



# Configuring Digital Subscriber Line for Small Form-Factor Pluggable Modules

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## Prerequisites to configure Digital Subscriber Line (DSL)

There are no prerequisites to configure a Digital Subscriber Line (DSL).

## Restrictions Digital Subscriber Line (DSL)

MTU Limitation

- For VDSL, the MTU range on the DSL SFP interface is between 64-1800 bytes.

## Information about Digital Subscriber Line (DSL)

- This section provides a list of what features are supported and unsupported.
- The DSL SFP operates only when inserted into G0/0/0 or G0/0/1 port of C1131.
- Only one DSL SFP is supported at a time on a C1131 router.
- DSL SFPs inserted into both G0/0/0 and G0/0/1 at the same time is not supported.
- OIR of DSL SFP is not supported.
- Router needs to be reloaded when there is change in port used for DSL SFP.
- VDSL2 only supports profiles 8a through 17a, 30a is not supported.
- DSL SFP is supported in autonomous mode only.
- Supports Radius and AAA when authenticating and configuring DSL users.
- The DSL interface requires a minimum configuration dependent of the DSL services, therefore Plug and Play (PnP) features are not available on the DSL interface.
- C1131 must be on Cisco IOS XE 17.12.1a release or above for DSL support.
- The **show controller vdsl 0/0/0** command is used to display all DSL [VDSL2/ADSL2/ADSL2+] controller information, like the C111x platforms. Although the controller command is VDSL, it actually means DSL and is used for ADSL and VDSL alike.
- Using the WebUI, interface g0/0/0 can be configured/monitored as normal. No specific options to monitor/configuration option for controller vdsl 0/0/0 on release Cisco IOS XE 17.12.1a. Using the WebUI, interface g0/0/0 can be configured/monitored as normal. No specific options to monitor/configuration option for Controller vdsl 0/0/0 on release Cisco IOS XE 17.12.1a.
- VDSL2 MIBS support only trickle in Cisco IOS XE 17.12.1a and beyond releases. MIB information is available later in this section.
- Dying GASP is not supported with DSL SFP in C1131 router.

## DSL Specifications

**Table 1: DSL Feature Specifications**

Multimode DSL (VDSL2)	<ul style="list-style-type: none"> <li>• Provided through a DSL SFP.</li> <li>• SFP has a single RJ-45 interface.</li> <li>• Support for double-ended line testing (DELT) diagnostics mode (VDSL2 Only).</li> </ul>
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# Installing the DSL SFP

Instructions for inserting the DSL SFP are found in your products Hardware Installation Guide.



**Warning** It is critical that the installer read these instructions and be familiar with the correct method of inserting and removing the SFP. Failure to do so may result in damage to the SFP.

## Basic Configuration

Once the SFP is installed, it requires a basic configuration to bring it up. Follow these steps:

```
configure t
Router(conf)#interface g0/0/0
Router(conf-if)#media-type sfp
Router(conf-if)#no shut
Router(conf-if)#exit
```

At this point, SFP insertion SYSLOG messages will appear.

## SFP Verification

After safely installing the SFP, you can check its status with the **show inventory** command:

```
Router#show inventory

+++++
INFO: Please use "show license UDI" to get serial number for licensing.
+++++

NAME: "Chassis", DESCR: "IR1101 Base Chassis"
PID: C1131X-8PLTEPWB , VID: V01 , SN: FGL2645LCPN

NAME: "Power Supply Module 0", DESCR: "External Power Supply Module"
PID: PWR-12V , VID: V01 , SN: FOC23473SRK

NAME: "module 0", DESCR: "C1131X-8PLTEPWB Built-In NIM controller"
PID: C1131X-8PLTEPWB , VID: , SN:

NAME: "NIM subslot 0/0", DESCR: "Front Panel 2 port Gigabitethernet Module"
PID: C1131X-2x1GE , VID: V01 , SN:

NAME: "subslot 0/0 transceiver 0", DESCR: "GE T"
PID: SFP-VADSL2+-I , VID: V01 , SN: MET21160FE7

NAME: "NIM subslot 0/1", DESCR: "C1131X-ES-8"
PID: C1131X-ES-8 , VID: V01 , SN:

NAME: "NIM subslot 0/3", DESCR: "Wireless LAN Module"
PID: ISR-AP1101AX-B , VID: V01 , SN: FOC261678TF

NAME: "module R0", DESCR: "Cisco C1131X-8PLTEPWB Route Processor"
PID: C1131X-8PLTEPWB , VID: V01 , SN: FOC26210GXQ

NAME: "module F0", DESCR: "Cisco C1131X-8PLTEPWB Forwarding Processor"
PID: C1131X-8PLTEPWB , VID: , SN:
Ignore the description, it will always reflect GE T for all C1131 SFPs
PID and S/N are what matter
```

