

show tag-switching tdp discovery

To display the status of the LDP discovery process, use the **show tag-switching tdp discovery** command in privileged EXEC mode. Status of the LDP discovery process means a list of interfaces over which LDP discovery is running.

```
show tag-switching tdp discovery
```

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Release	Modification
11.1 CT	This command was introduced.

Examples The following is sample output from the **show tag-switching tdp discovery** command.

```
show tag-switching tdp discovery

Local TDP Identifier:
  172.27.32.29:0
TDP Discovery Sources:
  Interfaces:
ATM0/0.1:      xmit/recv
ATM0/0.1:      xmit/rec
Ethernet4/0/1: xmit/recv
Ethernet4/0/2: xmit/recv
POS6/0/0:      xmit/recv
```

Table 83 describes the significant fields in this display.

Table 83 show tag-switching tdp discovery Field Descriptions

Field	Description
Local TDP Identifier	The LDP identifier for the local router. A LDP identifier is a 6-byte quantity displayed as an IP address:number. The Cisco convention is to use a router ID for the first 4 bytes of the LDP identifier, and integers starting with 0 for the final two bytes of the IP address:number.
Interfaces	Lists the interfaces engaging in LDP discovery activity. xmit indicates that the interface is transmitting LDP discovery hello packets; recv indicates that the interface is receiving LDP discovery hello packets.

Command	Description
show tag-switching tdp neighbors	Displays the status of LDP sessions.

show tag-switching tdp neighbors

To display the status of Label Distribution Protocol (LDP) sessions, use the **show tag-switching tdp neighbors** command in privileged EXEC mode.

show tag-switching tdp neighbors [*address* | *interface*] [**detail**]

Syntax Description		
	<i>address</i>	(Optional) The neighbor that has this IP address.
	<i>interface</i>	(Optional) LDP neighbors accessible over this interface.
	detail	(Optional) Displays information in long form.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines The neighbor information branch can give information about all LDP neighbors, or it can be limited to

- The neighbor with a specific IP address
- LDP neighbors known to be accessible over a specific interface

Examples The following is sample output from the **show tag-switching tdp neighbors** command:

```
show tag-switching tdp neighbors

Peer TDP Ident: 10.220.0.7:1; Local TDP Ident 172.27.32.29:1
    TCP connection: 10.220.0.7.711 - 172.27.32.29.11029
    State: Oper; PIES sent/rcvd: 17477/17487; Downstream on demand
Up time: 01:03:00
TDP discovery sources:
    ATM0/0.1
Peer TDP Ident: 210.10.0.8:0; Local TDP Ident 172.27.32.29:0
    TCP connection: 210.10.0.8.11004 - 172.27.32.29.711
    State: Oper; PIES sent/rcvd: 14656/14675; Downstream
Up time: 2d5h
TDP discovery sources:
    Ethernet4/0/1
    Ethernet4/0/2
    POS6/0/0
Addresses bound to peer TDP Ident:
    99.101.0.8      172.27.32.28    10.105.0.8      10.92.0.8
    10.205.0.8      210.10.0.8
```

Table 84 describes the significant fields in this display.

Table 84 show tag-switching tdp neighbors Field Descriptions

Field	Description
Peer TDP Ident	The LDP identifier of the neighbor (peer device) for this session.
Local TDP Ident	The LDP identifier for the local LSR (TSR) for this session.
TCP connection	The TCP connection used to support the LDP session. The format for displaying the TCP connection is <i>peer IP address.peer port</i> <i>local IP address.local port</i>
State	The state of the LDP session. Generally this is Oper (operational), but Transient is another possible state.
PIEs sent/rcvd	The number of LDP protocol information elements (PIEs) sent to and received from the session peer device. The count includes the transmission and receipt of periodic keepalive PIEs, which are required for maintenance of the LDP session.
Downstream	Indicates that the downstream method of label distribution is being used for this LDP session. When the downstream method is used, a LSR advertises all of its locally assigned (incoming) labels to its LDP peer device (subject to any configured access list restrictions).
Downstream on demand	Indicates that the downstream-on-demand method of label distribution is being used for this LDP session. When the downstream-on-demand method is used, a LSR advertises its locally assigned (incoming) labels to its LDP peer device only when the peer device asks for them.
Up time	The length of time the LDP session has existed.
TDP discovery sources	The source(s) of LDP discovery activity that led to the establishment of this LDP session.
Addresses bound to peer TDP Ident	The known interface addresses of the LDP session peer device. These are addresses that may appear as next-hop addresses in the local routing table. They are used to maintain the Label Forwarding Information Base (LFIB).

Related Commands

Command	Description
show tag-switching tdp discovery	Displays the status of the LDP discovery process.

show tag-switching tdp parameters

To display available LDP (TDP) parameters, use the **show tag-switching tdp parameters** command in privileged EXEC mode.

show tag-switching tdp parameters

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Examples The following is sample output from the **show tag-switching tdp parameters** command:

```
show tag-switching tdp parameters

Protocol version: 1
Downstream tag pool: min tag: 10; max_tag: 10000; reserved tags: 16
Session hold time: 15 sec; keep alive interval: 5 sec
Discovery hello: holdtime: 15 sec; interval: 5 sec
Discovery directed hello: holdtime: 15 sec; interval: 5 sec
Accepting directed hellos
```

Table 85 describes the significant fields in this display.

Table 85 *show tag-switching tdp parameters Field Descriptions*

Field	Description
Protocol version	Indicates the version of the Label Distribution Protocol (LDP) running on the platform.
Downstream tag pool	Describes the range of labels available for the platform to assign for Label Switching. The labels available run from the smallest label value (min label) to the largest label value (max label), with a modest number of labels at the low end of the range (reserved labels) reserved for diagnostic purposes.
Session hold time	Indicates the time to maintain a LDP session with a LDP peer device without receiving LDP traffic or a LDP keepalive from the peer device.
keep alive interval	Indicates the interval of time between consecutive transmission LDP keep alive messages to a LDP peer device.
Discovery hello	Indicates the amount of time to remember that a neighbor platform wants a LDP session without receiving a LDP Hello from the neighbor (holdtime), and the time interval between transmitting LDP Hello messages to neighbors (interval).

Table 85 *show tag-switching tdp parameters Field Descriptions (continued)*

Field	Description
Discovery directed hello	Indicates the amount of time to remember that a neighbor platform wants a LDP session when (1) the neighbor platform is not directly connected to the router and (2) the neighbor platform has not sent an LDP Hello message. The interval is known as holdtime. Also indicates the time interval between the transmission of Hello messages to a neighbor not directly connected to the router.
Accepting directed hellos	Indicates that the platform will accept and act on Directed LDP Hello messages. This field may not be present.

