



# Monitoring Ethernet Operations, Administration, and Maintenance Tool Properties

The following topics describe how you can use Cisco Prime Network Vision (Prime Network Vision) to monitor Ethernet operations, administration, and maintenance (OAM) tools:

- User Roles Required to View Ethernet OAM Tool Properties, page 16-1
- Ethernet OAM Overview, page 16-2
- Viewing Connectivity Fault Management Properties, page 16-3
- Viewing Ethernet LMI Properties, page 16-10
- Viewing Link OAM Properties, page 16-14
- Configuring CFM, page 16-18
- Configuring E-LMI, page 16-21
- Configuring L-OAM, page 16-22

# **User Roles Required to View Ethernet OAM Tool Properties**

This topic identifies the roles that are required to view Ethernet OAM tool properties. Prime Network determines whether you are authorized to perform a task as follows:

- For GUI-based tasks (tasks that do not affect elements), authorization is based on the default permission that is assigned to your user account.
- For element-based tasks (tasks that do affect elements), authorization is based on the default permission that is assigned to your account. That is, whether the element is in one of your assigned scopes and whether you meet the minimum security level for that scope.

For more information on user authorization, see the Cisco Prime Network 3.10 Administrator Guide.

The following tables identify the tasks that you can perform:

- Table 16-1 identifies the tasks that you can perform if a selected element **is not in** one of your assigned scopes.
- Table 16-2 identifies the tasks that you can perform if a selected element **is in** one of your assigned scopes.

By default, users with the Administrator role have access to all managed elements. To change the Administrator user scope, see the topic on device scopes in the *Cisco Prime Network 3.10 Administrator Guide*.

Γ

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
View CFM properties	_	—			X
View Ethernet LMI properties	LMI — — — — —			Х	
View Link OAM properties					Х
Using CFM Configure and Enable Commands				Х	Х
Using E-LMI Configure and Enable Commands				Х	Х
Using L-OAM Configuration, Assign, Enable, and Show Commands			_	X	X

 Table 16-1
 Default Permission/Security Level Required for Viewing Ethernet OAM Tool

 Properties - Element Not in User's Scope

 Table 16-2
 Default Permission/Security Level Required for Viewing Ethernet OAM Tool

 Properties - Element in User's Scope

Task	Viewer	Operator	OperatorPlus	Configurator	Administrator
View CFM properties	Х	Х	X	X	X
View Ethernet LMI properties	Х	X	Х	Х	X
Using CFM Configure and Enable Commands			—	Х	X
Using E-LMI Configure and Enable Commands	_		—	Х	X
Using L-OAM Configuration, Assign, Enable, and Show Commands	_	_		X	X

# **Ethernet OAM Overview**

Prime Network Vision supports three, interrelated OAM components, including:

 Connectivity Fault Management—Connectivity Fault Management (CFM) is an end-to-end per-service-instance (per VLAN) Ethernet layer OAM protocol that includes connectivity monitoring, fault verification, and fault isolation. CFM allows you to manage individual customer service instances. Ethernet Virtual Connections (EVCs) are the services that are sold to customers and are designated by service VLAN tags. CFM operates on a per-service-VLAN (or per-EVC) basis. It lets you know when an EVC fails and provides tools to isolate the failure. See Viewing Connectivity Fault Management Properties, page 16-3 and Configuring CFM, page 16-18.

- Ethernet Local Management Interface—Ethernet Local Management Interface (Ethernet LMI) operates between the customer edge (CE) and the user-facing provider edge (U-PE) devices. Ethernet LMI allows you to automatically provision CEs based on EVCs and bandwidth profiles. See Viewing Ethernet LMI Properties, page 16-10 and Configuring E-LMI, page 16-21.
- Link OAM—Link OAM allows you to monitor and troubleshoot a single Ethernet link. It is an
  optional sublayer implemented in the Data Link Layer between the Logical Link Control (LLC) and
  MAC sublayers of the Open Systems Interconnect (OSI) model. You can monitor a link for critical
  events and, if needed, put a remote device into loopback mode for link testing. Link OAM also
  discovers unidirectional links, which are created when one transmission direction fails. See Viewing
  Link OAM Properties, page 16-14 and Configuring L-OAM, page 16-22.

# **Viewing Connectivity Fault Management Properties**

CFM allows you to discover and verify end-to-end, Carrier Ethernet PE-to-PE or CE-to-CE paths through bridges and LANs.

CFM consists of maintenance domains. Maintenance domains are administrative regions used to manage and administer specific network segments. Maintenance domains are organized in a hierarchy. The administrator assigns a maintenance level to the domain from 0 (lowest level) to 7 (highest level); the maintenance level determines the domain's position within the CFM hierarchy.

CFM maintenance domain boundaries are indicated by maintenance points. A maintenance point is an interface point that participates within a CFM maintenance domain. Maintenance point types include:

- Maintenance Endpoints—Maintenance endpoints (MEPs) are active CFM elements residing at the edge of a domain. MEPs can be inward or outward facing. They periodically transmit continuity check messages and expect to periodically receive similar messages from other MEPs within a domain. If requested, MEPs can also transmit traceroute and loopback messages. MEPs are responsible for keeping CFM messages within the boundaries of a maintenance domain.
- Maintenance Intermediate Points—Maintenance intermediate points (MIPs) are passive elements that catalog information received from MEPs and other MIPs. MIPs only respond to specific CFM messages such as traceroute and loopback, and they forward those messages within the maintenance domain.



Prime Network Vision does not display information for CFM maintenance endpoints or maintenance intermediate points for Cisco Viking devices if errors exist in their configurations. An error in the configuration is indicated by an exclamation point (!) in the CLI output.

For example, if you enter the command **show ethernet cfm local maintenance-points**, a configuration error is indicated as follows:

cfm\_d100/2 cfm\_s100 Te0/2/0/3.110 Up MEP 2100 eb:7a:53!

CFM uses standard Ethernet frames. CFM frames are distinguishable by EtherType and for multicast messages, by MAC address. CFM frames are sourced, terminated, processed, and relayed by bridges. Routers support only limited CFM functions.

