



# Enabling PPPoE Relay Discovery and Service Selection Functionality

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The PPPoE Relay feature enables an L2TP access concentrator (LAC) to relay active discovery and service selection functionality for PPP over Ethernet (PPPoE), over a Layer 2 Tunneling Protocol (L2TP) control channel, to an L2TP network server (LNS) or tunnel switch (multihop node). The relay functionality of this feature allows the LNS or tunnel switch to advertise the services it offers to the client, thereby providing end-to-end control of services between the LNS and a PPPoE client.

## inding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the [“Feature Information for Enabling PPPoE Relay Discovery and Service Selection Functionality”](#) section on page 14.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to <http://www.cisco.com/go/cfn>. An account on Cisco.com is not required.

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## Prerequisites for Enabling PPPoE Relay Discovery and Service Selection Functionality

- You must understand the concepts described in the “Preparing for Broadband Access Aggregation” module.
- PPPoE sessions must be established using the procedures in the “Providing Protocol Support for Broadband Access Aggregation of PPPoE Sessions” module.
- This document assumes you understand how to configure a virtual private dialup network (VPDN) tunnel and a tunnel switch. See the “[Related Documents](#)” section on [page 13](#) for more information about these features.

## Information About Enabling PPPoE Relay Discovery and Service Selection Functionality

To configure PPPoE relay, you need to understand the following concept:

- [L2TP Active Discovery Relay for PPPoE, page 2](#)

### L2TP Active Discovery Relay for PPPoE

The PPPoE protocol described in RFC 2516 defines a method for active discovery and service selection of devices in the network by an LAC. A PPPoE client uses these methods to discover an access concentrator in the network, and the access concentrator uses these methods to advertise the services it offers.

The PPPoE Relay feature introduced in Cisco IOS Release 12.3(4)T allows the active discovery and service selection functionality to be offered by the LNS, rather than just by the LAC. The PPPoE Relay feature implements the Network Working Group Internet-Draft titled *L2TP Active Discovery Relay for PPPoE*. The Internet-Draft describes how to relay PPPoE Active Discovery (PAD) and Service Relay Request (SRRQ) messages over an L2TP control channel (the tunnel). (See the “[RFCs](#)” section on [page 13](#) for information on how to access Network Working Group Internet-Drafts.)

The key benefit of the PPPoE Relay feature is end-to-end control of services between the LNS and a PPPoE client.

### RADIUS Subscriber Profile Entry for the LAC

The following example shows how to enter Subscriber Service Switch subscriber service attributes in a AAA RADIUS server profile.

```
profile-1 = profile-name
.
.
.
Cisco:Cisco-Avpair = "sss:sss-service=relay-pppoe"
```

## RADIUS VPDN Group User Profile Entry for the LNS

The following example shows how to enter the VPDN group attributes in a AAA RADIUS server profile.

```
profile-1 = profile-name
.
.
.
Cisco:Cisco-Avpair = "vpdn:relay-pppoe-bba-group=group-name"
```

## How to Enable PPPoE Relay Discovery and Service Selection Functionality

This section contains the following procedures:

- [Configuring the LAC and Tunnel Switch for PPPoE Relay, page 3](#) (required)
- [Configuring the LNS \(or Multihop Node\) to Respond to Relayed PAD Messages, page 4](#) (required)
- [Additional References, page 13](#) (optional)

### Configuring the LAC and Tunnel Switch for PPPoE Relay

Perform this task to configure the LAC and tunnel switch for PPPoE Relay, which configures a subscriber profile that directs PAD messages to be relayed on an L2TP tunnel. The subscriber profile also will contain an authorization key for the outgoing L2TP tunnel.

#### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **subscriber profile** *profile-name*
4. **service relay pppoe vpdn group** *vpdn-group-name*
5. **exit**

#### DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>• Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.

	Command or Action	Purpose
Step 3	<p><b>subscriber profile</b> <i>profile-name</i></p> <p><b>Example:</b> Router(config)# subscriber profile profile-1</p>	<p>Configures the subscriber profile name and enters subscriber profile configuration mode.</p> <ul style="list-style-type: none"> <li><i>profile-name</i>—Is referenced from a PPPoE profile configured by the <b>bba-group pppoe</b> global configuration command, so that all the PPPoE sessions using the PPPoE profile defined by the <b>bba-group pppoe</b> command will be treated according to the defined subscriber profile.</li> </ul>
Step 4	<p><b>service relay pppoe vpdn group</b> <i>vpdn-group-name</i></p> <p><b>Example:</b> Router(config-sss-profile)# service relay pppoe vpdn group Group-A</p>	<p>Provides PPPoE relay service using a VPDN L2TP tunnel for the relay. The VPDN group name specified is used to obtain outgoing L2TP tunnel information.</p> <ul style="list-style-type: none"> <li>See the “<a href="#">What to Do Next</a>” section for the equivalent RADIUS profile entry.</li> </ul>
Step 5	<p><b>exit</b></p> <p><b>Example:</b> Router(config-sss-profile)# exit</p>	<p>(Optional) Ends the configuration session and returns to privileged EXEC mode.</p>

## What to Do Next

Configure the LNS side of the configuration by performing the tasks described in the “[Configuring the LNS \(or Multihop Node\) to Respond to Relayed PAD Messages](#)” section.

## Configuring the LNS (or Multihop Node) to Respond to Relayed PAD Messages

On the router that responds to relayed PAD messages, perform this task to configure a PPPoE group and attach it to a VPDN group that accepts dial-in calls for L2TP. The relayed PAD messages will be passed from the VPDN L2TP tunnel and session to the PPPoE broadband group for receiving the PAD responses.

### SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **vpdn-group** *vpdn-group-name*
4. **accept-dialin**
5. **protocol l2tp**
6. **virtual-template** *template-number*
7. **exit**
8. **terminate-from hostname** *host-name*
9. **relay pppoe bba-group** *pppoe-bba-group-name*
10. **exit**

## DETAILED STEPS

	Command or Action	Purpose
Step 1	<b>enable</b>  <b>Example:</b> Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> <li>Enter your password if prompted.</li> </ul>
Step 2	<b>configure terminal</b>  <b>Example:</b> Router# configure terminal	Enters global configuration mode.
Step 3	<b>vpdn-group</b> <i>vpdn-group-name</i>  <b>Example:</b> Router(config)# vpdn-group Group-A	Creates a VPDN group and enters VPDN group configuration mode.
Step 4	<b>accept-dialin</b>  <b>Example:</b> Router(config-vpdn)# accept-dialin	Configures the LNS to accept tunneled PPP connections from an LAC and creates an accept-dialin VPDN subgroup.
Step 5	<b>protocol l2tp</b>  <b>Example:</b> Router(config-vpdn-req-in)# protocol l2tp	Specifies the L2TP tunneling protocol.
Step 6	<b>virtual-template</b> <i>template-number</i>  <b>Example:</b> Router(config-vpdn-req-in)# virtual-template 2	Specifies which virtual template will be used to clone virtual access interfaces.
Step 7	<b>exit</b>  <b>Example:</b> Router(config-vpdn-req-in)# exit	Exits to VPDN group configuration mode.
Step 8	<b>terminate-from hostname</b> <i>host-name</i>  <b>Example:</b> Router(config-vpdn)# terminate-from hostname LAC-1	Specifies the LAC hostname that will be required when the VPDN tunnel is accepted.

	Command or Action	Purpose
Step 9	<pre>relay pppoe bba-group pppoe-bba-group-name</pre> <p><b>Example:</b> Router(config-vpdn)# relay pppoe bba-group group-2</p>	<p>Specifies the PPPoE BBA group that will respond to the PAD messages.</p> <ul style="list-style-type: none"> <li>The PPPoE BBA group name is defined with the <b>bba-group pppoe group-name</b> global configuration command.</li> <li>See the “<a href="#">Monitoring PPPoE Relay</a>” section for the equivalent RADIUS profile entry.</li> </ul>
Step 10	<pre>exit</pre> <p><b>Example:</b> Router(config-vpdn)# exit</p>	<p>Exits to global configuration mode.</p>

## Monitoring PPPoE Relay

Perform this task to monitor PPPoE Relay.

### DETAILED STEPS

#### Step 1 enable

Enables privileged EXEC mode.