Related Commands

Command	Description
tag-switching tdp discovery	Configures the interval between transmission of LDP discovery hello messages.
tag-switching tdp holdtime	Enables LSP tunnel functionality on a device.

show tag-switching tsp-tunnels

To display information about the configuration and status of selected tunnels, use the **show tag-switching tsp-tunnels** command in privileged EXEC mode.

```
show tag-switching tsp-tunnels [{head | middle | tail | all | remote | address}
                                [interface-number]] [brief]
```

Syntax Description

head	(Optional) Displays information for tunnels that originate at the node.
middle	(Optional) Displays information for tunnels that pass through the node.
tail	(Optional) Displays information for tunnels that terminate at the node.
all	(Optional) Displays the combination of head, middle, and tail information for tunnels.
remote	(Optional) Displays information for tunnels that originate elsewhere; it is thus the combination of middle and tail.
<i>address</i>	(Optional) Displays information for tunnels that use the specified address in their identifier.
<i>interface-number</i>	(Optional) Displays information for tunnels that use the specified number in their identifier.
brief	(Optional) Displays a brief summary of tunnel status and configuration.

Command Modes

Privileged EXEC

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

The optional keywords restrict the set of tunnels displayed. With no optional keywords, the command displays all tunnels passing through the node.

Each LSP tunnel has a globally unique identifier. When signalling, the LSP tunnel is signaled and is available at each hop, this identifier is used. This identifier is a combination of the originating IP address and the number of the Cisco IOS tunnel interface used in configuring the LSP tunnel at the headend.

Examples

The following is sample output from the **show tag-switching tsp-tunnels** command:

```
show tag-switching tsp-tunnels

Signalling Summary:
  TSP Tunnels Process:      running
  RSVP Process:             running
  Forwarding:               enabled

TUNNEL ID      DESTINATION      STATUS      CONNECTION
10.106.0.6 0    10.2.0.12      up          up
```

Table 86 describes the significant fields in this display.

Table 86 *show tag-switching tsp-tunnels Field Descriptions*

Field	Description
Signalling Summary	The status of the signalling and forwarding mechanism that is required in order for LSP tunnels to be signaled through the router.
TSP Tunnels Process	The status of the LSP tunnel signalling process. This process interacts with the signalling protocol to manage signaled tunnels and monitors the state of established tunnels.
RSVP Process	The status of the RSVP process. You use the RSVP protocol to signal tunnels.
Forwarding	The status of the forwarding mechanism used to switch data through local LSP tunnel segments.
TUNNEL ID	The identity of the tunnel being summarized as shown in the previous display output. The tunnel ID includes an IP address part and a number part, and is unique within the entire network.
DESTINATION	The destination of the LSP tunnel being summarized as shown in the previous display output—the IP address of the tunnel tail.
STATUS	The configuration status of the tunnel. At the head, this is an indication of whether the tunnel has been completely configured. It also refers to the status of the associated software and hardware interfaces.
CONNECTION	The connection status of the tunnel. This is an indication of whether the local signalling/configuration information shows that the tunnel is up. Typically the tunnel becomes “up” at the tail hop first, and then at the second to the last hop, and so forth, until signalling brings it up at the first hop.

Related Commands

Command	Description
tag-switching tsp-tunnels (interface configuration)	Allows LSP tunnel operation over an interface.
tunnel mode tag-switching	Sets the encapsulation mode of the tunnel to Label Switching.

show xtagatm cross-connect

To display information about the LSC’s view of the cross-connect table on the remotely controlled ATM switch, use the **show xtagatm cross-connect** command in EXEC mode.

```
show xtagatm cross-connect [traffic] [interface interface [vpi vci] | descriptor descriptor [vpi vci]]
```

Syntax Description		
traffic	(Optional) Displays receive and transmit cell counts for each connection.	
interface interface	(Optional) Displays only connections with an endpoint of the specified interface.	
<i>vpi vci</i>	(Optional) Displays only detailed information on the endpoint with the specified VPI/VCI on the specified interface.	
descriptor descriptor	(Optional) Displays only connections with an endpoint on the interface with the specified physical descriptor.	

Command Modes EXEC

Command History	Release	Modification
	12.0(3)T	This command was introduced.

Examples Each connection is listed twice in the sample output from the **show xtagatm vc cross-connect** command, once under each interface that is linked by the connection. Connections are marked as “->” (unidirectional traffic flow, into the first interface), “<-” (unidirectional traffic flow, away from the interface) or “<->” (bidirectional).

The following is sample output from the **show xtagatm cross-connect** command:

```
show xtagatm cross-connect

Phys Desc      VPI/VCI      Type      X-Phys Desc  X-VPI/VCI    State
-----
10.1.0         1/37         ->        10.3.0       1/35         UP
10.1.0         1/34         ->        10.3.0       1/33         UP
10.1.0         1/33         <->       10.2.0       0/32         UP
10.1.0         1/32         <->       10.3.0       0/32         UP
10.1.0         1/35         <-        10.3.0       1/34         UP
10.2.0         1/57         ->        10.3.0       1/49         UP
10.2.0         1/53         ->        10.3.0       1/47         UP
10.2.0         1/48         <-        10.1.0       1/50         UP
10.2.0         0/32         <->       10.1.0       1/33         UP
10.3.0         1/34         ->        10.1.0       1/35         UP
10.3.0         1/49         <-        10.2.0       1/57         UP
10.3.0         1/47         <-        10.2.0       1/53         UP
10.3.0         1/37         <-        10.1.0       1/38         UP
10.3.0         1/35         <-        10.1.0       1/37         UP
10.3.0         1/33         <-        10.1.0       1/34         UP
10.3.0         0/32         <->       10.1.0       1/32         UP
```

Table 87 lists the significant fields in this display.

Table 87 *show xtagatm cross-connect Field Descriptions*

Field	Description
Phys desc	Physical descriptor. A switch-supplied string identifying the interface on which the endpoint exists.
VPI/VCI	The virtual path identifier and virtual channel identifier for this endpoint.
Type	“->” indicates an ingress endpoint, where traffic is only expected to be received into the switch; “<-” indicates an egress endpoint, where traffic is only expected to be transmitted out the interface; “<->” indicates that traffic is expected to be both transmitted and received at this endpoint.
X-Phys desc	The physical descriptor for the interface of the other endpoint belonging to the cross-connect.
X-VPI/VCI	The virtual path identifier and virtual channel identifier of the other endpoint belonging to the cross-connect.
State	Indicates the status of the cross-connect to which this endpoint belongs. Is typically “UP”; other values, all of which should be transient, include: DOWN ABOUT_TO_DOWN ABOUT_TO_CONNECT CONNECTING ABOUT_TO_RECONNECT RECONNECTING ABOUT_TO_RESYNC RESYNCING NEED_RESYNC_RETRY ABOUT_TO_RESYNC_RETRY RETRYING_RESYNC ABOUT_TO_DISCONNECT DISCONNECTING

A sample of the detailed information provided for a single endpoint is:

```
show xtagatm cross-connect descriptor 12.1.0 1 42

Phys desc: 12.1.0
Interface: n/a
Intf type: switch control port
VPI/VCI: 1/42
X-Phys desc: 12.2.0
X-Interface: XTagATM0
X-Intf type: extended tag ATM
X-VPI/VCI: 2/38
Conn-state: UP
Conn-type: input/output
Cast-type: point-to-point
Rx service type: Tag COS 0
Rx cell rate: n/a
Rx peak cell rate: 10000
Tx service type: Tag COS 0
Tx cell rate: n/a
Tx peak cell rate: 10000
```

Table 88 lists the significant fields in this display.

