



Cisco IOS Carrier Ethernet Features Roadmap

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This feature roadmap lists the Cisco IOS features documented in the *Carrier Ethernet Configuration Guide* and maps them to the documents in which they appear. The roadmap is organized so that you can select your release train and see the features in that release. Find the feature name you are searching for and click the URL in the “Where Documented” column to access the document containing that feature.

Many legacy features have been incorporated into the configuration files, and these features may not have entries in this roadmap. In addition, information in this roadmap supports other software releases or platforms. For the latest feature information and caveats, see the release notes for your platform and software release.

Feature and Release Support

Table 1 lists Cisco IOS Carrier Ethernet feature support for the following Cisco IOS software release trains:

- [Cisco IOS Release 12.2SB](#)
- [Cisco IOS Release 12.2SR](#)
- [Cisco IOS Release 12.2SX](#)
- [Cisco IOS Release 12.4T](#)
- [Cisco IOS Release 15.0M](#)
- [Cisco IOS Release 15.1T](#)
- [Cisco IOS Release 15.0S](#)
- [Cisco IOS Release 15.1S](#)

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which 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.



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**Note**

Table 1 lists only the Cisco IOS software release 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 train also support that feature.

Table 1 lists the most recent release of each software train first and the features in alphabetical order within the release.

Table 1 Supported Cisco IOS Carrier Ethernet Features

Release	Feature Name	Feature Description	Where Documented
Cisco IOS Release 12.2SB			
12.2(33)SB	EtherChannel Min-Links	The EtherChannel Min-Links feature allows a port channel to be shut down when the number of active links falls below the minimum threshold. Using the lacp min-bundle command, you can configure the minimum threshold.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
	IEEE 802.3ad Faster Link Switchover Time	The IEEE 802.3ad Faster Link Switchover Time feature provides a link failover time of 10 milliseconds or less and a maximum time of 2 seconds. Also, port channels remain in the LINK_UP state to eliminate reconvergence by the Spanning-Tree Protocol.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
	IEEE 802.3ad Maximum Number of Links Increased	The IEEE 802.3ad Maximum Number of Links Increased feature supports eight member links per Link Aggregation Control Protocol (LACP) bundle, an increase from four in previous software releases.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
	IEEE 802.3ad MIB	This feature introduces IEEE 802.3ad Link Aggregation (LAG) MIB support in Cisco IOS software. The LAG MIB supports the management of interfaces and ports that are part of an LACP port channel and is accessed by a Simple Network Manager Protocol (SNMP) manager application.	Using the IEEE 802.3ad Link Aggregation MIB
	PPPoX Hitless Failover	The PPPoX Hitless Failover feature allows a port channel to remain in the LINK_UP state during a link switchover. In PPPoEoE, PPPoEoQinQ, and PPPoVLAN sessions, both the active and standby links assume the same configured elements after a switchover; the sessions are not forced to reestablish.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
	SSO—LACP	The SSO—LACP feature supports stateful switchover (SSO), In Service Software Upgrade (ISSU), Cisco Non-Stop Forwarding (NSF), and Non-Stop Routing (NSR) on Gigabit EtherChannel bundles.	Configuring IEEE 802.3ad Link Bundling and Load Balancing

