IEEE 802.1Q-in-Q VLAN Tag Termination

Encapsulating IEEE 802.1Q VLAN tags within 802.1Q enables service providers to use a single VLAN to support customers who have multiple VLANs. The IEEE 802.1Q-in-Q VLAN Tag Termination feature on the subinterface level preserves VLAN IDs and keeps traffic in different customer VLANs segregated.

Feature History for the IEEE 802.1Q-in-Q VLAN Tag Termination Feature

<table>
<thead>
<tr>
<th>Release</th>
<th>Modification</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.3(7)T</td>
<td>This feature was introduced.</td>
</tr>
<tr>
<td>12.3(7)XI1</td>
<td>This feature was implemented on the Cisco 10000 series router.</td>
</tr>
</tbody>
</table>

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at http://www.cisco.com/go/fn. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click Cancel at the login dialog box and follow the instructions that appear.

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- Restrictions for IEEE 802.1Q-in-Q VLAN Tag Termination, page 2
- Information About IEEE 802.1Q-in-Q VLAN Tag Termination, page 2
- How to Configure IEEE 802.1Q-in-Q VLAN Tag Termination, page 6
- Configuration Examples for IEEE 802.1Q-in-Q VLAN Tag Termination, page 11
- Additional References, page 13
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Prerequisites for IEEE 802.1Q-in-Q VLAN Tag Termination

- You have checked Feature Navigator to verify that your Cisco device and software image support this feature.
- You must be connected to an Ethernet device which supports double VLAN tag imposition/disposition or switching.

Restrictions for IEEE 802.1Q-in-Q VLAN Tag Termination

The following restrictions apply to the Cisco 10000 series router:
- Supported on Ethernet, FastEthernet, or Gigabit Ethernet interfaces.
- Supports only Point-to-Point Protocol over Ethernet (PPPoE) packets that are double-tagged for Q-in-Q VLAN tag termination.
- IP and Multiprotocol Label Switching (MPLS) packets are not supported.
- Modular QoS can be applied to unambiguous subinterfaces only.
- Limited ACL support.

Information About IEEE 802.1Q-in-Q VLAN Tag Termination

This section lists the concepts that the user should understand in order to perform the tasks in the “How to Configure IEEE 802.1Q-in-Q VLAN Tag Termination” section on page 6. The following concepts are described in this section:
- IEEE 802.1Q-in-Q VLAN Tag Termination on Subinterfaces, page 2
- Cisco 10000 Series Router Application, page 4
- Unambiguous and Ambiguous Subinterfaces, page 5

IEEE 802.1Q-in-Q VLAN Tag Termination on Subinterfaces

IEEE 802.1Q-in-Q VLAN Tag Termination simply adds another layer of IEEE 802.1Q tag (called “metro tag” or “PE-VLAN”) to the 802.1Q tagged packets that enter the network. The purpose is to expand the VLAN space by tagging the tagged packets, thus producing a “double-tagged” frame. The expanded VLAN space allows the service provider to provide certain services, such as Internet access on specific VLANs for specific customers, and yet still allows the service provider to provide other types of services for their other customers on other VLANs.

Generally the service provider’s customers require a range of VLANs to handle multiple applications. Service providers can allow their customers to use this feature to safely assign their own VLAN IDs on subinterfaces because these subinterface VLAN IDs are encapsulated within a service-provider designated VLAN ID for that customer. Therefore there is no overlap of VLAN IDs among customers, nor does traffic from different customers become mixed. The double-tagged frame is “terminated” or assigned on a subinterface with an expanded encapsulation dot1q command that specifies the two VLAN ID tags (outer VLAN ID and inner VLAN ID) terminated on the subinterface. See Figure 1 on page 3.
IEEE 802.1Q-in-Q VLAN Tag Termination is generally supported on whichever Cisco IOS features or protocols are supported on the subinterface; the exception is that Cisco 10000 series router only supports PPPoE. For example if you can run PPPoE on the subinterface, you can configure a double-tagged frame for PPPoE. The only restriction is whether you assign ambiguous or unambiguous subinterfaces for the inner VLAN ID. See the “Unambiguous and Ambiguous Subinterfaces” section on page 5.

Note

The Cisco 10000 series router only supports PPPoE over Q-in-Q (PPPoEQinQ).

