MPLS Traffic Engineering—Fast Reroute MIB

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The MPLS Traffic Engineering—Fast Reroute MIB provides Simple Network Management Protocol (SNMP)-based network management of the Multiprotocol Label Switching (MPLS) Fast Reroute (FRR) feature in Cisco IOS software.

The Fast Reroute MIB has the following features:

- Notifications can be created and queued.
- Command-line interface (CLI) commands enable notifications, and specify the IP address to where the notifications will be sent.
- The configuration of the notifications can be written into nonvolatile memory.

The MIB includes objects describing features within MPLS FRR, and it includes the following tables:

- cmplsFrrConstTable
- cmplsFrrLogTable
- cmplsFrrFacRouteDBTable

The MIB also includes scalar objects (that is, objects that are not in a table). For more information, see the "FRR MIB Scalar Objects" section on page 4.

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 MPLS Traffic Engineering—Fast Reroute MIB" section on page 18.

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 the MPLS Traffic Engineering—Fast Reroute MIB

- The network must support the Intermediate System-to-Intermediate System (IS-IS) or Open Shortest Path First (OSPF) protocol.
- The SNMP is installed and enabled on the label switch routers (LSRs).
- MPLS is enabled globally on each LSR.
- Cisco Express Forwarding is enabled on the LSRs.
- Traffic engineering (TE) tunnels are enabled.
- MPLS FRR is enabled on one of the TE tunnels.
- The Resource Reservation Protocol (RSVP) is enabled.

Restrictions for the MPLS Traffic Engineering—Fast Reroute MIB

- The implementation of the FRR MIB is limited to read-only (RO) permission for MIB objects.
- Configuration of the FRR MIB using the SNMP SET command is not supported in Cisco IOS Release 12.2(33)SRA or in prior releases.
- The following tables are not implemented in the specified releases:
  - mplsFrrOne2OnePlrTable—Not implemented in Cisco IOS Release 12.2(33)SRA or in prior releases.
  - mplsFrrDetourTable—Not implemented in Cisco IOS Release 12.2(33)SRA or in prior releases.
  - cmplsFrrLogTable—Not implemented in Cisco IOS Release 12.2(33)SRA.

Information About the MPLS Traffic Engineering—Fast Reroute MIB

To use the MPLS Traffic Engineering—Fast Reroute MIB, you need to understand the following concepts:

Feature Design of the MPLS Traffic Engineering—Fast Reroute MIB

The FRR MIB enables standard, SNMP-based network management of FRR in Cisco IOS software. This capability requires that SNMP agent code executes on a designated network management station (NMS) in the network. The NMS serves as the medium for user interaction with the network management objects in the MIB.

The FRR MIB is based on the Internet Engineering Task Force (IETF) draft MIB specification *draft-ietf-mpls-fastreroute-mib-02.txt*. The IETF draft MIB, which undergoes revisions periodically, is evolving toward becoming a standard. The Cisco implementation of the FRR MIB is expected to track the evolution of the IETF draft MIB, and may change accordingly.

Slight differences between the IETF draft MIB and the implementation of FRR within Cisco IOS software require some minor translations between the FRR MIB objects and the internal data structures of Cisco IOS software. These translations are accomplished by the SNMP agent, which runs in the background on the NMS workstation as a low priority process and provides a management interface to Cisco IOS software.

You can use an SNMP agent to access FRR MIB objects using standard SNMP GET operations. All the objects in the FRR MIB follow the conventions defined in the IETF draft MIB.

Functional Structure of the MPLS Traffic Engineering—Fast Reroute MIB

The SNMP agent code supporting the FRR MIB follows the existing model for such code in Cisco IOS software and is, in part, generated by the Cisco IOS tool set, based on the MIB source code. The basis for the generated code is the Cisco version of the FRR MIB CISCO-ietf-frr-mib.

The SNMP agent code, which has a layered structure that is common to MIB support code in Cisco IOS software, consists of the following layers:

- Platform-independent layer—This layer is generated primarily by the MIB development Cisco IOS tool set and incorporates platform- and implementation-independent functions. These functions handle SNMP standard functionality in the context of the specific MIB. This layer handles indexes and range or enumeration value checks for GET, GET-NEXT, and SET SNMP operations. A function is generated for each SNMP table or group of objects. This layer calls into the next layer.
- Application interface layer—The Cisco IOS tool set generates the function names and template code for MIB objects.

