



## PPPoE over IEEE 802.1Q VLANs

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This feature module describes the PPPoE over IEEE 802.1Q VLANs feature and includes the following sections:

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### Feature Overview

The PPPoE over IEEE 802.1Q VLANs feature provides support for running PPP over Ethernet (PPPoE) over IEEE 802.1Q encapsulated VLANs using Fast Ethernet. This feature is also supported on 10 Mbps Ethernet on which IEEE 802.1Q VLANs are supported. IEEE 802.1Q encapsulation is used to interconnect a VLAN-capable router with another VLAN-capable networking device. The packets on the 802.1Q link contain a standard Ethernet frame and the VLAN information associated with that frame.

### Benefits

PPPoE over ATM and PPPoE over Ethernet are currently supported by Cisco IOS software. This feature adds support for running PPPoE over IEEE 802.1Q VLANs, enabling you to connect a VLAN-capable router with other VLAN-capable networking devices.

### Restrictions

- The PPPoE over IEEE 802.1Q VLANs feature is supported on Fast Ethernet and 10 Mbps Ethernet when using the 4e/8e AMDP2 Ethernet adapter on the Cisco 7200 series routers.
- Only PPP over Ethernet dial-in is supported. PPP over Ethernet dial-out (client) will not be supported.
- PPP over Ethernet termination and bridging will not work together on the same VLAN.

- PPP over Ethernet will be disabled by default on a VLAN.
- The feature is supported on routers running Cisco IOS software. This feature will not be implemented on Route Switch Modules (RSMs) for Catalyst switches.

## Related Documents

- *PPPoE on ATM*, Cisco IOS Release 12.1(1)T
- *PPPoE on Ethernet*, Cisco IOS Release 12.1(2)T

## Supported Platforms

- Cisco 7200 series
- Cisco 7500 series

## Supported Standards, MIBs, and RFCs

### Standards

IEEE Standard 802.1Q, *Virtual Bridged Local Area Networks*, 1998

### MIBs

No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco Connection Online (CCO) at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

### RFCs

RFC 2516, *PPP over Ethernet*

## Configuration Tasks

See the following sections for configuration tasks for the PPPoE over IEEE 802.1Q VLANs feature. Each task in the list is identified as required or optional:

- Enabling PPPoE on an Ethernet 802.1Q Interface (Required)
- Configuring PPPoE in a VPDN Group (Required)
- Creating and Configuring a Virtual Template (Required)
- Verifying PPPoE over an IEEE 802.1Q VLAN (Optional)

## Enabling PPPoE on an Ethernet 802.1Q Interface

To enable PPPoE on an Ethernet 802.1Q encapsulated subinterface, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>interface fastethernet</b> <i>slot/port.subinterface-number</i>	Specifies a Fast Ethernet subinterface and enters subinterface configuration mode.
Step 2	Router(config-subif)# <b>encapsulation dot1q</b> <i>vlan-id</i>	Enables IEEE 802.1Q encapsulation on a specified subinterface in VLANs.
Step 3	Router(config-subif)# <b>pppoe enable</b>	Enables PPPoE and allows PPPoE sessions to be created through the specified subinterface.
Step 4	Router(config-subif)# <b>pppoe max-session</b> <i>number</i>	(Optional) Specifies the maximum number of PPPoE sessions under a VLAN.

## Configuring PPPoE in a VPDN Group

To configure a VPDN group for PPPoE and to link it to the appropriate virtual template interface, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>vpdn enable</b>	Enables virtual private dialup network (VPDN) configuration on this router.
Step 2	Router(config)# <b>vpdn group</b> <i>name</i>	Associates a VPDN group to a customer or VPDN profile.
Step 3	Router(config-vpdn)# <b>accept dialin</b>	Creates an accept dial-in VPDN group.
Step 4	Router(config-vpdn-acc-in)# <b>protocol pppoe</b>	Specifies the VPDN group to be used to establish PPPoE sessions.
Step 5	Router(config-vpdn-acc-in)# <b>virtual-template</b> <i>template-number</i>	Specifies which virtual template will be used to clone virtual access interfaces.
Step 6	Router(config-vpdn)# <b>pppoe limit per-vlan</b> <i>number</i>	(Optional) Specifies the maximum number of PPPoE sessions under each VLAN.