Table 88 show xtagatm cross-connect descriptor Field Descriptions

Field	Description
Phys desc	Physical descriptor. A switch-supplied string identifying the interface on which the endpoint exists.
Interface	The (IOS) interface name.
Intf type	Interface type. Either “extended label ATM” or “switch control port”.
VPI/VCI	The virtual path identifier and virtual channel identifier for this endpoint.
X-Phys desc	The physical descriptor for the interface of the other endpoint belonging to the cross-connect.
X-Interface	The (IOS) name for the interface of the other endpoint belonging to the cross-connect.
X-Intf type	The interface type for the interface of the other endpoint belonging to the cross-connect.
X-VPI/VCI	The virtual path identifier and virtual channel identifier of the other endpoint belonging to the cross-connect.

Table 88 *show xtagatm cross-connect descriptor Field Descriptions (continued)*

Field	Description
Conn-state	Indicates the status of the cross-connect to which this endpoint belongs. Is typically "UP"; other values, all of which should be transient, include DOWN ABOUT_TO_DOWN ABOUT_TO_CONNECT CONNECTING ABOUT_TO_RECONNECT RECONNECTING ABOUT_TO_RESYNC RESYNCING NEED_RESYNC_RETRY ABOUT_TO_RESYNC_RETRY RETRYING_RESYNC ABOUT_TO_DISCONNECT DISCONNECTING.
Conn-type	"input" indicates an ingress endpoint where traffic is only expected to be received into the switch; "output" indicates an egress endpoint, where traffic is only expected to be transmitted out the interface; "input/output" indicates that traffic is expected to be both transmitted and received at this endpoint.
Cast-type	Indicates whether or not the cross-connect is multicast. In the first release, this is always point-to-point.
Rx service type	Class of service type for the receive, or ingress, direction. This will be "Label COS <n>," (Label Class of Service <n>), where <i>n</i> is in the range from 0 to 7, for input and input/output endpoints; this will be "n/a" for output endpoints. (In the first release, <i>n</i> will be either 0 or 7.)
Rx cell rate	(Guaranteed) cell rate in the receive, or ingress, direction. In the first release, this is always "n/a".
Rx peak cell rate	Peak cell rate in the receive, or ingress, direction, in cells per second. This is "n/a" for an output endpoint.
Tx service type	Class of service type for the transmit, or egress, direction. This will be "Label COS <n>," (Label Class of Service <n>), where <i>n</i> is in the range from 0 to 7, for output and input/output endpoints; this will be "n/a" for input endpoints. (In the first release, <i>n</i> will be either 0 or 7.)
Tx cell rate	(Guaranteed) cell rate in the transmit, or egress, direction. In the first release, this is always "n/a."
Tx peak cell rate	Peak cell rate in the transmit, or egress, direction, in cells per second. This is "n/a" for an input endpoint.

show xtagatm vc

To display information about terminating VCs on extended label ATM (XTagATM) interfaces, use the **show xtagatm vc** command in EXEC mode.

show xtagatm vc [*vcd* [*interface*]]

Syntax Description

<i>vcd</i>	(Optional) Virtual circuit descriptor (virtual circuit number). If you specify the <i>vcd</i> argument, then detailed information about all VCs having that <i>vcd</i> is displayed. If you do not specify the <i>vcd</i> argument, then a summary description of all VCs on all XTagATM interfaces is displayed.
<i>interface</i>	(Optional) Interface number. If you specify the <i>interface</i> and the <i>vcd</i> arguments, then the single VC having the specified <i>vcd</i> on the specified <i>interface</i> is selected.

Each connection is listed twice in the sample output from the **show xtagatm vc cross-connect** command under each interface that is linked by the connection. Connections are marked as input (unidirectional traffic flow, into the interface), output (unidirectional traffic flow, away from the interface) or in/out (bidirectional).

Command Modes

EXEC

Command History

Release	Modification
12.0(3)T	This command was introduced.

Usage Guidelines

The columns marked VCD, VPI, and VCI display information for the corresponding private VC on the control interface. The private VC connects the XTagATM VC to the external switch. It is termed “private” because its VPI and VCI are used only for communication between the LSC and the switch, and is different from the VPI and VCI seen on the XTagATM interface and the corresponding switch port.

Examples

The following is sample output from the **show xtagatm vc** command:

```
show xtagatm vc
```

```
AAL / Control Interface
Interface      VCD   VPI   VCI  Type  Encapsulation  VCD   VPI   VCI  Status
XTagATM0      1     0     32   PVC   AAL5-SNAP      2     0     33  ACTIVE
XTagATM0      2     1     33   TVC   AAL5-MUX       4     0     37  ACTIVE
XTagATM0      3     1     34   TVC   AAL5-MUX       6     0     39  ACTIVE
```

Table 89 lists the significant fields in this display.

Table 89 *show xtagatm vc Field Descriptions*

Field	Description
VCD	Virtual circuit descriptor (virtual circuit number).
VPI	Virtual path identifier.
VCI	Virtual circuit identifier.
Control Interf. VCD	VCD for the corresponding private VC on the control interface.
Control Interf. VPI	VPI for the corresponding private VC on the control interface.
Control Interf. VCI	VCI for the corresponding private VC on the control interface.
Encapsulation	Displays the type of connection on the interface.
Status	Displays the current state of the specified ATM interface.

Related Commands

Command	Description
show atm vc	Displays all ATM VCs (PVCs and SVCs) and traffic information.
show xtagatm cross-connect	Displays information about the LSC view of the cross-connect table on the remotely controlled ATM switch.

tag-control-protocol vsi

To configure the use of VSI on a particular master control port, use the **tag-control-protocol vsi** command in interface configuration mode. To disable VSI, use the **no** form of this command.

tag-control-protocol vsi [*id controller-id*] [**base-vc** *vpi vci*] [**slaves** *slave-count*]
 [**keepalive** *timeout*] [**retry** *timeout count*]

no tag-control-protocol vsi [*id controller-id*] [**base-vc** *vpi vci*] [**slaves** *slave-count*]
 [**keepalive** *timeout*] [**retry** *timeout count*]

Syntax Description	
id <i>controller-id</i>	(Optional) Determines the value of the controller-id field present in the header of each VSI message. The default is 1.
base-vc <i>vpi vci</i>	(Optional) Determines the VPI/VCI value for the channel to the first slave. Together with the slaves value, this determines the VPI/VCI values for the channels to all the slaves, which are <i>vpi/vci</i> <i>vpi/vci+1, and so on.</i> <i>vpi/vci+slave_count-1.</i> The default is 0/40.
slaves <i>slave-count</i>	(Optional) Determines the number of slaves reachable through this master control port. The default is 14 (suitable for the BPX). In the first release, at most twelve sessions will be established with the BPX. The default of 14 will attempt sessions with cards 7 and 8, but such sessions are not used in this release and is always marked as UNKNOWN.
keepalive <i>timeout</i>	(Optional) Determines the value of the keepalive timer (in seconds). Note that the keepalive timer value should be greater than the value of the <i>retry_timer</i> times the <i>retry_count+1</i> . The default is 15 seconds.
retry <i>timeout count</i>	(Optional) Determines the value of the message retry timer (in seconds) and the maximum number of retries. The defaults are 8 seconds and 10 retries.

