Configuring PPPoE Client on the Cisco 2600 to Connect to a Non–Cisco DSL CPE

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Introduction

This document explains how to support a Point–to–Point Protocol over Ethernet (PPPoE) Client on Cisco IOS® routers connected via an Ethernet Interface to a DSL modem or the DSL customer premises equipment (CPE) of another vendor.

ISPs often provide their customers with a DSL modem that has one Ethernet interface to connect to the customer Ethernet segment, and another interface for DSL line connectivity. In such a case, the DSL modem only acts as a bridge if the CPE is not configurable for any IP connectivity or enhanced features over DSL. This limits your connectivity to only one PPPoE Client PC. With the addition of a Cisco IOS router connected to the Ethernet of the DSL modem, you can run the PPPoE Client IOS feature on the Cisco router. This can connect multiple PCs on the Ethernet segment connected to the Cisco IOS router. With the use of the Cisco IOS router, you can enhance your DSL connectivities and all IOS features, such as Security, Network Address Translation (NAT) and Dynamic Host Configuration Protocol (DHCP) to internal hosts.

The PPPoE feature allows you to initiate a PPP session on a simple bridging Ethernet connected client. The session is transported over the ATM link via encapsulated Ethernet–bridged frames. You can terminate the session at either a local exchange carrier central office or an ISP point of presence.

Prerequisites

Requirements

There are no specific requirements for this document.

Components Used

The information in this document is based on these software and hardware versions:

- Cisco 827–4V CPE IOS Software Release 12.1(1)XB
- Cisco 2611 router that runs a Cisco IOS Software Release 12.2(2)T1 image
• Cisco 6400 Universal Access Concentrator (UAC) that runs a Cisco IOS Software Release 12.1(5)DC1 image

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

For more information on document conventions, refer to the Cisco Technical Tips Conventions.

Configure

In this section, you are presented with the information used in order to configure the features described in this document.

Note: In order to find additional information on the commands used in this document, use the Command Lookup Tool (registered customers only).

Network Diagram

This document uses the network setup shown in this diagram.

Note: In this document, the PPPoE Client connection is initiated from the Cisco router. This is the Cisco 2611 router in this configuration. The Cisco 827 router in the diagram represents the non–Cisco DSL CPE.

Configurations

This document uses these configurations.

