

# Troubleshoot VDSL

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## Introduction

This document describes how to configure your Cisco Digital Subscriber Line (DSL) Customer Premise Equipment (CPE) Router for Very High Bit Rate Digital Subscriber Line (VDSL) service. It explains how to troubleshoot VDSL related issues on the Cisco 880 Series, 890 Series, 860 Series, and VDSL/ Asynchronous Digital Subscriber Line (ADSL) Enhanced High Speed WAN interface cards (EHWICs). This document is very specific to VDSL service, though you can have either ADSL or VDSL service on the above mentioned routers and modules. There are three layers in which the failure can occur:

- Layer 1 - DSL physical connectivity to your ISP's Digital Subscriber Line Access Multiplexer (DSLAM)
- Layer 2.1 - Ethernet end-to-end connectivity
- Layer 2.2 - Point-to-Point Protocol over Ethernet (PPPoE), IP over Ethernet (IPoE), RFC1483 Bridging, or RFC1483 Routing
- Layer 3 - IP

# Prerequisites

## Requirements

There are no specific requirements for this document.

## Components Used

This document is not restricted to specific software and hardware versions.

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.

## Layer 1 Issues

### Is the carrier detect (CD) light on the front panel of the Cisco DSL Router on or off?

If the CD light is on, go to the Layer 2 Issues section of this document.

If the CD light is off, continue with the next question.

### Does your ISP use a DSLAM that supports the Broadcom chipset?

Verify the information from your ISP. Check the DSLAM interoperability for the router model or card that refers to the data sheet.

### Is the DSL port on the back of the Cisco DSL router plugged into the DSL wall jack?

If the DSL port is not plugged into the DSL wall jack, connect the port to the wall with a straight-through RJ-11 cable. This is a standard telephone cable. VDSL lines use pins 3 and 4.

### What is the controller status, operating mode, and Transmission Coverage (TC) mode?

See this sample output:

```
Router#show controller vdsl 0/1/0
```

```
!--- Make sure the controller is in UP state. In case you see it in down state,  
it indicates a Layer 1 issue (Hardware issue, Line issue, Interoperability  
issue with DSLAM etc.)
```

```
Controller VDSL 0/1/0 is UP
```

Daemon Status: Up

!--- XTU-R and XTU-C shows local (Cisco Router) and remote (DSLAM) DSL related details like chipset vendor, Vendor ID etc.

	XTU-R (DS)	XTU-C (US)
Chip Vendor ID:	'BDCM'	'BDCM'
Chip Vendor Specific:	0x0000	0xA1AA
Chip Vendor Country:	0xB500	0xB500
Modem Vendor ID:	'CSCO'	' '
Modem Vendor Specific:	0x4602	0x0000
Modem Vendor Country:	0xB500	0x0000
Serial Number Near:	FOC15163V2Q 2911/K9 15.5(1)T	
Serial Number Far:		
Modem Version Near:	15.5(1)T	
Modem Version Far:	0xalaa	

Modem Status: TC Sync (Showtime!)

!--- Below shows the configured DSL operating mode, trained mode and TC mode.

DSL Config Mode: AUTO  
Trained Mode: G.993.2 (VDSL2) Profile 17a  
TC Mode: PTM  
Selftest Result: 0x00  
DELT configuration: disabled  
DELT state: not running

Full inits: 1  
Failed full inits: 0  
Short inits: 0  
Failed short inits: 0

!--- DSL firmware related details

Firmware	Source	File Name
VDSL	embedded	VDSL_LINUX_DEV_01212008

Modem FW Version: 130205\_1433-4.02L.03.B2pvC035j.d23j  
Modem PHY Version: B2pvC035j.d23j  
Trellis: ON ON  
SRA: disabled disabled  
SRA count: 0 0  
Bit swap: enabled enabled  
Bit swap count: 0 0

!--- Attenuation and Noise margin are two important parameters which points to the line quality and intern the stability of the DSL connection

