

Ethernet Local Management Interface Commands

This chapter provides details of the commands used for configuring Ethernet Local Management Interface.

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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.

Usage Guidelines

No specific usage guidelines.

Task ID

Task ID	Operation
ethernet-services	execute

The following example shows how to clear E-LMI statistics:

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

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 tengige interface and enter Ethernet LMI configuration mode:

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

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: tengige 0/0/0/0
  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 1: 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
-------------------------------------------------------------------------------
tengige 0/0/0/0            Up     Up            3      19 Multiplexing, no bundling
tengige 0/0/0/1            Down   Admin-down    1       0 All to One Bundling
```

Table 2: 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: tengige 0/0/0/0
  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: tengige 0/0/0/0.1
    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 3: 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)."