• 2611 Router
• Cisco DSL 827 Router
• Cisco 6400 Router

```
2611 Router

! hostname pooh
ip host rund 172.17.247.195
!```
ip subnet-zero
no ip domain-lookup
!
vpdn enable
no vpdn logging
!
vpdn-group 1
request-dialin
protocol pppoe
!
!
!
interface Ethernet0/0
ip address 10.200.56.22 255.255.255.0
ip nat inside
no ip mroute-cache
!
!
!
interface Ethernet0/1
no ip address
pppoe enable
pppoe-client dial-pool-number 1
!
interface Dialer1
ip address negotiated
ip nat outside
ip mtu 1492
encapsulation ppp
no ip mroute-cache
dialer pool 1
dialer-group 1
ppp authentication pap
ppp pap sent-username cisco password cisco1
!
ip classless
no ip http server
!
dialer-list 1 protocol ip permit
ip nat inside source list 1 interface Dialer1 overload
ip route 0.0.0.0 0.0.0.0 0.0.0.0 dialer1
access-list 1 permit 10.200.56.0 0.0.0.255
!
line con 0
exec-timeout 0 0
transport input none
line vty 0 4
login
password ww
!
end

Cisco DSL 827 Router
Building configuration...
Current configuration : 821 bytes
!
version 12.2
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Chansey
!
!
ip subnet-zero
no ip domain-lookup
!
!
interface Ethernet0
 no ip address
 bridge-group 1
!
interface ATM0
 no ip address
 no atm ilmi-keepalive
 bundle-enable
 bridge-group 1
 dsl operating-mode auto
!
interface ATM0.1 point-to-point
 pvc 53/53
!--- vpi/vci given by the ISP
!
!
ip classless
ip http server
!
bridge 1 protocol ieee
!
line con 0
 exec-timeout 0 0
 stopbits 1
line vty 0 4
 exec-timeout 0 0
 password ww
 login local
!
scheduler max-task-time 5000
end

Cisco 6400 Router

Current configuration : 3231 bytes
!
version 12.1
no service single-slot-reload-enable
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname alyssa_nrpl
!
logging rate-limit console 10 except errors
aaa new-model
aaa authentication ppp default local
enable password ww
!
username cisco password cisc01
redundancy
main-cpu
auto-sync standard
no secondary console enable
ip subnet-zero
ip cef
vpdn enable
no vpdn logging
!
vpdn-group cisco
accept-dialin
protocol pppoe
virtual-template 2
!
!
!
!
!
!
interface Loopback5
ip address 212.93.195.100 255.255.255.0
!
!
interface ATM0/0/0
no ip address
no ip mroute-cache
load-interval 30
atm pvc 16 0 16 ilmi
no atm ilmi-keepalive
pvc 10/100
!
hold-queue 1000 in
!
interface ATM0/0/0.60 multipoint
pvc 6/60
encapsulation aal5snap
protocol pppoe
!
!
interface Ethernet0/0/1
no ip address
!
interface Ethernet0/0/0
ip address 10.200.56.8 255.255.255.0
!
interface FastEthernet0/0/0
no ip address
full-duplex
!
!
interface Virtual-Template2
ip unnumbered Loopback5
ip mtu 1492
no ip route-cache cef
peer default ip address pool nrp1
ppp authentication pap
!
ip local pool nrp1 212.93.198.1
ip classless
!
!
line con 0
exec-timeout 0 0
password ww
transport input none
line aux 0
line vty 0 4
exec-timeout 0 0
password ww
!
!
end
Verify

This section provides information you can use in order to confirm your configuration works properly.

Certain show commands are supported by the Output Interpreter Tool (registered customers only), which allows you to view an analysis of show command output.

- show vpdn session all Displays VPDN session information. This information includes interface, tunnel, username, packets, status, and window statistics.
- show interface ethernet 0/1 Displays information about the Ethernet interface on the router.
- show interfaces dialer 1 Displays information about the dialer on the router.
- show ip local pool nrp1 Displays information about the ip local pool.
- show ip route Displays information about the IP route on the router.

This is the show vpdn session all command output on the Cisco 2611.

```
pooh#show vpdn session all
%No active L2TP tunnels
%No active L2F tunnels
%No active PPTP tunnels
PPPoE Session Information Total tunnels 1 sessions 1
  session id: 1
  !--- Local MAC address.
  local MAC address: 0030.9424.af21,
  remote MAC address: 0050.736f.4c37
  virtual access interface: Vi1, outgoing interface: Et0/1
  599 packets sent, 599 received
  9202 bytes sent, 8154 received

  !--- Verify that the outgoing interface for the PPPoE session
  !--- is Ethernet0/1 and the local MAC address that displays is the
  !--- MAC address of Ethernet0/1. The remote MAC address that displays
  !--- is the MAC address of the Aggregator device (6400).
  !--- You can see it on the 6400 as the local MAC address in the
  !--- show vpdn session on the 6400.
```

This is the show interface ethernet 0/1 command output on the Cisco 2611.

```
pooh#show interface ethernet 0/1
Ethernet0/1 is up, line protocol is up
Hardware is AmdP2, address is 0030.9424.af21 (bia 0030.9424.af21
MTU 1500 bytes, BW 10000 Kbit, DLY 1000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ARPA, loopback not set
Keepalive set (10 sec)
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:40, output 00:00:01, output hang never
Last clearing of "show interface" counters never
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
739 packets input, 64127 bytes, 0 no buffer
Received 57 broadcasts, 0 runts, 0 giants, 0 throttles
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
  0 input packets with dribble condition detected
1153 packets output, 89766 bytes, 0 underruns(1/0/0)
  0 output errors, 1 collisions, 1 interface resets
```
This is the `show interfaces dialer 1` command output on the Cisco 2611.