In the below output, ignore the Description and bitrate. The PID/Serial number information are true to the SFP.

```
Router#show interfaces transceiver detail
IDPROM for transceiver GigabitEthernet0/0/0:
Description = SFP or SFP+ optics (type 3)
Transceiver Type: = GE T (26)
Product Identifier (PID) = SFP-VADSL2+-I
Vendor Revision = V5.1
Serial Number (SN) = MET2023000A
Vendor Name = CISCO-METANOIA
Vendor OUI (IEEE company ID) = 00.00.00 (0)
CLEI code =
Cisco part number = 30-1635-01
Device State = Enabled.
Date code (yy/mm/dd) = 21/16/
Connector type = RJ45.
Encoding = 8B10B (1)
Nominal bitrate = GE (1300 Mbits/s)
Minimum bit rate as % of nominal bit rate = not specified
Maximum bit rate as % of nominal bit rate = not specified
```

Socket Verification

```
SFP IDPROM Page 0xA0:
000: 03 04 22 08 00 00 00 00 00 00
010: 00 01 0D 00 00 00 00 00 FF 00
020: 43 49 53 43 4F 2D 4D 45 54 41
030: 4E 4F 49 41 20 20 00 00 00 00
040: 53 46 50 56 35 33 31 31 54 52
050: 35 31 43 53 20 20 56 35 2E 31
060: 00 00 00 3F 08 00 00 00 4D 45
070: 54 32 31 31 36 30 46 45 37 20
080: 20 20 20 20 32 31 31 36 20 20
090: 20 20 00 00 00 94 63 00 30 0A
100: 5D C9 82 1C 20 84 16 76 1F 03
110: B8 F6 93 B7 75 00 00 00 00 00
120: 00 00 00 00 84 A7 F4 13 00 00
130: 00 00 00 00 00 00 00 00 33 30
140: 2D 31 36 33 35 2D 30 31 56 30
150: 31 20 CF EC 55 00 00 00 00 D4
160: 00 00 00 00 00 00 00 00 00 00
170: 00 00 00 00 00 00 00 00 00 00
180: 00 00 00 00 00 00 00 00 00 00
190: 00 00 53 46 50 2D 56 41 44 53
200: 4C 32 2B 2D 49 20 20 20 20 20
210: 20 20 00 00 17 00 00 00 00 00
220: 00 00 00 5A
```

```
SFP IDPROM Page 0xA2:
000: 00 00 00 00 00 00 00 00 00 00
010: 00 00 00 00 00 00 00 00 00 00
020: 00 00 00 00 00 00 00 00 00 00
030: 00 00 00 00 00 00 00 00 00 00
040: 00 00 00 00 00 00 00 00 00 00
050: 00 00 00 00 00 00 00 00 00 00
060: 00 00 00 00 00 00 00 00 00 00
070: 00 00 00 00 00 00 00 00 00 00
080: 00 00 00 00 00 00 00 00 00 00
090: 00 00 00 00 00 00 00 00 00 00
100: 00 00 00 00 00 00 00 00 00 00
110: 00 00 00 00 00 00 00 00 00 00
120: 00 00 00 00 00 00 00 00 00 00
```

```

130: 00 00 00 00 00 00 00 00 00 00
140: 00 00 00 00 00 00 00 00 00 00
150: 00 00 00 00 00 00 00 00 00 00
160: 00 00 00 00 00 00 00 00 00 00
170: 00 00 00 00 00 00 00 00 00 00
180: 00 00 00 00 00 00 00 00 00 00
190: 00 00 00 00 00 00 00 00 00 00
200: 00 00 00 00 00 00 00 00 00 00
210: 00 00 00 00 00 00 00 00 00 00
220: 00 00 00 00 00 00 00 00 00 00
230: 00 00 00 00 00 00 00 00 00 00
240: 00 00 00 00 00 00 00 00 00 00
250: 00 00 00 00 00 00
Link reach for 9u fiber (m) = SX(550/270m) (0)
1xFC-MM(500/300m) (0)
2xFC-MM(300/150m) (0)
ESCON-MM(2km) (0)

Link reach for 9u fiber (m) = SX(550/270m) (0)
1xFC-MM(500/300m) (0)
2xFC-MM(300/150m) (0)
ESCON-MM(2km) (0)

Link reach for 50u fiber (m) = SR(2km) (0)
IR-1(15km) (0)
IR-2(40km) (0)
LR-1(40km) (0)
LR-2(80km) (0)
LR-3(80km) (0)
DX(40KM) (0)
HX(40km) (0)
ZX(80km) (0)
VX(100km) (0)
1xFC, 2xFC-SM(10km) (0)
ESCON-SM(20km) (0)
Link reach for 62.5u fiber (m) = SR(2km) (0)
IR-1(15km) (0)
IR-2(40km) (0)
LR-1(40km) (0)
LR-2(80km) (0)
LR-3(80km) (0)
DX(40KM) (0)
HX(40km) (0)
ZX(80km) (0)
VX(100km) (0)
1xFC, 2xFC-SM(10km) (0)
ESCON-SM(20km) (0)
Nominal laser wavelength = 0 nm.
DWDM wavelength fraction = 0.0 nm.
Supported options = none
Supported enhanced options = none
Diagnostic monitoring = none
No transceiver present