Command Modes Interface configuration

Command History	Release	Modification
	12.0(3)T	This command was introduced.

Usage Guidelines

The command is available only on interfaces that can serve as VSI master control ports. It is recommended that all options to the **tag-control-protocol** command be entered at once.

Once VSI is active on the control interface (through an earlier **tag-control-protocol vsi** command), reentering the command may cause all associated XTagATM interfaces to go down and come back up. In particular, reentering the **tag-control-protocol vsi** command with any of the following options causes VSI to be shut down and reactivated on the control interface:

- **id**
- **base-vc**
- **slaves**

VSI remains continuously active (that is, will not be shut down and reactivated) if **tag-control-protocol vsi** command is reentered with only one or more of the following options:

- **keepalive**
- **retry**

In either case, reentering the **tag-control-protocol vsi** command causes the specified options to take on the newly specified values; the other options retain their previous values. To restore default values to all the options, enter the **no tag-control-protocol** command, followed by the **tag-control-protocol vsi** command.

Examples

The following example shows you how to configure the VSI driver on the control interface:

```
interface atm 0/0
tag-control-protocol vsi 0 51
```

tag-switching advertise-tags

To control the distribution of locally assigned (incoming) labels via the Label Distribution Protocol (LDP), use the **tag-switching advertise-tags** command in global configuration mode. To disable label advertisement, use the **no** form of this command.

tag-switching advertise-tags [**for** *access-list-number* [**to** *access-list-number*]]

no tag-switching advertise-tags [**for** *access-list-number* [**to** *access-list-number*]]

Syntax Description

for <i>access-list-number</i>	(Optional) Specifies which destinations should have their labels advertised.
to <i>access-list-number</i>	(Optional) Specifies which LSR neighbors should receive label advertisements. A LSR is identified by the router ID that is the first 4 bytes of its 6-byte LDP identifier.

Defaults

The labels of all destinations are advertised to all LSR neighbors.

Command Modes

Global configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

To enable the distribution of all locally assigned labels to all LDP neighbors, use the **tag-switching advertise-tags** command.

You can enter multiple **tag-switching advertise-tags** commands. Taken together, they determine how local labels are advertised.



Note

This command has no effect for a TC-ATM interface. The effect is always as if the **tag-switching advertise-tags** command had been executed.

Examples

In the following example, the router is configured to advertise all locally assigned labels to all LDP neighbors. This is the default.

```
tag-switching advertise-tags
```

In the following example, the router is configured to advertise to all LDP neighbors labels for networks 10.101.0.0 and 10.221.0.0 only.

```
access-list 1 permit 10.101.0.0 0.0.255.255
access-list 4 permit 10.221.0.0 0.0.255.255
tag-switching advertise-tags for 1
tag-switching advertise-tags for 4
```

In the following example, the router is configured to advertise all labels to all LDP neighbors except neighbor 10.101.0.8.

```
access-list 1 permit any
access-list 2 deny 10.101.0.8
tag-switching advertise-tags
tag-switching advertise-tags for 1 to 2
```

tag-switching atm allocation-mode

To control the mode used for handling label binding requests on TC-ATM interfaces, use the **tag-switching atm allocation-mode** command in global configuration mode. To disable this feature, use the **no** form of this command t.

tag-switching atm allocation-mode {optimistic | conservative}

no tag-switching atm allocation-mode {optimistic | conservative}

Syntax Description

optimistic	Label binding is returned immediately, and packets are discarded until the downstream setup is complete.
conservative	Label binding is delayed until the label VC has been set up downstream.

Defaults

The default is conservative.

Command Modes

Global configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Examples

In the following example, the mode for handling binding requests is set to optimistic on a TC-ATM interface:

```
tag-switching atm allocation-mode optimistic
```

tag-switching atm control-vc

To configure the VPI and VCI values to be used for the initial link to the Label Switching peer, use the **tag-switching atm control-vc** command in interface configuration mode. This link is used to establish the LDP session and to carry non-IP traffic.

tag-switching atm control-vc *vpi vci*

no tag-switching atm control-vc *vpi vci*

Syntax Description	
<i>vpi</i>	Virtual path identifier, in the range from 0 to 255.
<i>vci</i>	Virtual circuit identifier, in the range from 1 to 65535.

Defaults	0/32
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Command Modes	Interface configuration
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Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines

On an extended label ATM (XTagATM) interface, the default VPI range to be used for labeled VCs is the configured VPI range that is learned from the switch. This default range should be sufficient for most applications. Use the **tag-switching vpi** command on an XTagATM interface only when it is necessary to override these defaults.

For the **tag-switching atm vpi** command, the VPI range specified must lie within the range that was configured on the BPX for the corresponding BPX interface.

Examples

The following example shows how to create a Label Switching subinterface on a router and how to select VPI 1 and VCI 34 as the control VC.

```
interface atm4/0.1 tag-switching
tag-switching ip
tag-switching atm control-vc 1 34
```

Related Commands	Command	Description
	tag-switching ip (interface)	Enables Label Switching of IPv4 packets on an interface.

tag-switching atm maxhops

To limit the maximum hop count to a value you have specified, use the **tag-switching atm maxhops** command in global configuration mode. To ignore the hop count, use the **no** form of this command.

tag-switching atm maxhops [*number*]

no tag-switching atm maxhops

Syntax Description	<i>number</i> (Optional) Maximum hop count.
---------------------------	---

Defaults	The default is 254.
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Command Modes	Global configuration
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Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines	<p>When an ATM LSR receives a BIND REQUEST, it does not send a BIND back if the value in the request is equal to the maxhops value. Instead, the ATM-LSR or LSR returns an error that specifies that the hop count has been reached.</p> <p>When an ATM-LSR initiates a request for a label binding, it includes a parameter specifying the maximum number of hops that the request should travel before reaching the edge of the ATM Label Switching region. This is used to prevent forwarding loops in setting up label paths across the ATM region.</p>
-------------------------	---

Examples	<p>The following example sets the hop count limit to 2:</p> <pre>tag-switching atm maxhops 2</pre>
-----------------	--

Related Commands	Command	Description
	show isis database verbose	Displays the requested entries from the ATM LDP label binding database.

tag-switching atm multi-vc

To configure a router subinterface to create one or more tag-VCs over which packets of different classes are sent, use the **tag-switching atm multi-vc** command in ATM subinterface submode. To disable this option, use the **no** form of this command.

tag-switching atm multi-vc

no tag-switching atm multi-vc

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes ATM subinterface submode

Command History	Release	Modification
	12.0(5)T	This command was introduced.