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(31)SB	IEEE 802.3ad Link Bundling	The IEEE 802.3ad Link Bundling feature provides a method of aggregating multiple Ethernet links into a single logical channel. This feature helps improve the cost effectiveness of a device by increasing cumulative bandwidth without requiring hardware upgrades. In addition, the IEEE 802.3ad Link Bundling feature both provides a capability to dynamically provision, manage, and monitor various aggregated links and enables interoperability between various Cisco devices and devices of third-party vendors.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
Cisco IOS Release 12.2SR			
12.2(33)SRE	Configuring ITU-T Y.1731 Fault Management Functions	The Y.1731 Fault Management Functions feature provides new functionality for fault and performance management in large networks and extends the functionality of Ethernet Alarm Indication Signal (ETH-AIS) and Ethernet Remote Defect Indication (ETH-RDI) as part of the IEEE Ethernet CFM protocol.	Configuring ITU-T Y.1731 Fault Management Functions in IEEE CFM
	IEEE 802.1ag-2007 Compliant CFM - Bridge Domain Support	The IEEE 802.1ag-2007 Compliant CFM - Bridge Domain Support feature provides support for bridge domains in IEEE 802.1ag Standard-Compliant CFM in Cisco IOS software.	Configuring IEEE Standard-Compliant Ethernet CFM in a Service Provider Network
	MAC Address Security on EVC Port Channel	The MAC Address Security on EVC Port Channel feature supports multipoint bridging over Ethernet (MPBE).	Configuring MAC Address Limiting on Service Instances, Bridge Domains, and EVC Port Channels
	Multichassis LACP (mLACP)	The Multichassis LACP (mLACP) feature is an enhancement to the IEEE 802.1ad LACP and addresses the need for interchassis redundancy mechanisms when a carrier wants to “dual home” a device to two upstream points of attachment (PoAs) for redundancy.	Multichassis LACP
12.2(33)SRD1	Syslog Support for Ethernet Connectivity Fault Management	The Syslog Support for Ethernet CFM feature provides syslog support for CFM notifications that can be used to determine the status of services and of network connectivity. This feature must be implemented either on CFM over VLANs or when you use the IEEE 802.1ag on Bridge Domains feature and want to automate diagnostics or implement actions in response to CFM events.	Syslog Support for Ethernet Connectivity Fault Management
12.2(33)SRD1 12.2(33)SRD	EVC MIB	The EVC MIB is a Cisco proprietary SNMP MIB for managing an Ethernet infrastructure. SNMP versions 1 and 2c are supported.	Cross-Platform Release Notes for Cisco IOS Release 12.2SR

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(33)SRD	802.3ah SNMP MIB	The 802.3ah SNMP MIB is a Cisco proprietary OAM MIB. The 802.3ah SNMP MIB is an adaptation of the IETF draft OAM MIB and is compliant with SNMPv2. In conjunction with OAM protocols, the 802.3ah SNMP MIB provides the capability to monitor network health, identify link failures and fault conditions, and test and troubleshoot OAM-enabled links.	Cross-Platform Release Notes for Cisco IOS Release 12.2SR
	CFM (802.1ag) IEEE MIB	The Cisco proprietary CFM (802.1ag) IEEE MIB is a mechanism for managing connectivity and detecting faults in a network. This MIB interacts with the IF MIB and interfaces with SNMP to exchange information.	Cross-Platform Release Notes for Cisco IOS Release 12.2SR
	CFM Outward Facing MEPs on Switch Ports	The CFM Outward Facing MEPs on Switch Ports feature supports outward facing MEPs on switch ports. It is an enhancement to the Outward Facing MEP feature that supports the network at the distribution and access tiers.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	Ethernet OAM 3.0—CFM over BD, Untagged	The Ethernet OAM 3.0—CFM Over BD, Untagged feature supports Ethernet CFM on Cisco IOS devices that support the bridge-domain functionality. This feature allows untagged CFM packets to be associated with a MEP. These untagged CFM frames are mapped to an EVC or bridge domain (BD) based on the encapsulation configured on the EFP.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	E-OAM:Y.1731 (AIS/RDI/OOS)	The Y.1731 Fault Management Functions feature provides new functionality for fault and performance management in large networks and extends the functionality of Ethernet Alarm Indication Signal (ETH-AIS) and Ethernet Remote Defect Indication (ETH-RDI).	Configuring ITU-T Y.1731 Fault Management Functions
	EVC ISSU	The EVC ISSU feature provides In Service Software Upgrade (ISSU) support for Ethernet virtual circuit (EVC) service instances. When a service instance state is changed to error-disable, the EVC infrastructure performs a bulk update and a runtime update of the service instance state.	Cross-Platform Release Notes for Cisco IOS Release 12.2SR
	EVC SSO	The EVC SSO feature provides SSO support for EVC service instances.	Cross-Platform Release Notes for Cisco IOS Release 12.2SR

