

# Cisco IOS Software Release 12.0ST New Features



This product bulletin describes new features introduced in Cisco IOS software Release 12.0ST.

## Cisco IOS Release 12.0ST Overview

Cisco IOS software Release 12.0ST is an early deployment (ED) release for the Cisco 7200, 7500/7000RSP and 12000 (GSR) series routers for Service Providers (SPs). Cisco IOS Release 12.0ST is based on 12.0S, a widely deployed Service Provider release. Cisco IOS Release 12.0ST has been developed and maintained for a little less than a year and has been in use in a limited number of customer networks. The first available release is 12.0(11)ST. 12.0ST provides MPLS VPN support for the Cisco 7200, Cisco 7500/7000 RSP and Cisco 12000 (GSR) routers.

This release includes 12.0(11)S Release functionality. Please refer to *Cisco IOS Software Release 12.0(11)S New Features product bulletin 934* at the following URL:

[http://www.cisco.com/warp/customer/cc/pd/iosw/iore/iomjre12/prodlit/934\\_pb.htm](http://www.cisco.com/warp/customer/cc/pd/iosw/iore/iomjre12/prodlit/934_pb.htm)

Cisco IOS software Release 12.0ST will receive regular maintenance like all other major releases and will be supported at least for one year after FCS. Cisco IOS software Release 12.0ST is recommended for Service Providers that require the unique capabilities of this release.

The FCS date for Cisco IOS software Release 12.0ST is 12/05/00.

## New Features

Cisco IOS Release 12.0(11)ST introduces many new software features to support the Cisco 12000 (GSR) router. Table 1, "New Software Features," on page 1 lists new software support. The software features are described in detail in the following sections.

**Table 1** New Software Features

12.0(11)ST Platforms and Software Support	
Router Platforms	New Software Features Added in 12.0(11)ST
Cisco 7200 series	<ul style="list-style-type: none"> <li>MPLS VPN Provider Edge Router Support</li> <li>LDP</li> <li>LDP MIB</li> <li>VPN Aware PING MIB</li> <li>VRF Specific Static ARP Entry Support</li> <li>LC-ATM Support</li> <li>OSPF Support for PE-CE Link</li> <li>MPLS Egress Netflow Accounting</li> </ul>



Cisco 7500/RSP7000 series	MPLS VPN Provider Edge Router Support LDP LDP MIB VPN Aware PING MIB VRF Specific Static ARP Entry Support LC-ATM Support OSPF Support on the PE-CE Link MPLS Egress Netflow Accounting
Cisco 12000 series	LDP LDP MIB MPLS VPN Provider Edge Router Support VPN Aware PING MIB VRF Specific Static ARP Entry Support LC-ATM Support Link Protection Support for MPLS Fast Re-Route ATM AAL5 over MPLS Support DiffServ Aware TE—Dual Bandwidth Pool Support MPLS Egress Netflow Accounting

Table 2, “New Hardware Support,” on page 2 lists the hardware support for those features.

**Table 2** New Hardware Support

12.0(11)ST Platforms and New Hardware Support		
Router Platforms	Software Features	Hardware Supported on 12.0(11)ST
Cisco 7200 series	MPLS VPN Provider Edge Router Support LDP LDP MIB VPN Aware PING MIB VRF Specific Static ARP Entry Support LC-ATM Support OSPF Support for the PE-CE Link MPLS Egress Netflow Accounting	For supported hardware, please refer to the Release Notes.



Cisco 7500/ RSP7000 series	MPLS VPN Provider Edge Router Support LDP LDP MIB VPN Aware PING MIB VRF Specific Static ARP entry Support LC-ATM Support OSPF Support on the PE-CE Link MPLS Egress Netflow Accounting	For supported hardware, refer to the Release Notes.
Cisco 12000 series	LDP LDP MIB	All shipping line cards
	MPLS VPN Provider Edge Router Support VPN Aware PING MIB VRF Specific Static ARP Entry Support	Engine 0 support—4xOC3 POS, 1xOC-12 POS, 4xOC3 ATM, 1xOC-12 ATM Engine 2 support—4xOC-12 POS, OC48 POS, DPT-OC48, 16xOC3
	Link Protection support for MPLS Fast Re-Route	Engine 0 and engine 2 POS line card support only
	ATM AAL5 over MPLS Support	Engine 0 at the edge and engine 2 at the core
	DiffServ Aware TE—Phase I	Engine 0 -ingress (edge facing) Engine 2 - egress (core facing)
	LC-ATM Support	Engine 0 ATM line card support
	MPLS Egress Netflow Accounting	Engine 0 support

## Multiprotocol Label Switching (MPLS) VPN Provider Edge Router Support

### Description

Multiprotocol Label Switching (MPLS) provider edge router software enables a Service Provider to offer network-based VPN service to its customers. The provider edge (PE) router can maintain multiple routing tables, one per Virtual Private Network, to allow packets to be routed in the network and still maintain the segregation needed for privacy and connectivity.