Bridges that cannot interpret CFM messages forward them as normal data frames. All CFM messages are confined to a maintenance domain and to an S-VLAN (PE-VLAN or Provider-VLAN). CFM supports three types of messages:

L

- Continuity check—Multicast heartbeat messages exchanged periodically among MEPs. They allow MEPs to discover other MEPs within a domain and allow maintenance intermediate points (MIPs) to discover MEPs. Continuity check messages (CCMs) are confined to a domain and S-VLAN.
- Loopback—Unicast frames that a MEP transmits, at the request of an administrator, to verify connectivity to a particular maintenance point. A reply to a loopback message indicates whether a destination is reachable but does not allow hop-by-hop discovery of the path. A loopback message is similar in concept to an Internet Control Message Protocol (ICMP) Echo (ping) message.
- Traceroute—Multicast frames that a MEP transmits, at the request of an administrator, to track the path (hop-by-hop) to a destination MEP. They allow the transmitting node to discover vital connectivity data about the path, and allow the discovery of all MIPs along the path that belong to the same maintenance domain. For each visible MIP, traceroute messages indicate ingress action, relay action, and egress action. Traceroute messages are similar in concept to User Datagram Protocol (UDP) traceroute messages.

From the Logical Inventory tree, you can troubleshoot MEPs using CFM ping, traceroute, MEP status, and MEP cross-check status. These commands, and all CFM commands, are described in Configuring CFM, page 16-18.

Prime Network associates alarms with the corresponding MEP or global CFM logical inventory objects. Prime Network correlates MEP down, MEP up, MEP missing, ETH-AIS, and ETH-RDI events with root cause alarms and corresponding tickets that exist along the path between the MEP on the reporting network element and the network element hosting the remote MEP.

To view CFM properties:

- Step 1 In Prime Network Vision, double-click the required device for CFM.
- Step 2 In the inventory window, choose Logical Inventory > CFM.
  Figure 16-1 shows an example of CFM in logical inventory.

<b>V</b> c4-upe8 [1N]	×
<ul> <li>c4-upe8 [1N]</li> <li>Logical Inventory</li> <li>Access Lists</li> <li>Bridges</li> <li>CFM</li> <li>MD: DDDD</li> <li>MD: DDDD</li> <li>MD: User_Service1</li> <li>Cisco Discovery Protocol</li> <li>Ethernet Link Aggregation</li> <li>Ethernet Link Aggregation</li> <li>Ethernet Link Layer Discovery Protocol</li> <li>Operating System</li> <li>Routing Entities</li> <li>Spanning Tree Protocol</li> <li>Fmaint Ethernet Protocol</li> <li>Physical Inventory</li> </ul>	Cache Size: 0 Hold Time: 100 Maximum Cache Size: 100 Cfm Version: IEEE D8.1 Maintenance Domains Maintenance Intermediate Points Find : 2 2 7 7 5 5 Name 2 / Level ID DDDD 3 Oper_Service1 4 User_Service1 7
C Device Zoom Best Fit	Line 0 (Size 3)
	Memory: 10% Connected

Figure 16-1 CFM in Logical Inventory

Table 16-3 describes the information displayed for CFM.

Table 16-3	CFM Properties
------------	----------------

Field	Description				
Cache Size	CFM traceroute cache size in number of lines.				
Hold Time	Configured hold time (in minutes) that is used to indicate to the receiver the validity of traceroute and loopback messages transmitted by the device. The default value is 2.5 times the transmit interval.				
Maximum Cache Size	Maximum CFM traceroute cache size in number of lines.				
CFM Version	CFM version, such as IEEE D8.1.				
Maintenance Domains Tab	le				
Name	Domain name.				
Level	Unique level the domain is managed on. Values range from 0 to 7.				
ID	Optional domain identifier.				

**Step 3** Click the Maintenance Intermediate Points tab to view MIP information. See Figure 16-2.

C2-core1 [2M]	Poll Now Cfm Version: IEEE D8.1					_ 🗆 ×
CFM	Maintenance Domains Maintenance	Intermediate Points				
10 PM 0200	Find :	又至夏季				
MA: 5252 MA: 5254	Interface $ e  alpha$	MAC Address	InnerVLANs	VLANs	Auto Created	Level
▶     MA: 5254       ▶     MA: 5256       ▶     MA: 5258       ▶     MA: 5260       ▶     MA: 5262       ▶     MA: 5264       ▶     MA: 5266       ▶     MA: 5268	c2-core1#1.3:GigabitEthernet1/3/1	00 1D 71 98 EE C3		[250-270]	false	3
MA: 5258 MA: 5260	c2-core1#2.3:GigabitEthernet2/3/1	00 1D 71 98 EE C3		[250-270]	false	3
MA: 5268 MD: 53 Clsco Discovery Protocol Ethernet Link Aggregation Ethernet Unit Frame Relay Traffic Profile:						Line 0 (Size 2)
Find : 🗾 🗐 🛃 🔽 🦞	同時					
		-				
Tickets Network Events Provisioning Even	ts					
				Memory:	19%	Connected

*Figure 16-2 CFM Maintenance Intermediate Points Tab* 

Table 16-4 describes the information that is displayed in the Maintenance Intermediate Points table.

Table 16-4 CFM Maintenance Intermediate Point Properties

Field	Description					
Interface	Interface configured as a MIP, hyperlinked to its entry in physical inventory.					
MAC Address	MAC address of the interface.					
Inner VLANs	Inner VLAN identifiers.					
VLANs	VLANs associated with the interface.					
Auto Created	Whether or not the MIP was automatically created: True or False.					
Level	Unique level the domain is managed on. Values range from 0 to 7.					

**Step 4** To view the details of a specific maintenance domain, do one of the following:

- Choose Logical Inventory > CFM > domain.
- Double-click the required entry in the Maintenance Domains table.

Figure 16-3 shows an example of the information displayed for the maintenance domain.