```
pooh#show interfaces dialer 1
Dialer1 is up, line protocol is up (spoofing)
Hardware is Unknown
Internet address is 212.93.198.1/32
MTU 1500 bytes, BW 56 Kbit, DLY 20000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
DTR is pulsed for 1 seconds on reset
Interface is bound to Vi1
Last input never, output never, output hang never
Last clearing of "show interface" counters 01:38:43
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: weighted fair
Output queue: 0/1000/64/0 (size/max total/threshold/drops)
Conversations 0/0/16 (active/max active/max total)
Reserved Conversations 0/0 (allocated/max allocated)
Available Bandwidth 42 kilobits/sec
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
403 packets input, 6082 bytes
403 packets output, 6978 bytes
Bound to:
Virtual−Access1 is up, line protocol is up
Hardware is Virtual Access interface
MTU 1500 bytes, BW 100000 Kbit, DLY 100000 usec,
reliability 255/255, txload 1/255, rxload 1/255
Encapsulation PPP, loopback not set
Keepalive set (10 sec)
Interface is bound to Di1 (Encapsulation PPP)
LCP Open
Listen: CDPCP
Open: IPCP
Last input 00:00:09, output never, output hang never
Last clearing of "show interface" counters 00:35:16
Queueing strategy: fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
430 packets input, 6453 bytes, 0 no buffer
Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
430 packets output, 7400 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
0 carrier transitions
```

This is the `show vpdn session all` command output on the Cisco 6400.

```
alyssa_nrp1#show vpdn session all
%No active L2TP tunnels
%No active L2F tunnels
%No active PPTP tunnels
PPPoE Session Information Total tunnels 1 sessions 1
session id: 1
local MAC address: 0050.736f.4c37, remote MAC address: 0030.9424.af21
virtual access interface: Vi3, outgoing interface: AT0/0/0, vc: 6/60
495 packets sent, 494 received
7369 bytes sent, 7346 received
```
This is the `show ip local pool nrp1` command output on the Cisco 6400.

```
alyssa_nrp1#show ip local pool nrp1
Pool               Begin           End             Free  In use
nrp1               212.93.198.1    212.93.198.1       0       1
Available addresses:
None
Inuse addresses:
212.93.198.1       Vi3                         nrp1
```

This is the `show ip route` command output on the Cisco 6400.

```
alyssa_nrp1#show ip route
Codes: C − connected, S − static, I − IGRP, R − RIP, M − mobile, B − BGP
D − EIGRP, EX − EIGRP external, O − OSPF, IA − OSPF inter area
N1 − OSPF NSSA external type 1, N2 − OSPF NSSA external type 2
E1 − OSPF external type 1, E2 − OSPF external type 2, E − EGP
i − IS-IS, L1 − IS-IS level-1, L2 − IS-IS level-2, ia − IS-IS inter area
* − candidate default, U − per-user static route, o − ODR
P − periodic downloaded static route
Gateway of last resort is 0.0.0.0 to network 0.0.0.0
212.93.198.0/32 is subnetted, 1 subnets
C       212.93.198.1 is directly connected, Virtual-Access3

!−−−− You have to see the installed route for the remote PPPoE session.

C 212.93.195.0/24 is directly connected, Loopback5
10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C 10.200.56.0/24 is directly connected, Ethernet0/0/0
```

**Troubleshoot**

This section provides information you can use to troubleshoot your configuration.

**Troubleshooting Commands**

Certain `show` commands are supported by the Output Interpreter Tool (registered customers only), which allows you to view an analysis of `show` command output.

**Note:** Before you issue `debug` commands, refer to Important Information on Debug Commands.

- `show debugging` Displays debugging information on the router.

This is the `show debugging` command output on the Cisco 2611.