MPLS provider edge support has full support of multiprotocol BGP, which defines the extensions to BGP to carry additional information as part of BGP messaging and allows route filtering based on extended community attributes.

MPLS VPN functionality allows service providers to build an IP-based network and offer connectivity similar to that of Frame Relay and ATM networks without building a mesh of PVCs. MPLS VPN edge functionality allows aggregation of multiple customers' CPE routers (CE) onto a single edge router that support multiple routing tables (one per VPN).

MPLS VPNs have the following advantages over the current IP VPN solutions relying on Layer 2 VC, Layer 3 tunnels, or encryption:

- MPLS VPNs are more scalable.
- MPLS VPNs provide any-to-any communication through connectionless Layer 3 IP.
- MPLS VPNs allow flexible addressing schemes; addresses do not have to be globally unique.

- MPLS VPNs allow you to more easily manage the addition of new members and new VPNs.
- MPLS VPNs support different classes of service within and between VPNs.
- MPLS VPNs can leverage additional services, such as application and Web hosting or network commerce solutions.

End users do not have to modify their IP applications to support MPLS. MPLS-based VPNs support a variety of Layer 2 technologies (ATM, Frame Relay, Packet over SONET (POS), and multi-access) for customer access, and in the provider's backbone.

This IOS release supports MPLS VPN functionality for Cisco 12000, 7200 and 7500/RSP7000 routers in a Service Provider IOS release.

For more information, see the Release Notes at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm#xtocid994336>

## Label Distribution Protocol Support

### Description

Label Distribution Protocol (LDP) is an IETF standard for label distribution in an MPLS network. LDP provides a means to request and distribute labels for setting up label switched paths in an MPLS network.

LDP is a superset of the standard Tag Distribution Protocol (TDP), which also supports MPLS tag distribution and binding. TDP is also supported along with LDP in 12.0ST.

You can configure and run both LDP and TDP simultaneously on a router on a per link (interface) basis for directly connected neighbors and on a per-target basis for neighbors that are not directly connected. The Cisco router sets up a label switched path transparently when one neighbor is running TDP and another is running LDP. This provides backward compatibility with existing routers running tag switching and allows smooth migration to the MPLS network.

For more information, see the feature module at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st10/mpls\\_ldp.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st10/mpls_ldp.htm)

## Label Distribution Protocol MIB Support

### Description

MIB support is added for LDP to enhance management capabilities. The full LDP MIB is supported as defined in the IETF.

For more information on LDP MIB support, please refer to the feature module at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/ldp\\_mib.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/ldp_mib.htm)

For details of MIBs and how to use them, refer to the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

## VPN Aware PING MIB

### Description

The PING MIB is now MPLS VPN aware. The VRF name (VPN name) has been added to the ciscoPingEntry in the Cisco PING MIB. By specifying the VRF name, the router looks up the VPN routing table to send the packet to the next hop, instead of to the global routing table. If the VPN entry does not exist, the router uses the default VPN route.

For more information on LDP MIB support, please refer to the Release Notes at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm#xtocid994324>

For details of MIBs and how to use them, refer to the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

## VRF Static ARP Entry Support

### Description

This feature allows the configuration of Static ARP entries per VPN Routing and Forwarding (VRF) table. It extends the existing ARP configuration command to add VRF parameter. When the VRF parameter is specified, the static ARP entry is directly entered into the VRF table.

For details on the VRF Static ARP Entry Support feature, refer to the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm#xtocid994330>

## Label Controlled ATM Interface Support

### Description

LC-ATM support allows the routers to participate in Label Virtual Circuits (LVCs) in an MPLS-enabled ATM network. This feature allows Cisco 7200, 7500 and 12000 series routers to operate with a Cisco 8650 Label Switch Controller (LSC). The LSC must be running Cisco IOS software Release 12.1(5)T or higher.

For details, refer to the document at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm#xtocid994312>

## MPLS Egress Netflow Accounting

The MPLS Egress NetFlow Accounting feature allows you to capture the Multiprotocol Label Switching (MPLS) virtual private network (VPN) Internet Protocol (IP) flows that travel from one site on a VPN to another site on the same VPN through the provider backbone.

Prior to this feature being introduced, Netflow only worked on the ingress. Only incoming packets on the PE-CE link were captured, and packets outbound to CE from the PE were not captured. MPLS packets received on the egress PE were CEF switched from the input port and hence IP flows were not captured.