C2-core1 [2M] C2-core1 [2M] Cogical Inventory [1M] Access Lists ATM Traffic Profiles Ridges CFM		Poll Now	omain Name: D2	t Level:	2					
▼ ag MD: D2		Maintenance	Associations							
MA: 5250		Find :	1	<b>ۇ</b> ↓ 🖓 🏾						
林子 MA: 5254 神子 MA: 5256 神子 MA: 5256 神子 MA: 5256 神子 MA: 5260 神子 MA: 5260 神子 MA: 5260 神子 MA: 5266		Name 👌	Association Type	Direction	Continuity Check	Continuity Check Interval	Associated Entity	Cross Check	Maximum MEPs	Inner Vlan
MA: 5256		5250	Unknown	Up	true	10.0 sec	c2-core1 (250) VLAN0250	false	100	
MA: 5258 MA: 5260		5252	Unknown	Up	true	10.0 sec	c2-core1 (252) VLAN0252	false	100	
MA: 5260		S254	Unknown	Up	true	10.0 sec	c2-core1 (254) VLAN0254	false	100	
MA: 5264		S256	Unknown	Up	true	10.0 sec	c2-core1 (256) VLAN0256	false	100	
MA: 5266		5258	Unknown	Up	true	10.0 sec	c2-core1 (258) VLAN0258	false	100	
MA: 5268		5260	Unknown	Up	true	10.0 sec	c2-core1 (260) VLAN0260	false	100	
MD: D3		5262	Unknown	Up	true	10.0 sec	c2-core1 (262) VLAN0262	false	100	
Cisco Discovery Protocol		5264	Unknown	Up	true	10.0 sec	c2-core1 (264) VLAN0264	false	100	
Cisco Discovery Protocol Ethernet Link Aggregation Ethernet MI Frame Relay Traffic Profiles		5266	Unknown	Up	true	10.0 sec	c2-core1 (266) VLAN0266	false	100	
Ethernet LMI Frame Relay Traffic Profiles		5268	Unknown	Up	true	10.0 sec	c2-core1 (268) VLAN0268	false	100	
IS-IS	-	5270	Unknown	Up	true	10.0 sec	c2-core1 (270) VLAN0270	false	100	
Device Zoom	4 V F								1	ine 0 (Size 11
ind : 21 V	~~	 	10.10		n (1)	la e la c	u la com		c .	

Figure 16-3 CFM Maintenance Domain Properties

Table 16-5 describes the information that is displayed for CFM maintenance domains.

Field	Description					
Maintenance Domain Name	Name of the domain.					
Level	Level at which the domain is managed: 0-7.					
ID	Optional maintenance domain identifier.					
Maintenance Associations Table	)					
Name	Name of the maintenance association.					
Association Type	Maintenance association type.					
Direction	Direction of the maintenance association: Up or Down.					
Continuity Check	Whether or not the continuity check is enabled: True or False.					
Continuity Check Interval	Interval (in seconds) for checking continuity.					
Associated Entity	Bridge, port, or pseudowire that the maintenance association uses for CFM. Click the hyperlinked entry to view the item in inventory.					
Cross Check	Whether or not cross checking is enabled: True or False.					
Maximum MEPs	Maximum number of maintenance endpoints (MEPs) that can be configured on the maintenance association.					
Inner VLAN	Inner VLAN identifier.					

 Table 16-5
 CFM Maintenance Domain Properties

**Step 5** To view the properties for a maintenance association's endpoints, do one of the following:

- Choose Logical Inventory > CFM > domain > association.
- In the Maintenance Associations table, double-click the required association.

Figure 16-4 shows the information displayed for the maintenance association endpoints.

 Figure 16-4
 CFM Maintenance Association - Endpoint Properties

V c2-core1 [2M]						_ 🗆 :
▼         C2-core1 [2M]           ▲         Logical Inventory [1M]           ▲         Access Lists           ▲         ATM Traffic Profiles           ■         Bridges           ▼         CFM           ▼         Main S250           ▶         MAin S260           ▶         MAin S260           ▶         MAin S260           ▶         MAin S266           ▶         MAin S266           ▶         MAin S266           ▶         MAin S268           ▶         MAin S270	Poll Now Maintenance Association Direction: Continuity Check Interva Associated Entity:	Up d: 10.0		Association Continuity ( Cross Chec Maximum M	Theck: true	
▶ MA: 5254 ▶ MA: 5256	Maintenance End Points	Remote Mai	ntenance End Points			
► MA: 5258 ► MA: 5260	Find :	<b>1</b> 2↓	マキ軍員			
MA: 5262 MA: 5264	ID €∧ MA	C Address	Interface		Continuity Check Status	Direction
MA: 5266	1250 00	1D 71 98 EE C3	c2-core1#1.3:GigabitEthe	rnet1/3/1	MEP enabled	Up
MD: D3 Cisco Discovery Protocol Ethernet Link Aggregation Ethernet LMI Frame Relay Traffic Profiles JIS-15	3250 00	1D 71 98 EE C3	c2-core1#2.3:GigabitEthe	rnet2/3/1	MEP enabled	Up
Q Device Zoom Best Fit	1					
						Line 0 (Size 2)
Find :	御屋					
Tickets Network Events Provisioning Event						
					Memory: 22%	Connected

Table 16-6 describes the information that is displayed for CFM maintenance associations and MIPs.

Table 16-6 CFM Maintenance Association Properties

Field	Description
Maintenance Association Name	Name of the maintenance association.
Association Type	Maintenance association type, such as Bridge Domain.
Direction	Direction of the maintenance association: Up or Down.
Continuity Check	Whether or not the continuity check is enabled: True or False.
Continuity Check Interval	Interval (in seconds) for checking continuity.
Cross Check	Whether or not cross checking is enabled: True or False.
Associated Entity	Bridge that the maintenance association uses for CFM. Click the hyperlinked entry to view the bridge in logical inventory.
Maximum MEPs	Maximum number of MEPs that can be configured on the maintenance association.
Inner VLANs	Inner VLAN identifiers.
Maintenance End Points Table	
ID	Local identifier for the MEP.
MAC Address	MAC address that identifies the MEP.

Field	Description					
Interface	Interface on which the MEP is configured, hyperlinked to the respective EFP, VSI or interface in inventory.					
Continuity Check Status	CFM continuity check status: MEP Active, MEP Inactive, MEP Enabled, MEP Disabled, or Unknown.					
Direction	Direction of traffic on which the MEP is defined: Up, Down, or Unknown.					