- Enter your password if prompted.

```
Router> enable
```

#### Step 2 show pppoe session

Displays information about currently active PPPoE sessions.

```
Router# show pppoe session
```

```

      1 session in FORWARDED (FWDED) State
      1 session total

Uniq ID  PPPoE  RemMAC          Port          VT  VA          State
      SID  LocMAC
      26   19  0001.96da.a2c0  Et0/0.1      5  N/A  RELFWD
           000c.8670.1006  VLAN:3434
```

#### Step 3 show pppoe relay context all

Displays the PPPoE relay context created for relaying PAD messages.

```
Router# show pppoe relay context all
```

```

Total PPPoE relay contexts 1
UID  ID  Subscriber-profile  State
25   18  cisco.com          RELAYED
```

#### Step 4 clear pppoe relay context

This command clears the PPPoE relay context created for relaying PAD messages.

```
Router# clear pppoe relay context
```

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## Troubleshooting Tips

Use the following commands in privileged EXEC mode to help you troubleshoot the PPPoE Relay feature:

- `debug ppp forwarding`
- `debug ppp negotiation`
- `debug pppoe events`
- `debug pppoe packets`
- `debug vpdn l2x-events`
- `debug vpdn l2x-packets`

# Configuration Examples for Enabling PPPoE Relay Discovery and Service Selection Functionality

This section provides the following configuration examples:

- [PPPoE Relay on LAC Configuration: Example, page 7](#)
- [Basic LNS Configured for PPPoE Relay: Example, page 8](#)
- [Tunnel Switch \(or Multihop Node\) Configured to Respond to PAD Messages: Example, page 10](#)
- [Tunnel Switch Configured to Relay PAD Messages: Example, page 11](#)
- [RADIUS Subscriber Profile Entry for the LAC: Example, page 11](#)
- [RADIUS VPDN Group User Profile Entry for the LNS: Example, page 12](#)

## PPPoE Relay on LAC Configuration: Example

The following is an example of a standard LAC configuration with the commands to enable PPPoE relay added:

```
hostname User2
!
username User1 password 0 field
username User2 password 0 field
username user-group password 0 field
username User5 password 0 field
username User2-lac-domain password 0 field
username User1-client-domain@cisco.net password 0 field
username User3-lns-domain password 0 field
!
ip domain-name cisco.com
!
vpdn enable
vpdn source-ip 10.0.195.151
!
vpdn-group User2-vpdn-group-domain
 request-dialin
```

```

    protocol l2tp
    domain cisco.net
    initiate-to ip 10.0.195.133
    local name User2-lac-domain
    !
    !
interface Loopback123
 ip address 10.22.2.2 255.255.255.0
    !
interface Ethernet0/0
 ip address 10.0.195.151 255.255.255.0
 no keepalive
 half-duplex
 pppoe enable group group_1
 no cdp enable
    !
interface Virtual-Template1
 mtu 1492
 ip unnumbered Loopback123
 ppp authentication chap
 ppp chap hostname User2-lac-domain
    !
ip route 0.0.0.0 0.0.0.0 10.0.195.1
    !
    !
subscriber profile Profile1
 service relay pppoe vpdn group User2-vpdn-group-domain
    !
bba-group pppoe group_1
 virtual-template 1
 service profile Profile1
    !

```

## Basic LNS Configured for PPPoE Relay: Example

The following example shows the basic configuration for an LNS with commands added for PPPoE relay:

```

hostname User5
    !
    !
username User5 password 0 field
username user-group password 0 field
username User1 password 0 field
username User2 password 0 field
username User3 password 0 field
username User3-dialout password 0 cisco
username User2-dialout password 0 cisco
username abc password 0 cisco
username dial-7206a password 0 field
username msgbpgroup password 0 cisco
username User3-lns-domain password 0 field
username User2-lac-domain password 0 field
username User1-client-domain@cisco.net password 0 field
username User5-mh password 0 field
username User1@domain.net password 0 field
ip subnet-zero
    !
    !
ip domain-name cisco.com
    !
vpdn enable