```

## LED Indications on the SFP

The DSL SFP has two LED indicators built into it. This LED operates independent of any LED that is on the panel of the Router.



**Note** There is no **show platform led** support for the SFP LED. Use the **show controller vdsl 0/0/0 local** command for DSL link status.

### LED Indications

The following table describes the SFP LED indications:

Indicator LED	LED Color	State	Description
LED 1	Orange	On	CPE side (expected to be ON when used on an ISR router)
LED 1	Orange	Off	Orange LED off indicates SFP connected at central office side (DSLAM) which is not supported in C1131.
xDSL Status LED	Green	Slow Flash	Idle
xDSL Status LED	Green	Fast Flash	Training
xDSL Status LED	Green	Steady	Showtime
xDSL Status LED	Green	Extremely Rapid Flash	Packet Transmit

### SFP LED Workflow

The following table describes the SFP LED indications during a bootup:

Before SFP is inserted	Off
During SFP bootup	Slow Green Flash
After auto-negotiation has completed	Solid Green
SFP shut triggered from the CLI	Off
SFP no shut triggered from the CLI	Flashing, then Solid Green
SFP Traffic	Flashing Green

### Auto-Negotiation

You can tell the status of auto-negotiation based on the LED on the SFP. On shut/no shut or during auto-negotiation, the following sequence should be observed:

Slow Flashing Green	Idle
Fast Flashing Green	Training

Solid Green	Handshake success, Showtime
-------------	-----------------------------

If the SFP LED is toggling between slow flashing green and fast flashing green, it usually means it is in auto-negotiation mode. If this continues for a long time, the DSLAM and Router DSL SFP parameters need to be rechecked. The following chapters cover more details on Router xDSL configuration.

## DSL SFP Firmware Upgrade

The DSL SFP has firmware loaded on it. You should check the version loaded on the SFP and compare it to what is available in the router image. The customer should make their decision to upgrade according to their own agreement with their ISP.

The SFP must have a minimum configuration in order to upgrade it:

```
configure t
Router(conf)#interface g0/0/0
Router(conf-if)#media-type sfp
Router(conf-if)#no shut
Router(conf-if)#exit
```

Check your firmware levels by executing **show controller vdsl 0/0/0 local** command.

```
Router#show controllers vdsl 0/0/0 local
SFP Vendor PID: SFPV5311TR
SFP Vendor SN: V021932028C
Firmware embedded in IOS-XE: 1_62_8463
Running Firmware Version: 1_62_8463
Management Link: up
DSL Status: showtime
Dumping internal info: idle
Dying Gasp: armed
Dumping DELT info: idle
```

Use the following command to upgrade the SFP:

```
Router#upgrade hw-module subslot 0/0 sfp 0
Upgrade SFP firmware on interface GigabitEthernet0/0/0 from 1_62_8455 to 1_62_8463
Connection will be disrupted, Continue(Y/N)?y
Start ebm upgrade!!
.....
.....
.....
firmware update success!!
```

The command loads the new firmware, and then performs a shut/no shut on the interface to reset the SFP.



