDUs are being sent and received, and the local device is satisfied with the peer's capabilities, but the remote peer is not satisfied with the local device capabilities (for example, because there is a 'require-remote' configuration on the peer device). • SEND_ANY—The discovery process has completed, both devices are satisfied with the configuration and the session is up. All types of PDU can be sent and received.
EFD triggered	Indicates if an Ethernet Fault Detection (EFD) event has occurred on the interface and the type of fault that triggered the interface to be moved to the down state for the line protocol. The possible EFD trigger events are: • capabilities-conflict • discovery-timeout • link-fault • session-down • wiring-conflict

show ethernet oam statistics

To display the local and remote Ethernet OAM statistics for interfaces, use the **show ethernet oam statistics** command.

show ethernet oam statistics [**interface** *type interface-path-id* [**remote**]]

Syntax Description

interface *type*	(Optional) Displays information about the specified interface type. For more information, use the question mark (**?**) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router.
remote	(Optional) Retrieves and displays information from a remote device, as if the command was run on the remote device.

Command Default

No parameters displays statistics for all Ethernet OAM interfaces.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
ethernet-services	read

Examples

The following example shows how to display Ethernet OAM statistics for a specific interface:

```
RP/0/RP0:hostname# show ethernet oam statistics interface TenGigE0/1/5/1

TenGigE0/1/5/1:
Counters
--------
    Information OAMPDU Tx                       161177
    Information OAMPDU Rx                       151178
    Unique Event Notification OAMPDU Tx              0
    Unique Event Notification OAMPDU Rx              0
    Duplicate Event Notification OAMPDU Tx           0
    Duplicate Event Notification OAMPDU Rx           0
    Loopback Control OAMPDU Tx                       0
    Loopback Control OAMPDU Rx                       0
    Variable Request OAMPDU Tx                       0
    Variable Request OAMPDU Rx                       0
    Variable Response OAMPDU Tx                      0
    Variable Response OAMPDU Rx                      0
    Organization Specific OAMPDU Tx                  0
    Organization Specific OAMPDU Rx                  0
    Unsupported OAMPDU Tx                           45
```

```
    Unsupported OAMPDU Rx                          0
    Frames Lost due to OAM                        23
    Fixed frames Rx                                1

Local event logs
----------------
    Errored Symbol Period records                  0
    Errored Frame records                          0
    Errored Frame Period records                   0
    Errored Frame Second records                   0

Remote event logs
-----------------
    Errored Symbol Period records                  0
    Errored Frame records                          0
    Errored Frame Period records                   0
    Errored Frame Second records                   0
```

snmp-server traps ethernet cfm

To enable SNMP traps for Ethernet Connectivity Fault Management (CFM), use the **snmp-server traps ethernet cfm** command in global configuration mode.

snmp-server traps ethernet cfm

Syntax Description

This command has no keywords or arguments.

Command Default

Ethernet OAM event traps are not enabled.

Command Modes

Global configuration (config)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If a Local MEP is receiving Wrong Level CCMs, then a transient timeout might occur when correct Level CCMs are received again.

Task ID

Task ID	Operations
snmp	read, write

Examples

The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RP0:hostname #configure
RP/0/RP0:hostname(config)# snmp-server traps ethernet cfm
```

snmp-server traps ethernet oam events

To enable SNMP traps for Ethernet OAM events, use the **snmp-server traps ethernet oam events** command.

snmp-server traps ethernet oam events

Syntax Description

This command has no keywords or arguments.

Command Default

Ethernet OAM event traps are not enabled.

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Task ID

Task ID	Operations
snmp	read, write

Examples

The following example shows how to enable SNMP server traps on an Ethernet OAM interface.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# snmp-server traps ethernet oam events
```

status-counter

To set the Metro Ethernet Forum (MEF) N393 Status Counter value that is used to determine Ethernet Local Management Interface (E-LMI) operational status, use the **status-counter** command in interface Ethernet LMI configuration mode. To return to the default, use the **no** form of the command.

status-counter *threshold*
no status-counter *threshold*

Syntax Description

threshold	Number from 2 to 10. The default is 4.

Command Default

The N393 Status Counter is set to 4.

Command Modes

Interface Ethernet LMI configuration (config-if-elmi)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

If the E-LMI protocol status is currently Up, the Status Counter specifies how many consecutive times the PVT must expire before the status is changed to Down. If the E-LMI status is currently Down, the Status Counter specifies how many STATUS ENQUIRY messages must be received without the PVT expiring before the status is changed to Up. If the PVT is disabled, the status counter has no effect.

