



Ethernet Local Management Interface

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Ethernet Local Management Interface (LMI) is an Ethernet layer operation, administration, and management (OAM) protocol. It provides information that enables autoconfiguration of customer edge (CE) devices and provides the status of Ethernet virtual connections (EVCs) for large Ethernet metropolitan-area networks (MANs) and WANs. Specifically, Ethernet LMI notifies a CE device of the operating state of an EVC and the time when an EVC is added or deleted. Ethernet LMI also communicates the attributes of an EVC and a user-network interface (UNI) to a CE device.

The advent of Ethernet as a MAN and WAN technology imposes a new set of OAM requirements on Ethernet's traditional operations, which were centered on enterprise networks only. The expansion of Ethernet technology into the domain of service providers, where networks are substantially larger and more complex than enterprise networks and the user-base is wider, makes operational management of link uptime crucial. More importantly, the timeliness in isolating and responding to a failure becomes mandatory for normal day-to-day operations, and OAM translates directly to the competitiveness of the service provider.

Finding Feature Information in This Module

Your Cisco IOS software release may not support all of the features documented in this module. To reach links to specific feature documentation in this module and to see a list of the releases in which each feature is supported, use the [“Feature Information for Ethernet Local Management Interface”](#) section on page 26.

Finding Support Information for Platforms and Cisco IOS and Catalyst OS Software Images

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



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Prerequisites for Ethernet Local Management Interface

Business Requirements

- Ethernet OAM such as connectivity fault management (CFM) must be implemented and operational on the service provider's network.

Restrictions for Ethernet Local Management Interface

- Ethernet LMI relies on Ethernet CFM for the status of an EVC, the remote UNI identifier associated with an EVC, and remote UNI status.
- Ethernet LMI CE is available only on routing ports on routing platforms. For information about Ethernet LMI PE functionality on switching platforms, see the [“Configuring Ethernet OAM, CFM and E-LMI”](#) chapter of the *Cisco ME 3400 Switch Software Configuration Guide*, Release 12.2(46)SE.
- Ethernet LMI in the Cisco IOS Software Release 12.4(9)T does not support autoconfiguration of CE devices.

Information About Ethernet Local Management Interface

Before you set up Ethernet LMI, you should understand the following concepts:

- [EVC, page 3](#)
- [Ethernet LMI, page 3](#)

EVC

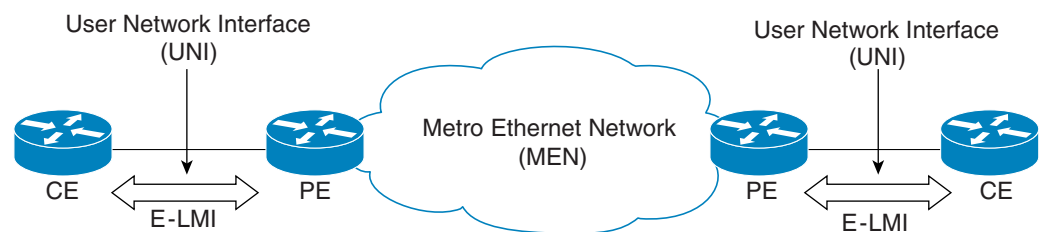
An EVC as defined by the Metro Ethernet Forum could be a port level point-to-point or multipoint-to-multipoint Layer 2 circuit. EVC status can be used by the CE device to find an alternative path in to the service provider network or in some cases, fall back to a backup path over Ethernet or another alternative service such as Frame Relay or ATM.

Ethernet LMI

Ethernet LMI is an Ethernet layer OAM protocol between a CE device and the PE in large Ethernet MANs and WANs. It provides information that enables service providers to autoconfigure CE devices with service parameters and parameter changes from a user provider edge (UPE) device.

Figure 1 shows where in a network Ethernet LMI functions.

Figure 1 Position in the Network Where Ethernet LMI Functions



E-LMI: Ethernet Provisioning and Management entity across UNI (CE-PE)

LMI also provides the status of Ethernet EVCs in large Ethernet MANs and WANs to the CE. Specifically, Ethernet LMI notifies a CE device of the operating state of an EVC and the time when an EVC is added or deleted. Ethernet LMI also communicates EVC and UNI attributes to a CE device.