The primary benefit for the service provider is reduced number of VLANs supported for the same number of customers. Other benefits of this feature include:

- PPPoE scalability. By expanding the available VLAN space from 4096 to approximately 16.8 million (4096 times 4096), the number of PPPoE sessions that can be terminated on a given interface is multiplied.
- When deploying Gigabyte Ethernet DSL Access Multiplexer (DSLAM) in wholesale model, you can assign the inner VLAN ID to represent the end-customer virtual circuit (VC) and assign the outer VLAN ID to represent the service provider ID.

The Q-in-Q VLAN tag termination feature is simpler than the IEEE 802.1Q tunneling feature deployed for the Catalyst 6500 series switches or the Catalyst 3550 and Catalyst 3750 switches. Whereas switches require IEEE 802.1Q tunnels on interfaces to carry double-tagged traffic, routers need only encapsulate Q-in-Q VLAN tags within another level of 802.1Q tags in order for the packets to arrive at the correct destination.

**Figure 1** Untagged, 802.1Q-Tagged, and Double-Tagged Ethernet Frames

<table>
<thead>
<tr>
<th>Destination address</th>
<th>Source address</th>
<th>Length/EtherType</th>
<th>Frame Check Sequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA</td>
<td>SA</td>
<td>Len/Etype</td>
<td>Data</td>
</tr>
</tbody>
</table>

Original Ethernet frame

<table>
<thead>
<tr>
<th>DA</th>
<th>SA</th>
<th>Etype</th>
<th>Tag</th>
<th>Len/Etype</th>
<th>Data</th>
<th>FCS</th>
</tr>
</thead>
</table>

802.1Q frame from customer network

<table>
<thead>
<tr>
<th>DA</th>
<th>SA</th>
<th>Etype</th>
<th>Tag</th>
<th>Etype</th>
<th>Tag</th>
<th>Len/Etype</th>
<th>Data</th>
<th>FCS</th>
</tr>
</thead>
</table>

Double-tagged frame
Cisco 10000 Series Router Application

For the emerging broadband Ethernet-based DSLAM market, the Cisco 10000 router supports Q-in-Q encapsulation. With the Ethernet-based DSLAM model shown in Figure 2, customers typically get their own VLAN and all these VLANs are aggregated on a DSLAM.

Figure 2: Broadband Ethernet-based DSLAM Model of Q-in-Q VLANs

VLAN aggregation on a DSLAM will result in a lot of aggregate VLANs that at some point need to be terminated on the broadband remote access servers (BRAS). Although the model could connect the DSLAMs directly to the BRAS, a more common model uses the existing Ethernet-switched network where each DSLAM VLAN ID is tagged with a second tag (Q-in-Q) as it connects into the Ethernet-switched network.

The only model that is supported is PPPoE over Q-in-Q (PPPoEoQinQ). This can either be a PPP terminated session or as a L2TP LAC session. No IP over Q-in-Q is supported.

The Cisco 10000 series router already supports plain PPPoE and PPP over 802.1Q encapsulation. Supporting PPP over Q-in-Q encapsulation is new. PPP over Q-in-Q encapsulation processing is an extension to 802.1q encapsulation processing. A Q-in-Q frame looks like a VLAN 802.1Q frame, only it has two 802.1Q tags instead of one. See Figure 1.

PPPoE over Q-in-Q encapsulation supports configurable outer tag Ethertype. The configurable Ethertype field values are 0x8100 (default), 0x9100, and 0x9200. See Figure 3.
Security ACL Application on the Cisco 10000 Router

The IEEE 802.1Q-in-Q VLAN Tag Termination feature provides limited security access control list (ACL) support for the Cisco 10000 series router.

If you apply an ACL to PPPoE traffic on a Q-in-Q subinterface in a VLAN, apply the ACL directly on the PPPoE session, using virtual access interfaces (VAIs) or RADIUS attribute 11 or 242.

You can apply ACLs to virtual access interfaces by configuring them under virtual template interfaces. You can also configure ACLs by using RADIUS attribute 11 or 242. When you use attribute 242, a maximum of 30,000 sessions can have ACLs.

ACLs that are applied to the VLAN Q-in-Q subinterface have no effect and are silently ignored. In the following example, ACL 1 that is applied to the VLAN Q-in-Q subinterface level will be ignored:

Router(config)# interface FastEthernet3/0/0.100
Router(config-subif)# encapsulation dot1q 100 second-dot1q 200
Router(config-subif)# ip access-group 1

Unambiguous and Ambiguous Subinterfaces

The `encapsulation dot1q` command is used to configure Q-in-Q termination on a subinterface. The command accepts an Outer VLAN ID and one or more Inner VLAN IDs. The outer VLAN ID always has a specific value, while inner VLAN ID can either be a specific value or a range of values.