Task ID

Task ID	Operation
ethernet-services	read, write

The following example shows how to set the MEF Status Counter for E-LMI to 6:

```
RP/0/RP0:hostname# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet lmi
RP/0/RP0:hostname(config-if-elmi)# status-counter 6
```

tags

To set the number of outer tags in CFM packets sent from up MEPs in a CFM domain service, use the **tags** command in CFM domain service configuration mode. To return the number of tags in CFM packets to the default value, use the **no** form of this command.

tags *number*
no tags *number*

Syntax Description

number	Specifies the number of tags in CFM packets from up MEPs. Currently, the only valid value is 1.

Command Default

When not configured, CFM packets are sent with the same number of tags as customer data traffic, according to the encapsulation and rewrite configuration.

Command Modes

CFM domain service configuration (config-cfm-dmn-svc)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command allows you to set the number of tags in CFM packets from up MEPs to 1, so that the system can differentiate between CFM packets and data packets. When not configured, CFM packets from UP MEPs have the same number of tags as data packets, and consequently, may not be forwarded to the appropriate route.

Tags can be configured only for services that are associated with a cross-connect.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to set the number of tags in CFM packets from up MEPs in a CFM domain service:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# domain D1 level 1
RP/0/RP0:hostname(config-cfm-dmn)# service S2 xconnect group grp1 p2p xc1
RP/0/RP0:hostname(config-cfm-dmn-svc)# tags 1
```

traceroute cache

To set the maximum limit of traceroute cache entries or the maximum time limit to hold the traceroute cache entries, use the **traceroute cache** command in CFM configuration mode. To return the traceroute cache to its default limits, use the **no** form of this command.

traceroute cache hold-time *minutes* **size** *entries*
no traceroute cache hold-time *minutes* **size** *entries*

Syntax Description

hold-time *minutes*	Timeout value in minutes that entries are held in the Ethernet CFM traceroute cache table before being cleared. Range is 1 minute or greater.
size *entries*	Maximum number of entries that are stored in the Ethernet CFM traceroute cache table. An entry is a single traceroute reply. Range is 1 to 5000.

Command Default

hold-time: 100

size: 100

Command Modes

CFM configuration (config-cfm)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

A separate cache is managed for each node that sends a traceroute request. All replies to a single traceroute request are cached at once. The **hold-time** begins when the last reply to a request is received. When the **hold-time** limit is reached, all replies to that request are cleared. The size of each traceroute reply is limited by the MTU of the interface.

When the maximum number of entries (**size** *entries*) is exceeded, all replies for the oldest request are deleted.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to set the **hold-time** and the **size** of a traceroute cache.

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet cfm
RP/0/RP0:hostname(config-cfm)# traceroute cache hold-time 1 size 3000
```

traceroute ethernet cfm

To send Ethernet connectivity fault management (CFM) traceroute messages to generate a basic, targeted, or exploratory traceroute, use the **traceroute ethernet** command in EXEC mode.

traceroute ethernet cfm domain *domain-name* **service** *service-name* {**mac-address** *target-mac-address* | **mep-id** *target-mep-id* | **explore** [**all-ports**] [**from** *from-mac-address*]} **source** [**mep-id** *source-mep-id*] **interface** *type interface-path-id* [**asynchronous**] [**timeout** *seconds*] [**filtering-db-only**] [**cos** *cos-no*] [**ttl** *ttl*] [**detail**]

Syntax Description

domain *domain-name*	String of a maximum of 80 characters that identifies the domain in which the destination MEP resides. (Basic traceroute)
service *service-name*	String of a maximum of 80 characters that identifies the maintenance association to which the destination MEP belongs. (Basic traceroute)
mac-address *target-mac-address*	Identifies the 6-byte MAC address (in hexadecimal H.H.H format) of the destination MEP. (Targeted traceroute)
mep-id *target-mepid*	Destination maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191. (Targeted traceroute)
explore	(Optional) Specifies that an exploratory traceroute is performed.
all-ports	(Optional) Specifies an exploratory traceroute of all ports.
from *from-mac-address*	(Optional) Specifies an exploratory traceroute beginning at the specified MAC address (in hexadecimal H.H.H format).
source	Specifies source information for the traceroute.
mep-id *source-mep-id*	(Optional) Source maintenance end point (MEP) ID number. The range for MEP ID numbers is 1 to 8191.
interface *type*	Source interface type. For more information, use the question mark (?) online help function.
interface-path-id	Physical interface or virtual interface. **Note** Use the **show interfaces** command to see a list of all interfaces currently configured on the router. For more information about the syntax for the router, use the question mark (**?**) online help function.
asynchronous	(Optional) Specifies that the traceroute is performed asynchronously, where control is returned to the command prompt immediately, and no results are displayed. The results can be displayed later using the **show ethernet cfm traceroute-cache** command.