```



```
vpdn multihop
vpdn source-ip 10.0.195.133
!
vpdn-group 1
  request-dialin
  protocol l2tp
!
vpdn-group 2
! Default L2TP VPDN group
  accept-dialin
  protocol l2tp
!
vpdn-group User5-mh
  request-dialin
  protocol l2tp
  domain cisco.net
  initiate-to ip 10.0.195.143
  local name User5-mh
!
vpdn-group User3-vpdn-group-domain
  accept-dialin
  protocol l2tp
  virtual-template 2
  terminate-from hostname User2-lac-domain
  local name User3-lns-domain
  relay pppoe group group_1
!
!
interface Loopback0
  no ip address
!
!
interface Loopback123
  ip address 10.23.3.2 255.255.255.0
!
!
interface FastEthernet0/0
  ip address 10.0.195.133 255.255.255.0
  duplex auto
  speed auto
  no cdp enable
!
!
interface Virtual-Template2
  mtu 1492
  ip unnumbered Loopback123
  ip access-group virtual-access3#234 in
  ppp mtu adaptive
  ppp authentication chap
  ppp chap hostname User3-lns-domain
!
!
ip default-gateway 10.0.195.1
ip classless
ip route 0.0.0.0 0.0.0.0 10.0.195.1
!
!
bba-group pppoe group_1
  virtual-template 2
!
```

## Tunnel Switch (or Multihop Node) Configured to Respond to PAD Messages: Example

The following is an example of a standard tunnel switch configuration with the commands to enable response to PPPoE relay messages added:

```

hostname User3
!
!
username User1 password 0 room1
username User2 password 0 room1
username User3 password 0 room1
username User1@domain.net password 0 room1
username User3-lns-dnis password 0 cisco
username User3-lns-domain password 0 room1
username User2-lac-dnis password 0 cisco
username User2-lac-domain password 0 room1
username User5 password 0 room1
username User5-mh password 0 room1
username user-group password 0 room1
username User3-dialout password 0 cisco
username User2-dialout password 0 cisco
username abc password 0 cisco
username dial-7206a password 0 room1
username msgbpgroup password 0 cisco
username User1-client-domain@cisco.net password 0 room1
username User4-lns-domain password 0 room1
!
ip domain-name cisco.com
!
vpdn enable
!
vpdn-group User3-mh
 accept-dialin
  protocol l2tp
  virtual-template 1
 terminate-from hostname User5-mh
 relay pppoe bba-group group_1
!
interface Loopback0
 ip address 10.4.4.2 255.255.255.0
!
interface Loopback1
 ip address 10.3.2.2 255.255.255.0
!
interface Ethernet2/0
 ip address 10.0.195.143 255.255.0.0
 half-duplex
 no cdp enable
!
interface Virtual-Template1
 mtu 1492
 ip unnumbered Loopback0
 no keepalive
 ppp mtu adaptive
 ppp authentication chap
 ppp chap hostname User3-lns-domain
!
ip default-gateway 10.0.195.1
ip route 0.0.0.0 0.0.0.0 10.0.195.1
!
!
```

```
bba-group pppoe group_1
  virtual-template 1
!
```

## Tunnel Switch Configured to Relay PAD Messages: Example

The following partial example shows a configuration that allows the tunnel switch to relay PAD messages:

```
subscriber profile profile-1
! Configure profile for PPPoE Relay
service relay pppoe vpdn group Sample1.net
.
.
.
vpdn-group Sample2.net
! Configure L2TP tunnel for PPPoE Relay
accept-dialin
  protocol l2tp
.
.
.
terminate-from host Host1
relay pppoe bba-group group-1
.
.
.
vpdn-group Sample1.net
! Configure L2TP tunnel for PPPoE Relay
request-dialin
  protocol l2tp
.
.
.
initiate-to ip 10.17.1.3
.
.
.
! PPPoE-group configured for relay
bba-group pppoe group-1
.
.
.
service profile profile-1
```

## RADIUS Subscriber Profile Entry for the LAC: Example

The following is an example of a typical RADIUS subscriber profile entry for an LAC:

```
cisco.com Password = "password"
Cisco:Cisco-Avpair = "sss:sss-service=relay-pppoe",
Tunnel-Type = L2TP,
Tunnel-Server-Endpoint = . . . . .,
Tunnel-Client-Auth-ID = "client-id",
Tunnel-Server-Auth-ID = "server-id",
Cisco:Cisco-Avpair = "vpdn:l2tp-tunnel-password=password",
Cisco:Cisco-Avpair = "vpdn:l2tp-nosession-timeout=never",
Tunnel-Assignment-Id = assignment-id
```