**Note** From Cisco IOS XE 17.12.1a release, the capability exists to upgrade standalone SFP firmware. Additionally, the SFP firmware is bundled with the IOS image.

```
Router#upgrade hw-module subslot 0/0 sfp 0 {flash|usbflash0|msata}:sfp_fw_image
```

# Configuring the DSL SFP

The router adds DSL capability by using a Small Form-factor Pluggable (SFP) network interface module. The DSL solution supports the following Annex:

VDSL2 supports Annex A, B. All in compliance with TR100, TR105, TR114, TR115.

## VDSL2

### VDSL2 Overview

This section provides an overview for VDSL2.

The Router DSL SFP-VADSL2+-I provides VDSL2 Annex A, B support in conformance to ITU-T standards G.993.2 (VDSL2). This xDSL SFP is also in compliance with TR-114 (VDSL2 Annex A and B performance) and TR-115 (VDSL2 Feature validation tests by University of New Hampshire). The SFP complies with ITU-T G.99x standard with supporting AVD2 CPE mode only.

- Configurable Band Plan, conforms to North America Annex A (G.998) and Europe Annex B (G.997, 998) Band Plans subject to the 3072/4096 and 8-band/4-passband constraints.
- Supports all VDSL2 profiles (8a/b/c/d, 12a/b, 17a).
- Supports EU type Upstream Band 0 (US0).
- Complies with ITU-T G.994.1 Handshake Procedure for DSL TRx.
- Complies with ITU-T G.997.1 Physical Layer Management for DSL TRx.
- Complies with ITU-T G.993.5 Self-FEXT Cancellation (Vectoring) for CPE mode.
- Supports Robust Overhead Channel (ROC).
- Supports Online Reconfiguration (OLR) including Seamless Rate Adaptation (SRA) with D/L change and Bit Swapping.
- Supports Upstream /Downstream Power Back Off (UPBO/DPBO).
- Supports DELT
- Supported maximum MTU size on VDSL2 is 1800 Bytes.
- Standard compliance VDSL2 mode is PTM (Packet transfer mode).
- Supports VDSL2 Vectoring.

For configuration and display commands, see the detailed sections below. The **show controller vdsl 0/0/0** is the fundamental command for validation.



# VDSL2 Specifications

Table 2: VDSL2 Feature Specifications

VDSL2	<ul style="list-style-type: none"> <li>• VDSL2993.2 Annex A and Annex B</li> <li>• 997 and 998 band plans</li> <li>• G.994.1ITU G.hs</li> <li>• VDSL2profiles: 8a, 8b, 8c, 8d, 12a, 12b, and 17a</li> <li>• Vectoring</li> <li>• U0band support (25 to 276 kHz)</li> <li>• Ethernet packet transfer mode (PTM) based only on IEEE 802.3ah 64/65 octet encapsulation.</li> <li>• Dying gasp not supported</li> </ul>
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## Configuring VDSL2

The router supports Very-high-bit-rate Digital Subscriber Line (VDSL2).

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b> <b>Example:</b> <code>router&gt; enable</code>	Enables privileged EXEC mode.
<b>Step 2</b>	<b>configure terminal</b> <b>Example:</b> <code>router# configure terminal</code>	Enters global configuration mode.
<b>Step 3</b>	<b>controller vdsl 0/0/0</b> <b>Example:</b> <code>router(config-controller)# controller vdsl 0/0/0</code>	Enters configuration mode for the VDSL2 controller.
<b>Step 4</b>	<b>carrier-set a43 a43c b43</b> <b>Example:</b> <code>router(config-controller)# carrier-set a43 a43c b43</code>	Configures the carrier set. Multiple choice. Default is a43 a43c b43. v43 is disabled by default.

	Command or Action	Purpose
Step 5	<b>end</b>  <b>Example:</b> <code>router(config-controller)# end</code>	Exits controller configuration mode.

## VDSL2 Controller Configuration Commands

This section describes some of the CLI commands specific to controller configuration.