timeout *seconds*	(Optional) Timeout value (in seconds) for the specified interface. For a basic traceroute, the timeout is a fixed value that defaults to 5 seconds. For an exploratory traceroute, a logarithmic algorithm is used unless this value is specified.
filtering-db-only	(Optional) Sets whether or not the remote maintenance points should base their responses on the filtering database only. The default is no—use both the filtering and MIP-CCM databases. **Note** The **filtering-db-only** option is only available for basic traceroute (when the MAC address or MEP ID is specified). It is not available with the **explore** option.
cos *cos-no*	(Optional) Identifies the class of traffic of the source MEP by setting a Class of Service (CoS) value. The valid values are from 0 to 7.
ttl *ttl*	Specifies the initial time-to-live (TTL) value (from 1 to 255) for the traceroute message. The default is 64.
detail	(Optional) Specifies that details are displayed in the output for the traceroute.

Command Default

No default behavior or values

Command Modes

EXEC (#)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

By default, this command pauses until the traceroute operation is complete, then displays the results. If the **asynchronous** option is used, this command returns immediately and no results are displayed. Results are placed placed the traceroute cache and can be retrieved using the **show ethernet cfm traceroute-cache** command.

An exploratory traceroute, by default uses a **timeout** value that is calculated by a logarithmic delay algorithm. If the **timeout** value is specified, the specified value is used.

The display output of this command is similar to the output of the **show ethernet cfm traceroute-cache** command.

Task ID

Task ID	Operations
interface	read

Examples

The following example shows how generate a basic traceroute:

```
RP/0/RP0:hostname# traceroute ethernet cfm domain bar service bar mep-id 1 source interface
 TenGigE0/0/0/0

Traceroutes in domain bar (level 4), service bar
```

```
Source: MEP-ID 1, interface TenGigE0/0/0/0
================================================================================
Traceroute at 2009-05-18 12:09:10 to 0001.0203.0402,
TTL 64, Trans ID 2:

Hop Hostname/Last            Ingress MAC/name       Egress MAC/Name        Relay
--- ------------------------ ---------------------- ---------------------- -----
  1 ios                      0001.0203.0400 [Down]                         FDB
      0000-0001.0203.0400    Te0/0/0/0
  2 abc                                             0001.0203.0401 [Ok]    FDB
      ios                                           Not present
  3 bcd                      0001.0203.0402 [Ok]                           Hit
      abc                    Te0/0
Replies dropped: 0
```

uni-directional link-fault detection

To enable detection of a local, unidirectional link fault and send notification of that fault to an Ethernet OAM peer, use the **uni-directional link-fault detection** command in Ethernet OAM configuration mode or interface Ethernet OAM configuration mode. To remove the configuration from a profile and return to the default, or to remove the override configuration at an interface, use the **no** form of this command.

uni-directional link-fault detection [**disable**]
no uni-directional link-fault detection [**disable**]

Syntax Description

disable	(Optional, Interface Ethernet OAM configuration only) Overrides the setting of unidirectional link fault detection from an Ethernet OAM profile, and disables it for this interface only.

Command Default

Detection and sending notification of local, unidirectional link faults is disabled.

Command Modes

Ethernet OAM configuration (config-eoam)

Interface Ethernet OAM configuration (config-if-eoam)

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

This command does not affect how the receipt of link-fault messages are handled by the router. Actions to be taken for the receipt of link-fault messages are configured using the **action uni-directional link-fault** command.