Usage Guidelines This option is valid only on ATM MPLS subinterfaces.

Examples The following commands configure interface a2/0/0.1 on the router for MPLS CoS multi-VC mode.

```
configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
int a2/0/0.1 tag-switching
tag atm multi-vc
exit
exit
```

tag-switching atm vc-merge

To control whether vc-merge (multipoint-to-point) is supported for unicast label VCs, use the **tag-switching atm vc-merge** command in global configuration mode. To disable this feature, use the **no** form of this command.

tag-switching atm vc-merge

no tag-switching atm vc-merge

Syntax Description This command has no arguments or keywords.

Defaults The default is enabled if the hardware supports the ATM-VC merge capability.

Command Modes Global configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Examples

The following example disables VC merge:

```
no tag-switching atm vc-merge
```

Related Commands

Command	Description
show tag-switching atm-tdp capability	Displays the ATM LDP label capabilities.

tag-switching atm vpi

To configure the range of values to use in the VPI field for label VCs, use the **tag-switching atm vpi** command in interface configuration mode. To clear the interface configuration, use the **no** form of this command.

tag-switching atm vpi *vpi* [- *vpi*]

no tag-switching atm vpi *vpi* [- *vpi*]

Syntax Description

<i>vpi</i>	Virtual path identifier, low end of range (1 to 255).
- <i>vpi</i>	(Optional) Virtual path identifier, high end of range (1 to 255).

Defaults

1-1

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

To configure ATM Label Switching on a router interface (for example, an ATM Interface Processor), you must enable a Label Switching subinterface.



Note

The **tag-switching atm control-vc** and **tag-switching atm vpi** subinterface level configuration commands are available on any interface that can support ATM labeling.

Use this command to select an alternate range of VPI values for ATM label assignment on this interface. The two ends of the link negotiate a range defined by the intersection of the range configured at each end.

Examples

The following example shows how to create a subinterface and how to select a VPI range from VPI 1 to VPI 3:

```
interface atm4/0.1 tag-switching
tag-switching ip
tag-switching atm vpi 1-3
```

Related Commands

Command	Description
tag-switching atm control-vc	Configure the VPI and VCI values to be used for the initial link to the MPLS peer.

tag-switching atm vp-tunnel

To specify an interface or a subinterface as a VP tunnel, use the **tag-switching atm vp-tunnel** command in interface configuration mode.

tag-switching atm vp-tunnel *vpi*

Syntax Description	<i>vpi</i>	Provides the VPI value for the local end of the tunnel.
Defaults	No default behavior or values.	
Command Modes	Interface configuration	
Command History	Release	Modification
	12.0(3)T	This command was introduced.

Usage Guidelines

The **tag-switching atm vp-tunnel** and **tag-switching atm vpi** commands are mutually exclusive.

This command is available on both extended label ATM interfaces and on TC-ATM subinterfaces of ordinary router ATM interfaces. The command is not available on the 1010, where all subinterfaces are automatically VP tunnels.

On an XTagATM interface, the tunnel/non-tunnel status and the VPI value to be used in case the XTagATM interface is a tunnel are normally learned from the switch through VSI interface discovery. Therefore, it should not be necessary to use the **tag-switching atm vp-tunnel** command on an XTagATM interface in most applications.

Examples

The following example shows how to specify a Label Switching subinterface VP tunnel, with a VPI value 4.

```
tag-switching atm vp-tunnel 4
```

tag-switching cos-map

To create a class map that specifies how classes map to label-VCs when combined with a prefix map, use the **tag-switching cos-map** command in global configuration mode.

tag-switching cos-map *number*

Syntax Description	<i>number</i>	Unique number for a CoS map (1 to 255).
---------------------------	---------------	---

Defaults	No default behavior or values.
-----------------	--------------------------------

Command Modes	Global configuration
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Command History	Release	Modification
	12.0(5)T	This command was introduced.

Examples This example shows how to create a class map.

```
tag-switching cos-map 55
class 1 premium
exit
```

Related Commands	Command	Description
		class (MPLS)
	show tag-switching cos-map	Displays the CoS map used to assign quantity of label virtual circuits and associated CoS of those LVCs.

tag-switching ip (global configuration)

To allow Label Switching of IPv4 packets, use the **tag-switching ip** command in global configuration mode. To disable IP Label Switching across all interfaces, use the **no** form of this command.

tag-switching ip

no tag-switching ip

Syntax Description This command has no arguments or keywords.

Defaults Label Switching of IPv4 packets is allowed.

Command Modes Global configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines Dynamic Label Switching (that is, distribution of labels based on routing protocols) is allowed by this optional command, but it is not actually enabled until the interface-level **tag-switching ip** command is issued on at least one interface. The **no** form of this command stops the distribution of dynamic labels and the sending of outgoing labeled packets on all interfaces. The command does not affect the sending of labeled packets through LSP tunnels.

For a TC-ATM interface, the **no** form of this command prevents the establishment of label VCs beginning at, terminating at, or passing through the platform.

Examples The following example prevents the distribution of dynamic labels on all interfaces:

```
configure terminal
no tag-switching ip
```

Related Commands	Command	Description
	tag-switching ip (interface configuration)	Enables Label Switching of IPv4 packets on an interface.

tag-switching ip (interface configuration)

To enable Label Switching of IPv4 packets on an interface, use the **tag-switching ip** command in interface configuration mode. To disable IP Label Switching on this interface, use the **no** form of this command.

tag-switching ip

no tag-switching ip

Syntax Description This command has no arguments or keywords.

Defaults Label Switching of IPv4 packets is disabled on this interface.

Command Modes Interface configuration

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

The first time this command is issued on any interface, dynamic Label Switching is enabled on the router as a whole. LDP hello messages are issued on this interface. When an outgoing label for a destination routed out through this interface is received, packets sent to that destination are assigned with that label.

The **no** form of this command causes packets routed out through this interface to be sent unlabeled, and outgoing LDP hello messages are no longer sent.

When the **no** form is issued on the only interface of a router for which Label Switching was enabled, dynamic Label Switching is disabled on the router as a whole.

For a TC-ATM interface, the **no** form of this command prevents the establishment of label VCs beginning at, terminating at, or passing through the platform.

Examples The following example, enables Label Switching on the specified Ethernet interface:

```
configure terminal
interface e0/2
tag-switching ip
```

Command	Description
show xtagatm cross-connect	Controls the distribution of locally assigned (incoming) labels through the LDP.
show tag-switching forwarding vrf	Displays information about one or more interfaces that have Label Switching enabled.

tag-switching ip default-route

To enable the distribution of labels associated with the IP default route, use the **tag-switching ip default-route** command in global configuration mode.

tag-switching ip default-route

Syntax Description This command has no arguments or keywords.