Brief	Format	Command Default	Description
bitswap		Default is Enabled	Bitswap
capability	<b>capability</b> [ <i>annex-j</i> ]	None	Set the DSL SFP Capability
carrier-set	<b>carrier-set</b> [ <i>a43 b43 a43c</i> ]	a43 b43 a43c	DSL SFP Carrier Set
default			Set a command to its defaults
description			Controller specific description
exit			Exit from controller configuration mode
help			Description of the interactive help system
mac-address	<b>mac-address</b> <MAC address>	The default is the MAC is preconfigured.	DSL SFP MAC Address. There is no need to configure anything to get the controller working.
modem vdsl		N/A	Modem Configuration
mpls			Not applicable to the IoT Router. Inherited from the c111x.
no			Negate a command or set its defaults
shutdown			Shutdown vdsl controller
sra		Default is Enabled	Seamless Rate Adaption

## VDSL Example

The following example is from a VDSL configuration:

```
show controllers vdsl 0/0/0
Controller VDSL 0/0/0 is UP
```

```

Daemon Status:          UP

Chip Vendor ID:         XTU-R (DS)          XTU-C (US)
Chip Vendor Specific:   'META'          'BDCM'
Chip Vendor Country:   0x0000          0x1FB1
Chip Vendor Country:   0xB500          0xB500
Modem Vendor ID:       'META'          ' '
Modem Vendor Specific: 0x0000          0x0000
Modem Vendor Country:  0xB500          0x0000
Serial Number Near:    MET21160FE7 V5311TR 1_62_8548
Serial Number Far:
Modem Version Near:    1_62_8548 MT5311
Modem Version Far:

Modem Status:          TC Sync (Showtime!)
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

Failed full inits:     0
Short inits:           0
Failed short inits:    0

Modem FW Version:
Modem PHY Version:
Modem PHY Source:      System

Line 0:

Trellis:               XTU-R (DS)          XTU-C (US)
SRA:                   ON          ON
SRA count:              disabled      disabled
Bit swap:               0          0
Bit swap count:         enabled      enabled
Line Attenuation:       2.2 dB        dB
Signal Attenuation:    2.9 dB        dB
Noise Margin:           6.3 dB        19.9 dB
Attainable Rate:       116179 kbits/s  82734 kbits/s
Actual Power:           10.8 dBm       3.5 dBm
Per Band Status:       D1      D2      D3      U0      U1      U2      U3
Line Attenuation(dB):  1.0    1.6    4.5    N/A    0.0    0.0    0.0
Signal Attenuation(dB): 2.3    2.0    5.5    N/A    0.0    0.0    0.0
Noise Margin(dB):      6.3    6.3    6.2    N/A    17.7   17.8   25.0
Total FECC:            1268          1335
Total ES:               0          636
Total SES:              0          9
Total LOSS:             0          0
Total UAS:              39          2306515
Total LPRS:             0          0
Total LOFS:             0          0
Total LOLS:             0          0

Speed (kbps):          DS Channel1    DS Channel0    US Channel1    US Channel0
SRA Previous Speed:   NA          116179         NA          49665
Previous Speed:       NA          0             NA          0

```

Reed-Solomon EC:	NA	0	NA	0
CRC Errors:	NA	0	NA	27166
Header Errors:	NA	0	NA	0
Interleave (ms):	NA	7.00	NA	3.00
Actual INP:	NA	2.00	NA	1.00

Training Log : Stopped  
 Training Log Filename : flash:vdslllog.bin

For an explanation of some of the key output messages, see [Controller Status Messages, on page 19](#).

## Troubleshooting and L1 Training Logs

### Troubleshooting

This section provides information for troubleshooting and debugging if the DSL control and/or datapath is not up.

**Problem:** If WAN interface g0/0/0 is DOWN:

**Solution:** Try the following:

- Check L1 cabling, networking, and with different SFP
- Capture output for **show int g0/0/0**, **show run all**, and **show version**
- Check if g0/0/0 has **media-type sfp** configuration set and the interface is unshut.
- Try another SFP to see if that is detected.
- Check SFP's LED status.