Consider the following guidelines when configuring the **uni-directional link-fault detection** command:

- You can configure unidirectional link-fault detection for multiple interfaces that share a similar configuration using the command within an Ethernet OAM profile and attaching the profile to the interfaces to which it applies.
- You can override the profile configuration for unidirectional link-fault detection using the command in interface Ethernet OAM configuration.
- The **disable** keyword is only available in interface Ethernet OAM configuration mode, and it allows you to override the feature set by the profile, and disable it for a particular interface. For example, if unidirectional link-fault detection is enabled within a profile that is attached to an interface, you can override that configuration to disable it at the interface using the **uni-directional link-fault detection disable** command in interface Ethernet OAM configuration mode.
- You can use the **no** form of the command in either the profile or interface configuration:
  - Running the **no** form of the command within the profile removes the configuration of the uni-directional command in the profile, effectively disabling the feature for all interfaces.
  - Running the **no** form of the command within interface Ethernet OAM configuration removes the override setting of the command at the interface and uses the profile setting.
- The **show ethernet oam configuration** command output will show either Y or N and (Overridden) depending on whether the interface is driving the configuration of the feature, or the profile is driving it. “Overriden” means that the configuration is being applied by the interface.

Task ID

Task ID	Operations
ethernet-services	read, write

Examples

The following example shows how to enable detection of a local, unidirectional link fault and send notification of that fault to an Ethernet OAM peer within an Ethernet OAM profile that can be attached to multiple interfaces:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# ethernet oam profile Profile_1
RP/0/RP0:hostname(config-eoam)# uni-directional link-fault detection
```

The same profile can be applied to multiple interfaces. The following example shows how to attach the Ethernet OAM profile to an interface:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# profile Profile_1
RP/0/RP0:hostname(config-if-eoam)# commit
```

Consider that you have decided that you do not want unidirectional link-fault detection enabled at this particular interface, but you do want to keep the other attached profile settings. The following example shows how to disable link-fault detection at this interface only:

```
RP/0/RP0:hostname# configure
RP/0/RP0:hostname(config)# interface TenGigE0/1/0/0
RP/0/RP0:hostname(config-if)# ethernet oam
RP/0/RP0:hostname(config-if-eoam)# uni-directional link-fault detection disable
RP/0/RP0:hostname(config-if-eoam)# commit
```

fault oam

The **fault oam** command triggers fault OAM messages which are used to communicate faults at server layer MEP to the client layer MEP.

fault oam

no fault oam

Syntax Description

This command has no keywords or arguments.

Command Default

No default behavior or values.

Command Modes

Bidirectional Interface Configuration Mode

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
ethernet-services	read, write

Example

The following example shows how to use the **fault oam** command:

```
RP0/0/0/CPU0: router (config-if-bidir) # fault oam
```

mpls-oam

To enable MPLS OAM LSP verification, use the **mpls-oam** command in global configuration mode. To return to the default behavior, use the **no** form of this command.

mpls-oam

no mpls-oam

Syntax Description

This command has no keywords or arguments.

Command Default

By default, MPLS OAM is disabled.

Command Modes

Global Configuration

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
mpls-te	read, write

Example

The following example shows how to use the **mpls-oam** command:

```
RP/0/RP0: router (config) # mpls-oam
```

path-option (MPLS-TE)

To configure a path option for an MPLS-TE tunnel, use the **path-option** command in tunnel-te interface configuration mode. To return to the default behavior, use the **no** form of this command.

path-option *preference-priority* [**protecting** *number*] { **dynamic** [**pce** [**address ipv4** *address*]] | **explicit** { **name** *path-name* | **identifier** *path-number* } [**protected-by** *path-option-level*] } **[attribute-set** *name]* [**isis** *instance-name* **level** *level*] [**lockdown**] [**sticky**] [**ospf** *instance-name* **area** { *value address* }] [**verbatim**]
no path-option *preference-priority* {**dynamic** [**pce** [**address ipv4** *address*]] | **explicit** {**name** *path-name* | **identifier** *path-number*}[**protected-by** *path-option-level*]} [**isis** *instance-name* **level** *level*] [**lockdown**] [**ospf** *instance-name* **area** {*value address*}] [**verbatim**]

Syntax Description

preference-priority	Path option number. Range is from 1 to 1000.
protecting *number*	Specifies a path setup option to protect a path. The range is from 1 to 1000.
dynamic	Specifies that label switched paths (LSP) are dynamically calculated.
pce	(Optional) Specifies that the LSP is computed by a Path Computation Element (PCE).
address	(Optional) Configures the address for the PCE.
ipv4 *address*	Configures the IPv4 address for the PCE.
explicit	Specifies that LSP paths are IP explicit paths.
name *path-name*	Specifies the path name of the IP explicit path.
identifier *path-number*	Specifies a path number of the IP explicit path.
protected-by *path-option-level*	(Optional) Configures path protection for an explicit path that is protected by another explicit path.
isis *instance-name*	(Optional) Limits CSPF to a single IS-IS instance and area.
attribute-set *name*	(Optional) Specifies the attribute set for the LSP.
level *level*	Configures the level for IS-IS. The range is from 1 to 2.
lockdown	(Optional) Specifies that the LSP cannot be reoptimized.
sticky	(Optional) Extended version of lockdown. LSP stays on the same path after change in resources. **Note** The sticky option can be configured only on the primary path option.
ospf *instance-name*	(Optional) Limits CSPF to a single OSPF instance and area.
area	Configures the area for OSPF.

value	Decimal value for the OSPF area ID.
address	IP address for the OSPF area ID.
verbatim	(Optional) Bypasses the Topology/CSPF check for explicit paths.