The Ethernet LMI protocol includes the following procedures, as defined by the MEF 16 Technical Specification:

- Notifying the CE when an EVC is added
- Notifying the CE when an EVC is deleted
- Notifying the CE of the availability state of a configured EVC (Active, Not Active, or Partially Active)
- Communicating UNI and EVC attributes to the CE

Benefits of Ethernet LMI

Ethernet LMI provides the following benefits:

- Communication of end-to-end status of the EVC to the CE device
- Communication of EVC and UNI attributes to a CE device
- Competitive advantage for service providers

How to Set Up Ethernet Local Management Interface

To set up Ethernet LMI, perform the following tasks:

- [Enabling Ethernet LMI on All Supported Interfaces, page 4](#)
- [Enabling Ethernet LMI on a Single Supported Interface, page 4](#)

Enabling Ethernet LMI on All Supported Interfaces

Perform this task to enable Ethernet LMI on all supported interfaces on a device.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ethernet lmi global**
4. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Puts the CLI in global configuration mode.
Step 3	ethernet lmi global Example: Router(config)# ethernet lmi global	Enables Ethernet LMI on all supported interfaces on the device.
Step 4	end Example: Router# end	Returns the CLI to privileged EXEC mode.

Enabling Ethernet LMI on a Single Supported Interface

Perform the steps in this task to enable Ethernet LMI on a specific supported interface.

SUMMARY STEPS

1. **enable**

2. **configure terminal**
3. **interface** *type number*
4. **ethernet lmi interface**
5. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Puts the CLI in global configuration mode.
Step 3	interface <i>type number</i> Example: Router(config)# interface ethernet 0/0	Specifies an interface and puts the CLI in interface configuration mode.
Step 4	ethernet lmi interface Example: Router(config-if)# ethernet lmi interface	Enables Ethernet LMI on the interface.
Step 5	end Example: Router# end	Returns the CLI to privileged EXEC mode.

Configuration Examples for Ethernet Local Management Interface

The examples in this section show the configurations that enable Ethernet LMI on all interfaces on a CE device (globally) and on a specific interface on a CE device.

- [Enabling Ethernet LMI on All Supported Interfaces: Example, page 5](#)
- [Enabling Ethernet LMI on a Single Supported Interface: Example, page 7](#)

Enabling Ethernet LMI on All Supported Interfaces: Example

The following example shows how to enable Ethernet LMI on all supported interfaces on a device:

```
enable
configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
ethernet lmi global
```

```
end
00:06:33: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed p
```

Enabling Ethernet LMI on a Single Supported Interface: Example

The following example shows how to enable Ethernet LMI on a single interface:

```
enable
configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
interface ethernet 0/0
ethernet lmi interface
end
00:05:51: %SYS-5-CONFIG_I: Configured from console by console
```

Additional References

The following sections provide references related to Ethernet Local Management Interface.

Related Documents

Related Topic	Document Title
Ethernet Connectivity Fault Management	Ethernet Connectivity Fault Management , Release 12.2(33)SRA
Configuring CFM and E-LMI in a service provider network	Cisco ME 3400 Switch Software Configuration Guide, Rel. 12.2(46)SE
Commands used for configuring Ethernet LMI in a service provider network	Cisco ME 3400 Switch Command Reference, Rel. 12.2(46)SE

Standards

Standard	Title
Metro Ethernet Forum 16 Technical Specification	Technical Specification MEF 16- Ethernet Local Management Interface
IEEE P802.1ag/D5.2	Draft Standard for Local and Metropolitan Area Networks
ITU-T Q.3/13	Liaison statement on Ethernet OAM (Y.17ethoam)
IETF VPLS OAM	L2VPN OAM Requirements and Framework

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
No new or modified RFCs are supported by this feature, and support for existing RFCs has not been modified by this feature.	—

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register on Cisco.com.	http://www.cisco.com/techsupport

Command Reference

This section documents only commands that are new or modified.

- [clear ethernet lmi statistics](#)
- [debug ethernet lmi](#)
- [ethernet lmi](#)
- [ethernet lmi global](#)
- [ethernet lmi interface](#)
- [show ethernet lmi](#)

clear ethernet lmi statistics

To clear Ethernet local management interface (LMI) statistics counters for all interfaces or for a specific interface, use the **clear ethernet lmi statistics** command in privileged EXEC mode.

```
clear ethernet lmi statistics [interface type number]
```

Syntax Description	interface	(Optional) Specifies the interface on which to clear counters.
	<i>type</i>	(Optional) String that identifies the type of interface. Valid options are the following: <ul style="list-style-type: none"> • ethernet—Ethernet IEEE 802.3 interface • fastethernet—Fast Ethernet IEEE 802.3 interface • gigabitethernet—Gigabit Ethernet IEEE 802.3z interface
	<i>number</i>	(Optional) Integer that identifies the interface.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.4(9)T	This command was introduced.
	12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines This command resets counters and is useful when you want to monitor Ethernet LMI errors for a period of time. For example, to monitor errors for 1 hour, you would issue the **clear ethernet lmi statistics** command to reset the counter. At the end of the hour, you would issue the **show ethernet lmi statistics** command to display errors that occurred during that one-hour time period.

