



Tag Switching Commands

This chapter documents commands used to configure Tag Switching features in Cisco IOS software. For guidelines on configuring Tag Switching features, refer to the *Cisco IOS Switching Services Configuration Guide*.



Note

Beginning with Cisco IOS Release 11.3, all commands supported on the Cisco 7500 series routers are also supported on Cisco 7000 series routers.

show ip traffic-engineering

To display information about the traffic engineering configuration and metric information associated with it, use the **show ip traffic-engineering** privileged EXEC command.

```
show ip traffic-engineering [metrics [detail]]
```

Syntax Description	metrics	(Optional) Displays metric information associated with traffic engineering.
	detail	(Optional) Displays information in long form.

Command Modes	Privileged EXEC
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Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines

The goal of the loop prevention algorithm is that traffic should not be sent down the tunnel if there is a possibility that, after leaving the tunnel, steady state routing will route the traffic back to the head of the tunnel.

The approach of the loop prevention algorithm is to compare the Layer 3 routing distance to the egress from the tunnel tailend and tunnel headend. The loop check passes only if the tunnel tail is closer to the egress than the tunnel head is.

The loop prevention algorithm allows you to use the tunnel for a route if one the following cases applies:

- Given that the two ends of the tunnel are routing to the egress using the same dynamic protocol in the same area, the Layer 3 routing distance from the tailend to the egress is less than the Layer 3 routing distance from the headend to the egress.
- The route to the egress is directly connected at the tunnel tailend router, but not at the tunnel headend router.
- The egress is unreachable from the tunnel headend router, but is reachable from the tunnel tailend router.

The loop prevention algorithm prevents you from using the tunnel for a given egress in all other cases. In particular, when

- The routers at the ends of the tunnel get their route to the egress from different dynamic routing protocols.
- The routing protocols at the two ends of the tunnel route to the egress through different areas.
- The two ends each use a static route to the egress.
- The tunnel headend router's route to the egress is a connected route.
- The egress is unreachable from the tunnel tailend router.

Devices request metrics via a TDP adjacency. The display output shows detailed metric information.

The metric information includes a metric type (shown as routing_protocol/routing_protocol_subtype) and a metric value.

The routing protocol is as follows:

OSPF
IS-IS
EIGRP
Connected
Static
Other (some other routing protocol)

The routing protocol subtype is specific to each routing protocol.

Examples

The following is sample output from the **show ip traffic-engineering metrics detail** command:

```
Router# show ip traffic-engineering metrics detail

Metrics requested BY this device
Prefix 43.0.0.1/32
  TDP id 2.2.2.2:0, metric: connected/0
    type request, flags metric-received, rev 6, refcnt 1
  TDP id 4.4.4.4:0, metric: ospf-300/2
    type request, flags metric-received, rev 7, refcnt 1
Prefix 44.0.0.0/8
  TDP id 18.18.18.18:0, metric: connected/0
    type request, flags metric-received, rev 1, refcnt 1
Metrics requested FROM this device
Prefix 36.0.0.0/8
  TDP id 18.18.18.18:0, metric: connected/0
    type advertise, flags none, rev 1, refcnt 1
```

Table 102 defines the fields displayed in the first three lines of this display.

Table 102 *show ip traffic-engineering metrics detail* Field Descriptions

Field	Description
Prefix	Destination network and mask.
TDP id	The TDP identifier of the TDP peer device at the other end of the tunnel. The TDP peer device advertises these metrics to this neighbor.
metric	The routing protocol and metric within that protocol for the prefix in question.
type	For metrics being requested by this device, the type is either request or release. For metrics being requested from this device, the type is advertise.
flags	For metrics being requested by this device metric-received indicates that the other end has responded with a metric value. For metrics being requested from this device, response-pending indicates that the metric value has not yet been sent to the requester.
rev	An internal identifier for the metric request or advertisement. The rev number is assigned when the request/advertisement is created. The rev number is updated if the local information for the metric changes.
refcnt	For a metric of type request, the number of traffic engineering routes interested in this metric value. Otherwise, refcnt is 1.

■ show ip traffic-engineering

Related Commands	Command	Description
	traffic-engineering filter	Uses the traffic-engineering filter command.
	traffic-engineering route	Configures a route for a specified filter, through a specified tunnel.

show ip traffic-engineering configuration

To display information about configured traffic engineering filters and routes, use the **show ip traffic-engineering configuration** privileged EXEC command.

show ip traffic-engineering configuration [*interface*] [*filter-number*] [**detail**]

Syntax Description		
<i>interface</i>	(Optional)	Specifies an interface for which to display traffic engineering information.
<i>filter-number</i>	(Optional)	A decimal value representing the number of the filter to display.
detail	(Optional)	Displays command output in long form.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines The sample output can show all filters or can be limited by interface, filter number, or both.

Examples The following is sample output from the **show ip traffic-engineering configuration detail** command:

```
Router# show ip traffic-engineering configuration detail

Traffic Engineering Configuration
  Filter 5: egress 44.0.0.0/8, local metric: ospf-0/1
    Tunnel5 route installed
      interface up, preference 1
      loop check on, passing, remote metric: connected/0
  Filter 6: egress 43.0.0.1/32, local metric: ospf-300/3
    Tunnel7 route installed
      interface up, preference 50
      loop check on, passing, remote metric: ospf-300/2
    Tunnel6 route not installed
      interface up, preference 75
      loop check on, passing, remote metric: connected/0
```

Table 103 describes the fields displayed in the first four lines of this display.