Line Attenuation:	0.0 dB	0.0 dB					
Signal Attenuation:	0.0 dB	0.0 dB					
Noise Margin:	11.1 dB	6.0 dB					
Attainable Rate:	40440 kbits/s	3280 kbits/s					
Actual Power:	14.5 dBm	4.9 dBm					
Per Band Status:	D1	D2	D3	U0	U1	U2	U3
Line Attenuation(dB):	20.0	48.3	73.7	9.4	37.9	56.2	N/A
Signal Attenuation(dB):	20.0	48.3	N/A	10.2	36.2	53.3	N/A
Noise Margin(dB):	10.9	11.3	N/A	5.9	6.0	6.0	N/A
Total FECC:	97252	0					
Total ES:	7	0					
Total SES:	0	0					
Total LOSS:	0	0					
Total UAS:	24	24					
Total LPRS:	0	0					

```
Total LOFS:      0          0
Total LOLS:      0          0
```

!--- DSL trained speed can be found below

```
DSChannel1  DSChannel0  US Channel1  US Channel0
Speed (kbps):      0          25087          0          3192
SRA Previous Speed:  0          0          0          0
Previous Speed:    0          0          0          0
Reed-Solomon EC:   0          97252          0          0
CRC Errors:        0          15          0          0
Header Errors:     0          62          0          0
Interleave (ms):   0.00        8.00        0.00        8.00
Actual INP:        0.00        3.01        0.00        2.00
```

```
Training Log :      Stopped
Training Log Filename :  flash:vdsllog.bin
```

Router#

Check for these in the **show controller** command output:

- The controller status is "UP". If it is in the "Down" state, it indicates a Layer 1 issue (hardware issue, line issue, or interoperability issue with DSLAM). Proceed with Layer 1 troubleshooting in this case.
- Check the operating mode, trained mode, and TC mode. Make sure you have the correct operating mode configured under the controller. Cisco recommends that you use DSL operating-mode auto if you are not sure what Discrete Multi-Tone (DMT) technology your ISP uses. These are the commands to configure operating mode autodetection:

```
Router#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Router(config)#controller vdsl 0
```

```
Router(config-controller)#operating-mode auto
```

```
Router(config-controller)#end
```

```
Router#write memory
```

Look at the trained mode and make sure you have the correct mode negotiated with the ISP. Another important parameter to look at is the TC mode. In case the training mode is VDSL2 or VDSL2+, the TC mode will be Packet Transfer Mode (PTM). In this case, you need to see the PTM Ethernet interface in the "up" state and all the upper layer parameters such as PPP, IP, and so on should be configured under the Ethernet interface. If the trained mode is ADSL, ADSL2, or ADSL2+, the TC mode should be ATM and all the upper layer parameters should be configured under the ATM Permanent Virtual Circuit (PVC) in this case. If you change the operating mode between ADSL and VDSL, you might not need to reboot the router in order to activate the corresponding Ethernet or ATM interfaces.

Check the noise margin and attenuation. Noise margin is the relative strength of the DSL signal to noise ratio. The higher the number the better for this measurement:

- 6dB or below is bad and will experience no synch or intermittent synch problems
- 7dB-10dB is fair, but does not leave much room for variances in conditions
- 11dB-20dB is good with little or no synch problems
- 20dB-28dB is excellent

- 29dB or above is outstanding

Attenuation is a measure of how much the signal has degraded between the DSLAM and the modem. This is largely a function of the distance from the exchange. The lower the dB the better for this measurement.

- 20dB and below is outstanding
- 20dB-30dB is excellent
- 30dB-40dB is very good
- 40dB-50dB is good
- 50dB-60dB is poor and might experience connectivity issues
- 60dB or above is bad and will experience connectivity issues

Make sure you have one of the latest versions of VDSL firmware. The latest firmware has a fix for most of the known interoperability issues. You can download the latest firmware from CCO.

Verify the DSL is in sync with proper upstream and downstream speeds.

## Do you have the correct router model?

Note that the ADSL/VDSL routers come in two versions; 1) DSL over Plain Old Telephone Service (Annex-A) and 2) DSL over Integrated Services Digital Network (Annex-B). In some countries, ISPs provide an Annex-B connection, while in most others it is Annex-A. An Annex-A DSL Router or card will not sync with an Annex-B line and vice versa. Hence you need to make sure that you have the right router model in place. See the router datasheet for more information.