**Problem:** If controller state is DOWN:

For example:

```
Router#show controllers vdsl 0/0/0
Controller VDSL 0/0/0 is DOWN
```

**Solution:** Try the following:

- Check L1 cabling.
- Try inserting RJ11 cable into an RJ11 male to RJ45 female connector to see if it helps align.
- Ensure Running FW is the same as System FW. If not, upgrade the SFP FW.
- Gather output for all L1 Training logs. Ensure L1 debug logs in folder are sent to Cisco TAC, as well as the output of service internal command **test vdsl option 0x0 6**, and the output from **show controller 0/0/0 local**.
- Possible workaround: After gathering the above logs, try to reboot the router to see if it recovers. If it still does not work, try to hot remove/insert the SFP again and reload the router.

**Problem:** If the controller is UP, but **show controller vdsl 0/0/0** shows the DSL Link Idle.

**Solution:** Try the following:

- Ensure **show controller vdsl 0/0/0 local** shows Running FW = System FW. If not, upgrade FW and shut/no shut g0/0/0.
- Ensure carrier-set match (in controller vdsl 0/0/0) configuration with DSLAM
- Restart DSLAM interface if any config changes have been made
- Fine-tune the Power Spectrum Density, Freq Bandplan, profile, operating mode, vlan, etc... on the DSLAM end. On the Router DSL controller end, auto mode is the default and no configuration is required except possibly carrier-set. For example: If DSLAM only supports POTS, recommended to set carrier-set to a43. By default, Cisco allows a43, a43c, b43.
- Ensure the DSLAM profile ONLY includes supported Profiles, bands, etc as per VDSL2.
- When using the service internal command **test vdsl rawcli "basic show summary 1"** consecutively, do you see the status move from Idle/Handshake/Training back to Idle, or stuck in Idle? If former case, recheck DSLAM profile configs. If latter, share L1 debug logs.
- If the DSLAM has the same configuration that used to work, and then after an image upgrade, or new SFP change the controller is UP but no negotiation, then please provide following to Cisco:
  - SFP LED status
  - Capture **show version, show running-config, show run all | sec controller, show interface gigabitethernet 0/0/0**, and **show controller vdsl 0/0/0 local**.
- Possible workaround: After providing logs to Cisco, attempt to write erase and reload the router. Also, shut/no shut the DSLAM interface tied to this device, and unplug/plug SFP and cables again.

**Problem:** If the controller is Up, but the daemon is Down.

**Solution:** Try the following:

- Enable debug vdsl for debug, share with Cisco TAC
- Provide last known working configs and software version
- Possible workaround: After providing logs to Cisco, attempt to write erase and reload the router. Also, shut/no shut the DSLAM interface tied to this device, and unplug/plug SFP and cables again.
- Check if the appropriate datak9, securityk9, and network-advantage licenses are enabled on both Peer and Client.

**Problem:** If Controller is up, profile with DSLAM up in **show controller vdsl 0/0/0**, but Dialer did not acquire IP

**Solution:** Try the following:

- Check routes
- Check the output of **debug dialer** to see if it offers any information. If dialer idle time is resetting too soon, modify dialer idle-timeout (default is 120s , which ideally should be enough).
  - Ensure there are SW Licenses (datak9, securityk9, and network-advantage) on both PPPoE server and the PPPoE Client/CPE.
  - The following is a basic Dialer configuration that works:

```
interface Dialer1
ip address negotiated
no ip redirects
encapsulation ppp
dialer pool 1
dialer-group 1
no cdp enable
ppp authentication chap callin
ppp chap hostname WORD
ppp chap password 0 WORD
ppp ipcp route default
!
ip route 0.0.0.0 0.0.0.0 Dialer1 (or any route that works in user environment)
```

- Ensure PPPoE Server authentication credentials match PPPoE client
- If using DHCP, ensure the Server has enough addresses to lease out
- Enable debug ppp session and debug ip dhcp server packet detail on the headend/Peer router to debug if we receive any packets. Enable debug ppp session on router.
- If the above steps did not resolve the issue, provide all of the above debug information to Cisco TAC, along with the following:
  - Output of **show version, show running, show run all | sec controller, show controller vdsl 0/0/0** and **show controller vdsl 0/0/0 local**.
  - Output of service internal commands **test vdsl rawcli "basic show summary 1"**, **basic show summary 1**, and **test vdsl option 0x0 6**.
  - Configuration of the DSLAM.
  - L1 training logs.
- Possible workaround: After gathering the above logs in sequence for Cisco, you can try to write erase and reload Peer and Router. Specifically removing the Dialer interface with PPP configurations and reapplying. As a last resort, try to shut/no shut DSLAM interface attached to this Router DSL SFP interface. Additionally, to isolate behavior, validate this SFP on another Router if available. If it works, then validate multiple SFPs on same Router (to narrow down if it is an SFP or Router issue).