Examples The following example shows how to clear Ethernet LMI statistics counters on all interfaces:

```
Router# clear ethernet lmi statistics
Clear "show ethernet lmi" statistics counters on all interfaces [confirm]
Router#
```

The following example shows how to clear Ethernet LMI statistics counters on the Gigabit Ethernet 1/0 interface:

```
Router# clear ethernet lmi statistics interface gigabitethernet 1/0
Clear "show ethernet lmi" statistics counters on this interface [confirm]
Router#
```

■ clear ethernet lmi statistics

Related Commands	Command	Description
	show ethernet lmi	Displays Ethernet LMI Ethernet virtual connections (EVCs) configured on a device.
	show interface	Displays statistics for all interfaces configured on a device.

debug ethernet lmi

To enable debugging of Ethernet local management interface (LMI) messages on all interfaces or on a specified interface, use the **debug ethernet lmi** command in privileged EXEC mode. To disable debugging, use the **no** form of this command.

```
debug ethernet lmi {all | errors | events | packets} [interface type number]
```

```
no debug ethernet lmi {all | errors | events | packets} [interface type number]
```

Syntax Description

all	All debug messages are to be filtered.
errors	All errors are to be filtered.
events	All events are to be filtered.
packets	All decoded messages are to be filtered.
interface	(Optional) Specifies an interface to use to filter debug messages.
<i>type</i>	(Optional) String that identifies the type of interface. Valid options are the following: <ul style="list-style-type: none"> ethernet—Ethernet IEEE 802.3 interface fastethernet—Fast Ethernet IEEE 802.3 interface gigabitethernet—Gigabit Ethernet IEEE 802.3z interface
<i>number</i>	(Optional) Integer that identifies the interface.

Command Default

Debugging is disabled.

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(9)T	This command was introduced.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

When you use the **all** keyword, keep in mind how many interfaces support Ethernet LMI. Some messages may be lost if many interfaces are supported.

Use of the **errors** keyword enables debugging of Ethernet LMI errors such as invalid messages; for example, unexpected information element (IE) and mandatory IE missing.

Use of the **events** keyword enables debugging of Ethernet LMI events such as status changes, timeouts, and messages received.

Use of the **packets** keyword enables debugging of decoded Ethernet LMI packets.

The output from this command is a log of activity. Use this command to troubleshoot Ethernet LMI in your network.

Examples

The following example output from the **debug ethernet lmi all** command shows event and packet messages:

```
Router# debug ethernet lmi all

Ethernet LMI errors debugging is on
Ethernet LMI packets debugging is on
Ethernet LMI events debugging is on
Ethernet LMI packets hex debugging is on

00:29:32: ELMI Et0/0 EVENT: ce_event: State 0x0, Event 0x4
00:29:32: ELMI Et0/0 EVENT: Old State=0x0, Event=0x4, New State=0x2
00:29:32: ELMI Et0/0 EVENT: Updated Stat Type: ETHER_LMI_ST_LMSG_SENT

00:29:32: ELMI Et0/0 PKT HEX: TX->:0x01750101010202B4B303050000000004000000000000
00:29:32: ELMI Et0/0 PACKET: Outgoing
          Protocol Version      : 0x1
          Message                : STATUS ENQ (0x75)
          Report Type             : Check
          Sequence Number         : Snd(0xB4), Rcv(0xB3)
          Data Instance           : Value(0x4)

00:29:32: ELMI Et0/0 PKT HEX: RX<-:0x017D0101010202B4B403050000000004000000000000
00:29:32: ELMI Et0/0 PACKET: Incoming
          Protocol Version      : 0x1
          Message                : STATUS (0x7D)
          Report Type           : Check
          Sequence Number       : Snd(0xB4), Rcv(0xB4)
          Data Instance         : Value(0x4)
00:29:32: ELMI Et0/0 EVENT: ce_event: State 0x2, Event 0x1
00:29:32: ELMI Et0/0 EVENT: Update seq: current send 0xB4 rcv 0xB3
00:29:32: ELMI Et0/0 EVENT: Updated Stat Type: ETHER_LMI_ST_LMSG_RCVD
00:29:32: ELMI Et0/0 EVENT: Old State=0x2, Event=0x1, New State=0x0
```