#### Table 16-6 CFM Maintenance Association Properties (continued)

# **Step 6** Click the **Remote Maintenance End Points** tab to view the information displayed for remote MEPs. See Figure 16-5.



Figure 16-5 Remote Maintenance End Points Table

Table 16-7 describes the information presented for remote MEPs.

Field	Description			
MEP ID	Remote MEP identifier.			
Level	Level at which the remote MEP is managed: 0-7.			
Status	Status of the remote MEP, such as MEP Active.			
MAC Address	MAC address of the remote MEP.			
Local MEP ID	Numeric identifier assigned to the local MEP. Values range from 1 to 8191.			
	<b>Note</b> If the remote MEP is in Up mode, the remote MEP is not associated to the local MEP. As a result, the Local MEP ID column is empty.			

Table 16-7 CFM Remote Maintenance End Points Table

### **Viewing Ethernet LMI Properties**

Ethernet Local Management Interface (E-LMI) is a protocol that operates between the customer edge (CE) network element and the provider edge (PE) network element. Ethernet LMI is a protocol between the CE network element and the provider edge (PE) network element. It runs only on the PE-CE UNI link and notifies the CE of connectivity status and configuration parameters of Ethernet services available on the CE port. Ethernet LMI interoperates with an OAM protocol, such as CFM, that runs within the provider network to collect OAM status. CFM runs at the provider maintenance level. Ethernet LMI relies on the OAM Ethernet Infrastructure (EI) to work with CFM for end-to-end status of EVCs across CFM domains. E-LMI commands are described in Configuring E-LMI, page 16-21.

The IOS OAM manager streamlines interaction between OAM protocols, and handles the interaction between CFM and E-LMI. Ethernet LMI interaction with the OAM manager is unidirectional, running only from the OAM manager to E-LMI on the U-PE side of the switch. Information is exchanged either as a result of a request from E- LMI or triggered by the OAM manager when it receives notification of a change from the OAM protocol. Information that is relayed includes the EVC name and availability status, remote UNI name and status, and remote UNI counts.

To view Ethernet LMI properties:

**Step 1** In Prime Network Vision, double-click the device configured for Ethernet LMI.

**Step 2** In the inventory window, choose **Logical Inventory > Ethernet LMI**.

Figure 16-6 shows an example of Ethernet LMI properties in logical inventory.

•	npe1-76 [1M] Logical Inventory Access Lists ATM Traffic Profiles Bidirectional Forwarding Detection Bridges CFM		Poll Now Mode: Unk	nown ELMI f	Enabled State:	Unknown			
	Cisco Discovery Protocol Clock	Ш	Find :		1 1 2 1 7				
	Ethernet Link Aggregation			1					-
, <u> </u>	Ethernet LMI		EVC Name	EVC Type	EVC Status	Maintenance Association	Active Remote UNI Count	Configured Remote UNI Count	せん
	Frame Relay Traffic Profiles		4_0_1_401	PointToPoint	NotDefined		0	1	
	IS-IS Local Switching		4_0_1_402	PointToPoint	NotDefined		0	1	
>	LSEs	:	4_0_1_403	PointToPoint	NotDefined		0	1	
▶	MPBGPs		4_0_1_404	PointToPoint	NotDefined		0	1	
•	OAM		4_0_1_405	PointToPoint	NotDefined		0	1	
	Operating System		4_0_1_406	PointToPoint	NotDefined		0	1	
>	OSPF Processes Pseudowires		4 0 1 407	PointToPoint	NotDefined		0	1	
-	Pseudowires Routing Entities		4 0 1 409	PointToPoint	NotDefined		0	1	
- III - III			4_0_1_411	PointToPoint	NotDefined		0	1	
E.P.	ARP Entity		4 0 1 415	PointToPoint	NotDefined		0	1	
•	Spapping Tree Protocol	<b>•</b>					-		
Device Zoo	m 💽 Best Fit		4_0_1_416	PointToPoint	NotDefined		0	1	
			4_0_1_417	PointToPoint	NotDefined		0	1	
		-	4_0_1_418	PointToPoint	NotDefined		0	1	
		•	4 0 1 410	DointToDoint	MatDofinad		0	1	0 (Size 5
			-						
ind :			A 0 1 410		MotDofinad		0	Line	
rity Tic	ket ID Last Modification Time 🏾 🄁	V	Root 1	Root Event Time	5	Description Lo	cation Acknowledged	Creation Time	

Figure 16-6 Ethernet LMI in Logical Inventory

Table 16-8 describes the information displayed for Ethernet LMI.

Table 16-8 Ethernet LMI Properties in Logical Inventory

Field	Description			
Globally Enabled	Whether or not Ethernet LMI is enabled globally: True or False.			
Mode	Ethernet LMI mode: CE or PE.			
Device EVCs Tab				
EVC Name	Name of the EVC.			
EVC Type Type of EVC: Point-to-point or Multipoint.				
EVC Status	EVC status: Active, Inactive, Not Defined, or Partially Active.			
Maintenance Association	Hyperlinked entry to the maintenance association in CFM in logical inventory. For more information about maintenance associations, see Table 16-6.			
Active Remote UNI Count	Number of active remote UNIs.			
Configured Remote UNI Count	Number of configured remote UNIs.			

Field	Description
ELMI Interfaces Tab	
Interface Name	Hyperlinked entry to the interface in physical inventory. For more information, see Step 4 in this procedure.
T391	Frequency at which the customer equipment sends status inquiries. The range is 5-30 seconds, with a default of 10 seconds.
T392	Frequency at which the metro Ethernet network verifies that status enquiries have been received. The range is 5-30 seconds, with a default of 15 seconds. A value of 0 (zero) indicates the timer is disabled.
N391 Frequency at which the customer equipment polls the state and all EVCs. The range is 1-65000 seconds, with a defau seconds.	
N393	Error count for the metro Ethernet network. The range is 1-10, with a default of 4.

Step 3 To view device EVC properties, double-click an EVC name in the Device EVCs tab.The Device EVC Properties window is displayed as shown in Figure 16-7.