For more information on the MPLS Egress NetFlow Accounting feature module, please refer to the feature module at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st10/egress.htm>

## OSPF Support on PE-CE Link

### Description

This feature allows support for the OSPF routing protocol to run between provider edge (PE) routers and customer edge (CE) routers. It provides better flexibility and avoids configuration of static routes on PE routers.

For more information and restrictions, refer to the *MPLS Virtual Private Network Enhancements* feature module in Cisco IOS Release 12.0(7)T, which is at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120t/120t7/vpn\\_en.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120t/120t7/vpn_en.htm)

Also, see the Release Notes for IOS Release 12.0(11)ST at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm#xtocid994328>

## Link Protection Support for MPLS Fast Re-Route

### Description

In MPLS Traffic Engineering, the head-end router gets an error message when a failure condition occurs in the network. When the IGP update occurs, this path is pruned from the topology database. In the meantime, the head-end router tries to re-establish the LSP using a different path option. This process can take several seconds or minutes, depending on the number of tunnels present or affected by the failure and on the IGP convergence time (if applicable). This can result in data loss or non-availability of a destination, resulting in downtime for traffic for a single-link failure.

MPLS fast re-route provides link protection by re-routing traffic onto backup LSPs when a link fails. This feature is similar to Automatic Protection switching of SONET. A backup LSP must be configured around the link that needs to be protected. When this link fails, the router detects the link failure and locally patches traffic to the backup paths in a fraction of a second. The traffic is locally re-routed without the teardown of the complete LSP. After the subsequent IGP update, the head-end router can prune the path that corresponds to the failed link in the topology database. The head-end router can then choose to re-route the whole path with a different path option. In the meantime, traffic continues to travel along the backup path. MPLS fast re-route provides better network availability and minimizes network down time in the case of single-link failures. It is a useful tool to protect expensive links, such as transcontinental links or high-volume links.

In the 12.0(10)ST release, Link Protection was available for Cisco 12000 series routers.

As of 12.0(16) ST, MPLS Fast Re Route (FRR) Link Protection will be available for Cisco 7200 and 7500 series routers. For details on platform and interface support, please refer to the feature module at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm#xtocid1747721>

## ATM AAL5 over MPLS Support

### Description

The ATM Adaptation Layer Type 5 (AAL5) Transport over MPLS feature provides an ATM permanent virtual circuit (PVC) transport service for transporting AAL5 protocol data units (PDUs) across an IP/MPLS backbone. A dynamic MPLS tunnel is configured to enable label imposition and disposition of encapsulated ATM AAL5 PDUs transported between two edge routers having a label distribution protocol (LDP) neighbor relationship. The ATM AAL5 Transport over MPLS feature can be configured with rate-limit policing and configurable PVC priority value.

The ATM PVC value is carried in one label prepended to AAL5 PDU. A second label is imposed, which is determined by the IGP route to the destination. Label imposition and disposition is performed by the edge routers allowing “PVC-like” connectivity over the MPLS network.

For more information on the AAL5 Transport over MPLS feature module, please refer to the feature module at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st10/aal5atm.htm>

## DiffServ Aware MPLS Traffic Engineering—Phase I

### Description

MPLS traffic engineering support has no means to guarantee QoS. It only does admission control but makes no attempt to police traffic. DiffServ Aware MPLS-TE extends MPLS Traffic Engineering to account for bandwidth and to provide QoS support for label switched paths that require guaranteed bandwidth transport for applications like Virtual IP leased line, VoIP and DiffServ EF.

DiffServ Aware MPLS-TE adds the ability to support Guaranteed Bandwidth LSPs combined with QoS for high-priority traffic in addition to regular LSPs created by MPLS TE applications. It maintains a separate subpool for bandwidth accounting of guaranteed bandwidth LSPs. OSPF IGP is extended to advertise available bandwidth for the global pool as well as the subpool, allowing routers to support both services simultaneously.

This feature is available in Release 12.0(11)ST with OSPF IGP, because it requires the extensions to the IGP to advertise both available link bandwidth and available subpool bandwidth.

For more details, please refer to the feature module at the following URL:

[http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/ds\\_te.htm](http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/ds_te.htm)

#### Additional Sources

For additional information on Cisco IOS software Release 12.0ST, please refer to the following sources:

*Cisco IOS Software Release 12.0ST Migration Guide*

*Release Notes for Cisco IOS Release 12.0(11)ST*, which includes the features for 12.0(9)ST and 12.0(10)ST. See the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/software/ios120/120newft/120limit/120st/120st11/reln1211.htm>



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