Table 103 show ip traffic-engineering configuration detail Field Descriptions

Field	Description
Filter	The configured filter identifier for the traffic engineering route.
egress	The prefix/mask configured with the filter local metric.
local metric	The local TSR's routing protocol and metric value for the egress prefix/mask.

Table 103 *show ip traffic-engineering configuration detail Field Descriptions (continued)*

Field	Description
Tunnel5	The tunnel for the traffic engineering route.
route installed/not installed	Indicates whether the route is installed in the forwarding tables (typically CEF and tag interface up/down).
interface	Indicates whether the tunnel interface for the traffic engineering route is up or down. The traffic engineering route is not installed if the tunnel interface is down.
preference	The configured administrative preference for the traffic engineering route.
loop check	Indicates whether the loop check has been configured on or off.
passing/failing	If the loop check is configured on, indicates whether the check is passing. The traffic engineering route is not installed if the loop check is configured on and is failing.
remote metric	The routing protocol and the metric within that protocol for the prefix in question, as seen by the TSR advertising the metric. As part of the loop check, a comparison is made between the remote metric and the local metric.

Related Commands

Command	Description
show ip traffic-engineering routes	Displays information about the requested filters configured for traffic engineering.

show ip traffic-engineering routes

To display information about the requested filters configured for traffic engineering, use the **show ip traffic-engineering routes** privileged EXEC command.

show ip traffic-engineering routes [*filter-number*] [**detail**]

Syntax Description		
<i>filter-number</i>	(Optional)	A decimal value representing the number of the filter to display.
detail	(Optional)	Display of command output in long form.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines Requests can be limited to a specific filter.

Examples The following is sample output from the **show ip traffic-engineering routes** command:

```
Router# show ip traffic-engineering routes

Installed traffic engineering routes:
Codes: T - traffic engineered route
T    43.0.0.1/32 (not override of routing table entry)
      is directly connected, 00:06:35, Tunnel7
T    44.0.0.0/8 (override of routing table entry)
      is directly connected, 01:12:39, Tunnel5
```

Table 104 describes the significant fields in this display.

Table 104 *show ip traffic-engineering routes* Field Descriptions

Field	Description
T	Traffic engineering route.
43.0.0.1/32 (not override of routing table entry) is directly connected	Prefix/mask being routed. The routing table does not contain an entry for this prefix/mask.
00:06:35	The time since the route was installed (hours:minutes:seconds).
Tunnel7	The TSP tunnel for the route.

Related Commands	Command	Description
	show ip traffic-engineering configuration	Displays information about configured traffic engineering filters and routes.

show tag-switching atm-tdp bindings

To display the requested entries from the ATM TDP tag binding database, use the **show tag-switching atm-tdp bindings** privileged EXEC command. The ATM TDP database contains TIB entries for tag VCs on TC-ATM interfaces.

```
show tag-switching atm-tdp bindings [network {mask | length}] [local-tag vpi vci ][remote-tag
vpi vci] [neighbor interface]
```

Syntax Description		
<i>network</i>	(Optional)	Destination network number.
<i>mask</i>		Network mask in the form A.B.C.D (destination prefix).
<i>length</i>		Mask length (1 to 32).
local-tag <i>vpi vci</i>	(Optional)	Select tag VC value assigned by this router.
remote-tag <i>vpi vci</i>	(Optional)	Select tag values assigned by the other router.
neighbor <i>interface</i>	(Optional)	Select tag values assigned by neighbor on a specified interface.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines The display output can show entries from the entire database, or it can be limited to a subset of entries based on prefix, VC tag value, and/or an assigning interface.

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

```
Router# show tag-switching atm-tdp bindings

Destination: 10.16.0.16/32
    Tailend Router ATM1/0.1 1/35 1/34 Active, VCD=2
Destination: 10.24.0.0/24
    Tailend Router ATM1/0.1 1/39 Active, VCD=3
Destination: 10.15.0.15/32
    Tailend Router ATM1/01 1/33 Active, VCD=4
Destination: 10.23.0.0/24
    Tailend Router ATM1/01 1/37 Active, VCD=5
```

Table 105 describes the significant fields in this display.

Table 105 show tag-switching atm-tdp bindings Field Descriptions

Field	Description
Destination:	Destination (network/mask)

Table 105 *show tag-switching atm-tdp bindings Field Descriptions (continued)*

Tailend Router	Types of VC. Options are Tailend—VC that terminates at this router Headend—VC that originates at this router Transit—VC that passes through a switch
ATM1/0.1	Interface.
1/35	VPI/VCI.
Active	TVC state: Active—Set up and working. Bindwait—Waiting for response. Remote Resource Wait—Waiting for resources (VPI/VCI space) to be available on the downstream device. Parent Wait—Transit VC input side waiting for output side to become active.
VCD=2	Virtual circuit descriptor number.

The following is ATM switch sample output from the **show tag-switching atm-tdp bindings** command:

```
Switch# show tag-switching atm-tdp bindings
```

```
Destination: 6.6.6.6/32
  Tailend Switch ATM0/0/3 1/34 Active -> Terminating Active
Destination: 150.0.0.0/16
  Tailend Switch ATM0/0/3 1/35 Active -> Terminating Active
Destination: 4.4.4.4/32
  Transit ATM0/0/3 1/33 Active -> ATM0/1/1 1/33 Active
```

Related Commands

Command	Description
show tag-switching atm-tdp summary	Displays summary information on ATM tag bindings.

show tag-switching atm-tdp capability

To display the ATM TDP tag capabilities, use the **show tag-switching atm-tdp capability** privileged EXEC command.

show tag-switching atm-tdp capability

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 example shows the display from the **show tag-switching atm-tdp capability** command.