- Application-specific layer—This layer provides the mechanism for retrieving relevant data from the managed application layer. It includes an entry point function for each table. This function calls two other functions; one that searches the TE tunnel database that RSVP maintains for the relevant data according to the indexes, and another function that fills the data into the structure.
- Managed application layer—This layer includes all the structures and mechanisms, and is managed by the MIB.

System Flow of SNMP Protocol Requests and Response Messages

All SNMP protocol requests and response messages are ultimately handled by the SNMP master agent. When such a message is received on a router, the master agent parses the requests and identifies the MIB to which the request refers. The master agent then queries the subagent responsible for the MIB with a GET, GET-NEXT, or SET request. The FRR MIB subagent retrieves the appropriate data, and returns it to the master agent. The master agent is then responsible for returning an SNMP response to the NMS. All queries occur within the IP SNMP Cisco IOS process, which runs as a low priority task.

FRR MIB Scalar Objects

Scalar objects are objects that are not in tables. A scalar object has one instance (that is, one occurrence).

Table 1 describes the FRR MIB scalar objects supported in Cisco IOS Release 12.2(33)SRA and in prior releases.

Table 1 Scalar Objects

MIB Object	Function
cmplsFrrDetourIncoming	Number of detour link-state packets (LSPs) entering the device. This object returns 0 because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrDetourOutgoing	Number of detour LSPs leaving the device. This object returns 0 because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrDetourOriginating	Number of detour LSPs originating from the device. This object returns 0 because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrSwitchover	Number of tunnels that are being backed up because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrNumOfConfIfs	Number of MPLS interfaces FRR configured for protection; 0 indicates that LSPs traversing any interface can be protected.
cmplsFrrActProtectedIfs	Number of interfaces FRR is protecting because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrConfProtectingTuns	Number of backup Fast Reroute-protected tunnels configured because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrActProtectedTuns	Number of tunnels protected by the Fast Reroute feature. This object returns 0 because cmplsFrrConstProtectionMethod is set to facilityBackup(1).
cmplsFrrActProtectedLSPs	Number of LSPs that FRR is protecting. If cmplsFrrConstProtectionMethod is set to facilityBackup(1), this object returns 0.
cmplsFrrConstProtectionMethod	This object always returns facilityBackup(1) because Cisco supports only the facility backup protection method.

Table 1 Scalar Objects (continued)

MIB Object	Function
cmplsFrrNotifsEnabled	A value that indicates whether FRR notifications defined in this MIB are enabled or disabled. This object returns True(1) for enabled, or False(2) for disabled. The default is that notifications are disabled.
cmplsFrrLogTableMaxEntries	Maximum number of entries allowed in the FRR log table. This object always returns 32. Exception: In Cisco IOS Release 12.2(33)SRA, this value always is 0.
cmplsFrrLogTableCurrEntries	Current number of entries in the FRR log table. In Cisco IOS Release 12.2(33)SRA, this object always returns 0.
cmplsFrrNotifMaxRate	Maximum interval rate between FRR MIB notifications. This object always returns 0.

FRR MIB Notifications

Notifications are issued after particular FRR events occur. This section provides the following information about FRR MIB notifications supported in Cisco IOS Release 12 2(33)SRA and in prior releases:

- Notification Generation Events, page 5
- Notification Specification, page 5
- Notification Monitoring, page 6

Notification Generation Events

When you enable FRR MIB notification functionality by issuing the **snmp-server enable traps mpls fast-reroute** command, notification messages are generated and sent to a designated NMS in the network to signal the occurrence of specific events in Cisco IOS software.

The FRR MIB objects involved in FRR status transitions and event notifications include cmplsFrrProtected. This message is sent to an NMS if there is a major TE tunnel change (that is, fast rerouting of TE tunnels).

Notification Specification

Each FRR notification has a generic type identifier and an enterprise-specific type identifier for identifying the notification type. The generic type for all FRR notifications is “enterprise Specific” because this is not one of the generic notification types defined for SNMP. The enterprise-specific type is 1 for cmplsFrrProtected.