**Problem:** If controller is Up, Dialer is Up, but Dialer did not acquire IP, Authentication works only with PAP and does not work with CHAP.

**Solution:** Suppose there is a scenario where:

**show controller vdsl 0/0/0** shows showtime

**show pppoe session** shows PPP session established.

Then we see Virtual Access bound with Dialer successfully, but still Dialer didn't acquire an IP with PAP config in dialer all as well, but CHAP would not work On PPPoE Server end, it showed CHAP authentication passed and device ack too, but still IP not acquiring on PPPoE Client/device end.

debug ppp packet showed everything was okay, but still IP not acquiring. In such cases, enable following to monitor: **debug ppp authentication** enabled, we may notice that after successful chap handshake, there was another attempt by our device/client to validate based on local hostname set on Router CLI required to disable, if there is default local hostname set for chap in Router client (or any IOS router):

```
config t
service internal
Int Dialer1
no ppp chap ignoreus
no shut
exit
```

**Problem** If controller is up, Dialer acquired an IP, but cannot self-ping Dialer or ping PPPoE Server

**Solution:** Try the following:

- Ensure the appropriate SW licenses (datak9, securityk9, and network-advantage) are enabled on both the PPPoE Server and Client
- Verify if icmp is enabled on PPPoE client session (enable via access list)
- Ensure pap/chap authentication match is seen in **debug pppoe session**.
- show pppoe session should reflect session (virtual-access binding with Dialer)
- Apply Static IP on g0/0/0 DSL interface and check if you can ping the DSLAM and Peer (to isolate DSL SFP issues)
- The following is a Basic PPPoE Server and PPPoE client configuration that works, presuming PPPoE Server is a Cisco IOS device as well:

```
PPPoE Server
ip dhcp excluded-address 41.41.41.1 41.41.41.9
!
ip dhcp pool 41-41-41-pool
network 41.41.41.0 255.255.255.0
default-router 41.41.41.1
lease 2
!
username dslpeer password 0 dslpeerpass
!!
bba-group pppoe global
virtual-template 1
!
interface GigabitEthernet0/0/0
no ip address
media-type sfp
```

```

!
interface GigabitEthernet0/0/0.1
encapsulation dot1Q 1 native
ip address 41.41.41.1 255.255.255.0
pppoe enable group global
!
interface Virtual-Template1
ip unnumbered GigabitEthernet0/0/0.1
peer default ip address dhcp-pool 41-41-41-pool
ppp authentication pap chap
!
>>>>> Add routes as relevant, next hop being the IP that Router Dialer acquires
!
ip route 10.0.0.0 255.255.255.0 41.41.41.3 >> dialer ip, change as necessary

PPPoE Client:
controller VDSL 0/0/0
Carrier-set a43 >>> Can set to whichever [a43, b43, a43c, v43 depending on DSLAM support]
interface GigabitEthernet0/0/0
no ip address
media-type sfp
!
interface GigabitEthernet0/0/0.1
encapsulation dot1Q 1 native
pppoe enable group global
pppoe-client dial-pool-number 1
!
interface Dialer1
ip address negotiated
no ip redirects
encapsulation ppp
dialer pool 1
dialer-group 1
no cdp enable
ppp authentication chap callin
ppp chap hostname dslpeer
ppp chap password 0 dslpeerpass
ppp ipcp route default
!
ip route 0.0.0.0 0.0.0.0 Dialer1

```

**Problem:** If DSL traffic has been going through for a while, however bandwidth drops in time:

**Solution:** Try the following:

- Ensure DSLAM profile PSD, Freq band plan configurations are fine-tuned (in such cases, ideally unrelated to Router DSL SFP).
- Ensure ip arp timeout is increased in the Cisco Router DSL interface, Dialer interface - this may specially help in bursty traffic or during congestion.