Defaults No distribution of IP default routes.

Command Modes Global configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines Dynamic Label Switching (that is, distribution of labels based on routing protocols) must be enabled before you can use the **tag-switching ip default-route** command.

The following commands enable the distribution of labels associated with the IP default route:

```
configure terminal
tag-switching ip
tag-switching ip default-route
```

Related Commands	Command	Description
	tag-switching ip (interface configuration)	Enables Label Switching of IPv4 packets on an interface.
	tag-switching ip (global configuration)	Allows Label Switching of IPv4 packets across all interfaces.

tag-switching mtu

To set the per-interface tag-switching maximum transmission unit (MTU) for tag-switched packets, use the **tag-switching mtu** command in interface configuration mode. To restore the default, use the **no** form of this command.

tag-switching mtu *bytes*

no tag-switching mtu

Syntax Description	<i>bytes</i>	The MTU in bytes includes the label stack in the value. For example, to transport an IPv4 packet of 1500 bytes from the edge through a tag-switched core, you need a tag-switching MTU of at least 1504 bytes. This value accounts for the single 4-byte tag and avoids fragmentation. Use the following calculation to determine the MTU: $\text{tag-switching MTU} = \text{edge MTU} + (\text{label stack} * 4 \text{ bytes})$
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Defaults	The default tag-switching MTU is the MTU configured for the interface. The minimum is 64 bytes; the maximum depends on type of interface medium.
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Command Modes	Interface configuration
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Command History	<table border="1"> <thead> <tr> <th>Release</th> <th>Modification</th> </tr> </thead> <tbody> <tr> <td>11.1 CT</td> <td>This command was introduced.</td> </tr> </tbody> </table>	Release	Modification	11.1 CT	This command was introduced.
Release	Modification				
11.1 CT	This command was introduced.				

Usage Guidelines	<ul style="list-style-type: none"> • Setting the tag-switching MTU to a high number can lead to packets being dropped on some devices, because the tagged packet is larger than the interface physical MTU. • ATM interfaces cannot accommodate packets that exceed the Segmentation and Reassembly (SAR) buffer size, because tags are added to the packet. The <i>bytes</i> argument refers to the number of bytes in the packet before the addition of any tags. If each tag is 4 bytes, the maximum value of <i>bytes</i> on an ATM interface is the physical MTU minus $4 * x$ bytes, where <i>x</i> is the number of tags expected in the received packet. • If a tagged IPv4 packet exceeds the MTU set for the interface, the Cisco IOS software fragments it. If a tagged non-IPv4 packet exceeds the tag-switching MTU size, the packet is dropped. • All devices on a physical medium must have the same tag-switching MTU value in order for MPLS to interoperate. • The MTU for tagged packets for an interface is determined as follows: <ul style="list-style-type: none"> – If the tag-switching mtu command has been used to configure the tag-switching MTU, the MTU for tagged packets is the <i>bytes</i> value. – Otherwise, the MTU for tagged packets is the default MTU for the interface.
-------------------------	--

- Because tagging a packet makes it larger due to the label stack, you may want the tag-switching MTU to be larger than the interface MTU or IP MTU in order to prevent the fragmentation of labeled packets, which would not be fragmented if they were unlabeled.
- Changing the interface MTU value (using the **mtu** interface configuration command) can affect the tag-switching MTU of the interface. If the tag-switching MTU value is the same as the interface MTU value (this is the default), and you change the interface MTU value, the tag-switching MTU value will automatically be set to this new MTU as well. However, the reverse is not true; changing the tag-switching MTU value has no effect on the interface MTU.

Examples

The following example sets the maximum labeled packet size for the Fastethernet interface to 1508, which is common in a tag-switched core carrying tag-switched VPN traffic, for example:

```
interface Fastethernet0
  tag-switching mtu 1508
```

tag-switching prefix-map

To configure a router to use a specified CoS map when a label destination prefix matches the specified access-list, use the **tag-switching prefix-map** command in ATM subinterface submode.

tag-switching prefix-map *prefix-map* **access-list** *access-list* **cos-map** *cos-map*

Syntax Description	prefix-map	A unique number for a prefix map.
	access-list <i>access list</i>	A unique number for a simple IP access list.
	cos-map <i>cos-map</i>	A unique number for a CoS map.

Defaults No default behavior or values.

Command Modes ATM subinterface submode

Command History	Release	Modification
	12.0(5)T	This command was introduced.

Usage Guidelines This is a global command used to link an access list to a CoS map.

Examples The following example links an access list to a CoS map:

```
tag-switching prefix-map 55 access-list 55 cos-map 55
```

Related Commands	Command	Description
	show tag prefix-map	Displays the prefix map used to assign a CoS map to network prefixes matching a standard IP access list.

tag-switching tag-range downstream

To configure the size of the label (tag) space for downstream unicast label allocation, use the **tag-switching tag-range downstream** command in global configuration mode. To revert the platform defaults, use the **no** form of this command.

tag-switching tag-range downstream *min max reserved*

no tag-switching tag-range downstream *min max reserved*

Syntax Description	<i>min</i>	The smallest label allowed in the label space. The default is 10.
	<i>max</i>	The largest label allowed in the label space. The default is 100000.
	<i>reserved</i>	The number of labels reserved for diagnostic purposes. These labels come out of the low end of the label space. Default is 16.

Defaults	<i>min</i> —10
	<i>max</i> —100000
	<i>reserved</i> —16

Command Modes	Global configuration
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Command History	Release	Modification
	11.1 CT	This command was introduced.

Examples

The following example shows how to configure the size of the label space for downstream unicast label allocation. In the example, *min* is set with the value of 10, *max* is set with the value of 12000, and *reserved* is set with the value of 16.

```
tag-switching tag-range downstream 10 12000 16
```

Related Commands	Command	Description
	show tag-switching tdp parameters	Displays available LDP parameters.

tag-switching tdp discovery

To configure the interval between transmission of LDP (TDP) discovery hello messages, or the hold time for a LDP transport connection, use the **tag-switching tdp discovery** command in global configuration mode.

tag-switching tdp discovery { **hello** | **directed hello** } { **holdtime** | **interval** } *seconds*

Syntax Description	Parameter	Description
	hello	Configures the intervals and hold times for directly connected neighbors.
	directed-hello	Configures the intervals and hold times for neighbors that are not directly connected (for example, LDP sessions that run through a LSP tunnel).
	holdtime	The interval for which a connection stays up if no hello messages are received. The default is 15 seconds.
	interval	The period between the sending of consecutive hello messages. The default is 5 seconds.
	<i>seconds</i>	The hold time or interval.