Router# **show tag-switching atm-tdp capability**

```

VPI          VCI          Alloc  Odd/Even  VC Merge
ATM0/1/0
  Negotiated [100 - 101] [33 - 1023] UNIDIR
  Local      [100 - 101] [33 - 16383] UNIDIR      EN  EN
  Peer       [100 - 101] [33 - 1023] UNIDIR
ATM0/1/1
  VPI          VCI          Alloc  Odd/Even  VC Merge
  Range        Range        Scheme  Scheme    IN  OUT
  Negotiated [201 - 202] [33 - 1023] BIDIR
  Local      [201 - 202] [33 - 16383] UNIDIR  ODD  NO  NO
  Peer       [201 - 202] [33 - 1023] BIDIR  EVEN -  -

```

Table 106 lists the significant fields in this display.

Table 106 *show tag-switching atm-tdp capability Field Descriptions*

Field	Description
VPI Range	Minimum and maximum number of VPIs supported on this interface.
VCI Range	Minimum and maximum number of VCIs supported on this interface.

Table 106 show tag-switching atm-tdp capability Field Descriptions (continued)

Field	Description
Alloc Scheme	<p>UNIDIR—Unidirectional capability indicates that the peer device can, within a single VPI, support binding of the same VCI to different prefixes on different directions of the link.</p> <p>BIDIR—Bidirectional capability indicates that within a single VPI, a single VCI can appear in one binding only. In this case, one peer device allocates bindings in the even VCI space, and the other in the odd VCI space. The system with the lower TDP identifier will assign even-numbered VCIs.</p> <p>The negotiated allocation scheme is UNIDIR, if and only if, both peer devices have UNIDIR capability. Otherwise it is BIDIR.</p>
Odd/Even Scheme	Indicates whether the local device or the peer device is assigning an odd- or even-numbered VCI when the negotiated scheme is BIDIR. It does not display any information when the negotiated scheme is UNIDIR.
VC Merge	<p>Indicates the type of VC merge support on this interface.</p> <p>IN—Indicates input interface merge capability. IN accepts the following values:</p> <p>EN—The hardware interface supports VC merge and VC merge is enabled on the device.</p> <p>DIS—The hardware interface supports VC merge and VC merge is disabled on the device.</p> <p>NO—The hardware interface does not support VC merge.</p> <p>OUT—Indicates output interface merge capability. OUT accepts the same values as the input merge side.</p> <p>The VC merge capability is meaningful only on ATM switches. It is not negotiated.</p>
Negotiated	Set of options that both TDP peer devices have agreed to share on this interface. For example, the VPI or VCI allocation on either peer device remains within the negotiated ranges.
Local	Options supported locally on this interface.
Peer	Options supported by the remote TDP peer device on this interface.

Related Commands

Command	Description
tag-switching atm control-vc	Configures the VPI and VCI to be used for the initial link to the Tag Switching peer device.
tag-switching atm vc-merge	Controls whether vc-merge (multipoint-to-point) is supported for unicast tag VCs.
tag-switching atm vpi	Configures the range of values to use in the VPI field for tag VCs.

show tag-switching atm-tdp summary

To display summary information on ATM tag bindings, use the **show tag-switching atm-tdp summary** privileged EXEC command.

show tag-switching atm-tdp summary

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 atm-tdp summary** command:

```
Router# show tag-switching atm-tdp summary

Total number of destinations: 788

TC-ATM bindings summary
interface  total    active  bindwait  local    remote  other
ATM0/0/0   594     592     1         296     298     1
ATM0/0/1   590     589     0         294     296     1
ATM0/0/2   1179    1178    0         591     588     1
ATM0/0/3   1177    1176    0         592     585     1
ATM0/1/0   1182    1178    4         590     588     0
Waiting for bind on ATM0/0/0 10.21.0.0/24
```

Table 107 describes the significant fields in this display.

Table 107 *show tag-switching atm-tdp summary Field Descriptions*

Field	Description
Total number of destinations	The number of known destination address prefixes.
interface	The name of an interface with associated ATM tag bindings.
total	The total number of ATM tags on this interface.
active	The number of ATM tags in an “active” state that are ready to use for data transfer.
bindwait	The number of bindings that are waiting for a tag assignment from the neighbor TSR.
local	The number of ATM tags assigned by this TSR on this interface.
remote	The number of ATM tags assigned by the neighbor TSR on this interface.

Table 107 *show tag-switching atm-tdp summary Field Descriptions (continued)*

Field	Description
other	The number of ATM tags in a state other than “active” or “bindwait.”
Waiting for bind on ATM0/0/0	A list of the destination address prefixes (on a particular interface) that are waiting for ATM tag assignment from the neighbor TSR.