## Is the circuit tested/provisioned correctly?

Obtain this information from your ISP or telephone company.

## Layer 2 Issues

### Is the PTM Ethernet up?

Once it is verified that the trained mode is VDSL, make sure the Ethernet interface is in the "up" state.

```
Router#show ip interface brief
Interface                IP-Address      OK? Method Status          Protocol
Embedded-Service-Engine0/0 unassigned      YES NVRAM    administratively down down
GigabitEthernet0/0       unassigned      YES NVRAM    up              up
GigabitEthernet0/0.1     unassigned      YES unset    up              up
GigabitEthernet0/1       unassigned      YES NVRAM    administratively down down
GigabitEthernet0/2       192.168.22.1   YES NVRAM    up              up
ISM0/1                   unassigned      YES unset    up              up
ATM0/1/0                 unassigned      YES NVRAM    administratively down down
!--- Verify that the Ethernet interface is in up state
Ethernet0/1/0            unassigned      YES NVRAM    up              up
```

### Does the provider expect tagged traffic? If yes, what is the Virtual LAN Identifier (VLAN ID)?

Most of the providers expect tagged traffic from the Customer Premise Equipment (CPE). You can

configure the VLAN tagging as shown here after you get the VLAN ID from your ISP.

```
Router(config)#interface Ethernet0.835

Router(config-subif)#encapsulation dot1Q 835

Router(config-subif)#end

Router#
```

## Is the Address Resolution Protocol (ARP) entry populated?

Determine if the MAC address of the remote is in the **show arp** command output.

## Do you receive data from your ISP?

If you have the correct VLAN ID, the next step is to verify your attempt to negotiate Point to Point Protocol (PPP) with your ISP. In order to do this, enter the command **show interface Ethernet0** and check the input and output packets.

```
Router#show interface ethernet0
Ethernet0/1/0 is up, line protocol is up
Hardware is VDSL_ETHERNET, address is 30f7.0d7e.3408 (bia 30f7.0d7e.3408)
MTU 1500 bytes, BW 3261 Kbit/sec, DLY 3000 usec,
    reliability 255/255, txload 19/255, rxload 1/255
Encapsulation 802.1Q Virtual LAN, Vlan ID 1., loopback not set
Keepalive set (10 sec)
ARP type: ARPA, ARP Timeout 04:00:00
Last input 00:00:19, output 00:00:00, output hang never
Last clearing of "show interface" counters never
Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
Queueing strategy: fifo
Output queue: 0/1024 (size/max)
5 minute input rate 23000 bits/sec, 19 packets/sec
5 minute output rate 244000 bits/sec, 29 packets/sec
    3096276 packets input, 3672318911 bytes, 0 no buffer
    Received 0 broadcasts (1517324 IP multicasts)
    0 runs, 0 giants, 1 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
    0 input packets with dribble condition detected
    1287646 packets output, 240862302 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 unknown protocol drops
    0 babbles, 0 late collision, 0 deferred
    1 lost carrier, 0 no carrier
    0 output buffer failures, 0 output buffers swapped out

Router#show controller vdsl 0 datapath
ptm0          Link encap:Ethernet  HWaddr 02:10:18:01:00:02
              UP BROADCAST RUNNING MULTICAST  MTU:1600  Metric:1
              RX packets:3111732 errors:0 dropped:0 overruns:0 frame:0
              TX packets:1311107 errors:0 dropped:0 overruns:0 carrier:0
              collisions:0 txqueuelen:1000
              RX bytes:3677814427 (3.4 GiB)  TX bytes:265796876 (253.4 MiB)

atm/ptm interface statistics for port 0
in octets          4983267
out octets        27636440
```

<b>in packets</b>	<b>16376</b>
<b>out packets</b>	<b>26024</b>
in OAM cells	0
out OAM cells	0
in ASM cells	0
out ASM cells	0
in packet errors	0
in cell errors	0

If the packet counters increment, you should receive PPP negotiation packets from your ISP. If this is not the case, call your ISP.