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(33)SRD	IEEE 802.1s Support on Ethernet Virtual Circuit Bridge Domains	The IEEE 802.1s Support on Ethernet Virtual Circuit Bridge Domains feature enables Multiple Spanning Tree (MST) on EVC interfaces.	<i>IEEE 802.1s Support on Ethernet Virtual Circuit Bridge Domains</i>
	ISSU Support in 802.3ah OAM	ISSU allows you to perform a Cisco IOS software upgrade or downgrade without disrupting packet flow. ISSU lowers the impact that planned maintenance activities have on network availability by allowing software changes while the system is in service.	<i>Using Ethernet Operations, Administration, and Maintenance</i>
	ISSU Support in CFM 802.1ag/1.0d	ISSU allows you to perform a Cisco IOS software upgrade or downgrade without disrupting packet flow. ISSU lowers the impact that planned maintenance activities have on network availability by allowing software changes while the system is in service.	<i>Configuring Ethernet Connectivity Fault Management in a Service Provider Network</i>
	ISSU Support in E-LMI	ISSU allows you to perform a Cisco IOS software upgrade or downgrade without disrupting packet flow. ISSU lowers the impact that planned maintenance activities have on network availability by allowing software changes while the system is in service. ISSU is automatically enabled in Ethernet LMI.	<i>Configuring Ethernet Local Management Interface at a Provider Edge</i>
	Layer 2 Access Control Lists on EVCs	The Layer 2 Access Control Lists on EVCs feature allows you to implement access control lists (ACLs) on EVCs.	<i>Layer 2 Access Control Lists on EVCs</i>
	MAC Address Limiting for Service Instances and Bridge Domains	The MAC Address Limiting for Service Instances and Bridge Domains feature addresses port security by providing the capability to control and filter MAC address learning behavior at the granularity of a per-service instance. When a violation requires a shutdown, only the customer assigned to a given service instance is affected. MAC address limiting, a type of MAC security, can be referred to as a MAC security component or element.	<i>Configuring MAC Address Limiting on Service Instances, Bridge Domains, and EVC Port Channels</i>
	NSF/SSO Support in 802.3ah OAM	The redundancy configurations Stateful Switchover (SSO) and Non-Stop Forwarding (NSF) are automatically enabled in Ethernet OAM. NSF interoperates with the SSO feature to minimize network downtime following a switchover. The primary function of Cisco NSF is to continue forwarding IP packets following a route processor (RP) switchover.	<i>Using Ethernet Operations, Administration, and Maintenance</i>

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(33)SRD	NSF/SSO Support in CFM 802.1ag/1.0d	The redundancy configurations SSO and NSF are automatically enabled in Ethernet CFM. NSF interoperates with the SSO feature to minimize network downtime following a switchover. The primary function of Cisco NSF is to continue forwarding IP packets following an RP switchover.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	NSF/SSO Support in E-LMI	The redundancy configurations SSO and NSF are supported in Ethernet LMI and are automatically enabled. A switchover from an active to a standby RP occurs when the active RP fails, is removed from the networking device, or is manually taken down for maintenance. NSF interoperates with the SSO feature to minimize network downtime following a switchover. The primary function of Cisco NSF is to continue forwarding IP packets following an RP switchover.	Configuring Ethernet Local Management Interface at a Provider Edge
12.2(33)SRC	EtherChannel Load Distribution	The EtherChannel Load Distribution feature uses a port reassignment scheme that enhances EtherChannel availability by limiting the load distribution reassignment to the port that is added or deleted. The new load on existing bundled ports does not conflict with the load programmed on those ports when a port is added or deleted.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
	LACP Single Fault Direct Load Balance Swapping	The LACP Single Fault Direct Load Balance Swapping feature reassigns the load balance bits so that the swapped-in hot standby port is assigned the load balance bits of the failed port, and the load balance bits of the remaining ports in the aggregation remain unchanged. When the swapped-in port is bundled, the loadshare is recalculated and the stored loadshare of the failed port is assigned to the swapped-in port. The remaining ports in the bundle are not affected.	Configuring IEEE 802.3ad Link Bundling and Load Balancing