The following example output from the **debug ethernet lmi all** command shows detailed information about the user-network interfaces (UNIs) and Ethernet virtual connections (EVCs) for packet messages.

```
Router# debug ethernet lmi all

Ethernet LMI errors debugging is on
Ethernet LMI packets debugging is on
Ethernet LMI events debugging is on
Ethernet LMI packets hex debugging is on

Jun 16 18:59:49.372: ELMI Gi0/1 PKT HEX: RX<-:0x017D0101000202D30103050000000004
Jun 16 18:59:49.372: ELMI Gi0/1 PACKET: Incoming
          Protocol Version      : 0x1
          Message                : STATUS (0x7D)
          Report Type           : Full
          Sequence Number       : Snd(0xD3), Rcv(0x1)
          Data Instance         : Value(0x4)
          UNI                   : Bundle
             UNI Id             : 'uni_sandiego'
          EVC Status            : Evc Ref(0x1), New, Active
             EVC Parameters     : Point-to-Point
             EVC Id             : 'EVC_P2P_110'
             Remote UNI Sum     : Cfgd(1), Up(1)
          EVC Status            : Evc Ref(0x2), New, Active
             EVC Parameters     : MultiPoint-to-MultiPoint
             EVC Id             : 'EVC_MP2MP_101'
             Remote UNI Sum     : Cfgd(2), Up(2)
          CEVLAN EVC Map       : Evc Ref(0x1), Seq(0x1)
             EVC Map            : Num Vlans(1), 110
```

```

CEVLAN EVC Map      : Evc Ref(0x2), Seq(0x1)
  EVC Map           : Num Vlans(1), 101
Remote UNI Status   : Evc Ref(0x1), Uni Ref(0x26), Up
  UNI Id            : 'cisco_newyork'
Remote UNI Status   : Evc Ref(0x2), Uni Ref(0x1D), Up
  UNI Id            : 'uni_newyork'
Remote UNI Status   : Evc Ref(0x2), Uni Ref(0x96), Up
  UNI Id            : 'miami-detroit'

Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: ce_event: State 0x1, Event 0x0
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update seq: current send 0x1 rcv 0x0
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update uni:
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_sts: ref_id: 0x1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_param: type 0x0
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_id
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update remote_uni_sum cfgd 1 up 1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_sts: ref_id: 0x2
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_param: type 0x1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_id
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update remote_uni_sum cfgd 2 up 2
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update cevlan_evc_map: ref_id: 0x1 seq#1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_map: num_vlans 1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update cevlan_evc_map: ref_id: 0x2 seq# 1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update evc_map: num_vlans 1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update remote_uni_det: evc ref_id: 0x1 u6
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update remote_uni_det: evc ref_id: 0x2 uD
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: Update remote_uni_det: evc ref_id: 0x2 u6
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: upd_lmi_db: new uni_evc ref 0x1
Jun 16 18:59:49.372: ELMI Gi0/1 EVENT: upd_lmi_db: new uni_evc ref 0x2
Jun 16 18:59:49.372: %ETHER_LMI-6-MISMATCHED_VLAN_NOT_CONFIGURED: VLAN 101,110 1
Jun 16 18:59:49.372: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthn
Jun 16 18:59:49.376: ELMI Gi0/1 EVENT: Update di: current 0x0 rcvd 0x4
Jun 16 18:59:49.376: ELMI Gi0/1 EVENT: Old State=0x1, Event=0x0, New State=0x0
Jun 16 18:59:49.376: ELMI Gi0/1 EVENT: Updated Stat Type: ETHER_LMI_ST_LFULL_MSD
Jun 16 18:59:50.100: %SYS-5-CONFIG_I: Configured from console by console
Jun 16 18:59:59.376: ELMI Gi0/1 EVENT: ce_event: State 0x0, Event 0x4
Jun 16 18:59:59.376: ELMI Gi0/1 EVENT: Old State=0x0, Event=0x4, New State=0x2
Jun 16 18:59:59.376: ELMI Gi0/1 EVENT: Updated Stat Type: ETHER_LMI_ST_LMSG_SENT