If the output bound counters increment, you should send PPP negotiation packets. If this is not the case, check the configuration on the router. If PPP is configured properly, PPP negotiation packets are continually sent out the Ethernet0 interface.

## Does the PPP negotiate properly?

If Layer 1 is up and you have the correct VLAN ID, the next step is to make sure PPP comes up properly. In order to accomplish this, you need to run a series of **debug** commands on the Cisco DSL Router and interpret the output. The primary debug command you use is **debug ppp negotiation**. This command output is an example of a successful PPP negotiation:

```
Router#debug ppp negotiation
```

```
PPP protocol negotiation debugging is on
```

```
Router#
```

```
2w3d: Vi1 PPP: No remote authentication for call-out
2w3d: Vi1 PPP: Phase is ESTABLISHING
2w3d: Vi1 LCP: O CONFREQ [Open] id 146 len 10
2w3d: Vi1 LCP: MagicNumber 0x8CCF0E1E (0x05068CCF0E1E)
2w3d: Vi1 LCP: O CONFACK [Open] id 102 Len 15
2w3d: Vi1 LCP: AuthProto CHAP (0x0305C22305)
2w3d: Vi1 LCP: MagicNumber 0xD945AD0A (0x0506D945AD0A)
2w3d: Di1 IPCP: Remove route to 10.10.10.1
2w3d: Vi1 LCP: I CONFACK [ACKsent] id 146 Len 10
2w3d: Vi1 LCP: MagicNumber 0x8CCF0E1E (0x05068CCF0E1E)
2w3d: Vi1 LCP: State is Open
2w3d: Vi1 PPP: Phase is AUTHENTICATING, by the peer
2w3d: Vi1 CHAP: I CHALLENGE id 79 Len 33 from "6400-2-NRP-2"
2w3d: Vi1 CHAP: O RESPONSE id 79 Len 28 from "John"
2w3d: Vi1 CHAP: I SUCCESS id 79 Len 4
2w3d: Vi1 PPP: Phase is UP
2w3d: Vi1 IPCP: O CONFREQ [Closed] id 7 Len 10
2w3d: Vi1 IPCP: Address 0.0.0.0 (0x030600000000)
2w3d: Vi1 IPCP: I CONFREQ [REQsent] id 4 Len 10
2w3d: Vi1 IPCP: Address 10.10.10.1 (0x030614140201)
2w3d: Vi1 IPCP: O CONFACK [REQsent] id 4 Len 10
2w3d: Vi1 IPCP: Address 10.10.10.1 (0x030614140201)
2w3d: Vi1 IPCP: I CONFNAK [ACKsent] id 7 Len 10
2w3d: Vi1 IPCP: Address 10.1.1.1 (0x030628010102)
2w3d: Vi1 IPCP: O CONFREQ [ACKsent] id 8 Len 10
2w3d: Vi1 IPCP: Address 10.1.1.1 (0x030628010102)
2w3d: Vi1 IPCP: I CONFACK [ACKsent] id 8 Len 10
2w3d: Vi1 IPCP: Address 10.1.1.1 (0x030628010102)
2w3d: Vi1 IPCP: State is Open
2w3d: Di1 IPCP: Install negotiated IP interface address 10.1.1.1
2w3d: Di1 IPCP: Install route to 10.10.10.1
Router#
```

There are four main points of failure in a PPP negotiation:

- No response from the remote device (your ISP)
- Link Control Protocol (LCP) not open
- Authentication failure
- IP Control Protocol (IPCP) failure