Figure 16-7 Device EVC Properties Window

EvcName VFI7_	EVC - Device I	EVC Properties				_ 🗆 ×
EVC Name:	VFI7_	EVC EVC Type:	Point	ToPoint		
EVC Status:	Inact	ti <b>ve</b> Active Rem	ote UNI Count: 0			
Configured Remote UN	II Count: 1					
NI Interfaces		÷ = =				
ind :	-	マキ目型				
NIId 🔁 🛆	UNI Status	LMI Link Status	Interface Name	Is UNI Local	Local Interface	VLAN List
	Up		FastEthernet1/0/1	true	c1-upe3#0:FastEthernet1/0/1	
						Line 0 (Size 1)

Table 16-9 describes the information displayed in the Device EVC Properties window.

Field	Description			
EVC Name	Name of the EVC.			
EVC Type	Type of EVC: Point-to-point or Multipoint.			
EVC Status	EVC status: Active, Inactive, Not Defined, or Partially Active.			
Maintenance Association	Hyperlinked entry to the maintenance association in CFM in logical inventory. For more information about maintenance associations, see Table 16-6.			
Active Remote UNI Count Number of active remote UNIs.				
Configured Remote UNI Count	Number of configured remote UNIs.			
UNI Interfaces Table				
UNI Id UNI identifier.				
UNI Status	Status of the UNI: Up or Down.			
LMI Link Status	Status of the LMI link: Up or Down.			
Interface Name	Interface on which UNI is configured.			
Is UNI Local	Whether or not UNI is local: True or False.			
Local Interface	Hyperlinked entry to the interface in physical inventory.			
VLAN List	Name of the VLAN associated with the UNI interface.			

Table 10-9 Device EVC Properties in Logical Inventor	Table 16-9	Device EVC Properties in Logical Inventory
--	------------	--

**Step 4** To view properties for an Ethernet LMI interface in physical interface, click the required interface name in the ELMI Interfaces table.

Table 16-10 describes the information displayed in the UNI Properties area in physical inventory.

 Table 16-10
 Ethernet LMI UNI Properties in Physical Inventory

Field	Description
Service Multiplexing Enabled	Whether or not the interface is configured for UNI multiplexing: True or False.
Bundling Enabled	Whether or not the interface is configured for UNI bundling: True or False.
UNI Id	UNI identifier.
Bundling Type	Type of bundling applied: All-to-One or None.
	This field appears only when a bundling type is set.

# **Viewing Link OAM Properties**

Link OAM is an optional sublayer implemented in the OSI Data Link Layer between the Logical Link Control and MAC sublayers. Link (802.3AH) OAM (L-OAM) can be implemented on any full-duplex point-to-point or emulated point-to-point Ethernet link.

The frames (OAM Protocol Data Units [OAMPDUs]) cannot propagate beyond a single hop within an Ethernet network and have modest bandwidth requirements (frame transmission rate is limited to a maximum of 10 frames per second).

Link OAM processes include:

- Discovery—Discovery is the first Link OAM process. During discovery, Link OAM identifies the devices at each end of the link and learns their OAM capabilities.
- Link monitoring—Link OAM link monitoring includes:
  - Monitoring links and issuing notifications when error thresholds are exceeded or faults occur.
  - Collecting statistics on the number of frame errors (or percent of frames that have errors) and the number of coding symbol errors.
- Remote MIB Variable Retrieval—Provides 802.3ah MIB polling and response (but not writing).
- Remote Failure indication—Informs peers when a received path goes down. Because link connectivity faults caused by slowly deteriorating quality are difficult to detect, Link OAM communicates such failure conditions to its peer using OAMPDU flags. The failure conditions that can be communicated are a loss of signal in one direction on the link, an unrecoverable error (such as a power failure), or some other critical event.
- Remote Loopback—Puts the peer device in (near-end) intrusive loopback mode using the OAMPDU loopback control. Statistics can be collected during the link testing. In loopback mode, every frame received is transmitted back unchanged on the same port (except for OAMPDUs, which are needed to maintain the OAM session). Loopback mode helps ensure the quality of links during installation or troubleshooting. Loopback mode can be configured so that the service provider device can put the customer device into loopback mode, but the customer device cannot put the service provider device in loopback mode.

Prime Network Vision supports topology discovery based on Link OAM information and enables you to view Link OAM properties. You can also configure L-OAM using the commands described in Configuring L-OAM, page 16-22.

For information on CFM and Ethernet LMI, see Viewing Connectivity Fault Management Properties, page 16-3 and Viewing Ethernet LMI Properties, page 16-10.

To view Link OAM properties:

- **Step 1** In Prime Network Vision, double-click the device configured for Link OAM.
- **Step 2** In the inventory window, choose **Logical Inventory > OAM**.

Figure 16-8 shows an example of Link OAM properties in logical inventory.

🗑 🤍 UPE2-3400ME-FL [1M] 🔻 🖷 🖤 Logical Inventory [1M]	Poll Now						
Access Lists	raue rypes: UAP						
Cisco Discovery Protocol							
Ethernet LMI IP SLA Responder	OAM						
OAM Operating System		7 专 篇 辱					
Operating System	Local Port 👻 🛆	Local Port ID	Admin Status	Port Status	Remote MAC Address		
Resilient Ethernet Protocol     Routing Entities	UPE2-3400ME-FL#0:GigabitEthernet0/13	GigabitEthernet0/13	Up	active send			
Spanning Tree Protocol	UPE2-3400ME-FL#0:GigabitEthernet0/14	GigabitEthernet0/14	Up	operational	00 25 46 79 DF 9B		
Physical Inventory	UPE2-3400ME-FL#0:GigabitEthernet0/15	GigabitEthernet0/15	Up	operational	00 24 C3 C7 CF 02		
	UPE2-3400ME-FL#0:GigabitEthernet0/16	GigabitEthernet0/16	Up	active send			
Device Zoom							
Stot Fan 1 2						Line 0 (Size 4	
Slot Fan 1 2						Line 0 (Size 4	
ind :	7 章 座	****				Line 0 (Size 4	
Stot Fan 1 2	·			··· ··	· 6 · •	Line 0 (Size 4	

Figure 16-8 Link OAM Properties in Logical Inventory

Table 16-11 describes the information displayed for Link OAM.