Defaults	Parameter	Default Value
	holdtime	15 seconds
	interval	5 seconds

Command Modes	Mode
	Global configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Examples In the following example, the interval for which a connection stays up if no hello messages are received is set to 5 seconds:

```
tag-switching tdp discovery hello holdtime 5
```

Related Commands	Command	Description
	show tag-switching tdp parameters	Displays available LDP parameters.
	tag-switching tdp holdtime	Enables LSP tunnel functionality on a device.

tag-switching tdp holdtime

To enable LSP tunnel functionality on a device, use the **tag-switching tdp holdtime** command in global configuration mode.

tag-switching tdp holdtime *seconds*

Syntax Description	<i>seconds</i>	The time for which a LDP session is maintained in the absence of LDP messages from the session peer device.
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Defaults	15 seconds
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Command Modes	Global configuration
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Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines	When an LDP session is initiated, the hold time is set to the lower of the values configured at the two ends.
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Examples	In the following example, the hold time of LDP sessions is configured for 30 seconds: tag-switching tdp holdtime 30
-----------------	--

Related Commands	Command	Description
	show tag-switching tdp parameters	Displays available LDP parameters.
	tag-switching tdp discovery	Configures the interval between transmission of LDP discovery hello messages.

tag-switching tsp-tunnels (global configuration)

To allow the operation of Label-Switched Path (LSP) tunnels, use the **tag-switching tsp-tunnels** command in global configuration mode. To disable the operation of LSP tunnels, use the **no** form of this command.

tag-switching tsp-tunnels

no tag-switching tsp-tunnels

Syntax Description This command has no arguments or keywords.

Defaults Disabled.

Command Modes Global configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines LSP tunnel operation is allowed on the device by this optional command, but proper operation also requires that the interface-level **tag-switching tsp-tunnels** command be issued on the interfaces that are used by LSP tunnels. The **no** form of this command completely disables LSP tunnel operation on the device.

Examples The following example allows LSP tunnel operation on a device:

```
ip cef distributed
tag-switching tsp-tunnels
```

Related Commands	Command	Description
	ip cef	Enables CEF on the route processor card.
	show tag-switching tsp-tunnels	Displays information about the configuration and status of selected tunnels.

tag-switching tsp-tunnels (interface configuration)

To allow Label-Switched Path (LSP) tunnel operation over an interface, use the **tag-switching tsp-tunnels** command in interface configuration mode. To disable LSP tunnel operation over an interface, use the **no** form of this command.

tag-switching tsp-tunnels

no tag-switching tsp-tunnels

Syntax Description This command has no arguments or keywords.

Defaults Disabled

Command Modes Interface configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines LSP tunnel operation over a specific interface is allowed by this optional command. In order for LSP tunnels to operate over an interface, the **tag-switching tsp-tunnels** global configuration command must also be enabled. The **no** form of this command disables LSP tunnel operation over the specified interface.

Examples The following example allows LSP tunnel operation over an interface:

```
configure terminal
ip cef distributed
tag-switching tsp-tunnels
```

Related Commands	Command	Description
	ip cef	Enables CEF on the route processor card.
	show tag-switching tsp-tunnels	Displays information about the configuration and status of selected tunnels.

tunnel mode tag-switching

To set the encapsulation mode of the tunnel to Label (Tag) Switching, use the **tunnel mode tag-switching** command in interface configuration mode. To set the tunneling encapsulation mode to the default, use the **no** form of this command.

tunnel mode tag-switching

no tunnel mode tag-switching

Syntax Description This command has no arguments or keywords.

Defaults Generic Routing Encapsulation (GRE)

Command Modes Interface configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines A tunnel interface number must be less than or equal to 65535.
The **tunnel mode tag-switching** command fails if the interface number is invalid for a LSP tunnel identifier.

Examples In the following example, the tunnel mode is set to Label Switching:

```
interface tunnel 5
 tunnel mode tag-switching
```

Related Commands	Command	Description
	tunnel tsp-hop	Defines hops in the path for the Label Switching tunnel.

tunnel mpls traffic-eng affinity

To configure tunnel affinity (the properties the tunnel requires in its links), use the **tunnel mpls traffic-eng affinity** command in interface configuration mode. To disable this feature, use the **no** form of this command.

tunnel mpls traffic-eng affinity *properties* [**mask** *mask*]

no tunnel mpls traffic-eng affinity *properties* [**mask** *mask*]

Syntax Description		
	<i>properties</i>	Attribute values required for links carrying this tunnel (values of bits are either 0 or 1).
	mask <i>mask</i>	Which attribute values should be checked. If a bit in the mask is 0, a link's attribute value or that bit is irrelevant. If a bit in the masks is 1, the link's attribute value and the tunnel's required affinity for that bit must match.

Defaults	
	<i>properties</i> —0X00000000
	<i>mask</i> —0X0000FFFF

Command Modes	
	Interface configuration

Command History	Release	Modification
	12.0(5)S	This command was introduced.

Examples The following is an example of the **tunnel mpls traffic-eng affinity** command that specifies the attribute value of 1:

```
Router(config)# tunnel mpls traffic-eng affinity 1
```

Related Commands	Command	Description
	mpls traffic-eng attribute-flags	Sets the user-specified attribute-flags for the interface.
	tunnel mode mpls traffic-eng	Sets the mode of a tunnel to MPLS for traffic engineering.

tunnel mpls traffic-eng autoroute announce

To instruct the IGP to use the tunnel in its SPF/next hop calculation (if the tunnel is up), use the **tunnel mpls traffic-eng autoroute announce** command in interface configuration mode. To disable this feature, use the **no** form of this command.

tunnel mpls traffic-eng autoroute announce

no tunnel mpls traffic-eng autoroute announce

Syntax Description

This command has no arguments or keywords.

Defaults

The tunnel is not used by the IGP in its SPF/next hop calculation.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)S	This command was introduced.

Usage Guidelines

Currently, the only way to cause traffic to be forwarded onto a tunnel is by enabling this feature, or for example, by configuring forwarding explicitly with an interface static route.

Related Commands

Command	Description
ip route	Establishes static routes and defines the next hop for large-scale dialout.
tunnel mode mpls traffic-eng	Sets the mode of a tunnel to MPLS for traffic engineering.

tunnel mpls traffic-eng autoroute metric

To specify the MPLS traffic-engineering tunnel metric used by IGP autoroute, use the **tunnel mpls traffic-eng autoroute metric** command in interface configuration mode. To disable this feature, use the **no** form of this command.

tunnel mpls traffic-eng autoroute metric {**absolute**|**relative**} *value*

no tunnel mpls traffic-eng autoroute metric

Syntax Description

metric	The MPLS traffic engineering tunnel metric.
absolute	The MPLS traffic-engineering tunnel metric mode absolute: a positive metric value can be supplied.
relative	The MPLS traffic-engineering tunnel metric mode relative: a positive, negative, or zero value can be supplied.
<i>value</i>	The metric that the IGP enhanced SPF calculation uses. The relative value can be from -10 to 10.