Related Commands

Command	Description
show tag-switching atm-tdp bindings	Displays the requested entries from the ATM TDP tag binding database.

show tag-switching forwarding-table

To display the contents of the Tag Forwarding Information Base (TFIB), use the **show tag-switching forwarding-table** privileged EXEC command.

```
show tag-switching forwarding-table [{network {mask | length} | tags tag [- tag] | interface
interface | next-hop address | tsp-tunnel [tunnel-id ]}] [detail]
```

Syntax Description	
<i>network</i>	(Optional) Destination network number.
<i>mask</i>	IP address of destination mask whose entry is to be shown.
<i>length</i>	Number of bits in mask of destination.
tags <i>tag - tag</i>	(Optional) Shows entries with specified local tags only.
interface <i>interface</i>	(Optional) Shows entries with specified outgoing interface only.
next-hop <i>address</i>	(Optional) Shows entries with specified neighbor as next hop only.
tsp-tunnel [<i>tunnel-id</i>]	(Optional) Shows entries with specified TSP tunnel only, or all TSP tunnel entries.
detail	(Optional) Displays information in long form (includes length of encapsulation, length of MAC string, maximum transmission unit (MTU), and all tags).

Command Modes	
	Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines	
	The optional parameters allow specification of a subset of the entire TFIB.

Examples

The following is sample output from the **show tag-switching forwarding-table** command:

```
Router# show tag-switching forwarding-table

Local Outgoing      Prefix              Bytes tag Outgoing   Next Hop
tag  tag or VC          or Tunnel Id       switched interface
26  Untagged          10.253.0.0/16      0           Et4/0/0      172.27.32.4
28  1/33              10.15.0.0/16       0           AT0/0.1      point2point
29  Pop tag           10.91.0.0/16       0           Hs5/0        point2point
    1/36              10.91.0.0/16       0           AT0/0.1      point2point
30  32                10.250.0.97/32    0           Et4/0/2      10.92.0.7
    32                10.250.0.97/32    0           Hs5/0        point2point
34  26                10.77.0.0/24       0           Et4/0/2      10.92.0.7
    26                10.77.0.0/24       0           Hs5/0        point2point
35  Untagged [T]      10.100.100.101/32  0           Tu301        point2point
36  Pop tag           168.1.0.0/16       0           Hs5/0        point2point
    1/37              168.1.0.0/16       0           AT0/0.1      point2point
```

[T] Forwarding through a TSP tunnel.
View additional tagging info with the 'detail' option

The following is sample output from the **show tag-switching forwarding-table** command when you specify **detail**:

```
Router# show tag-switching forwarding-table detail

Local Outgoing      Prefix              Bytes tag Outgoing   NextHop
tag  tag or VC          or Tunnel Id       switched interface
26  Untagged          10.253.0.0/16      0           Et4/0/0      172.27.32.4
    MAC/Encaps=0/0, MTU=1504, Tag Stack{}
28  1/33              10.15.0.0/16       0           AT0/0.1      point2point
    MAC/Encaps=4/8, MTU=4470, Tag Stack{1/33(vcd=2)}
    00020900 00002000
29  Pop tag           10.91.0.0/16       0           Hs5/0        point2point
    MAC/Encaps=4/4, MTU=4474, Tag Stack{}
    FF030081
    1/36              10.91.0.0/16       0           AT0/0.1      point2point
    MAC/Encaps=4/8, MTU=4470, Tag Stack{1/36(vcd=3)}
    00030900 00003000
30  32                10.250.0.97/32    0           Et4/0/2      10.92.0.7
    MAC/Encaps=14/18, MTU=1500, Tag Stack{32}
    006009859F2A00E0F7E984828847 00020000
    32                10.250.0.97/32    0           Hs5/0        point2point
    MAC/Encaps=4/8, MTU=4470, Tag Stack{32}
    FF030081 00020000
34  26                10.77.0.0/24       0           Et4/0/2      10.92.0.7
    MAC/Encaps=14/18, MTU=1500, Tag Stack{26}
    006009859F2A00E0F7E984828847 0001A000
    26                10.77.0.0/24       0           Hs5/0        point2point
    MAC/Encaps=4/8, MTU=4470, Tag Stack{26}
    FF030081 0001A000
35  Untagged          10.100.100.101/32  0           Tu301        point2point
    MAC/Encaps=0/0, MTU=1504, Tag Stack{}, via Et4/0/2
36  Pop tag           168.1.0.0/16       0           Hs5/0        point2point
    MAC/Encaps=4/4, MTU=4474, Tag Stack{}
    FF030081
    1/37              168.1.0.0/16       0           AT0/0.1      point2point
    MAC/Encaps=4/8, MTU=4470, Tag Stack{1/37(vcd=4)}
    00040900 00004000
```

Table 108 describes the significant fields in this display.

Table 108 show tag-switching forwarding-table Field Descriptions

Field	Description
Local tag	Tag assigned by this router.
Outgoing tag or VC	Tag assigned by next hop, or VPI/VCI used to get to next hop. Some of the entries you can have in this column are [T] means forwarding through a TSP tunnel. “Untagged” means there is no tag for the destination from the next hop, or Tag Switching is not enabled on the outgoing interface. “Pop tag” means the next hop advertised an implicit NULL tag for the destination, and this router popped the top tag.
Prefix or Tunnel Id	Address or tunnel to which packets with this tag are going.
Bytes tag switched	Number of bytes switched with this incoming tag.
Outgoing interface	Interface through which packets with this tag are sent.
NextHop	IP address of neighbor that assigned the outgoing tag.
Mac/Encaps	Length in bytes of Layer 2 header, and length in bytes of packet encapsulation, including Layer 2 header and tag header.
MTU	Maximum transmission unit (MTU) of tagged packet.
Tag Stack	All the outgoing tags. If the outgoing interface is TC-ATM, the VCD is also shown.
00020900 00002000	The actual encapsulation in hexadecimal form. There is a space shown between Layer 2 and tag header.

show tag-switching interfaces

To display information about one or more interfaces that have Tag Switching enabled, use the **show tag-switching interfaces** privileged EXEC command.

```
show tag-switching interfaces [interface][detail]
```

Syntax Description	<i>interface</i>	(Optional) The interface about which to display Tag Switching information.
	detail	(Optional) Displays information in long form.