A subinterface that is configured with a single Inner VLAN ID is called an unambiguous Q-in-Q subinterface. In the following example, Q-in-Q traffic with an Outer VLAN ID of 101 and an Inner VLAN ID of 1001 is mapped to the Gigabit Ethernet 1/0.100 subinterface:

Router(config)# interface gigabitEthernet1/0.100
Router(config-subif)# encapsulation dot1q 101 second-dot1q 1001

A subinterface that is configured with multiple Inner VLAN IDs is called an ambiguous Q-in-Q subinterface. By allowing multiple Inner VLAN IDs to be grouped together, ambiguous Q-in-Q subinterfaces allow for a smaller configuration, improved memory usage and better scalability.

In the following example, Q-in-Q traffic with an Outer VLAN ID of 101 and Inner VLAN IDs anywhere in the 2001-2100 and 3001-3100 range is mapped to the Gigabit Ethernet 1/0.101 subinterface:

Router(config)# interface gigabitEthernet1/0.101
Router(config-subif)# encapsulation dot1q 101 second-dot1q 2001-2100,3001-3100

Ambiguous subinterfaces can also use the `any` keyword to specify the inner VLAN ID.

See the “Configuration Examples for IEEE 802.1Q-in-Q VLAN Tag Termination” section on page 11 for an example of how VLAN IDs are assigned to subinterfaces, and for a detailed example of how the `any` keyword is used on ambiguous subinterfaces.

Only PPPoE is supported on ambiguous subinterfaces. Standard IP routing is not supported on ambiguous subinterfaces.
How to Configure IEEE 802.1Q-in-Q VLAN Tag Termination

This section contains the following tasks:

- Configuring the Interfaces for IEEE 802.1Q-in-Q VLAN Tag Termination, page 6 (required)
- Verifying the IEEE 802.1Q-in-Q VLAN Tag Termination, page 8 (optional)

Configuring the Interfaces for IEEE 802.1Q-in-Q VLAN Tag Termination

Perform this task to configure the main interface used for the Q-in-Q double tagging and to configure the subinterfaces. An optional step in this task shows you how to configure the EtherType field to be 0x9100 for the outer VLAN tag, if that is required. After the subinterface is defined, the 802.1Q encapsulation is configured to use the double tagging.

Prerequisites

For the Cisco 10000 series router:

- PPPoE is already configured.
- Virtual private dial-up network (VPDN) is enabled.

SUMMARY STEPS

Steps to configure EtherType field for outer VLAN tag (Optional):

1. enable
2. configure terminal
3. interface type number
4. dot1q tunneling ethertype ethertype

Steps to configure the Q-in-Q Subinterface (Required):

5. interface type number.subinterface-number
6. encapsulation dot1q vlan-id second-dot1q { any | vlan-id | vlan-id-vlan-id[,]vlan-id-vlan-id]}
7. pppoe enabled [group group-name]
8. exit
9. Repeat Step 5 to configure another subinterface.

10. Repeat Step 6 and Step 7 to specify the VLAN tags to be terminated on the subinterface and to enable PPPoE sessions on the subinterface.