## No Response from Your ISP

If your ISP does not respond, this should not be a problem since you already verified that packets increment on the Ethernet0 interface in the inbound direction. However, if packets increment on Ethernet0 in the inbound direction, and you receive this when you run **debug ppp negotiation**, contact your ISP in order to verify that packets are sent to the Cisco DSL Router.

```
Router#debug ppp negotiation
```

```
*Mar 1 04:04:50.718: Vi1 PPP: Treating connection as a callout
*Mar 1 04:04:50.718: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 0 load]
*Mar 1 04:04:50.718: Vi1 PPP: No remote authentication for call-out
*Mar 1 04:04:50.722: Vi1 LCP: O CONFREQ [Closed] id 1 Len 10
```

```
!--- "O" specifies an outbound packet
```

```
*Mar 1 04:04:50.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
*Mar 1 04:04:52.722: Vi1 LCP: TIMEOUT: State REQsent
*Mar 1 04:04:52.722: Vi1 LCP: O CONFREQ [REQsent] id 2 Len 10
```

```
!--- "O" specifies an outbound packet
```

```
*Mar 1 04:04:52.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
*Mar 1 04:04:54.722: Vi1 LCP: TIMEOUT: State REQsent
*Mar 1 04:04:54.722: Vi1 LCP: O CONFREQ [REQsent] id 3 Len 10
*Mar 1 04:04:54.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
*Mar 1 04:04:56.722: Vi1 LCP: TIMEOUT: State REQsent
*Mar 1 04:04:56.722: Vi1 LCP: O CONFREQ [REQsent] id 4 Len 10
*Mar 1 04:04:56.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
*Mar 1 04:04:58.722: Vi1 LCP: TIMEOUT: State REQsent
*Mar 1 04:04:58.722: Vi1 LCP: O CONFREQ [REQsent] id 5 Len 10
*Mar 1 04:04:58.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
*Mar 1 04:05:00.722: Vi1 LCP: TIMEOUT: State REQsent
*Mar 1 04:05:00.722: Vi1 LCP: O CONFREQ [REQsent] id 6 Len 10
*Mar 1 04:05:00.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
*Mar 1 04:05:02.722: Vi1 LCP: TIMEOUT: State REQsent
*Mar 1 04:05:02.722: Vi1 LCP: O CONFREQ [REQsent] id 7 Len 10
```

```
!--- "O" specifies an outbound packet
```

```
*Mar 1 04:05:02.722: Vi1 LCP: MagicNumber 0x317722F4 (0x0506317722F4)
```

```
Router#undebg all
```

In this output there are only **O** packets, which are outbound packets. In order to successfully negotiate PPP, there should be an **I** inbound packet from your ISP for each **O** packet sent. If packets increment inbound, but you do not see **I** packets, contact your ISP in order to verify the packets that are sent to the Cisco DSL Router.

## LCP Not Open

If the LCP is not open, this is usually caused by a mismatch in PPP options. This mismatch occurs



when the Cisco DSL Router has a PPP parameter configured that your ISP does not support, or when your ISP has a parameter configured that the Cisco DSL Router does not support. This output shows an example of a PPP option mismatch:

```
Router#debug ppp negotiation
*Mar 1 04:52:43.254: Vi1 PPP: Treating connection as a callout
*Mar 1 04:52:43.258: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
*Mar 1 04:52:43.258: Vi1 PPP: No remote authentication for call-out
*Mar 1 04:52:43.258: Vi1 LCP: O CONFREQ [Closed] id 3 len 10
*Mar 1 04:52:43.262: Vi1 LCP: MagicNumber 0x31A2F808 (0x050631A2F808)
*Mar 1 04:52:43.310: Vi1 LCP: I CONFREQ [REQsent] id 180 Len 14
*Mar 1 04:52:43.310: Vi1 LCP: AuthProto PAP (0x0304C023)
*Mar 1 04:52:43.310: Vi1 LCP: MagicNumber 0x39D50E9B (0x050639D50E9B)
*Mar 1 04:52:43.314: Vi1 LCP: O CONFNAK [REQsent] id 180 Len 9

!--- PPP option reject

*Mar 1 04:52:43.314: Vi1 LCP: AuthProto CHAP (0x0305C22305)

!--- PPP option that is rejected

*Mar 1 04:52:43.314: Vi1 LCP: I CONFACK [REQsent] id 3 Len 10
*Mar 1 04:52:43.318: Vi1 LCP: MagicNumber 0x31A2F808 (0x050631A2F808)
*Mar 1 04:52:43.366: Vi1 LCP: I CONFREQ [ACKrcvd] id 181 Len 14
*Mar 1 04:52:43.366: Vi1 LCP: AuthProto PAP (0x0304C023)
*Mar 1 04:52:43.366: Vi1 LCP: MagicNumber 0x39D50E9B (0x050639D50E9B)
*Mar 1 04:52:43.370: Vi1 LCP: O CONFNAK [ACKrcvd] id 181 Len 9

!--- PPP option reject

*Mar 1 04:52:43.370: Vi1 LCP: AuthProto CHAP (0x0305C22305)

!--- PPP option that is rejected

*Mar 1 04:52:43.418: Vi1 LCP: I CONFREQ [ACKrcvd] id 182 Len 14
*Mar 1 04:52:43.418: Vi1 LCP: AuthProto PAP (0x0304C023)
*Mar 1 04:52:43.418: Vi1 LCP: MagicNumber 0x39D50E9B (0x050639D50E9B)
Router#undebug all
```