```

The following example shows output of the **debug ethernet lmi all interface** command for interface Ethernet 0/0.

```
Router# debug ethernet lmi all interface ethernet 0/0
```

```

Ethernet LMI errors debugging is on for Ethernet0/0
Ethernet LMI packets debugging is on for Ethernet0/0
Ethernet LMI events debugging is on for Ethernet0/0
Ethernet LMI packets hex debugging is on for Ethernet0/0

00:45:14: ELMI Et0/0 EVENT: ce_event: State 0x0, Event 0x4
00:45:14: ELMI Et0/0 EVENT: Old State=0x0, Event=0x4, New State=0x2
00:45:14: ELMI Et0/0 EVENT: Updated Stat Type: ETHER_LMI_ST_LMSG_SENT
00:45:14: ELMI Et0/0 PKT HEX: TX->:0x01750101010202131203050000000004000000000000
00:45:14: ELMI Et0/0 PACKET: Outgoing
  Protocol Version      : 0x1
  Message               : STATUS ENQ (0x75)
  Report Type           : Check
  Sequence Number       : Snd(0x13), Rcv(0x12)
  Data Instance         : Value(0x4)

00:45:14: ELMI Et0/0 PKT HEX: RX<-:0x017D0101010202131303050000000004000000000000
00:45:14: ELMI Et0/0 PACKET: Incoming
  Protocol Version      : 0x1

```

```
Message           : STATUS (0x7D)
Report Type       : Check
Sequence Number   : Snd(0x13), Rcv(0x13)
Data Instance     : Value(0x4)
```

```
00:45:14: ELMI Et0/0 EVENT: ce_event: State 0x2, Event 0x1
00:45:14: ELMI Et0/0 EVENT: Update seq: current send 0x13 rcv 0x12
00:45:14: ELMI Et0/0 EVENT: Updated Stat Type: ETHER_LMI_ST_LMSG_RCVD
00:45:14: ELMI Et0/0 EVENT: Old State=0x2, Event=0x1, New State=0x0
```


ethernet lmi

To set Ethernet local management interface (LMI) parameters for a user-network interface (UNI), use the **ethernet lmi** command in interface configuration mode. To remove Ethernet LMI parameters on a UNI, use the **no** form of this command.

```
ethernet lmi {n391 | n393 | t391 | t392} value
```

```
no ethernet lmi {n391 | n393 | t391 | t392}
```

Syntax Description

n391	Polling counter on the customer equipment. A polling counter polls the status of the UNI and all Ethernet virtual connections (EVCs).
n393	An error counter for customer equipment or for a metro Ethernet network.
t391	Polling timer on the customer equipment. A polling timer transmits status enquiries and when status messages are not received, records errors.
t392	Polling verification timer on the metro Ethernet network. The polling verification timer verifies status enquiries received. When a timer expires, an error is recorded and the timer is restarted.
	 Note The t392 timer is valid only on Ethernet LMI provider edge (PE) devices. It is not available on customer edge (CE) devices.
<i>value</i>	Integer value within ranges that vary depending on the keyword with which it is used. Valid values are as follows: <ul style="list-style-type: none"> • n391—1 to 65000. Default is 360. • n393—1 to 10. Default is 4. • t391—5 to 30 (seconds). Default is 10. • t392—5 to 30 (seconds); default is 15 or 0 to 0 (0-0), which disables the timer.

Command Default

Ethernet LMI parameters are not set on any UNIs.

Command Modes

Interface configuration

Command History

Release	Modification
12.4(9)T	This command was introduced.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

The value for the polling verification timer (t392) should be greater than the value for the polling timer (t391).

The polling verification timer (t392) can be disabled.

A very high value for the polling timer (t391) means more time spent detecting Ethernet LMI link-down errors.

Examples

The following example shows how to set a polling counter for 30 seconds on interface Ethernet 1/0:

```
Router# configure terminal  
Router(config)# interface ethernet 1/0  
Router(config-if)# ethernet lmi t391 30
```

ethernet lmi global

To enable Ethernet local management interface (LMI) functionality globally on a device, use the **ethernet lmi global** command in global configuration mode. To disable Ethernet LMI globally on a device, use the **no** form of this command.

ethernet lmi global

no ethernet lmi global

Syntax Description This command has no arguments or keywords.

Command Default Ethernet LMI is disabled.

Command Modes Global configuration

Command History	Release	Modification
	12.4(9)T	This command was introduced.
	12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines Ethernet LMI is disabled by default on an interface and must be explicitly enabled. The **ethernet lmi global** command enables Ethernet LMI on all interfaces for an entire device. The benefit of this command is that you can enable Ethernet LMI on all interfaces with one command compared to enabling Ethernet LMI separately on each interface.