11. end
## DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td>Example: Router&gt; enable</td>
<td>- Enter your password if prompted.</td>
</tr>
<tr>
<td><strong>Step 2</strong> configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
<tr>
<td>Example: Router# configure terminal</td>
<td></td>
</tr>
<tr>
<td><strong>Step 3</strong> interface type number</td>
<td>Configures an interface and enters interface configuration mode.</td>
</tr>
<tr>
<td>Example: Router(config)# interface gigabitethernet 1/0/0</td>
<td></td>
</tr>
<tr>
<td><strong>Step 4</strong> dot1q tunneling ethertype ethertype</td>
<td>(Optional) Defines the Ethertype field type used by peer devices when implementing Q-in-Q VLAN tagging.</td>
</tr>
<tr>
<td>Example: Router(config-if)# dot1q tunneling ethertype 0x9100</td>
<td></td>
</tr>
<tr>
<td><strong>Step 5</strong> interface type number.subinterface-number</td>
<td>Configures a subinterface and enters subinterface configuration mode.</td>
</tr>
<tr>
<td>Example: Router(config-if)# interface gigabitethernet 1/0/0.1</td>
<td></td>
</tr>
<tr>
<td><strong>Step 6</strong> encapsulation dot1q vlan-id second-dot1q {any</td>
<td>vlan-id</td>
</tr>
<tr>
<td>Example: Router(config-subif)# encapsulation dot1q 100 second-dot1q 200</td>
<td></td>
</tr>
<tr>
<td><strong>Step 7</strong> pppoe enable [group group-name]</td>
<td>Enables PPPoE sessions on a subinterface.</td>
</tr>
<tr>
<td>Example: Router(config-subif)# pppoe enable group vpn1</td>
<td>The example specifies that the PPPoE profile, vpn1, will be used by PPPoE sessions on the subinterface.</td>
</tr>
<tr>
<td><strong>Step 8</strong> exit</td>
<td>Exits subinterface configuration mode and returns to interface configuration mode.</td>
</tr>
<tr>
<td>Example: Router(config-subif)# exit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Repeat this step one more time to exit interface configuration mode.</td>
</tr>
</tbody>
</table>
How to Configure IEEE 802.1Q-in-Q VLAN Tag Termination

Verifying the IEEE 802.1Q-in-Q VLAN Tag Termination

Perform this optional task to verify the configuration of the IEEE 802.1Q-in-Q VLAN Tag Termination feature.

SUMMARY STEPS

1. enable
2. show running-config
3. show vlans dot1q [internal | interface-type interface-number,subinterface-number] [detail] | outer-id |interface-type interface-number | second-dot1q [inner-id | any] [detail]

DETAILED STEPS

Step 1 enable

Enables privileged EXEC mode. Enter your password if prompted.

Router> enable
Step 2  show running-config

Use this command to show the currently running configuration on the device. You can use delimiting characters to display only the relevant parts of the configuration.

The following shows the currently running configuration on a Cisco 7300 series router:

Router# show running-config

```
interface FastEthernet0/0.201
  encapsulation dot1Q 201
  ip address 10.7.7.5 255.255.255.252
!
interface FastEthernet0/0.401
  encapsulation dot1Q 401
  ip address 10.7.7.13 255.255.255.252
!
interface FastEthernet0/0.201999
  encapsulation dot1Q 201 second-dot1q any
  pppoe enable
!
interface FastEthernet0/0.2012001
  encapsulation dot1Q 201 second-dot1q 2001
  ip address 10.8.8.9 255.255.255.252
!
interface FastEthernet0/0.2012002
  encapsulation dot1Q 201 second-dot1q 2002
  ip address 10.8.8.13 255.255.255.252
!
interface FastEthernet0/0.2019999
  encapsulation dot1Q 201 second-dot1q 100-900,1001-2000
  pppoe enable
!
interface FastEthernet0/0.4019999
  encapsulation dot1Q 401 second-dot1q 100-900,1001-2000
  pppoe enable
!
interface GigabitEthernet5/0.101
  encapsulation dot1Q 101
  ip address 10.7.7.1 255.255.255.252
!
interface GigabitEthernet5/0.301
  encapsulation dot1Q 301
  ip address 10.7.7.9 255.255.255.252
!
interface GigabitEthernet5/0.301999
  encapsulation dot1Q 301 second-dot1q any
  pppoe enable
!
interface GigabitEthernet5/0.1011001
  encapsulation dot1Q 101 second-dot1q 1001
  ip address 10.8.8.1 255.255.255.252
!
interface GigabitEthernet5/0.1011002
  encapsulation dot1Q 101 second-dot1q 1002
  ip address 10.8.8.5 255.255.255.252
!
interface GigabitEthernet5/0.1019999
  encapsulation dot1Q 101 second-dot1q 1-1000,1003-2000
  pppoe enable