Table 16-11 Link OAM Properties in Logical Inventory

Field	Description
Table Types	Type of table. In this case, it is OAM.
OAM Table	·
Local Port	Name of the OAM-supported interface, hyperlinked to the location in physical inventory.
Local Port ID	Local port identifier, such as FastEthernet1/0/9.
Admin Status	Administrative status of the interface.
Port Status Status of the port.	
Remote MAC Address	Remote client MAC address.

Step 3 To view detailed information about an entry in the table, double-click the required entry.The Link OAM Data Properties window is displayed as shown in Figure 16-9.

V FastEthernet0/2 - 0/	AM Data Properties		_ <b>_</b> ×
Poll Now			
Local Port:	c4-upe5#0:FastEthernet0/2	Local Port ID:	FastEthernet0/2
Admin Status:	Up	Port Status:	operational
Pdu Max Rate(Frames/sec):	10	Pdu Min Rate(Seconds/frame):	1
Link Timeout(seconds):	5	High Threshold Action:	no action
Link Fault Action:	no action	Dying Gasp Action:	no action
Critical Event Action:	no action	Mode:	active
Unidirection:	not supported	Link Monitor:	supported (on)
Remote Loopback:	not supported	Loopback Status:	no loopback
MAC Address:	00 24 C3 C7 17 04	Vendor:	cisco
Mode:	active	Unidirection:	not supported
Link Monitor:	supported	Remote Loopback:	not supported
			Memory: 7% Connected

Figure 16-9 Link OAM Data Properties Window

Table 16-12 describes the information that is displayed in the Link OAM Data Properties window.

Table 16-12 Link OAM Data Properties Window

Field	Description		
Local Interface			
Local Port	Name of the OAM-supported interface, hyperlinked to the location in physical inventory.		
Local Port ID	Local port identifier.		
Admin Status	Administrative status of the interface: Up or Down.		
Port Status	Status of the port, such as Operational.		
PDU Max Rate (Frames/sec)	Maximum transmission rate measured by the number of OAM PDUs per second; for example, 10 packets per second.		
PDU Min Rate (Seconds/frame)	Minimum transmission rated measured by the number of seconds required for one OAM PDU; for example, 1 packet per 2 seconds.		
Link Timeout	Number of seconds of inactivity on a link before the link is dropped.		
High Threshold Action	Action that occurs when the high threshold for an error is exceeded.		
Link Fault Action	Action that occurs when the signal is lost.		

Field	Description		
Dying Gasp Action	Action that occurs when an unrecoverable condition is encountered.		
Critical Event Action	Action that occurs when an unspecified vendor-specific critical event occurs.		
Mode	Mode of the interface: Active or Passive.		
Unidirection	Status of unidirectional Ethernet on the local interface: Supported or Not supported.		
Link Monitor	Status of link monitoring on the local interface: Supported or Not supported.		
Remote Loopback	Status of remote loopback on the local interface: Supported or Not supported.		
Loopback Status	Status of loopback on the local interface: Supported or No loopback.		
Remote Client			
MAC Address	MAC address for the remote client.		
Vendor	Vendor of the remote client.		
Mode	Mode of the remote client: Active or Passive.		
Unidirection	Status of unidirectional Ethernet on the remote client interface: Supported or Not supported.		
Link Monitor	Status of link monitoring on the remote client interface: Supported or Not supported.		
Remote Loopback	Status of loopback on the remote client interface: Supported or Not supported.		

Step 4 To view Link OAM status in physical inventory, choose Physical **Inventory** > *chassis* > *slot* > *interface*.

The Link OAM administrative status is displayed as shown in Figure 16-10.

c1-upe1	🚖 🛞 Poll No	~						
Logical Inventory		rol and Monitoring Properties						
Access Lists	-Storin Con	roi and moniconing Propercies						
Bridges	Storm Co	ntrol: Disabled	Port Monitoring Status:	Enabled				
► 🔤 CFM	Port Mon	toring Interval: 10.0 sec	MAC Address:	00 21 D7 EE EA I	01			
Cisco Discovery Proto	ocol							
Ethernet LMI	Ethernet	LMI Enabled: false	OAM Admin Status:	Up			-	
IP SLA Responder	Particul							-
Link Layer Discovery	Protocol -Gigabit Eth	ernet						
Operating System	MAC Add	ress: 00 21 D7 EE EA 0	1 Ethernet LMI Enable	d: false				
CFM     Cisco Discovery Protot     Ethernet LMI     IP SLA Responder     Link Layer Discovery     OAM     Operating System     Routing Entities	Contract	in Chabury II.	Death Transa	NNI				
Spanning Tree Protoc		in Status: Up	Port Type:	ININI				
Physical Inventory								
<ul> <li>Chassis</li> </ul>								
	-3400G-12CS-A - F Discovery	Protocols						
GigabitEtherne		Protocol Type: CDP	Info:	Up				1
GigabitEtherne	ieco/2			-				
46 GigabitEtherne 46 GigabitEtherne		ress: 00 21 D7 EE	EA 01 Ethernet LMI E	nabled: false			-	
- GigabitEtherne	et0/5							<u> </u>
GigabitEtherne		SMA/CD						
GigabitEtherne	et0/7							
GigabitEtherne								_
GigabitEtherne GigabitEtherne	et0/9 Find :	± 2↓ √	7 节 肩 导					
GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne	et0/9 Find : et0/10 Address		7 <b>中 原 季</b> Mask	VLA	N Type O	perational State	VLAN ID	
GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne	et0/9 Find : et0/10 Address			VLA Brie		perational State	VLAN ID (1) default	
GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne	et0/9 Find : et0/10 Address et0/11 et0/12			Brid	lge	perational State	(1) default	
GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne	et0/9 Find : et0/10 Address			Brid	lge Ige	perational State	(1) default (30) VLANO	
GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern	et0/9 Find : et0/10 Address et0/11 et0/12 et0/13 - No Trans, ▼			Bric Bric	lge Ige	perational State	(1) default (30) VLANO (102) VLAN	
GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern	et0/9 Find : et0/10 Address et0/11 et0/12 et0/13 - No Trans, ▼			Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN	
GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern	et0/9 Find : et0/10 Address et0/11 et0/12 et0/13 - No Trans, ▼			Bric Bric	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN	
GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne GigabitEtherne	et0/9 Find : et0/10 et0/11 Address et0/13 - No Trans ♥ et0/13 - No Trans ♥			Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	
GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern CashitFthern Device Zoon	et0/9 Find : et0/10 et0/11 et0/11 et0/12 et0/12 et0/13 - No Trans ♥			Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	···
GgabiEthern GgabiEthern GgabiEthern GgabiEthern GgabiEthern GgabiEthern GgabiEthern Cevice Zoon	et0/9 et0/10 et0/11 et0/11 et0/12 et0/12. et0/13 No. Trans, ▼	€∧ []		Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	···
GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern GgabitEthern CashitFthern Device Zoon	et0/9 Find : et0/10 et0/11 et0/11 et0/12 et0/12 et0/13 - No Trans ♥	€∧ []		Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	···
GgabitEhern GgabitEhern GgabitEhern GgabitEhern GgabitEhern GgabitEhern Bevice Zoon	et0/9 Find : et0/10 et0/11 Address et0/12 et0/13 - No. Trans, * et0/14 Sub Inter	€∧ []		Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	···
GgabitEhern GgabitEhern GgabitEhern GgabitEhern GgabitEhern GgabitEhern Bevice Zoon	et0/9 et0/10 et0/11 et0/11 et0/12 et0/12. et0/13 No. Trans, ▼	€∧ []		Brid Brid Brid Brid	lge Ige Ige	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	···
di GgabitEherni di GgabitEhern	et0/9 et0/10 et0/11 et0/11 et0/12 et0/12. et0/13 No. Trans, ▼ sub Inter	€∧ []	Mask	Brid Brid Brid Brid	lge lge lge lge	perational State	(1) default (30) VLANO (102) VLAN (103) VLAN (100) VLAN	···