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

Usage Guidelines You can show information about the requested interface or about all interfaces on which Tag Switching is enabled.

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

```
Router# show tag-switching interfaces

Interface          IP      Tunnel  Operational
Hssi3/0            Yes    Yes     No
ATM4/0.1           Yes    Yes     Yes          (ATM tagging)
Ethernet5/0/0      No     Yes     Yes
Ethernet5/0/1      Yes    No      Yes
Ethernet5/0/2      Yes    No      No
Ethernet5/0/3      Yes    No      Yes
Ethernet5/1/1      Yes    No      No
```



Note

If the interface uses TC-ATM procedures, the line in the display output is marked (ATM tagging).

Table 109 describes the significant fields in this display.

Table 109 *show tag-switching interfaces command Field Descriptions*

Field	Description
Interface	Interface name.
IP	“Yes” if IP tagging has been enabled on this interface.
Tunnel	“Yes” if TSP tunnel tagging has been enabled on this interface.
Operational	Operational state. “Yes” if packets are being tagged.
MTU	Maximum number of data bytes per tagged packet that will be transmitted.

The following is sample output from the **show tag-switching interfaces** command when you specify **detail**:

```
Router# show tag-switching interface Ethernet2/0/1 detail
```

```
Interface Hssi3/0:
  IP tagging enabled
  TSP Tunnel tagging enabled
  Tagging not operational
  MTU = 4470
Interface ATM4/0.1:
  IP tagging enabled
  TSP Tunnel tagging enabled
  Tagging operational
  MTU = 4470
  ATM tagging: Tag VPI = 1, Control VC = 0/32
Interface Ethernet5/0/0:
  IP tagging not enabled
  TSP Tunnel tagging enabled
  Tagging operational
  MTU = 1500
Interface Ethernet5/0/1:
  IP tagging enabled
  TSP Tunnel tagging not enabled
  Tagging operational
  MTU = 1500
Interface Ethernet5/0/2:
  IP tagging enabled
  TSP Tunnel tagging not enabled
  Tagging not operational
  MTU = 1500
Interface Ethernet5/0/3:
  IP tagging enabled
  TSP Tunnel tagging not enabled
  Tagging operational
  MTU = 1500
```

Related Commands

Command	Description
tag-switching ip (interface configuration)	Enables Tag Switching of IPv4 packets on an interface.
tag-switching tsp-tunnels (interface configuration)	Allows TSP tunnel operation over an interface.

show tag-switching tdp bindings

To display the contents of the tag information base (TIB), use the **show tag-switching tdp bindings** privileged EXEC command:

```
show tag-switching tdp bindings [network {mask | length}] [longer-prefixes] [local-tag tag [- tag]] [remote-tag tag [- tag]] [neighbor address] [local]
```

Syntax Description	
<i>network</i>	(Optional) Destination network number.
<i>mask</i>	Network mask written as A.B.C.D.
<i>length</i>	Mask length (1 to 32 characters).
longer-prefixes	(Optional) Selects any prefix that matches <i>mask</i> with <i>length</i> to 32.
local-tag <i>tag - tag</i>	(Optional) Display entries matching local tag values by this router. Use the <i>- tag</i> argument to indicate tag range.
remote-tag <i>tag - tag</i>	(Optional) Displays entries matching tag values assigned by a neighbor router. Use the <i>- tag</i> argument to indicate tag range.
neighbor <i>address</i>	(Optional) Displays tag bindings assigned by selected neighbor.
local	(Optional) Displays local tag bindings.

Command Modes Privileged EXEC

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines A request can specify that the entire database be shown, or it or can be limited to a subset of entries. A request to show a subset of entries can be based on the prefix, on input or output tag values or on ranges, and/or the neighbor advertising the tag.

Examples

The following is sample output from the **show tag-switching tdp bindings** command. This form of the command causes the contents of the entire TIB to be displayed.

```
Router# show tag-switching tdp bindings

Matching entries:
tib entry: 10.92.0.0/16, rev 28
    local binding: tag: imp-null(1)
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 10.102.0.0/16, rev 29
    local binding: tag: 26
    remote binding: tsr: 172.27.32.29:0, tag: 26
tib entry: 10.105.0.0/16, rev 30
    local binding: tag: imp-null(1)
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 10.205.0.0/16, rev 31
    local binding: tag: imp-null(1)
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 10.211.0.7/32, rev 32
    local binding: tag: 27
    remote binding: tsr: 172.27.32.29:0, tag: 28
tib entry: 10.220.0.7/32, rev 33
    local binding: tag: 28
    remote binding: tsr: 172.27.32.29:0, tag: 29
tib entry: 99.101.0.0/16, rev 35
    local binding: tag: imp-null(1)
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 100.101.0.0/16, rev 36
    local binding: tag: 29
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 171.69.204.0/24, rev 37
    local binding: tag: imp-null(1)
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 172.27.32.0/22, rev 38
    local binding: tag: imp-null(1)
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 210.10.0.0/16, rev 39
    local binding: tag: imp-null(1)
tib entry: 210.10.0.8/32, rev 40
    remote binding: tsr: 172.27.32.29:0, tag: 27
```