To disable Ethernet LMI on a specific interface after the **ethernet lmi global** command has been issued, the **no ethernet lmi interface** command must be issued on that interface.

The sequence in which the **ethernet lmi interface** and **ethernet lmi global** commands are issued is significant. The latest command issued overrides the prior command issued.

Examples The following example shows how to enable Ethernet LMI globally on a device:

```
Router(config)# ethernet lmi global
```

Related Commands	Command	Description
	ethernet lmi interface	Enables Ethernet LMI for a user-network interface.

ethernet lmi interface

To enable Ethernet local management interface (LMI) on a user-network interface (UNI), use the **ethernet lmi interface** command in interface configuration mode. To remove Ethernet LMI on a UNI, use the **no** form of this command.

ethernet lmi interface

no ethernet lmi interface

Syntax Description This command has no arguments or keywords.

Command Default Ethernet LMI parameters are not set on any UNIs.

Command Modes Interface configuration

Command History

Release	Modification
12.4(9)T	This command was introduced.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

This command enables Ethernet LMI processing on an interface if the **ethernet lmi global** command has not been issued. When the **ethernet lmi global** command has been issued, Ethernet LMI is enabled on all interfaces. In this case, the **no ethernet lmi interface** command overrides the **ethernet lmi global** command and disables Ethernet LMI processing on the interface.

The sequence in which the commands are issued is significant. The latest command issued overrides the prior command issued.

Examples

The following example shows how to enable Ethernet LMI on interface Ethernet 1/0:

```
Router# configure terminal
Router(config)# interface ethernet 1/0
Router(config-if)# ethernet lmi interface
```

Related Commands

Command	Description
ethernet lmi global	Enables Ethernet LMI functionality globally on a device.

show ethernet lmi

To display Ethernet local management interface (LMI) Ethernet virtual connections (EVCs) configured on a device, use the **show ethernet lmi** command in privileged EXEC mode.

```
show ethernet lmi {{ evc [detail evc-id [interface type number] | map interface type number]} |
  {parameters | statistics} interface type number | uni map [interface type number]}
```

Syntax Description

evc	Displays information about an EVC.
detail	(Optional) Displays detailed information about a specified EVC.
<i>evc-id</i>	(Optional) String of a maximum of 100 characters that identifies an EVC.
interface	Indicates that an interface is specified. This keyword is optional except with the parameters and statistics keywords.
<i>type</i>	String that identifies the type of interface. Valid options are the following: <ul style="list-style-type: none"> ethernet—Ethernet IEEE 802.3 interface fastethernet—Fast Ethernet IEEE 802.3 interface gigabitethernet—Gigabit Ethernet IEEE 802.3z interface
<i>number</i>	Integer that identifies the interface.
map	(Optional) Indicates a VLAN map.
parameters	Displays Ethernet LMI parameters.
statistics	Displays Ethernet LMI statistics.
uni map	Displays information about the user-network interface (UNI).

Command Modes

Privileged EXEC

Command History

Release	Modification
12.4(9)T	This command was introduced.
12.2(33)SRB	Support for this command on the Cisco 7600 router was integrated into Cisco IOS Release 12.2(33)SRB.

Usage Guidelines

Use this command to check the operational statuses of EVCs.

Examples

The following examples show output from a **show ethernet lmi** command for interface Ethernet 0/0 using different keywords and arguments.

The following sample output is generated from the **show ethernet lmi** command using the **evc** keyword:

```
Router# show ethernet lmi evc

St  EVC Id                                     Port
-----
A   EVC_MP2MP_101                             Gi0/1
A   EVC_P2P_110                                Gi0/1
```

Key: St=Status, A=Active, P=Partially Active, I=Inactive, ?=Link Down

The following sample output is generated from the **show ethernet lmi** command using the **evc** and optional **detail** keywords:

```
Router# show ethernet lmi evc detail EVC_MP2MP_101

EVC Id: EVC_MP2MP_101
interface Ethernet0/0
  Time since Last Full Report: 00:25:25
  Ether LMI Link Status: Up
  UNI Status: Up
  UNI Id: router3-e0/0+router-e0/0
  CE-VLAN/EVC Map Type: Bundling
  VLAN: 101

  EVC Status: Active
  EVC Type: Multipoint-to-Multipoint
  Remote UNI Count: Configured = 2, Active = 2

  UNI Id                               UNI Status   Port
  ----                               -
  router4-e0/0+router1-e0/0           Up           Remote
  router5-e0/0+router6-e0/0           Up           Remote
```

[Table 1](#) describes the significant fields shown in output of the **show ethernet lmi** command using the **evc** and **detail** keywords.