Each notification contains the following objects from the FRR MIB so that the FRR tunnel can be easily identified:

- ifIndex of the broken tunnel
- ifIndex of the protecting tunnel
- ifIndex of the protecting tunnel instance

Upon being invoked, the appropriate FRR interface indexes have already been retrieved by existing FRR code. The FRR interfaces are then used to fill in data for the three objects included in the notification.

Notification Monitoring

When FRR MIB notifications are enabled (see the **snmp-server enable traps** command), notification messages relating to specific FRR events within Cisco IOS software are generated and sent to a specified NMS in the network. Any utility that supports SNMPv1 or SNPv2 notifications can receive notification messages.

To monitor FRR MIB notifications, log in to an NMS that supports a utility that displays SNMP notifications, and start the display utility.

MIB Tables in the MPLS Traffic Engineering—Fast Reroute MIB

The FRR MIB consists of the following tables:

- cmplsFrrConstTable, page 6
- cmplsFrrLogTable, page 7
- cmplsFrrFacRouteDBTable, page 7

The tables access various data structures to obtain information regarding detours, the FRR database, and logging.

cmplsFrrConstTable

cmplsFrrConstTable displays the configuration of an FRR-enabled tunnel and the characteristics of its accompanying backup tunnels. For each protected tunnel, there can be multiple backup tunnels.

The table is indexed by the following:

- cmplsFrrConstIfIndex—The interface on which the protected tunnel is configured
- cmplsFrrConstTunnelIndex—The SNMP interface index
- cmplsFrrConstTunnelInstance—The tunnel instance

Table 2 describes the MIB objects for cmplsFrrConstTable.

Table 2 cmplsFrrConstTable Objects

MIB Object	Function
cmplsFrrConstIfIndex	Uniquely identifies an interface on which FRR is configured. If an index has a value of 0, the configuration applies to all interfaces on the device on which the FRR feature can operate.
cmplsFrrConstTunnelIndex	Tunnel for which FRR is requested.
cmplsFrrConstTunnelInstance	Tunnel for which FRR is requested. The value always is 0 because only tunnel heads are represented, and tunnel heads have an instance value of 0.
cmplsFrrConstSetupPrio	Setup priority of the backup tunnel.
cmplsFrrConstHoldingPrio	Holding priority of the backup tunnel.
cmplsFrrConstInclAnyAffinity	Attribute bits that must be set for the tunnel to traverse a link.
cmplsFrrConstInclAllAffinity	Attribute bits that must not be set for the tunnel to traverse a link.
cmplsFrrConstExclAllAffinity	A link satisfies the exclude-all constraint only if the link contains none of the administrative groups specified in the constraint.

Table 2 cmplsFrrConstTable Objects (continued)

MIB Object	Function
cmplsFrrConstHopLimit	The maximum number of hops that the backup tunnel can traverse.
cmplsFrrConstBandwidth	The bandwidth of the backup tunnels for this tunnel, in thousands of bits per second (kbps).
cmplsFrrConstRowStatus	Creates, modifies, and deletes a row in this table.

cmplsFrrLogTable

Note cmplsFrrLogTable and the **show mpls traffic-eng fast-reroute log reroutes** command are not supported in Cisco IOS Release 12.2(33)SRA.

cmplsFrrLogTable is indexed by the object cmplsFrrLogIndex. The index corresponds to a log entry in the FRR feature's **show mpls traffic-eng fast-reroute log reroutes** command. That **show** command stores up to 32 entries at a time. If entries are added, the oldest entry is overwritten with new log information.

cmplsFrrLogTable can store up to 32 entries at a time, overwriting older entries as newer ones are added. The index cmplsFrrLogIndex is incremented to give each log table entry of the MIB a unique index value. Therefore, it is possible to have indexes greater than 32 even though only 32 entries are displaying.

Table 3 describes the MIB objects for cmplsFrrLogTable.