The following is sample output from the **show tag tdp bindings 10.0.0.0 8 longer-prefixes neighbor 172.27.32.29** variant of the command; it displays tags learned from TSR 172.27.32.29 for network 10.0.0.0 and any of its subnets. The use of the **neighbor** option suppresses the output of local tags and tags learned from other neighbors.

```
Router# show tag tdp bindings 10.0.0.0 8 longer-prefixes neighbor 172.27.32.29

tib entry: 10.92.0.0/16, rev 28
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 10.102.0.0/16, rev 29
    remote binding: tsr: 172.27.32.29:0, tag: 26
tib entry: 10.105.0.0/16, rev 30
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 10.205.0.0/16, rev 31
    remote binding: tsr: 172.27.32.29:0, tag: imp-null(1)
tib entry: 10.211.0.7/32, rev 32
    remote binding: tsr: 172.27.32.29:0, tag: 28
tib entry: 10.220.0.7/32, rev 33
    remote binding: tsr: 172.27.32.29:0, tag: 29
```

Table 110 describes the significant fields in this display.

Table 110 *show tag-switching tdp bindings* Field Descriptions

Field	Description
tib entry	Indicates that the following lines are the TIB entry for a particular destination (network/mask). The revision number is used internally to manage tag distribution for this destination.
remote binding	A list of outgoing tags for this destination learned from other Tag Switching Routers (TSRs). Each item on this list identifies the TSR from which the outgoing tag was learned and the tag itself. The TSR is identified by its TDP identifier.
imp-null	The implicit null tag. This tag value instructs the upstream router to pop the tag entry off the tag stack before forwarding the packet.

Related Commands

Command	Description
show tag-switching forwarding-table	Displays the contents of the TFIB.
show tag-switching tdp neighbors	Displays the status of TDP sessions.

show tag-switching tdp discovery

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

show tag-switching tdp discovery

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 discovery** command.

```
Router# 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/recv
 Ethernet4/0/1: xmit/recv
 Ethernet4/0/2: xmit/recv
 POS6/0/0:      xmit/recv
```

Table 111 describes the significant fields in this display.

Table 111 *show tag-switching tdp discovery Field Descriptions*

Field	Description
Local TDP Identifier	The TDP identifier for the local router. A TDP 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 TDP identifier, and integers starting with 0 for the final two bytes of the IP address:number.
Interfaces	Lists the interfaces engaging in TDP discovery activity. xmit indicates that the interface is transmitting TDP discovery hello packets; rcv indicates that the interface is receiving TDP discovery hello packets.

Related Commands	Command	Description
	show tag-switching tdp neighbors	Displays the status of TDP sessions.

show tag-switching tdp neighbors

To display the status of Tag Distribution Protocol (TDP) sessions, enter the **show tag-switching tdp neighbors** privileged EXEC command:

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

Syntax Description		
	<i>address</i>	(Optional) The neighbor with this IP address.
	<i>interface</i>	(Optional) TDP 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 TDP neighbors, or it can be limited to

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

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

```
Router# 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 112 describes the significant fields in this display.

Table 112 show tag-switching tdp neighbors Field Descriptions

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

Related Commands

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

show tag-switching tdp parameters

To display available TDP parameters, use the **show tag-switching tdp parameters** privileged EXEC command:

```
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:

```
Router# 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 113 describes the significant fields in this display.

Table 113 *show tag-switching tdp parameters command Field Descriptions*

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

Table 113 *show tag-switching tdp parameters command Field Descriptions (continued)*

Field	Description
Discovery directed hello	Indicates the amount of time to remember that a neighbor platform wants a TDP session when (1) the neighbor platform is not directly connected to the router and (2) the neighbor platform has not sent a TDP 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 TDP Hello messages (may not be present).

Related Commands

Command	Description
tag-switching tdp discovery	Configures the interval between transmission of TDP discovery hello messages.
tag-switching tdp holdtime	Enables TSP 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** privileged EXEC command.

```
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 is 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 TSP tunnel has a globally unique identifier. When signalling the TSP tunnel is signalled 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 TSP tunnel at the headend.

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

```
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 114 describes the significant fields in this display.

Table 114 *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 TSP tunnels to be signalled through the router.
TSP Tunnels Process	The status of the TSP tunnel signalling process. This process interacts with the signalling protocol to manage signalled 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 TSP 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 TSP 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 whether or not 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 whether or not 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 TSP tunnel operation over an interface.
tunnel mode tag-switching	Sets the encapsulation mode of the tunnel to Tag Switching.

tag-switching advertise-tags

To control the distribution of locally assigned (incoming) tags via the Tag Distribution Protocol (TDP), use the **tag-switching advertise-tags** global configuration command. To disable tag 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 tags advertised.
to <i>access-list-number</i>	(Optional) Specifies which TSR neighbors should receive tag advertisements. A TSR is identified by the router ID that is the first 4 bytes of its 6-byte TDP identifier.

Defaults

The tags of all destinations are advertised to all TSR 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 tags to all TDP neighbors, use the **tag-switching advertise-tags** command.

You can enter multiple **tag-switching advertise-tags** commands. Taken together, they determine how local tags 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 tags to all TDP neighbors. This is the default.