Table 1 *show ethernet lmi evc detail Field Descriptions*

Field	Description
EVC Id	Identifier of the EVC.
Time since Last Full Report	Number of hours, minutes, seconds since the CE requested a detailed report.
Ether LMI Link Status	Operational state of the LMI link.
UNI Status	Operational state of the UNI.
UNI Id	Identifier of the UNI between the CE and PE devices.
CE-VLAN/EVC Map Type	EVC map type: bundling, multiplex, or all-to-one
VLAN	Identifier of the VLAN.
EVC Status	Operational state of the EVC.
EVC Type	Type of connection (point-to-point or multipoint-to-multipoint).

Table 1 *show ethernet lmi evc detail Field Descriptions (continued)*

Field	Description
Remote UNI Count	Number of remote UNIs that are configured and the number that are operational.
Port	Type of port, either local or remote, on which the EVC is configured. If the port is local, the interface ID is specified.

The following sample output is generated from the **show ethernet lmi** command using the **map interface** keyword:

```
Router# show ethernet lmi evc map interface Ethernet0/0
```

```
UNI Id: router3-e0/0+router-e0/0
St  Evc Id                               CE-VLAN
-----
A  EVC_MP2MP_101                          101
A  EVC_P2P_110                             110
```

Key: St=Status, A=Active, P=Partially Active, I=Inactive, *=Default EVC,
?=Link Down

Table 2 describes the significant fields shown in output of the **show ethernet lmi** command using the **evc** and **map** keywords.

Table 2 *show ethernet lmi evc map Field Descriptions*

Field	Description
UNI Id	Identifier of the UNI between the CE and PE devices.
St	Operational state of the EVC.
Evc Id	Identifier of the EVC.
CE-VLAN	Identifier of the VLAN used by the CE.

The following sample output is generated from the **show ethernet lmi** command using the **parameters** and **interface** keywords:

```
Router# show ethernet lmi parameters interface Ethernet0/0
```

```
E-LMI Parameters for interface Ethernet0/0
Version : MEF.16-0106
Mode : CE
T391 : 10
T392 : NA
N391 : 360
N393 : 4
```

Table 3 describes the significant fields shown in output of the **show ethernet lmi** command using the **parameters** keyword.

Table 3 *show ethernet lmi parameters Field Descriptions*

Field	Description
Version	Version number of the specification that E-LMI implementation is based on.
Mode	Customer equipment or the Metro Ethernet network.
T391	Polling timer.
T392	Polling verification timer.
N391	Polling counter.
N393	Event counter.

The following sample output is generated from the **show ethernet lmi** command using the **statistics** and **interface** keywords:

```
Router# show ethernet lmi statistics interface Ethernet0/0

E-LMI Statistics for interface Ethernet0/0
  Ether LMI Link Status: Up
  UNI Status: Up
  UNI Id: router3-e0/0+router-e0/0

Reliability Errors:
  Status Timeouts                0  Invalid Sequence Number      0
  Invalid Status Response        0  Unsolicited Status Received  0

Protocol Errors:
  Invalid Protocol Version       0  Invalid EVC Reference Id     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
  Short Message                  0

Last Full Status Enq Sent      00:50:35  Last Full Status Rcvd       00:50:35
Last Status Check Sent        00:00:06  Last Status Check Rcvd      00:00:06
Last clearing of counters      00:09:57
```



Note The UNI Id field displays only when it is available from the provider edge router.

Table 4 describes the significant fields shown in output of the **show ethernet lmi** command using the **statistics** keyword.

Table 4 *show ethernet lmi statistics Field Descriptions*

Field	Description
E-LMI Statistics for interface <interface-id>	
Ether LMI Link Status	Operational state of Ethernet LMI connectivity.
UNI Status	Operational state of the UNI.