Table 3 cmplsFrrLogTable Objects

MIB Object	Function
cmplsFrrLogIndex	Number of the FRR event.
cmplsFrrLogEventTime	Number of milliseconds that elapsed from bootstrap time to the time that the event occurred.
cmplsFrrLogInterface	Identifies the interface that was affected by this FRR event. The value can be set to 0 if mplsFrrConstProtectionMethod is set to oneToOneBackup(0).
cmplsFrrLogEventType	The type of FRR event that occurred. The object returns Protected or Other.
cmplsFrrLogEventDuration	Duration of the event, in milliseconds.
cmplsFrrLogEventReasonString	Implementation-specific explanation of the event. The object returns interface down event or interface other event.

cmplsFrrFacRouteDBTable

The following indexes specify which interface and tunnel are being protected by the FRR feature:

- cmplsFrrFacRouteProtectedIfIndex
- cmplsFrrFacRouteProtectedTunIndex

The following indexes specify the backup tunnel that provides protection to the protected tunnel:

- cmplsFrrFacRouteProtectingTunIndex
- cmplsFrrFacRouteProtectedTunInstance
- cmplsFrrFacRouteProtectedTunIngressLSRId
- cmplsFrrFacRouteProtectedTunEgressLSRId

This implementation will attempt to leverage the work already done for the MPLS TE MIB because it contains similar lookup functions for TE tunnels.

Table 4 describes the MIB objects for cmplsFrrFacRouteDBTable.

Table 4 cmplsFrrFacRouteDBTable Objects

MIB Object	Function
cmplsFrrFacRouteProtectedIfIndex	Interface configured for FRR protection.
cmplsFrrFacRouteProtectedTunIndex	The mplsTunnelEntry primary index for the tunnel head interface designated to protect the interface specified in mplsFrrFacRouteIfProtIdx (and all the tunnels using this interface).
cmplsFrrFacRouteProtectingTunIndex	An mplsTunnelEntry that is being protected by FRR. An index uniquely identifies a tunnel.
cmplsFrrFacRouteProtectedTunInstance	An mplsTunnelEntry that is being protected by FRR. An instance uniquely identifies a tunnel.
cmplsFrrFacRouteProtectedTunIngressLSRId	Inbound label for the backup LSR.
cmplsFrrFacRouteProtectedTunEgressLSRId	Outbound label for the backup LSR.
cmplsFrrFacRouteProtectedTunStatus	State of the protected tunnel. Valid values are: • active—Tunnel label has been placed in the Label Forwarding Information Base (LFIB) and is ready to be applied to incoming packets. • ready—Tunnel's label entry has been created, but is not in the LFIB. • partial—Tunnel's label entry has not been fully created.
cmplsFrrFacRouteProtectingTunResvBw	Amount of bandwidth, in megabytes per second, that is reserved by the backup tunnel.
cmplsFrrFacRouteProtectingTunProtectionType	Type of protection: 0 designates link protection; 1 designates node protection.

How to Configure the MPLS Traffic Engineering—Fast Reroute MIB

This section contains the following procedures:

- Enabling the SNMP Agent for FRR MIB Notifications, page 9 (required)
- Enabling Cisco Express Forwarding, page 10 (required)
- Enabling MPLS Globally on Each LSR, page 11 (required)
- Enabling TE Tunnels, page 11 (required)

- Enabling MPLS FRR on Each TE Tunnel, page 12 (required)
- Enabling a Backup Tunnel on an Interface, page 13 (required)

Enabling the SNMP Agent for FRR MIB Notifications

To enable the SNMP agent for FRR MIB notifications, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **show running-config**
3. **configure terminal**
4. **snmp-server community** *string* [**view** *view-name*] [**ro**] [*access-list-number*]
5. **snmp-server enable traps mpls fast-reroute protected**
6. **end**
7. **write memory**

DETAILED STEPS

	Command or Action	Purpose

Step 1	`enable`
	
	Example:
	`Router> enable`
		Enables privileged EXEC mode.
		• Enter your password if prompted.

Step 2	`show running-config`
	
	Example:
	`Router# show running-config`
		Displays the running configuration of the router to determine if an SNMP agent is already running on the device.
		If no SNMP information is displayed, continue with the next step.
		If any SNMP information is displayed, you can modify or change the information.

Step 3	`configure terminal`
	
	Example:
	`Router# configure terminal`
		Enters global configuration mode.

Step 4	**snmp-server community** *string* [**view** *view-name*] [**ro**] [*access-list-number*] **Example:** `Router(config)# snmp-server community public ro`	Configures read-only (ro) SNMP community strings for the FRR MIB.