```
The following shows the currently running configuration on a Cisco 10000 series router:

```
Router# show running-config

interface FastEthernet1/0/0.201
   encapsulation dot1Q 201
   ip address 10.7.7.5 255.255.255.252
!
interface FastEthernet1/0/0.401
   encapsulation dot1Q 401
   ip address 10.7.7.13 255.255.255.252
!
interface FastEthernet1/0/0.201999
   encapsulation dot1Q 201 second-dot1q any
   pppoe enable
!
interface FastEthernet1/0/0.4019999
   encapsulation dot1Q 401 second-dot1q 100-900,1001-2000
   pppoe enable
!
interface GigabitEthernet5/0/0.101
   encapsulation dot1Q 101
   ip address 10.7.7.1 255.255.255.252
!
interface GigabitEthernet5/0/0.301
   encapsulation dot1Q 301
   ip address 10.7.7.9 255.255.255.252
!
interface GigabitEthernet5/0/0.301999
   encapsulation dot1Q 301 second-dot1q any
   pppoe enable
!
interface GigabitEthernet5/0/0.1019999
   encapsulation dot1Q 101 second-dot1q 1-1000,1003-2000
   pppoe enable
```

Step 3  
```
show vlans dot1q [internal | interface-type interface-number:subinterface-number [detail] | outer-id [interface-type interface-number | second-dot1q [inner-id | any]] [detail]]
```

Use this command to show the statistics for all the 802.1Q VLAN IDs. In this example, only the outer VLAN ID is displayed.

```
Router# show vlans dot1q

Total statistics for 802.1Q VLAN 1:
  441 packets, 85825 bytes input
  1028 packets, 69082 bytes output
Total statistics for 802.1Q VLAN 101:
  5173 packets, 510384 bytes input
  3042 packets, 369567 bytes output
Total statistics for 802.1Q VLAN 201:
```

Note  
The `show vlans dot1q` command is not supported on the Cisco 10000 series router.
Configuration Examples for IEEE 802.1Q-in-Q VLAN Tag Termination

This section contains the following example:

- Configuring any Keyword on Subinterfaces for IEEE 802.1Q-in-Q VLAN Tag Termination: Example, page 11

Configuring any Keyword on Subinterfaces for IEEE 802.1Q-in-Q VLAN Tag Termination: Example

Some ambiguous subinterfaces can use the any keyword for the inner VLAN ID specification. The any keyword represents any inner VLAN ID that is not explicitly configured on any other interface. In the following example, seven subinterfaces are configured with various outer and inner VLAN IDs.

Note: The any keyword can be configured on only one subinterface of a specified physical interface and outer VLAN ID.

interface GigabitEthernet1/0/0.1
  encapsulation dot1q 100 second-dot1q 100

interface GigabitEthernet1/0/0.2
  encapsulation dot1q 100 second-dot1q 200

interface GigabitEthernet1/0/0.3
  encapsulation dot1q 100 second-dot1q 300-400,500-600

interface GigabitEthernet1/0/0.4
  encapsulation dot1q 100 second-dot1q any

interface GigabitEthernet1/0/0.5
  encapsulation dot1q 200 second-dot1q 50

interface GigabitEthernet1/0/0.6
  encapsulation dot1q 200 second-dot1q 1000-2000,3000-4000

interface GigabitEthernet1/0/0.7
  encapsulation dot1q 200 second-dot1q any

Table 1 shows which subinterfaces are mapped to different values of the outer and inner VLAN ID on Q-in-Q frames that come in on Gigabit Ethernet interface 1/0/0.
A new subinterface is now configured:

```plaintext
interface GigabitEthernet1/0/0.8
  encapsulation dot1q 200 second-dot1q 200-600,900-999
```

Table 2 shows the changes made to the table for the outer VLAN ID of 200. Notice that subinterface 1/0/0.7 configured with the `any` keyword now has new inner VLAN ID mappings.

### Table 1  Subinterfaces Mapped to Outer and Inner VLAN IDs for GE Interface 1/0/0

<table>
<thead>
<tr>
<th>Outer VLAN ID</th>
<th>Inner VLAN ID</th>
<th>Subinterface mapped to</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1 through 99</td>
<td>GigabitEthernet1/0/0.4</td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>GigabitEthernet1/0/0.1</td>
</tr>
<tr>
<td>100</td>
<td>101 through 199</td>
<td>GigabitEthernet1/0/0.4</td>
</tr>
<tr>
<td>100</td>
<td>200</td>
<td>GigabitEthernet1/0/0.2</td>
</tr>
<tr>
<td>100</td>
<td>201 through 299</td>
<td>GigabitEthernet1/0/0.4</td>
</tr>
<tr>
<td>100</td>
<td>300 through 400</td>
<td>GigabitEthernet1/0/0.3</td>
</tr>
<tr>
<td>100</td>
<td>401 through 499</td>
<td>GigabitEthernet1/0/0.4</td>
</tr>
<tr>
<td>100</td>
<td>500 through 600</td>
<td>GigabitEthernet1/0/0.3</td>
</tr>
<tr>
<td>100</td>
<td>601 through 4095</td>
<td>GigabitEthernet1/0/0.4</td>
</tr>
<tr>
<td>200</td>
<td>1 through 49</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>50</td>
<td>GigabitEthernet1/0/0.5</td>
</tr>
<tr>
<td>200</td>
<td>51 through 999</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>1000 through 2000</td>
<td>GigabitEthernet1/0/0.6</td>
</tr>
<tr>
<td>200</td>
<td>2001 through 2999</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>3000 through 4000</td>
<td>GigabitEthernet1/0/0.6</td>
</tr>
<tr>
<td>200</td>
<td>4001 through 4095</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
</tbody>
</table>