Whether it is an I or an O packet, a Configure-Negative-Acknowledge (CONFNAK) is indicative of a PPP configuration mismatch. What this means is that one side of the PPP connection asks for a PPP option that the other side is unable or not configured to perform. If the Cisco DSL Router sends the CONFNAK (indicated by "O CONFNAK"), the Cisco DSL Router is not able to perform or is not configured for the option the ISP sends. If the CONFNAK is sent by your ISP (indicated by "I CONFNAK"), you have configured an option on the Cisco DSL router that your ISP does not want to perform.

The line after the CONFNAK describes the option that is rejected. In this example output, the option is Challenge Handshake Authentication Protocol (CHAP), but it could be any option. The only place on the Cisco DSL Router where PPP options can be configured is interface dialer 1. Enter the command **show run interface dialer 1** in order to view your interface dialer 1 configuration.

If your ISP sends the I CONFNAK, look for commands under interface dialer 1 that match the line after the CONFNAK and remove them. If the Cisco DSL Router sends the O CONFNAK, add a command to interface dialer 1 in order to properly negotiate PPP with your ISP. In the case that the router sends packets, you might need to call Cisco Support in order to determine which command(s) need to be enabled on the Cisco DSL Router.

## Authentication Failure

An authentication failure occurs when your ISP is unable to authenticate your PPP username or password. There are two scenarios in which this can occur. The first scenario is an authentication type mismatch, which is caused when you do not properly configure the router. All the authentication configurations listed in this document account for both Password Authentication Protocol (PAP) and CHAP authentication types. For configuration flexibility, you should have both CHAP and PAP configured. If you do not have both configured, you might see output from a **debug ppp negotiation** command like this example:

```
Router#debug ppp negotiation
00:34:29: Vi1 LCP: O CONFREQ [REQsent] id 53 Len 15
00:34:29: Vi1 LCP: AuthProto CHAP (0x0305C22305)

!--- Sends CHAP requests

00:34:29: Vi1 LCP: MagicNumber 0x01B63483 (0x050601B63483)
00:34:29: Vi1 LCP: I CONFREQ [REQsent] id 252 Len 14
00:34:29: Vi1 LCP: AuthProto PAP (0x0304C023)
```

```
!--- Receives PAP requests from the service provider

00:34:29: Vi1 LCP: MagicNumber 0xBC5233F9 (0x0506BC5233F9)
00:34:29: Vi1 LCP: O CONFREQ [REQsent] id 252 Len 8
Router#undebug all
```

In order to correct both authentication mismatch problems, you need to reconfigure the authentication protocol to the one requested by the ISP in the inbound **CONFREQ** packet.