## Creating and Configuring a Virtual Template

To create and configure a virtual template, use the following commands beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>interface virtual-template</b> <i>number</i>	Creates a virtual template, and enters interface configuration mode.
Step 2	Router(config-if)# <b>ip unnumbered ethernet</b> <i>number</i>	(Optional) Enables IP without assigning a specific IP address on the LAN.

Other optional configuration commands can be added to the virtual template configuration. For example, you can enable the PPP authentication on the virtual template using the **ppp authentication chap** command. Refer to the “Virtual Interface Template Service” chapter in the Release 12.1 *Cisco IOS Dial Solutions Configuration Guide* for additional information about configuring the virtual template.

## Verifying PPPoE over an IEEE 802.1Q VLAN

To verify the configuration of VPDN groups and PPPoE over IEEE 802.1Q VLAN, use either or both of the following EXEC commands:

Command	Purpose
Router# <b>show vpdn session</b>	Displays information about active Layer 2 Tunnel Protocol (L2TP) or Layer 2 Forwarding (L2F) sessions in a VPDN.
Router# <b>show vpdn tunnel</b>	Displays information about active L2TP or L2F tunnels in a VPDN.

## Configuration Examples

This section provides the following configuration example for PPPoE over an IEEE 802.1Q VLAN:

- PPPoE over an IEEE 802.1Q VLAN Configuration Example

### PPPoE over an IEEE 802.1Q VLAN Configuration Example

The following example shows the configuration of PPPoE over an 802.1Q encapsulated VLAN:

```
interface FastEthernet0/0.10
  encapsulation dot1Q 10
  pppoe enable
  !
  vpdn enable
  no vpdn logging
  !
  vpdn-group 1
  accept dialin
  protocol pppoe
  virtual-template 1
  pppoe limit per-vlan 200
  !
interface virtual-template 1
  ip address 100.100.100.100 255.255.255.0
  mtu 1492
```

# Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

- **pppoe enable**
- **pppoe limit per-vlan**
- **pppoe max-session**

# pppoe enable

To enable PPP over Ethernet (PPPoE) sessions on an Ethernet interface, use the **pppoe enable** interface configuration command. To disable PPPoE, use the **no** form of this command.

**pppoe enable**

**no pppoe enable**

**Syntax Description** This command has no arguments or keywords.

**Defaults** PPPoE is disabled by default.

**Command Modes** Interface configuration

Command History	Release	Modification
	12.1(2)T	This command was introduced.
	12.1(5)T	This command was modified to enable PPPoE on IEEE 802.1Q encapsulated virtual LAN (VLAN) interfaces.

## Examples

### PPPoE on an 802.1Q VLAN Subinterface Example

The following example shows how to enable PPPoE on an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
 encapsulation dot1q 10
 pppoe enable
```

### PPPoE on an Ethernet Interface Example

The following example enables PPPoE sessions on Ethernet interface 1/0:

```
interface ethernet1/0
 pppoe enable
```

## Related Commands

Command	Description
<b>debug vpdn pppoe-data</b>	Displays data packets of PPPoE sessions.
<b>debug vpdn pppoe-error</b>	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
<b>debug vpdn pppoe-events</b>	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
<b>pppoe limit per-mac</b>	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
<b>pppoe limit per-vlan</b>	Specifies the maximum number of PPPoE sessions under each VLAN.

# pppoe limit per-vlan

To specify the maximum number of PPP over Ethernet (PPPoE) sessions under each virtual LAN (VLAN), use the **pppoe limit per-vlan** VPDN configuration command. To remove this specification, use the **no** form of this command.

**pppoe limit per-vlan** *number*

**no pppoe limit per-vlan**

<b>Syntax Description</b>	<i>number</i>	Maximum number of PPP over Ethernet sessions under each VLAN.
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<b>Defaults</b>	100 PPPoE sessions per VLAN
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<b>Command Modes</b>	VPDN configuration
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)T	This command was introduced.

**Usage Guidelines**

If the **pppoe max-session** command is configured on a virtual circuit (VC), that command will take precedence over the **pppoe limit per-vlan** command. The **pppoe limit per-vlan** command applies to all VCs on which the **pppoe max-session** command has not been configured.

The **pppoe limit per-vlan** command must be configured after the accept dial-in VPDN group has been configured using the **accept-dialin** VPDN configuration command.

**Examples**

The following example shows a maximum of 200 PPPoE sessions configured for an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
  encapsulation dot1q 10
  pppoe enable
!
vpdn enable
vpdn-group 1
  accept dialin
  protocol pppoe
  virtual-template 1
  pppoe limit per-vlan 200
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>accept dial-in</b>	Creates an accept dial-in VPDN subgroup.
	<b>debug vpdn pppoe-data</b>	Displays data packets of PPPoE sessions.
	<b>debug vpdn pppoe-error</b>	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
	<b>debug vpdn pppoe-events</b>	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.
	<b>debug vpdn pppoe-packet</b>	Displays each PPPoE protocol packet exchanged.
	<b>pppoe enable</b>	Enables PPPoE sessions on an Ethernet interface.
	<b>pppoe limit per-mac</b>	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
	<b>pppoe limit per-vc</b>	Specifies the maximum number of PPPoE sessions to be established over a VC.
	<b>pppoe max-session</b>	Specifies the maximum number of PPPoE sessions under a VLAN.

# pppoe max-session

To specify the maximum number of PPP over Ethernet (PPPoE) sessions under a virtual LAN (VLAN), use the **pppoe max-session** Ethernet subinterface configuration command. To remove this specification, use the **no** form of this command.

**pppoe max-session** *number*

**no pppoe max-session**

<b>Syntax Description</b>	<i>number</i>	Maximum number of PPP over Ethernet sessions under a VLAN.
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<b>Defaults</b>	No default behavior or values.	
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<b>Command Modes</b>	Ethernet subinterface configuration	
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<b>Command History</b>	<b>Release</b>	<b>Modification</b>
	12.1(5)T	This command was introduced.

**Usage Guidelines** Use the **pppoe max-session** command to specify the maximum number of PPPoE session under a VLAN. The **pppoe limit per-vlan** global configuration command can also be used to specify the maximum number of PPPoE sessions. If the **pppoe max-session** command and the **pppoe limit per-vlan** command are both configured, the **pppoe max-session** command takes precedence on the virtual circuit (VC).

**Examples** The following example shows a maximum of 200 PPPoE sessions configured for an 802.1Q VLAN subinterface:

```
interface FastEthernet0/0.10
 encapsulation dot1q 10
 pppoe enable
 pppoe max-session 200
```

<b>Related Commands</b>	<b>Command</b>	<b>Description</b>
	<b>debug vpdn pppoe-data</b>	Displays data packets of PPPoE sessions.
	<b>debug vpdn pppoe-error</b>	Displays PPPoE protocol errors that prevent a session from being established or errors that cause an established session to be closed.
	<b>debug vpdn pppoe-events</b>	Displays PPPoE protocol messages about events that are part of normal session establishment or shutdown.

<b>Command</b>	<b>Description</b>
<b>debug vpdn pppoe-packet</b>	Displays each PPPoE protocol packet exchanged.
<b>pppoe enable</b>	Enables PPPoE sessions on an Ethernet interface.
<b>pppoe limit per-mac</b>	Specifies the maximum number of PPPoE sessions to be sourced from a MAC address.
<b>pppoe limit per-vc</b>	Specifies the maximum number of PPPoE sessions to be established over a VC.
<b>pppoe limit per-vlan</b>	Specifies the maximum number of PPPoE sessions under each VLAN.