Enabling Ethernet Local Management Interface

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.

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Prerequisites for Enabling Ethernet Local Management Interface

Business Requirements

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

Restrictions for Enabling Ethernet Local Management Interface

- Ethernet Local Management Interface (LMI) relies on Ethernet connectivity fault management (CFM) for the status of an Ethernet virtual circuit (EVC), the remote user network interface (UNI) identifier associated with an EVC, and remote UNI status.
- Ethernet LMI customer edge (CE) is available only on routing ports on routing platforms. For information about Ethernet LMI provider edge (PE) functionality on switching platforms, see the "Configuring Ethernet CFM and E-LMI" chapter of the *Cisco ME 3400 Switch Software Configuration Guide*.
- Not all Cisco software releases support autoconfiguration of CE devices.

Information About Enabling Ethernet Local Management Interface

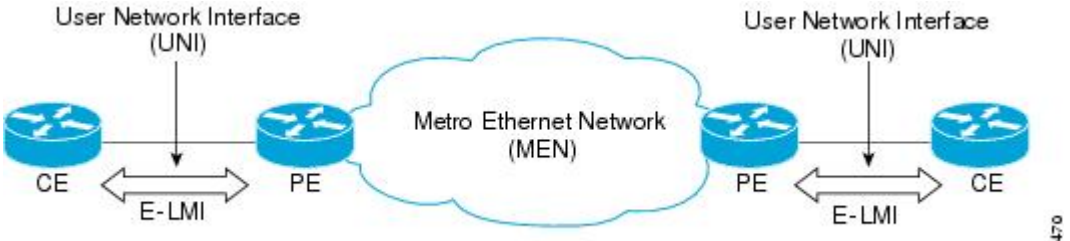
EVC

An Ethernet virtual circuit (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 customer edge (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 ATM.

Ethernet LMI

Ethernet Local Management Interface (LMI) is an Ethernet layer operation, administration, and management (OAM) protocol between a customer edge (CE) device and the provider edge (PE) device 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.

The figure below shows where in a network Ethernet LMI functions.



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

LMI also provides the status of Ethernet virtual circuits (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 user network identifier (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

- 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 Enable Ethernet Local Management Interface

Enabling Ethernet LMI on All Supported Interfaces

SUMMARY STEPS

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

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**ethernet lmi global** **Example:** `Device(config)# ethernet lmi global`	Enables Ethernet Local Management Interface (LMI) on all supported interfaces on the device.

	Command or Action	Purpose
Step 4	**end** **Example:** `Device# end`	Returns to privileged EXEC mode.

Enabling Ethernet LMI on a Single Supported Interface

SUMMARY STEPS

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

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**interface** *type number* **Example:** `Device(config)# interface ethernet 0/0`	Specifies an interface and enters interface configuration mode.
Step 4	**ethernet lmi interface** **Example:** `Device(config-if)# ethernet lmi interface`	Enables Ethernet Local Management Interface (LMI) on the interface.
Step 5	**end** **Example:** `Device# end`	Returns 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.

Example: Enabling Ethernet LMI on All Supported Interfaces

```
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
```

Example: Enabling Ethernet LMI on a Single Supported 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 for Enabling Ethernet Local Management Interface

Related Documents

Related Topic	Document Title
Ethernet Connectivity Fault Management (CFM)	"Configuring Ethernet Connectivity Fault Management in a Service Provider Network" in the *Cisco IOS Carrier Ethernet Configuration Guide*
Configuring CFM and Ethernet Local Management Interface (E-LMI) in a service provider network	*Cisco ME 3400 Switch Software Configuration Guide, Rel. 12.2(25)SEG*
Commands used for configuring Ethernet LMI in a service provider network	*Cisco ME 3400 Switch Command Reference, Rel. 12.2(25)SEG*
Ethernet LMI at a provider edge	"Configuring Ethernet Local Management Interface at a Provider Edge" in the *Carrier Ethernet Configuration Guide*

Related Topic	Document Title
Carrier Ethernet commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Carrier Ethernet Command Reference*

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*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for Enabling Ethernet Local Management Interface

Table 1: Feature Information for Enabling Ethernet Local Management Interface

Feature Name	Releases	Feature Information
Ethernet Local Management Interface	Cisco IOS XE Release 3.9S	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. The following commands were introduced or modified: **clear ethernet lmi statistics**, **debug ethernet lmi**, **ethernet lmi**, **ethernet lmi global**, **ethernet lmi interface**, **show ethernet lmi**.

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 the connection point between an operator's bridge and 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.