## How do I know if my PAP username and password are correct?

After you have confirmed that your ISP uses PAP, enter the **debug ppp negotiation** command in order to confirm that your PAP username and password are correct.

```
Router#debug ppp negotiation
*Mar 2 00:50:15.741: Vi1 PPP: Treating connection as a callout
*Mar 2 00:50:15.745: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
*Mar 2 00:50:15.745: Vi1 PPP: No remote authentication for call-out
*Mar 2 00:50:15.745: Vi1 LCP: O CONFREQ [Closed] id 177 Len 10
*Mar 2 00:50:15.745: Vi1 LCP: MagicNumber 0x35EB5D4F (0x050635EB5D4F)
*Mar 2 00:50:15.789: Vi1 LCP: I CONFACK [REQsent] id 177 Len 10
*Mar 2 00:50:15.793: Vi1 LCP: MagicNumber 0x35EB5D4F (0x050635EB5D4F)
*Mar 2 00:50:17.241: Vi1 LCP: I CONFREQ [ACKrcvd] id 203 Len 14
*Mar 2 00:50:17.241: Vi1 LCP: AuthProto PAP (0x0304C023)
*Mar 2 00:50:17.241: Vi1 LCP: MagicNumber 0x3E1D1E5E (0x05063E1D1E5E)
*Mar 2 00:50:17.245: Vi1 LCP: O CONFACK [ACKrcvd] id 203 Len 14
*Mar 2 00:50:17.245: Vi1 LCP: AuthProto PAP (0x0304C023)
*Mar 2 00:50:17.245: Vi1 LCP: MagicNumber 0x3E1D1E5E (0x05063E1D1E5E)
*Mar 2 00:50:17.249: Vi1 LCP: State is Open
*Mar 2 00:50:17.249: Vi1 PPP: Phase is AUTHENTICATING, by the peer [0 sess, 1 load]
*Mar 2 00:50:17.249: Vi1 PAP: O AUTH-REQ id 9 Len 14 from "cisco"

!--- "cisco" is the PAP username configured on this DSL Router.

*Mar 2 00:50:17.297: Vi1 PAP: I AUTH-NAK id 9 Len 27 msg is "Authentication failure"
*Mar 2 00:50:17.301: Vi1 LCP: I TERMREQ [Open] id 204 Len 4
*Mar 2 00:50:17.301: Vi1 LCP: O TERMACK [Open] id 204 Len 4
*Mar 2 00:50:17.305: Vi1 PPP: Phase is TERMINATING [0 sess, 1 load]u
```

```
*Mar 2 00:50:19.305: Vi1 LCP: TIMEout: State TERMSent
*Mar 2 00:50:19.305: Vi1 LCP: State is Closed
*Mar 2 00:50:19.305: Vi1 PPP: Phase is DOWN [0 sess, 1 load]
```

You need to contact your ISP and get the correct credentials in order to fix this. You can reconfigure the PAP credentials with these commands:

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface dialer 1
Router(config-if)#ppp pap sent-username <username> password <password>
Router(config-if)#end
Router#write memory
```

## How do I know if my CHAP username and password are correct?

After you have confirmed that your ISP uses CHAP, enter the **debug ppp negotiation** command in order to confirm that your CHAP username and password are correct.

```
Router#debug ppp negotiation
*Mar 3 02:51:47.287: Vi1 PPP: Treating connection as a callout
*Mar 3 02:51:47.287: Vi1 PPP: Phase is ESTABLISHING, Active Open [0 sess, 1 load]
*Mar 3 02:51:47.291: Vi1 PPP: No remote authentication for call-out
*Mar 3 02:51:47.291: Vi1 LCP: O CONFREQ [Closed] id 188 Len 10
*Mar 3 02:51:47.291: Vi1 LCP: MagicNumber 0x3B821FF1 (0x05063B821FF1)
*Mar 3 02:51:47.339: Vi1 LCP: I CONFREQ [REQsent] id 204 Len 15
*Mar 3 02:51:47.343: Vi1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 3 02:51:47.343: Vi1 LCP: MagicNumber 0x43B3F393 (0x050643B3F393)
*Mar 3 02:51:47.343: Vi1 LCP: O CONFACK [REQsent] id 204 Len 15
*Mar 3 02:51:47.347: Vi1 LCP: AuthProto CHAP (0x0305C22305)
*Mar 3 02:51:47.347: Vi1 LCP: MagicNumber 0x43B3F393 (0x050643B3F393)
*Mar 3 02:51:47.347: Vi1 LCP: I CONFACK [ACKsent] id 188 Len 10
*Mar 3 02:51:47.351: Vi1 LCP: MagicNumber 0x3B821FF1 (0x05063B821FF1)
*Mar 3 02:51:47.351: Vi1 LCP: State is Open
*Mar 3 02:51:47.351: Vi1 PPP: Phase is AUTHENTICATING, by the peer [0 sess, 1 load]
*Mar 3 02:51:47.395: Vi1 CHAP: I CHALLENGE id 1 Len 32 from "6400-2-NRP3"
*Mar 3 02:51:47.395: Vi1 CHAP: Using alternate hostname cisco
*Mar 3 02:51:47.399: Vi1 CHAP: Username 6400-2-NRP3 not found
*Mar 3 02:51:47.399: Vi1 CHAP: Using default password
*Mar 3 02:51:47.399: Vi1 CHAP: O RESPONSE id 1 Len 26 from "cisco"
```

!--- "cisco" is the CHAP username configured on this DSL Router.