```
Router(config)# tag-switching advertise-tags
```

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

```
Router(config)# access-list 1 permit 10.101.0.0 0.0.255.255
Router(config)# access-list 4 permit 10.221.0.0 0.0.255.255
Router(config)# tag-switching advertise-tags for 1
Router(config)# tag-switching advertise-tags for 4
```

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

```
Router(config)# access-list 1 permit any
Router(config)# access-list 2 deny 10.101.0.8
Router(config)# tag-switching advertise-tags
Router(config)# tag-switching advertise-tags for 1 to 2
```

tag-switching atm allocation-mode

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

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

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

Syntax Description	Mode	Description
	optimistic	Tag binding is returned immediately and packets are discarded until the downstream setup is complete.
	conservative	Tag binding is delayed until the tag 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 to be used for the initial link to the Tag Switching peer device, use the **tag-switching atm control-vc** interface configuration command. The initial link is used to establish the TDP session and to carry non-IP traffic. To clear the interface configuration, use the **no** form of this command.

tag-switching atm control-vc *vpi vci*

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

Syntax Description

<i>vpi</i>	Virtual path identifier.
<i>vci</i>	Virtual channel identifier.

Defaults

If the subinterface has not changed to a VP tunnel, the default is 0/32. If the subinterface corresponds to VP tunnel VPI X, the default is X/32.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

For a router interface (for example, an AIP) ATM Tag Switching can be enabled only on a tag-switch 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 tagging.

On the Cisco LightStream 1010 ATM switch, a subinterface corresponds to a VP tunnel, so the VPI field of the control-vc must match the VPI field of the VP tunnel.

Examples

The following creates a Tag Switching subinterface on a router and selects 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
	show tag-switching atm-tdp capability	Displays the ATM TDP tag capabilities.
	show tag-switching interfaces	Displays information about one or more interfaces that have Tag Switching enabled.

tag-switching atm maxhops

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

tag-switching atm maxhops [*number*]

no tag-switching atm maxhops

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

Defaults	The default is 254.
-----------------	---------------------

Command Modes	Global configuration
----------------------	----------------------

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines	When an ATM TSR 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 TSR or TSR returns an error that specifies that the hop count has been reached.
-------------------------	---

When an ATM-TSR initiates a request for a tag binding, it includes a parameter specifying the maximum number of hops that the request should travel before reaching the edge of the ATM Tag Switching region. This is used to prevent forwarding loops in setting up tag paths across the ATM region.

Examples	The following example sets the hop count limit to 2:
-----------------	--

```
tag-switching atm maxhops 2
```

Related Commands	Command	Description
	show tag-switching atm-tdp bindings	Displays the requested entries from the ATM TDP tag binding database.

tag-switching atm vc-merge

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

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 TDP tag capabilities.

tag-switching atm vpi

To configure the range of values to use in the VPI field for tag VCs, use the **tag-switching atm vpi** interface configuration command. 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).
- <i>vpi</i>	(Optional) Virtual path identifier (high end of range).

Defaults

The default is 1-1.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

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



Note

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

Use this command to select an alternate range of VPI values for ATM tag 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 creates a subinterface and selects 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	Configures the VPI and VCI to be used for the initial link to the Tag Switching peer device.

tag-switching ip (global configuration)

To allow Tag Switching of IPv4 packets, use the **tag-switching ip** global configuration command. To disable IP Tag 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 Tag Switching of IPv4 packets is allowed.

Command Modes Global configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines Dynamic Tag Switching (that is, distribution of tags 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 tags, and the sending of outgoing tagged packets on all interfaces. The command does not affect the sending of tagged packets through TSP tunnels.

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

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

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

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

tag-switching ip (interface configuration)

To enable Tag Switching of IPv4 packets on an interface, use the **tag-switching ip** interface configuration command. To disable IP Tag 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 Tag Switching of IPv4 packets is disabled on this interface.

Command Modes Interface configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

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

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

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

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

Examples

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

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

Related Commands

Command	Description
tag-switching advertise-tags	Controls the distribution of locally assigned (incoming) tags through the TDP.
show tag-switching interfaces	Displays information about one or more interfaces that have Tag Switching enabled.

tag-switching ip default-route

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

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 Tag Switching (that is, distribution of tags 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 tags 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 Tag Switching of IPv4 packets on an interface.
	tag-switching ip (Global configuration)	Allows Tag Switching of IPv4 packets across all interfaces.

tag-switching mtu

To override the per-interface maximum transmission unit (MTU), use the **tag-switching mtu** interface configuration command. To restore the default, use the **no** form of this command.

tag-switching mtu *bytes*

no tag-switching mtu

Syntax Description

bytes MTU in bytes.

Defaults

Minimum is 128 bytes; maximum depends on interface medium type.

Command Modes

Interface configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

If a tagged IP packet exceeds the MTU set for the interface, the Cisco IOS software will fragment it. All devices on a physical medium must have the same protocol MTU in order to operate.



Note

Changing the MTU value (with the **mtu** interface configuration command) can affect the tag IP MTU value. If the current tag IP MTU value is the same as the MTU value, and you change the MTU value, the tag IP MTU value will be modified automatically to match the new MTU. However, the reverse is not true; changing the tag IP MTU value has no effect on the value for the **mtu** command.

Examples

The following example sets the maximum tagged packet size for the first serial interface to 300 bytes:

```
interface serial 0
 tag-switching mtu 300
```

tag-switching tag-range downstream

To configure the size of the tag space for downstream unicast tag allocation, use the **tag-switching tag-range downstream** global configuration command. Use the **no** form of this command to revert to the platform defaults.

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

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

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

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

Command Modes	
	Global configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Examples The following example shows how to configure the size of the tag space for downstream unicast tag 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.

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

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

tag-switching tdp discovery

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

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

Syntax 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, TDP sessions that run through a TSP 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	
	holdtime —15 seconds
	interval —5 seconds

Command Modes	
	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 TDP parameters.
	tag-switching tdp holdtime	Enables TSP tunnel functionality on a device.

tag-switching tdp holdtime

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

tag-switching tdp holdtime *seconds*

Syntax Description	<i>seconds</i>	The time for which a TDP session is maintained in the absence of TDP messages from the session peer device.
Defaults	15 seconds	
Command Modes	Global configuration	
Command History	Release	Modification
	11.1 CT	This command was introduced.
Usage Guidelines	When a TDP session is initiated, the hold time is set to the lower of the values configured at the two ends.	
Examples	In the following example, the hold time of TDP sessions is configured for 30 seconds: tag-switching tdp holdtime 30	
Related Commands	Command	Description
	show tag-switching tdp parameters	Displays available TDP parameters.
	tag-switching tdp discovery	Configures the interval between transmission of TDP discovery hello messages.

tag-switching tsp-tunnels (global configuration)

To allow the operation of Tag-Switched Path (TSP) tunnels, use the **tag-switching tsp-tunnels** global configuration command. To disable the operation of TSP 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 TSP 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 TSP tunnels. The **no** form of this command completely disables TSP tunnel operation on the device.

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

```
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.

tag-switching tsp-tunnels (interface configuration)

To allow TSP tunnel operation over an interface, use the **tag-switching tsp-tunnels** interface configuration command. To disable TSP 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

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines TSP tunnel operation over a specific interface is allowed by this optional command. In order for TSP 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 TSP tunnel operation over the specified interface.

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

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

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.

traffic-engineering filter

To specify a filter with the given number and properties, use the **traffic-engineering filter** command. To disable this function, use the **no** form of this command.

traffic-engineering filter *filter-number egress ip-address mask*

no traffic-engineering filter

Syntax Description

<i>filter-number</i>	A decimal value representing the number of the filter.
egress <i>ip-address mask</i>	IP address and mask for the egress port.

Command Modes

Router configuration

Command History

Release	Modification
11.1 CT	This command was introduced.

Usage Guidelines

You must specify that the egress is the indicated address/mask, where egress is either the destination or the BGP next hop.

Examples

In the following example, configuration is provided for the traffic engineering routing process, a traffic engineering filter, and a traffic engineering route for that filter over a TSP-encapsulated tunnel:

```
router traffic-engineering
traffic-engineering filter 5 egress 83.0.0.1 255.255.255.255
traffic-engineering route 5 tunnel 5
```

Related Commands

Command	Description
show ip traffic-engineering routes	Displays information about the requested filters configured for traffic engineering.
traffic-engineering route	Configures a route for a specified filter, through a specified tunnel.

traffic-engineering route

To configure a route for a specified filter, through a specified tunnel, use the **traffic-engineering route** command. To disable this function, use the **no** form of this command.

traffic-engineering route *filter-number interface* [**preference number**] [**loop-prevention** {**on** | **off**}]

no traffic-engineering route *filter-number interface* [**preference number**] [**loop-prevention** {**on** | **off**}]

Syntax Description		
<i>filter-number</i>		The number of the traffic engineering filter to be forwarded through the use of this traffic engineering route, if the route is installed.
<i>interface</i>		TSP-encapsulated tunnel on which traffic-passing filter should be sent, if this traffic engineering route is installed.
preference number		(Optional) This is a number between 1 and 255, with a lower value being more desirable. The default is 1.
loop-prevention		(Optional) This can be on or off. The default is on.

Defaults
preference—1
loop-prevention—on

Command Modes
 Router configuration

Command History	Release	Modification
	11.1 CT	This command was introduced.

Usage Guidelines
 The traffic engineering process is used to decide if a configured traffic engineering route should be installed in the forwarding table.

The first step is to determine if the route is up. If the route is enabled, the TSP tunnel interface is up, the loop prevention check is either disabled or passed, and the traffic engineering route is up.

If multiple routes for the same filter are up, a route is selected based on administrative preference.

If loop prevention is enabled, metrics are solicited from the tunnel tail, and the loop prevention algorithm is run on the result. For a discussion of the loop prevention algorithm, see the **show ip traffic-engineering metrics** command.

Examples

In the following example, configuration is provided for the traffic engineering routing process, a traffic engineering filter, and a traffic engineering route for that filter through a TSP-encapsulated tunnel.

```
router traffic-engineering
traffic-engineering filter 5 egress 83.0.0.1 255.255.255.255
traffic-engineering route 5 tunnel 5
```

Related Commands

Command	Description
show ip traffic-engineering configuration	Displays information about configured traffic engineering filters and routes.
show ip traffic-engineering routes	Displays information about the requested filters configured for traffic engineering.

tunnel mode tag-switching

To set the encapsulation mode of the tunnel to Tag Switching, use the **tunnel mode tag-switching** interface configuration command. Use the **no** form of this command to set the tunneling encapsulation mode to the default, Generic Routing Encapsulation (GRE).

tunnel mode tag-switching

no tunnel mode tag-switching

Syntax Description This command has no arguments or keywords.

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 TSP tunnel identifier.

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

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

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

tunnel tsp-hop

To define hops in the path for the Tag Switching tunnel, use the **tunnel tsp-hop** interface configuration command. 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
166	Sets the encapsulation mode of the tunnel to Tag Switching.