	Command or Action	Purpose
Step 5	**snmp-server enable traps mpls fast-reroute protected** **Example:** `Router(config)# snmp-server enable traps mpls fast-reroute protected`	Enables Fast Reroute traps.
Step 6	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.
Step 7	**write memory** **Example:** `Router# write memory`	Writes the modified SNMP configuration into NVRAM of the router, permanently saving the SNMP settings.

Enabling Cisco Express Forwarding

To enable Cisco Express Forwarding, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip cef distributed**
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`	Enters global configuration mode.
Step 3	**ip cef distributed** **Example:** `Router(config)# ip cef distributed`	Enables distributed Cisco Express Forwarding.
Step 4	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

Enabling MPLS Globally on Each LSR

To enable MPLS globally on each LSR, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mpls ip**
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`
		Enters global configuration mode.

Step 3	`mpls ip`
	
	Example:
	`Router(config)# mpls ip`
		Enables MPLS forwarding of IPv4 packets along normally routed paths for the platform.

Step 4	`end`
	
	Example:
	`Router(config)# end`
		Exits to privileged EXEC mode.

Enabling TE Tunnels

To enable TE tunnels, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **ip cef**
4. **mpls traffic-eng tunnels**
5. **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`
		Enters global configuration mode.

Step 3	`ip cef`
	
	Example:
	`Router(config)# ip cef`
		Enables standard Cisco Express Forwarding operations.

Step 4	`mpls traffic-eng tunnels`
	
	Example:
	`Router(config)# mpls traffic-eng tunnels`
		Enables the MPLS TE tunnel feature on a device.

Step 5	`end`
	
	Example:
	`Router(config)# end`
		Exits to privileged EXEC mode.

Enabling MPLS FRR on Each TE Tunnel

To enable MPLS FRR on each TE tunnel, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **tunnel mpls traffic-eng fast-reroute**
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`	Enters global configuration mode.
Step 3	**tunnel mpls traffic-eng fast-reroute** **Example:** `Router(config)# tunnel mpls traffic-eng fast-reroute`	Enables Fast Reroute on each TE tunnel.
Step 4	**end** **Example:** `Router(config)# end`	Exits to privileged EXEC mode.

Enabling a Backup Tunnel on an Interface

To enable a backup tunnel on an interface, perform the following steps.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **mpls traffic-eng backup-path tunnel** *interface*
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`	Enters interface configuration mode.

	Command or Action	Purpose
Step 3	**mpls traffic-eng backup-path tunnel** *interface* **Example:** `Router(config-if)# mpls traffic-eng backup-path tunnel tunnel1`	Enables a backup tunnel on a specified interface.
Step 4	**end** **Example:** `Router(config-if)# end`	Exits to privileged EXEC mode.

Configuration Examples for the MPLS Traffic Engineering—Fast Reroute MIB

Enabling an SNMP Agent on a Host NMS: Example

The following example shows how to enable an SNMP agent on the host NMS:

```
enable
 show running-config
 configure terminal
 snmp-server community public ro
 snmp-server enable traps mpls fast-reroute protected
 end
 write memory
```

Enabling Cisco Express Forwarding: Example

The following example shows how to enable Cisco Express Forwarding:

```
enable
 configure terminal
 ip cef distributed
 end
```

Enabling MPLS Globally on Each LSR: Example

The following example shows how to enable MPLS globally on each LSR:

```
enable
 configure terminal
 mpls ip
 end
```

Enabling TE Tunnels: Example

The following example shows how to enable traffic engineering tunnels:

```
enable
 configure terminal
 ip cef
 mpls traffic-eng tunnels
 end
```

Enabling MPLS FRR on Each TE Tunnel: Example

The following example shows how to enable MPLS Fast Reroute on each TE tunnel:

```
enable
 configure terminal
 tunnel mpls traffic-eng fast-reroute
 end
```

Enabling a Backup Tunnel on an Interface: Example

The following example shows how to enable a backup tunnel on an interface:

```
enable
 configure terminal
 mpls traffic-eng backup-path tunnel1
 end
```

Additional References

The following sections provide references related to the MPLS Traffic Engineering—Fast Reroute MIB feature.