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(33)SRC1 2.2(33)SRB	IEEE 802.3ad Link Bundling	The IEEE 802.3ad Link Bundling feature provides a method of aggregating multiple Ethernet links into a single logical channel. This feature helps improve the cost effectiveness of a device by increasing cumulative bandwidth without requiring hardware upgrades. In addition, the IEEE 802.3ad Link Bundling feature both provides a capability to dynamically provision, manage, and monitor various aggregated links and enables interoperability between various Cisco devices and devices of third-party vendors.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
	Outward Facing MEP	The Outward Facing MEP feature is an enhancement to Ethernet CFM that supports the distribution and access environments by supporting outward facing maintenance endpoints (MEPs) on routed (Layer 3) ports. Outward facing MEPs can also be used to monitor network-to-network interfaces between operators on Layer 2 switch ports.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	Remote Port Shutdown	The Remote Port Shutdown feature uses Ethernet LMI in an Ethernet over Multiprotocol Label Switching (EoMPLS) network to propagate remote link status to a CE device.	Configuring Remote Port Shutdown
12.2(33)SRB	Ethernet Local Management Interface at a Provider Edge	Ethernet Local Management Interface (LMI) is an Ethernet OAM protocol between a customer edge (CE) device and a provider edge (PE) device. Ethernet LMI provides CE devices with the status of Ethernet virtual circuits (EVCs) for large Ethernet MANs and WANs and provides information that enables CE devices to autoconfigure. Ethernet LMI runs on the PE-CE user network interface (UNI) link and notifies a CE device of both the operating state of an EVC and the time when an EVC is added or deleted.	Configuring Ethernet Local Management Interface at a Provider Edge
	Ethernet OAM and Ethernet CFM Interworking	The Ethernet OAM and Ethernet CFM Interworking feature enables Ethernet OAM and CFM to function together in a network.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
12.2(33)SRB1 2.2(33)SRA	Ethernet Connectivity Fault Management	Ethernet Connectivity Fault Management (CFM) is an end-to-end per-service-instance Ethernet layer OAM protocol. It includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet MANs and WANs.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(33)SRA	Ethernet Operations, Administration, and Maintenance	Ethernet operations, administration, and maintenance (OAM) is a protocol for installing, monitoring, and troubleshooting Ethernet metropolitan-area networks (MANs) and Ethernet WANs. It relies on a new, optional sublayer in the data link layer of the Open Systems Interconnection (OSI) model. The OAM features covered by this protocol are Discovery, Link Monitoring, Remote Fault Detection, Remote Loopback, and Cisco Proprietary Extensions.	Using Ethernet Operations, Administration, and Maintenance
Cisco IOS Release 12.2SX			
12.2(33)SXI2	802.1ag - IEEE D8.1 Standard-Compliant CFM, Y.1731 multicast LBM / AIS / RDI / LCK, IP SLA for Ethernet	Ethernet CFM is an end-to-end per-service-instance Ethernet layer OAM protocol. CFM includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet MANs and WANs. This feature is the implementation of IEEE 802.1ag Standard CFM in Cisco IOS software.	Configuring IEEE Standard-Compliant Ethernet CFM in a Service Provider Network
12.2(33)SXI	Ethernet OAM and Ethernet CFM Interworking	The Ethernet OAM and Ethernet CFM Interworking feature enables Ethernet OAM and CFM to function together in a network.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	IEEE 802.3ah Link Fault RFI Support	The IEEE 802.3ah Link Fault RFI Support feature provides a per-port configurable option that moves a port into a blocking state when an OAMPDU control request packet is received with the Link Fault Status flag set. In the blocking state, the port can continue to receive BPDUs and OAMPDUs, detect remote link status, and automatically recover when the remote link becomes operational.	Using Ethernet Operations, Administration, and Maintenance
12.2(33)SXI 12.2(33)SXH	Ethernet Connectivity Fault Management	Ethernet Connectivity Fault Management (CFM) is an end-to-end per-service-instance Ethernet layer OAM protocol. It includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet MANs and WANs.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	Ethernet Operations, Administration, and Maintenance	Ethernet OAM is a protocol for installing, monitoring, and troubleshooting Ethernet MANs and Ethernet WANs. It relies on a new, optional sublayer in the data link layer of the OSI model. The OAM features covered by this protocol are Discovery, Link Monitoring, Remote Fault Detection, Remote Loopback, and Cisco Proprietary Extensions.	Using Ethernet Operations, Administration, and Maintenance

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.2(33)SXH	IEEE 802.1ab LLDP (Link Layer Discovery Protocol)	IEEE 802.1ab LLDP (Link Layer Discovery Protocol) is an optional link layer protocol for network topology discovery in multivendor networks. Discovery information includes device and port attachments, switch connections, and paths among clients, servers, switches, and routers for application and network services. As a network management tool, LLDP provides accurate network mapping, inventory data, and network troubleshooting information.	Using Link Layer Discovery Protocol in Multivendor Networks
	IEEE 802.1ab MED	LLDP-Media Endpoint Device (MED) is an LLDP enhancement for voice over IP (VoIP) applications. It operates only between endpoint devices such as IP phones and conference bridges and network connectivity devices such as routers and switches.	Using Link Layer Discovery Protocol in Multivendor Networks
Cisco IOS Release 12.4T			
12.4(15)T2	Ethernet Connectivity Fault Management	Ethernet Connectivity Fault Management (CFM) is an end-to-end per-service-instance Ethernet layer OAM protocol. It includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet MANs and WANs.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	Ethernet Operations, Administration, and Maintenance	Ethernet OAM is a protocol for installing, monitoring, and troubleshooting Ethernet MANs and Ethernet WANs. It relies on a new, optional sublayer in the data link layer of the OSI model. The OAM features covered by this protocol are Discovery, Link Monitoring, Remote Fault Detection, Remote Loopback, and Cisco Proprietary Extensions.	Using Ethernet Operations, Administration, and Maintenance
12.4(15)T2 12.4(9)T	Ethernet Local Management Interface	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. Specifically, Ethernet LMI notifies a CE device of both 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 UNI to a CE device.	Enabling Ethernet Local Management Interface