Figure 16-10 Link OAM Administrative Status in Physical Inventory

# **Configuring CFM**

CFM provides capabilities for detecting, verifying, and isolating connectivity failures in networks with bridges operated by multiple independent organizations, each with restricted management access to each other's equipment.

The CFM commands can be launched from the inventory by right-clicking a CFM node and selecting **Commands**. Unless otherwise noted, all of the following commands are launched by right-clicking the device and choosing **Commands > Configure > Cisco**. You can navigate from the MEP logical inventory to the interface or port channel on which the MEP is configured.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands.

For details on the software versions Prime Network supports for the listed supported network elements, see *Cisco Prime Network 3.10 Supported Cisco VNEs*.

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Description	Supported on:
Maintenance Domain > Config ure CFM Maintenance Domain Global Parameters > Co nfigure CFM Global Parameters	A maintenance domain is a management space for the purpose of managing and administering a network. A single entity owns and operates a domain and is defined by the set of ports internal to it and at its boundary. Each maintenance domain can contain any number of maintenance associations. Each maintenance association identifies a service that can be uniquely identified within the maintenance domain. The CFM protocol runs within a particular maintenance association. Using this command, assign a unique maintenance level to each domain and a maintenance endpoint archived hold time. Maintenace level defines the hierarchical relationship among domains and MEP Archive Hold time acts as a demarcation point on an interface that participates in CFM. Enable CFM globally for a network element. Using this command you can configure the device to transmit traceroute and loopback messages with a hold-time value that indicates the validity of the messages.	<ul> <li>Cisco 7600 Series Routers</li> <li>Cisco ME 3400 Series Ethernet Access Switches</li> <li>Cisco ME 3750 Series Ethernet Access Switches</li> <li>Cisco ASR 9000 Series Aggregation Services Routers (supported only for the CFM IEEE 802.1ag</li> <li>(draft 8.1))</li> <li>Cisco Mobile Wireless Router 2941 (supported only for the CFM Cisco draft mode)</li> <li>Cisco Catalyst 6500 Series (IOS) Switches</li> <li>Cisco 3900 Series Integrated Services Routers</li> <li>Cisco XR 12000 Series Routers</li> <li>Cisco CRS Carrier Routing System</li> <li>Cisco ME3600X and Cisco ME3800X Carrier Ethernet Switches</li> <li>Cisco 3900 Series Integrated Services Routers</li> <li>Cisco ME3600X and Cisco ME3800X Carrier Ethernet Switches</li> <li>Cisco MWR 2900 Series Mobile Wireless Routers</li> <li>Cisco Carrier Packet Transport (CPT) System</li> <li>Cisco ASR 903 Series Aggregation Services Routers</li> </ul>

Command	Description	Supported on:
Enable > Cisco >Continui ty Check > Configu re CFM Continuity Check Enable > Cisco >Continui ty Check > Enable CFM Continuity Check MIP > Configure CFM MIP	Enable continuity check parameters on the specified domain, service <sup>1</sup> , bridge group, and bridge domain names. The Configure CFM MIP command configures an operator-level maintenance intermediate point (MIP) for the domain-level ID. If the port on which a MIP is configured is blocked by Spanning-Tree Protocol (STP), the MIP cannot receive CFM messages or relay them toward the relay function side. The MIP can, however, receive and respond to CFM messages from the wire. A MIP has only one level associated with it, and the command-line interface (CLI) does not allow you to configure a MIP for a domain that does not exist.	<ul> <li>Cisco 7600 Series Routers</li> <li>Cisco ME 3400 Series Ethernet Access Switches</li> <li>Cisco ME 3750 Series Ethernet Access Switches</li> <li>Cisco ASR 9000 Series Aggregation Services Routers (supported only for the CFM IEEE 802.1ag</li> <li>(draft 8.1))</li> <li>Cisco Mobile Wireless Router 2941 (supported only for the CFM Cisco draft mode)</li> <li>Cisco Catalyst 6500 Series (IOS) Switches</li> <li>Cisco 3900 Series Integrated Services Routers</li> <li>Cisco CRS Carrier Routing System</li> <li>Cisco ME3600X and Cisco ME3800X Carrier Ethernet Switches</li> <li>Cisco 3900 Series Integrated Services Routers</li> <li>Cisco ME3600X and Cisco ME3800X Carrier Ethernet Switches</li> <li>Cisco MWR 2900 Series Mobile Wireless Routers</li> </ul>
	Note This command is not supported on the Cisco Carrier Packet Transport (CPT) System.	Cisco Carrier Packet Transport (CPT) System
Service ID > Configure CFM Service ID	Use the Configure CFM Service ID command to configure the CFM service ID.	Cisco ASR 903 Series Aggregation Services Routers