Note

Even though the value for a relative metric can be from -10 to 10, configuring a tunnel metric with a negative value is considered a misconfiguration. If from the routing table the metric to the tunnel tail appears to be 4, then the cost to the tunnel tail router is actually 3 because 1 is added to the cost for getting to the loopback address. In this instance, the lowest value that you can configure for the relative metric is -3.

Defaults

The default is metric relative 0.

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)S	This command was introduced.

Usage Guidelines

If you enter a relative value that causes the tunnel metric to be a negative number, the configuration is invalid.

Related Commands	Command	Description
	show mpls traffic-eng autoroute	Displays tunnels that are announced to IGP, including interface, destination, and bandwidth.
	tunnel mpls traffic-eng autoroute announce	Instructs the IGP to use the tunnel in its SPF/next hop calculation (if the tunnel is up).

tunnel mpls traffic-eng bandwidth

To configure bandwidth required for an MPLS traffic engineering tunnel, use the **tunnel mpls traffic-eng bandwidth** command in configuration mode. To disable this feature, use the **no** form of this command.

tunnel mpls traffic-eng bandwidth *bandwidth*

no tunnel mpls traffic-eng bandwidth *bandwidth*

Syntax Description	<i>bandwidth</i>	The bandwidth required for an MPLS traffic engineering tunnel. Bandwidth is specified in kilobits per seconds.
---------------------------	------------------	--

Defaults	Default bandwidth is 0.	
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Command Modes	Interface configuration	
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Command History	Release	Modification
	12.0(5)S	This command was introduced.

Related Commands	Command	Description
	show mpls traffic-eng tunnel	Displays information about tunnels.

tunnel mpls traffic-eng path-option

To configure a path option, use the **tunnel mpls traffic-eng path-option** command in interface configuration mode. To disable this feature, use the **no** form of this command.

tunnel mpls traffic-eng path-option identifier *path-number* **name** *path-name*

no tunnel mpls traffic-eng path-option identifier *path-number* **name** *path-name*

Syntax Description	identifier <i>path-number</i>	Uses the IP explicit path with the indicated path number.
	name <i>path-name</i>	Uses the IP explicit path with the indicated path name.

Defaults No default behavior or values.

Command Modes Interface configuration

Command History	Release	Modification
	12.0(5)S	This command was introduced.

Usage Guidelines Multiple path setup options may be configured for a single tunnel. For example, you can configure several explicit paths and a dynamic option for one tunnel. Path setup prefers options with lower numbers to options with higher numbers, so option 1 is the most preferred option.

Related Commands	Command	Description
	ip explicit-path	Enters the subcommand mode for IP explicit paths to create or modify the named path.
	show ip explicit-paths	Displays configured IP explicit paths.
	tunnel mode mpls traffic-eng	Sets the mode of a tunnel to MPLS for traffic engineering.

tunnel mpls traffic-eng priority

To configure setup and reservation priority for a tunnel, use the **tunnel mpls traffic-eng priority** command in interface configuration mode. To disable this feature, use the **no** form of this command.

tunnel mpls traffic-eng priority *setup-priority* [*hold-priority*]

no tunnel traffic-eng priority *setup-priority* [*hold-priority*]

Syntax Description

<i>setup-priority</i>	The priority used when signalling an LSP for this tunnel to figure out what existing tunnels are eligible to be preempted. The range is from 0 to 7, where a lower numeric value indicates a higher priority. Therefore, an LSP with a setup priority of 0 can preempt any LSP with a non-0 priority.
<i>hold-priority</i>	(Optional) The priority associated with an LSP for this tunnel once established to figure out if it should be preempted by other LSPs that are being signaled. The range is from 0 to 7, where a lower numeric value indicates a higher priority.

Defaults

setup-priority—7
hold-priority—setup priority

Command Modes

Interface configuration

Command History

Release	Modification
12.0(5)S	This command was introduced.

Usage Guidelines

The priority mechanism allows a hard-to-fit LSP to preempt easy-to-fit LSPs so that the easy-to fit LSPs can be reestablished once the hard-to-fit LSP has been placed.

Typically, setup and hold priorities are equal. However, a separate hold priority allows a subset on tunnels to not preempt on setup, but to be preempted once established.

Setup priority may not be better than (numerically smaller than) hold priority.

Related Commands

Command	Description
tunnel mode mpls traffic-eng	Sets the mode of a tunnel to MPLS for traffic engineering.

tunnel mode mpls traffic-eng

To set the mode of a tunnel to MPLS for traffic engineering, use the **tunnel mode mpls traffic-eng** command in interface configuration mode. To disable this feature, use the **no** form of this command.

tunnel mode mpls traffic-eng

no tunnel mode mpls traffic-eng

Syntax Description This command has no arguments or keywords.

Defaults No default behavior or values.

Command Modes Interface configuration

Command History	Release	Modification
	12.0(5)S	This command was introduced.

Usage Guidelines This command specifies that the tunnel interface is for an MPLS traffic engineering tunnel and enables the various tunnel MPLS configuration options.

Related Commands	Command	Description
	tunnel mpls traffic-eng affinity	Configures tunnel affinity (the properties that the tunnel requires in its links).
	tunnel mpls traffic-eng autoroute announce	Instructs the IGP to use the tunnel in its SPF/next hop calculation (if the tunnel is up).
	tunnel mpls traffic-eng bandwidth	Configures bandwidth required for an MPLS traffic engineering tunnel.
	tunnel mpls traffic-eng path-option	Configures a path option.
	tunnel mpls traffic-eng priority	Configures setup and reservation priority for a tunnel.

tunnel tsp-hop

To define hops in the path for the Label Switching tunnel, use the **tunnel tsp-hop** command in interface configuration mode. Use the **no** form of this command to remove these hops.

tunnel tsp-hop *hop-number ip-address* [**lasthop**]

no tunnel tsp-hop *hop-number ip-address* [**lasthop**]

Syntax Description		
	<i>hop-number</i>	The sequence number of the hop being defined in the path. The first number is 1, which identifies the hop just after the head hop.
	<i>ip-address</i>	The IP address of the input interface on that hop.
	lasthop	(Optional) Indicates that the hop being defined is the final hop in the path (the tunnel destination).

Defaults No hops are defined.

Command Modes Interface configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines The list of tunnel hops must specify a strict source route for the tunnel. In other words, the router at hop <N> must be directly connected to the router at hop <N>+1.

Examples The following example shows the configuration of a two-hop tunnel. The first hop router/switch is 82.0.0.2, and the second and last hop is router/switch 81.0.0.2.

```
interface tunnel 5

tunnel mode tag-switching
ip unnumbered e0/1
  tunnel tsp-hop 1 82.0.0.2
  tunnel tsp-hop 2 81.0.0.2 lasthop
```

Related Commands	Command	Description
	tunnel mode tag-switching	Sets the encapsulation mode of the tunnel to Label Switching.