Command Default

No default behavior or values

Command Modes

Tunnel-te interface configuration

Command History

Release	Modification
Release 6.1.42	This command was introduced.

Usage Guidelines

You can configure several path options for a single tunnel. For example, there can be several explicit path options and a dynamic option for one tunnel. The path setup preference is for lower (not higher) numbers, so option 1 is preferred.

When the lower number path option fails, the next path option is used to set up a tunnel automatically (unless using the lockdown option).

The **protecting** keyword specifies that you can configure path-protection for the primary LSP. The **protecting** keyword is available only for tunnel-gte interfaces.

You specify the backup path for the **path-option** command in case of the primary path failure.

CSPF areas are configured on a per-path-option basis.

The **dynamic** keyword is required to configure path-protection.

Any primary explicit path on a path protection enabled tunnel can be configured to be protected by an explicit path option level using **protected-by** keyword. Only one explicit protecting path is supported per path option.

Task ID

Task ID	Operations
mpls-te	read, write

Examples

The following example shows how to configure the tunnel to use a named IPv4 explicit path as verbatim and lockdown options for the tunnel. This tunnel cannot reoptimize when the FRR event goes away, unless you manually reoptimize it:

```
RP/0/RP0:hostname(config)# interface tunnel-te 1
RP/0/RP0:hostname(config-if)# path-option 1 explicit name test verbatim lockdown
```

The following example shows how to enable path protection on a tunnel to configure an explicit path:

```
RP/0/RP0:hostname(config)# interface tunnel-te 1
RP/0/RP0:hostname(config-if)# path-option 1 explicit name po4
```

```
RP/0/RP0:hostname(config-if)# path-option protecting 1 explicit name po6
```

The following example shows how to limit CSPF to a single OSPF instance and area:

```
RP/0/RP0:hostname(config)# interface tunnel-te 1
RP/0/RP0:hostname(config-if)# path-option 1 explicit name router1 ospf 3 area 7 verbatim
```

The following example shows how to limit CSPF to a single IS-IS instance and area:

```
RP/0/RP0:hostname(config)# interface tunnel-te 1
RP/0/RP0:hostname(config-if)# path-option 1 dynamic isis mtbf level 1 lockdown
```

mpls traffic-eng path-protection switchover

To force a manual switchover for path-protected tunnel, use the **mpls traffic-eng path-protection switchover** command in EXEC mode. To disable this feature, use the **no** form of this command.

mpls traffic-eng path-protection switchover [**non-revertive**] **tunnel** *tunnel_name*
no mpls traffic-eng path-protection switchover [**non-revertive**] **tunnel** *tunnel_name*

Syntax Description

non-revertive	(Optional) Configures the LSP to not switch back to the original working path.
tunnel *tunnel_name*	Switchover occurs for the specified tunnel name.

Command Default

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
mpls-te	read, write

Example

This example shows how to use the **mpls traffic-eng path-protection switchover** command:

```
RP/0/RP0:router# mpls traffic-eng path-protection switchover non-revertive tunnel t1
```

mpls traffic-eng reroute

To configure the router to assign new or more efficient backup MPLS-TE tunnels and to clear sticky paths for protected MPLS-TE tunnels, use the **mpls traffic-eng reroute** command in EXEC mode. To return to the default behavior, use the **no** form of this command.

mpls traffic-eng reroute tunnel *tunnel_name*
no mpls traffic-eng reroute tunnel *tunnel_name*

Syntax Description

tunnel *tunnel_name*	Clears sticky paths for the specified tunnel.

Command Default

No default behavior or values.

Command Modes

EXEC

Command History

Release	Modification
Release 6.5.29	This command was introduced.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
mpls-te	read, write

Example

This example shows how to use the **mpls traffic-eng reroute** command:

```
RP/0/RP0: router # mpls traffic-eng reroute tunnel t1
```