Related Documents

Related Topic	Document Title
SNMP agent support for the MPLS Traffic Engineering MIB (MPLS TE MIB)	*MPLS Traffic Engineering (TE) MIB*
Fast Reroute	*MPLS Traffic Engineering (TE)--Fast Reroute (FRR) Link and Node Protection*, Release 12.2(33)SRA

Standards

Standard	Title
MPLS-FRR-MIB	*draft-ietf-mpls-fastreroute-mib-02.txt*

MIBs

MIB	MIBs Link
MPLS Traffic Engineering (TE) MIB	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
http://www.ietf.org/internet-drafts/draft-ietf-mpls-fastreroute-mib-01.txt	*Multiprotocol Label Switching (MPLS) Traffic Engineering Management Information Base for Fast Reroute*

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 feature uses no new or modified commands.

Feature Information for MPLS Traffic Engineering—Fast Reroute MIB

Table 5 lists the release history for this feature.

Table 5 Feature Information for MPLS Traffic Engineering—Fast Reroute MIB

Feature Name	Releases	Feature Information
MPLS Traffic Engineering—Fast Reroute MIB	12.0(10)ST 12.0(16)ST 12.0(22)S 12.0(26)S 12.2(33)SRA 12.2(33)SXH	The MPLS Traffic Engineering—Fast Reroute MIB provides SNMP-based network management of the Multiprotocol Label Switching (MPLS) Fast Reroute (FRR) feature in Cisco IOS software. In 12.0(10)ST, the Fast Reroute link protection feature was introduced. In 12.0(16)ST, link protection for Cisco series 7200 and 7500 platforms was added. In 12.0(22)S, Fast Reroute enhancements, including node protection, were added. In 12.0(26)S, support for the IETF MIB *draft-ietf-mpls-fastreroute-mib-02.txt*, which provides network management for the FRR feature, was added. In 12.2(33)SRA, support for cmplsFrrLogTableCurrEntries and cmplsFrrNotifMaxRate was added. The cmplsFrrLogTable is not supported. Support for 12.2(33)SXH was added.

Glossary

Cisco Express Forwarding—An advanced Layer 3 IP switching technology. Cisco Express Forwarding optimizes network performance and scalability for networks with large and dynamic traffic patterns.

index—A method of uniquely identifying a tunnel.

instance—An occurrence. An object can have one or more instances.

IS-IS—Intermediate System-to-Intermediate System. OSI link-state hierarchical routing protocol based on DECnet Phase V routing whereby ISs (routers) exchange routing information based on a single metric to determine network topology.

label—A short, fixed-length data construct that tells switching nodes how to forward data (packets or cells).

LFIB—Label Forwarding Information Base. The data structure for storing information about incoming and outgoing tags (labels) and associated equivalent packets suitable for labeling.

LSR—label switching router. A device that forwards MPLS packets based on the value of a fixed-length label encapsulated in each packet.

MIB—Management Information Base. A database of network management information that is used and maintained by a network management protocol such as Simple Network Management Protocol (SNMP). The value of a MIB object can be changed or retrieved by using SNMP commands, usually through a network management system. MIB objects are organized in a tree structure that includes public (standard) and private (proprietary) branches.

NMS—network management station. A powerful, well-equipped computer (typically an engineering workstation) that is used by a network administrator to communicate with other devices in the network. An NMS is typically used to manage network resources, gather statistics, and perform a variety of network administration and configuration tasks.

notification—A message sent by a Simple Network Management Protocol (SNMP) agent to a network management station, console, or terminal to indicate that a significant event within Cisco IOS software has occurred.

object—A variable that has a specific instance associated with it.

OSPF—Open Shortest Path First. Link-state, hierarchical Interior Gateway Protocol (IGP) routing algorithm proposed as a successor to Routing Information Protocol (RIP) in the Internet community. OSPF features include least-cost routing, multipath routing, and load balancing. OSPF was derived from an early version of the IS-IS protocol.

RSVP—Resource Reservation Protocol. Protocol for reserving network resources to provide quality of service (QoS) guarantees to application flows.

scalar object—Objects that are not instances. A scalar object has one instance.

SNMP—Simple Network Management Protocol. A network management protocol used almost exclusively in TCP/IP networks. SNMP provides a means to monitor and control network devices, manage configurations, collect statistics, monitor performance, and ensure network security.

SNMP agent—A managed node or device. The router that has the MIB implementation on it.

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