```
pooh#show debugging
PPP:
PPP protocol negotiation debugging is on
VPN:
PPPoE protocol events debugging is on
PPPoE control packets debugging is on
01:54:21: Sending PADI: Interface = Ethernet0/1
01:54:21: pppoe_send_padi:
FF FF FF FF FF FF FF 00 30 94 24 AF 21 88 63 11 09
00 00 00 0C 01 01 00 00 01 03 00 04 82 2E 39 F0
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ...
01:54:21: PPPoE 0: 1 PADO L:0030.9424.af21 R:0050.736f.4c37 Et0/1
00 30 94 24 AF 21 00 50 73 6F 4C 37 88 63 11 07
00 00 00 2F 01 01 00 00 01 03 00 04 82 2E 39 F0
01 02 00 0B 61 6C 79 73 73 61 5F 72 70 31 ...
```
01:54:23: PPoE: we've got our pado and the pado timer went off
01:54:23: OUT PADR from PPPoE tunnel
01:54:23: 00 50 73 6F 4L 37 00 30 94 24 AF 21 88 63 11 19
01:54:23: 00 01 00 OB 61 6C 79 73 73 61 5F 6E 70 31 ...
01:54:23: PPPoE: I PADS L:0030.9424.af21 R:0050.736f.4c37 Et0/1
01:54:23: 00 01 00 OB 61 6C 79 73 73 61 5F 6E 70 31 ...
01:54:23: IN PADS from PPPoE tunnel
01:54:23: 01:54:23: Vi1 Debug: Condition 1, interface Di1 triggered, count 1
01:54:23: %DIALER−6−BIND: Interface Vi1 bound to profile Di1
01:54:23: PPPoE: Virtual Access interface obtained.
01:54:23: IN PADS from PPPoE tunnel
01:54:23: Vi1 PPP: Treating connection as a callout
01:54:23: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
01:54:23: Vi1 PPP: No remote authentication for call-out
01:54:23: Vi1 PPP: Time is AUTHENTICATING, by the peer [0 sess, 0 load]
01:54:23: Vi1 PPP: Install negotiated IP interface address 212.93.198.1
01:54:23: Di1 IPCP: Install route to 212.93.195.100
01:54:26: %LINEPROTO−5−UPDOWN: Line protocol on Interface Virtual−Access1, changed state to up
This is the show debugging command output on the Cisco 6400.

*Aug 16 15:58:51.346: PPPoE: IN PADI discovery packet
A70/0/0.60
FF FF FF FF FF 00 30 94 24 AF 21 88 63 11 09
00 00 00 0C 01 01 00 01 03 00 04 82 2E 3F F0
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 ...
*Aug 16 15:58:51.346: PPPoE: PADO OUT from PPPoE tunnel
AT0/0/0.60
00 05 09 00 AA AA 03 00 80 C2 00 07 00 00 00 30
94 24 AF 21 00 50 73 6F 4C 37 88 63 11 07 00 00
00 2F 01 01 00 00 01 03 00 04 82 2E 3F F0 01 ...
*Aug 16 15:58:53.390: PPPoE: IN PADR discovery packet
AT0/0/0.60
00 50 73 6F 4C 37 00 30 94 24 AF 21 88 63 11 19
00 00 00 2F 01 01 00 01 03 00 04 82 2E 3F F0
01 02 00 0B 61 6C 79 73 73 61 5F 6E 70 31 ...
*Aug 16 15:58:53.394: Vi3 PPP: Phase is DOWN, Setup [0 sess, 0 load]
*Aug 16 15:58:53.418: PPPoE: Create session: 1
AT0/0/0.60
*Aug 16 15:58:53.418: PPPoE: PADS OUT from PPPoE tunnel
AT0/0/0.60
00 05 09 00 AA AA 03 00 80 C2 00 07 00 00 00 30
94 24 AF 21 00 50 73 6F 4C 37 88 63 11 07 00 00
00 2F 01 01 00 00 01 03 00 04 82 2E 3F F0 01 ...
*Aug 16 15:58:53.426: Vi3 PPP: Treating connection as a dedicated line
*Aug 16 15:58:53.426: Vi3 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