Command	Description	Supported on:
Command MEP > Configur e CFM MEP	DescriptionUse this command to configure maintenance endpoints (MEPs), which have the following characteristics:• Per-maintenance domain (level) and service (S-VLAN or EVC)• At the edge of a domain, define the boundary• Within the bounds of a maintenance domain, confine CFM messages	<ul> <li>Supported on:</li> <li>Cisco 7600 Series Routers</li> <li>Cisco ME 3400 Series Ethernet Access Switches</li> <li>Cisco ME 3750 Series Ethernet Access Switches</li> <li>Cisco ASR 9000 Series Aggregation Services Routers (supported only for the CFM IEEE 802.1ag</li> <li>(draft 8.1))</li> <li>Cisco Mobile Wireless Router 2941</li> </ul>
	<ul> <li>When configured to do so, proactively transmit CFM continuity check messages (CCMs)</li> <li>At the request of an administrator, transmit traceroute and loopback messages</li> <li>Note This command is not supported on the Cisco Carrier Packet Transport (CPT) System.</li> </ul>	(supported only for the CFM Cisco draft mode)
Enable > Cisco > SNMP Server Traps > Enable CFM SNMP Server Traps	Enables Ethernet CFM continuity check traps and Ethernet CFM cross-check traps	<ul> <li>Cisco ME3600X and Cisco ME3800X Carrier Ethernet Switches</li> <li>Cisco 3900 Series Integrated Services Routers</li> <li>Cisco MWR 2900 Series Mobile Wireless Routers</li> <li>Cisco Carrier Packet Transport (CPT) System</li> <li>Cisco ASR 903 Series Aggregation Services Routers</li> </ul>

1. Applicable for Cisco ASR 9000 series that run on Cisco IOS XR software.

# **Configuring E-LMI**

E-LMI notifies the CE of connectivity status and configuration parameters of Ethernet services available on the CE port.

The following commands can be launched from the inventory by right-clicking an E-LMI node and selecting **Commands**. Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands. The table below lists the Ethernet LMI commands and the supported network elements.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands.

For details on the software versions Prime Network supports for the listed supported network elements, see *Cisco Prime Network 3.10 Supported Cisco VNEs*.

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Description	Supported on:
Enable > Global E-LMI Enable On Interface	Enable Ethernet LMI globally. Note Not supported on Cisco IOS XR. If E-LMI is disabled globally, you can use this command to enable E-LMI on specific interfaces.	<ul> <li>Cisco 7600 Series Routers</li> <li>Cisco Catalyst 3750 Metro Series Switches</li> <li>Cisco Catalyst 6500 Series (IOS) Switches</li> </ul>
Configure MultiPoint To MultiPoint or Point To Point EVC Configure UNI in an Interface	UNI count indicates the range of the Unified network interface(UNI) is 2 to 1024; the default is 2. If you enter a value of 2, you have the option to select point-to-multipoint service. If you configure a value of 3 or greater, the service is point-to-multipoint.	<ul> <li>Cisco ME3600X and Cisco ME3800X Carrier Ethernet Switches</li> <li>Cisco ME 3400 Series Ethernet Access Switches</li> <li>Cisco MWR 2941 Mobile Wireless Routers</li> <li>Cisco ASR9000 Series Routers</li> </ul>
Configure Service Instance Vlan Id on Interface	Specify the service interface ID (Per-interface Ethernet service instance identifier that does not map to a VLAN).	

# **Configuring L-OAM**

L-OAM commands monitors and troubleshoots a single Ethernet link. The following commands can be launched from the inventory by right-clicking a L-OAM node and selecting **Commands**. Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands. The table below lists the L-OAM commands.

To run the these commands, the software on the network element must support the technology. Before executing any commands, you can preview them and view the results. If desired, you can also schedule the commands.

For details on the software versions Prime Network supports for the listed supported network elements, see *Cisco Prime Network 3.10 Supported Cisco VNEs*.

You might be prompted to enter your device access credentials while executing a command. Once you have entered them, these credentials will be used for every subsequent execution of a command in the same GUI client session. If you want to change the credentials, click **Edit Credentials**. The Edit Credentials button will not be available for SNMP commands or if the command is scheduled for a later time.

Command	Description	Supported on:
Assign Template on Interface	Assign template name	<ul> <li>Cisco 7600 Series Routers</li> <li>Cisco Catalyst 3750 Metro</li> </ul>
Configure MultiPoint To MultiPoint or Point To Point EVC	Configure OAM (L-OAM) on any full-duplex point-to-point or emulated point-to-point Ethernet link.	<ul><li>Series Switches</li><li>Cisco Catalyst 6500 Series (IOS) Switches</li></ul>
Enable OAM on Interface	Enable or disable OAM on the specified interface.	Cisco ME 3400 Series Ethernet Access Switches
Disable OAM on Interface	specified interface.	Cisco MWR 2941 Mobile Wireless Routers
Enable E-LMI On Interface	Interface name (if E-LMI is disabled globally, you can use this command to enable E-LMI on specific interfaces)	Cisco ASR 9000 Series     Aggregation Services Routers
		Cisco 2900 Series Integrated Services Routers
Configure OAM Parameter on Interface	Configure OAM parameters, like maximum and minimum transmission rate of OAM PDU, OAM client mode and remote loopback ability on an interface.	Cisco 3900 Series Integrated Services Routers
		Cisco ME 3600X Ethernet Access Switches
Start Remote Loopback	Specify the local interface name on which the remote loopback should be	Cisco ME 3800X Carrier Ethernet Switch Routers
Stop Remote Loopback	started and stopped.	Cisco 3900 Series Integrated Services Routers
		Cisco 2900 Series Integrated Services Routers
		Cisco 1900 Series Integrated Services Routers
		Cisco ASR 903 Series     Aggregation Services Routers
		Cisco Carrier Packet Transport (CPT) System

Configuring L-OAM