### Table 2  Subinterfaces Mapped to Outer and Inner VLAN IDs for GE Interface 1/0/0—Changes Resulting from Configuring GE Subinterface 1/0/0.8

<table>
<thead>
<tr>
<th>Outer VLAN ID</th>
<th>Inner VLAN ID</th>
<th>Subinterface mapped to</th>
</tr>
</thead>
<tbody>
<tr>
<td>200</td>
<td>1 through 49</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>50</td>
<td>GigabitEthernet1/0/0.5</td>
</tr>
<tr>
<td>200</td>
<td>51 through 199</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>200 through 600</td>
<td>GigabitEthernet1/0/0.8</td>
</tr>
<tr>
<td>200</td>
<td>601 through 899</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>900 through 999</td>
<td>GigabitEthernet1/0/0.8</td>
</tr>
<tr>
<td>200</td>
<td>1000 through 2000</td>
<td>GigabitEthernet1/0/0.6</td>
</tr>
<tr>
<td>200</td>
<td>2001 through 2999</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
<tr>
<td>200</td>
<td>3000 through 4000</td>
<td>GigabitEthernet1/0/0.6</td>
</tr>
<tr>
<td>200</td>
<td>4001 through 4095</td>
<td>GigabitEthernet1/0/0.7</td>
</tr>
</tbody>
</table>
Additional References

The following sections provide references related to the IEEE 802.1Q-in-Q VLAN Tag Termination feature.
## Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface commands: complete command syntax, command mode, defaults, usage</td>
<td>Cisco IOS Interface and Hardware Component Command</td>
</tr>
<tr>
<td>guidelines, and examples</td>
<td>Reference, Release 12.3 T</td>
</tr>
<tr>
<td>Interface configuration examples</td>
<td>Cisco IOS Interface and Hardware Component Configuration Guide</td>
</tr>
</tbody>
</table>

## Standards

<table>
<thead>
<tr>
<th>Standards</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE 802.1Q</td>
<td>—</td>
</tr>
</tbody>
</table>

## MIBs

<table>
<thead>
<tr>
<th>MIBs</th>
<th>MIBs Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>No new or modified MIBs are supported by this feature, and support</td>
<td>To locate and download MIBs for selected platforms, Cisco IOS releases,</td>
</tr>
<tr>
<td>for existing MIBs has not been modified by this feature.</td>
<td>and feature sets, use Cisco MIB Locator found at the following URL:</td>
</tr>
<tr>
<td></td>
<td><a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a></td>
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## RFCs

<table>
<thead>
<tr>
<th>RFCs</th>
<th>Title</th>
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<tbody>
<tr>
<td>No new or modified RFCs are supported by this feature, and support</td>
<td>—</td>
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<tr>
<td>for existing RFCs has not been modified by this feature.</td>
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## Technical Assistance

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
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<tr>
<td>Technical Assistance Center (TAC) home page, containing 30,000 pages of</td>
<td><a href="http://www.cisco.com/public/support/tac/home.shtml">http://www.cisco.com/public/support/tac/home.shtml</a></td>
</tr>
<tr>
<td>searchable technical content, including links to products, technologies,</td>
<td></td>
</tr>
<tr>
<td>solutions, technical tips, and tools. Registered Cisco.com users can log</td>
<td></td>
</tr>
<tr>
<td>in from this page to access even more content.</td>
<td></td>
</tr>
</tbody>
</table>

## Command Reference

The following commands are pertinent to this feature. To see the command pages for these commands

- `dot1q tunneling ethertype`
- `encapsulation dot1q`
- `show vlans dot1q`

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