*Aug 16 15:58:53.426: Vi3 LCP: O CONFREQ [Closed] id 1 len 18
*Aug 16 15:58:53.426: Vi3 LCP: MRU 1492 (0x010405D4)
*Aug 16 15:58:53.426: Vi3 LCP: AuthProto PAP (0x0304C023)
*Aug 16 15:58:53.426: Vi3 LCP: MagicNumber 0x5C7E3144 (0x05065C7E3144)
*Aug 16 15:58:53.426: Vi3 LCP: I CONFREQ [REQsent] id 1 len 10
*Aug 16 15:58:53.426: Vi3 LCP: MagicNumber 0x31017223 (0x050631017223)
*Aug 16 15:58:53.426: Vi3 LCP: O CONFACK [REQsent] id 1 len 10
*Aug 16 15:58:53.426: Vi3 LCP: I CONFNAK [ACKsent] id 1 len 8
*Aug 16 15:58:53.426: Vi3 LCP: MRU 1500 (0x010405DC)
*Aug 16 15:58:53.426: Vi3 LCP: O CONFREQ [ACKsent] id 2 len 18
*Aug 16 15:58:53.426: Vi3 LCP: MRU 1500 (0x010405DC)
*Aug 16 15:58:53.426: Vi3 LCP: AuthProto PAP (0x0304C023)
*Aug 16 15:58:53.426: Vi3 LCP: MagicNumber 0x5C7E3144 (0x05065C7E3144)
*Aug 16 15:58:53.426: Vi3 LCP: I CONFACK [ACKsent] id 2 len 18
*Aug 16 15:58:53.426: Vi3 LCP: MRU 1500 (0x010405DC)
*Aug 16 15:58:53.426: Vi3 LCP: AuthProto PAP (0x0304C023)
*Aug 16 15:58:53.426: Vi3 LCP: MagicNumber 0x5C7E3144 (0x05065C7E3144)
*Aug 16 15:58:53.426: Vi3 LCP: State is Open
*Aug 16 15:58:53.510: Vi3 PPP: Phase is AUTHENTICATING, by this end [0 sess, 0 load]
*Aug 16 15:58:53.514: Vi3 PPP: Phase is FORWARDING [0 sess, 0 load]
*Aug 16 15:58:53.514: Vi3 PPP: Phase is AUTHENTICATING [0 sess, 0 load]
*Aug 16 15:58:53.514: Vi3 PPP: Phase is AUTHENTICATING [0 sess, 0 load]
*Aug 16 15:58:53.514: Vi3 PPP: Phase is UP [0 sess, 0 load]
*Aug 16 15:58:53.514: Vi3 IPCP: O CONFREQ [Closed] id 1 len 10
*Aug 16 15:58:53.514: Vi3 IPCP: Address 212.93.195.100 (0x0306D45DC364)
*Aug 16 15:58:53.574: Vi3 IPCP: I CONFREQ [REQsent] id 1 len 10
*Aug 16 15:58:53.574: Vi3 IPCP: Address 0.0.0.0 (0x0306D0000000)
*Aug 16 15:58:53.574: Vi3 IPCP: Pool returned 212.93.198.1
*Aug 16 15:58:53.574: Vi3 IPCP: O CONFNAK [REQsent] id 1 len 10
*Aug 16 15:58:53.574: Vi3 IPCP:    Address 212.93.198.1 (0x0306D45DC601)
*Aug 16 15:58:53.574: Vi3 CDPCP: I CONFREQ [Not negotiated] id 1 len 4
*Aug 16 15:58:53.574: Vi3 LCP: O PROTREJ [Open] id 3 len 10 protocol CDPCP (0x820701010004)
*Aug 16 15:58:53.574: Vi3 IPCP: I CONFWATES [REQsent] id 1 len 10
*Aug 16 15:58:53.574: Vi3 IPCP:    Address 212.93.195.100 (0x0306D45DC364)
*Aug 16 15:58:53.618: Vi3 IPCP:    Address 212.93.198.1 (0x0306D45DC601)
*Aug 16 15:58:53.618: Vi3 IPCP:    Address 212.93.198.1 (0x0306D45DC601)
*Aug 16 15:58:53.618: Vi3 IPCP: State is Open
*Aug 16 15:58:53.622: Vi3 IPCP: Install route to 212.93.198.1
2d08h: %LINEPROTO−5−UPDOWN: Line protocol on Interface Virtual−Access3, changed state to up

Related Information

- Configuring the Cisco 827 Router
- Cisco 6400 Carrier−Class Broadband Aggregator
- Cisco DSL Technology Support Information
- Technical Support – Cisco Systems

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