Table 4 *show ethernet lmi statistics Field Descriptions (continued)*

Field	Description
UNI Id	Identifier of the UNI.
Reliability Errors	
Status Timeouts	Number of times that a status request has been sent but not received.
Invalid Sequence Number	Number of times the sequence numbers of Ethernet LMI packets do not match the sequence numbers expected.
Invalid Status Response	Number of times a status response received was invalid and discarded.
Unsolicited Status Received	Number of times status was received that had not been requested.
Protocol Errors	
Invalid Protocol Version	Number of times the protocol version in Ethernet LMI packets does not match what is supported.
Invalid EVC Reference Id	Number of times EVC reference IDs are invalid in Ethernet LMI packets.
Invalid Message Type	Number of message types that are not valid for LMI.
Out of Sequence IE	Number of information elements (IEs) that are not in the correct sequence.
Duplicated IE	Number of duplicated IEs.
Mandatory IE Missing	Number of mandatory IEs that are missing.
Invalid Mandatory IE	Number of mandatory IEs that are invalid.
Invalid non-Mandatory IE	Number of non-mandatory IEs that are invalid.
Unrecognized IE	Number of IEs that are not recognized.
Unexpected IE	Number of IEs that are unexpected.
Short Message	Number of times the Ethernet LMI message received is shorter than supported packets.
Last Full Status Enq Sent	Time in hours, minutes, and seconds when the CE sent the last full LMI status request.
Last Full Status Rcvd	Time in hours, minutes, and seconds when the CE received the last full LMI status report.
Last Status Check Sent	Time in hours, minutes, and seconds when the CE sent the last LMI status request.
Last Status Check Rcvd	Time in hours, minutes, and seconds when the CE received the last LMI status report.
Last clearing of counters	Time in hours, minutes, and seconds when the clear ethernet lmi statistics command was issued for the interface.

The following sample output is generated from the **show ethernet lmi** command using the **uni map** keyword:

```
Router# show ethernet lmi uni map
```

```
UNI Id                               EVC Id                               Port
-----                               -
uni_sandiego                         EVC_MP2MP_101                       Gi0/1
uni_sandiego                         EVC_P2P_110                         Gi0/1
Router#
```

The following sample output is generated from the **show ethernet lmi** command using the **uni map** and optional **interface** keywords:

```
Router# show ethernet lmi uni map interface gigabitethernet 0/1
```

```
UNI Id                               EVC Id                               Port
-----                               -
uni_sandiego                         EVC_MP2MP_101                       Gi0/1
uni_sandiego                         EVC_P2P_110                         Gi0/1
Router#
```

[Table 5](#) describes the significant fields shown in output of the **show ethernet lmi** command using the **uni map** keyword and **uni map** and **interface** keyword pair.

Table 5 *show ethernet lmi uni map and uni map interface Field Descriptions*

Field	Description
UNI Id	Identifier of the UNI.
EVC Id	Identifier of the EVC.
Port	Interface on the CE device.

Glossary

CE—customer edge. Edge equipment on the customer side of a user-network interface (UNI).

CE-VLAN ID—Identifier of a CE-VLAN.

E-LMI—Ethernet Local Management Interface. An Ethernet layer OAM protocol. It provides information that enables autoconfiguration of CE devices and provides the status of Ethernet virtual connections (EVCs) for large Ethernet MANs and WANs.

EVC—Ethernet virtual connection. An association of two or more user-network interfaces.

OAM—operations, administration, and maintenance. A term used by several standards bodies to describe protocols and procedures for operating, administrating, and maintaining networks. Examples are ATM OAM and IEEE Std. 802.3ah OAM.

PE—provider edge. Edge equipment on the service provider side of a user-network interface (UNI).

UNI—user-network interface. A common term for a bridge portion an operator's bridge that is connected to customer equipment. A UNI often includes a C-VLAN-aware bridge component. The term UNI is used broadly in the IEEE P802.1ag/D5.2 standard when the purpose for various features of LMI are explained.

**Note**

See *Internetworking Terms and Acronyms* for terms not included in this glossary.

Feature Information for Ethernet Local Management Interface

Table 6 lists the feature release history for this feature.

Not all commands may be available in your Cisco IOS software release. For release information about a specific command, see the command reference documentation.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which Cisco IOS and Catalyst OS software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.



Note

Table 6 lists only the Cisco IOS software release train that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release also support that feature.

Table 6 Feature Information for Ethernet Local Management Interface

Feature Name	Releases	Feature Information
Ethernet Local Management Interface	12.4(9)T 12.2(33)SRB	Ethernet LMI is an Ethernet layer OAM protocol. It provides information that enables autoconfiguration of CE devices and provides the status of EVCs for large Ethernet MANs and WANs. This feature was implemented on the Cisco 7600 router in Cisco IOS Release 12.2(33)SRB.

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