## RADIUS VPDN Group User Profile Entry for the LNS: Example

The following is an example of a typical RADIUS subscriber profile entry for an LNS:

```
cisco.com Password = "password"  
  Tunnel-Type = L2TP,  
  Tunnel-Server-Endpoint = . . . . .,  
  Tunnel-Client-Auth-ID = "client-id",  
  Tunnel-Server-Auth-ID = "server-id",  
  Cisco:Cisco-Avpair = "vpdn:l2tp-tunnel-password=password",  
  Cisco:Cisco-Avpair = "vpdn:l2tp-nosection-timeout=never",  
  Cisco:Cisco-Avpair = "vpdn:relay-pppoe-bba-group=group-name"  
  Tunnel-Assignment-Id = assignment-id
```

# Additional References

The following sections provide referenced related to the PPPoE Relay feature.

## Related Documents

Related Topic	Document Title
VPDN tunnels	<i>Cisco IOS Dial Technologies Configuration Guide, Release 12.3</i> ; refer to the “Configuring Virtual Private Networks” chapter in the “Virtual Templates, Profiles, and Networks” part
VPDN tunnel commands	<a href="#">Cisco IOS Dial Technologies Command Reference, Release 12.3</a>
Tunnel switching	<i>L2TP Tunnel Switching</i> feature module
PPPoE broadband groups	<i>Cisco IOS Wide-Area Networking Configuration Guide, Release 12.3</i> ; refer to the chapters in the “Broadband Access” part
PPPoE broadband commands	<a href="#">Cisco IOS Wide-Area Networking Command Reference, Release 12.3</a>
Broadband access aggregation concepts	Refer to the “Understanding Broadband Access Aggregation” module.
Tasks for preparing for broadband access aggregation	Refer to the “Preparing for Broadband Access Aggregation” module.

## Standards

Standards	Title
None	—

## MIBs

MIBs	MIBs Link
None	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:  <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a>

## RFCs

RFCs	Title
RFC 2516	“Method for Transmitting PPP Over Ethernet (PPPoE)”
RFC 3817	L2TP Active Discovery Relay for PPPoE Network Working Group Internet-Draft, <i>L2TP Active Discovery Relay for PPPoE</i> , which can be seen at <a href="http://tools.ietf.org/html/draft-dasilva-l2tp-relaysvc-06">http://tools.ietf.org/html/draft-dasilva-l2tp-relaysvc-06</a>

## Technical Assistance

Description	Link
The Cisco Technical Support website contains thousands of pages of searchable technical content, including links to products, technologies, solutions, technical tips, and tools. Registered Cisco.com users can log in from this page to access even more content.	<a href="http://www.cisco.com/techsupport">http://www.cisco.com/techsupport</a>

## Feature Information for Enabling PPPoE Relay Discovery and Service Selection Functionality

Table 10 lists the features in this module and provides links to specific configuration information. Only features that were introduced or modified in Release 12.3(4)T or later releases appear in the table.

Not all commands may be available in your Cisco IOS software release. For details on when support for specific commands was introduced, see the command reference documents.

If you are looking for information on a feature in this technology that is not documented here, see the “[Configuring Broadband Access Aggregation Features Roadmap](#).”

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### Note

Table 10 lists only the Cisco IOS software release that introduced support for a given feature in a given Cisco IOS software release train. Unless noted otherwise, subsequent releases of that Cisco IOS software release train also support that feature.

**Table 10** Feature Information for Enabling PPPoE Relay Discovery and Service Selection Functionality

Feature Name	Releases	Feature Configuration Information
PPPoE Relay	12.3(4)T	<p>The PPPoE Relay feature enables an L2TP access concentrator (LAC) to relay active discovery and service selection functionality for PPP over Ethernet (PPPoE), over a Layer 2 Tunneling Protocol (L2TP) control channel, to an L2TP network server (LNS) or tunnel switch (multihop node).</p> <p>The following sections provide information about this feature:</p> <ul style="list-style-type: none"> <li>“<a href="#">Information About Enabling PPPoE Relay Discovery and Service Selection Functionality</a>” section on page 2</li> <li>“<a href="#">How to Enable PPPoE Relay Discovery and Service Selection Functionality</a>” section on page 3</li> </ul>

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