```
*Mar 3 02:51:47.447: Vi1 CHAP: I FAILURE id 1 Len 26 MSG is "Authentication failure"
*Mar 3 02:51:47.447: Vi1 LCP: I TERMREQ [Open] id 205 Len 4
*Mar 3 02:51:47.451: Vi1 LCP: O TERMACK [Open] id 205 Len 4
*Mar 3 02:51:47.451: Vi1 PPP: Phase is TERMINATING [0 sess, 0 load]
*Mar 3 02:51:49.451: Vi1 LCP: TIMEout: State TERMSent
*Mar 3 02:51:49.451: Vi1 LCP: State is Closed
*Mar 3 02:51:49.451: Vi1 PPP: Phase is DOWN [0 sess, 0 load]
Router#undebug all
```

You need to contact your ISP and get the correct credentials in order to fix this. You can reconfigure the CHAP credentials with these commands:

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#interface dialer 1
Router(config-if)#ppp chap hostname <username>
Router(config-if)#ppp chap password <password>
```

```
Router(config-if)#end
Router#write memory
```

## How do I know when PPP authentication is successful?

This example shows a successful CHAP negotiation.

```
Router#debug ppp negotiation
<... snipped ...>
*Mar 3 03:30:09.335: Vi1 LCP: State is Open
*Mar 3 03:30:09.335: Vi1 PPP: Phase is AUTHENTICATING, by the peer [0 sess, 1 load]
*Mar 3 03:30:09.379: Vi1 CHAP: I CHALLENGE id 41 len 32 from "6400-2-NRP3"
*Mar 3 03:30:09.379: Vi1 CHAP: Using alternate hostname cisco
*Mar 3 03:30:09.379: Vi1 CHAP: Username 6400-2-NRP3 not found
*Mar 3 03:30:09.383: Vi1 CHAP: Using default password
*Mar 3 03:30:09.383: Vi1 CHAP: O RESPONSE id 41 Len 26 from "cisco"
*Mar 3 03:30:09.431: Vi1 CHAP: I SUCCESS id 41 Len 4
```

!--- CHAP negotiation was a success.

```
*Mar 3 03:30:09.431: Vi1 PPP: Phase is UP [0 sess, 1 load]
```

```
<... snipped ...>
```

```
Router#undebug all
```

This example shows a successful PAP negotiation.

```
Router#debug ppp negotiation
```

```
<... snipped ...>
```

```
*Mar 3 03:33:19.491: Vi1 LCP: State is Open
*Mar 3 03:33:19.491: Vi1 PPP: Phase is AUTHENTICATING, by the peer [0 sess, 0 load]
*Mar 3 03:33:19.495: Vi1 PAP: O AUTH-REQ id 255 Len 16 from "cisco"
*Mar 3 03:33:19.539: Vi1 PAP: I AUTH-ACK id 255 Len 5
*Mar 3 03:33:19.539: Vi1 PPP: Phase is UP [0 sess, 0 load]
```

!--- PAP negotiation was a success.

```
<... snipped ...>
```

```
Router#undebug all
```

## Performance Issues over PPPoE

This section is specific to PPPoE connections. It is expected to see issues with throughput, slow browsing, and so on with PPPoE connections when you use the default Maximum Transmission Unit (MTU) size on the dialer interface. You need to set the MTU on the PPPoE Dialer to 1492 in order to take account for the eight bytes used by the PPPoE header. Enter these commands in order to configure the proper MTU:

```
Router#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Router(config)#interface dialer 1
```

```
Router(config-if)#mtu 1492
```