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
12.4(11)T	Outward Facing MEP	The Outward Facing MEP feature is an enhancement to Ethernet CFM that supports the distribution and access environments by supporting outward facing MEPs on routed (Layer 3) ports. Outward facing MEPs can also be used to monitor network-to-network interfaces between operators on Layer 2 switch ports.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
Cisco IOS Release 15.0M			
15.0(1)M	Ethernet Connectivity Fault Management	Ethernet Connectivity Fault Management (CFM) is an end-to-end per-service-instance Ethernet layer OAM protocol. It includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet MANs and WANs.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network
	Ethernet Operations, Administration, and Maintenance	Ethernet OAM is a protocol for installing, monitoring, and troubleshooting Ethernet MANs and Ethernet WANs. It relies on a new, optional sublayer in the data link layer of the OSI model. The OAM features covered by this protocol are Discovery, Link Monitoring, Remote Fault Detection, Remote Loopback, and Cisco Proprietary Extensions.	Using Ethernet Operations, Administration, and Maintenance
	Ethernet Local Management Interface	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. Specifically, Ethernet LMI notifies a CE device of both 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 UNI to a CE device.	Enabling Ethernet Local Management Interface
	Outward Facing MEP	The Outward Facing MEP feature is an enhancement to Ethernet CFM that supports the distribution and access environments by supporting outward facing MEPs on routed (Layer 3) ports. Outward facing MEPs can also be used to monitor network-to-network interfaces between operators on Layer 2 switch ports.	Configuring Ethernet Connectivity Fault Management in a Service Provider Network

Table 1 Supported Cisco IOS Carrier Ethernet Features (continued)

Release	Feature Name	Feature Description	Where Documented
Cisco IOS Release 15.1T			
15.1(1)T	IEEE 802.1ag - D8.1 Standard Compliant CFM, Y.1731 Multicast LBM / AIS / RDI / LCK, IP SLA for Ethernet	Ethernet CFM is an end-to-end per-service-instance Ethernet layer OAM protocol. CFM includes proactive connectivity monitoring, fault verification, and fault isolation for large Ethernet MANs and WANs. This feature is the implementation of IEEE 802.1ag Standard-compliant CFM in Cisco IOS software.	Configuring IEEE Standard-Compliant Ethernet CFM in a Service Provider Network
Cisco IOS Release 15.0S			
15.0(1)S	802.3ad Link Aggregation with Weighted Load Balancing	The 802.3ad Link Aggregation with Weighted Load Balancing feature is an enhancement introduced in Cisco IOS Release 15.0(1)S that allows you to assign weights to service instances to efficiently distribute traffic flow across active member links in a port channel.	Configuring IEEE 802.3ad Link Bundling and Load Balancing
Cisco IOS Release 15.1S			
15.1(1)S	IEEE 802.1ag-2007 Compliant CFM MIB	The IEEE CFM MIB provides MIB support for IEEE CFM services. The IEEE CFM MIB can be used as a tool to trace paths, verify and manage connectivity, and detect faults in a network.	IEEE-Compliant CFM MIB
15.1(2)S	CFM Extension for 1+1 Hot-Standby Support	The NSN Microwave 1+1 HSBY protocol is a link-protection protocol that extends CFM CCMs to enable 1:1 link redundancy in microwave devices. NSN Microwave 1+1 HSBY provides link-protection support for both IDUs and ODUs.	CFM CCM Extensions to Support the NSN Microwave 1+1 Hot Standby Protocol
15.1(2)S	Y.1731 Performance Monitoring	The Y.1731 Performance Monitoring feature describes the Ethernet performance management aspect of SLAs such as delay, delay variation, and frame loss.	ITU-T Y.1731 Performance Monitoring In a Service Provider Network

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