---

**Note** The following commands may be helpful for troubleshooting:

---



**Interface Status:**

```
Router#show ip interface brief
Use this command to validate if Dialer acquired an IP address
```

**Inventory Status:**

```
Router#show inventory

+++++
INFO: Please use "show license UDI" to get serial number for licensing.
+++++

NAME: "Chassis", DESCR: "Cisco C1131X-8PLTEPWB Chassis"
PID: C1131X-8PLTEPWB , VID: V01 , SN: FGL2645LCPN

NAME: "Module 0 - Mother Board", DESCR: "Cisco C1131X-8PLTEPWB Built-In NIM controller"
PID: C1131X-8PLTEPWB , VID: , SN:

NAME: "NIM subslot 0/0", DESCR: "Front Panel 2 port Gigabitethernet Module"
PID: C1131X-2x1GE , VID: V01 , SN:

NAME: "subslot 0/0 transceiver 0", DESCR: "GE T"
PID: SFP-VADSL2+-I , VID: V01 , SN: MET21160FE7

NAME: "NIM subslot 0/1", DESCR: "C1131X-ES-8"
PID: C1131X-ES-8 , VID: V01 , SN:

NAME: "NIM subslot 0/3", DESCR: "Wireless LAN Module"
PID: ISR-AP1101AX-B , VID: V01 , SN: FOC261678TF

NAME: "module R0", DESCR: "Cisco C1131X-8PLTEPWB Route Processor"
PID: C1131X-8PLTEPWB , VID: V01 , SN: FOC26210GXQ

NAME: "module F0", DESCR: "Cisco C1131X-8PLTEPWB Forwarding Processor"
PID: C1131X-8PLTEPWB , VID: , SN:
Ignore the description, it will always reflect GE T for all ISR Router SFPs
PID and S/N are what matter
```

**Commands to display the running software details:**

```
Router#show running-config all
Router#dir flash:
Router#dir nvram:
Router#show version
```

There are some debugging commands that will also reflect the status of auto-negotiation:

```
Router#configure terminal
Router#service internal
Router#exit
The following test command will reflect auto-negotiation status:
Router#test vdsl rawcli "basic show summary 1"
Link time Rate US/DS Mode Status Annex TxPkts/RxPkts
4 1097/12491 ADSL2 Showtime AnnexA 0/0
```

## Frequently Asked Questions

This section provides answers to some common questions.

**Question:** How can I set VDSL2 to a specific Annex and profile in Controller?

**Answer:** The Router DSL SFP operates in auto mode only. There are no options to configure on the SFP controller end. You can only make changes on the DSLAM side.

**Question:** There is no Controller ADSL option to configure.

**Answer:** Controller vdsl 0/0/0 is common nomenclature across Cisco IOS-XE products. The same cli is valid for ALL DSL protocols - VDSL2, ADSL2, ADSL2+.

**Question:** The training log in show controller vdsl 0/0/0 is not working. There is no option to start/stop.

**Answer:** This option is only specific to the c111x platform and not the Router DSL SFP.

**Question:** Where can I download DSL SFP Firmware?

**Answer:**

In 17.5.1 and beyond, standalone FW is available to upgrade via Flash:, mSATA and usbflash0: in IOS.

**Question:** Controller configurations are not taking effect.

**Answer:** Ensure you exit out of controller configuration mode for the configuration to take effect. As a workaround, shut/no shut the controller interface. Ideally this should reflected the moment you 'exit' out of controller config mode. Check the DSLAM for matching profile criteria, unsupported bands/profiles should be removed as they may delay the Handshake.

**Question:** System hangs during L1 Debug Logs capture, taking very long. show commands are not working.

**Answer:** When **debug vdsl controller 0/0/0 dump** *internal folder\_name* is executed, it drains most of the system resources. A warning syslog to that effect is displayed as well. This takes approximately 10 minutes to complete depending on state of controller. Multiple times during the process the controller is shut/no shut, during this activity do NOT intervene. Once complete, you should observe 'DONE' in syslog and prompted to shut/no shut g0/0/0.



**Caution** When inserting the SFP, make sure you hear it lock in. Insert the cable and then close the latch. You should hear the click again. If you force the latch and it breaks, the SFP will be stuck in the Router. Workaround is to remove the faceplate and remove the SFP.

## Controller Status Messages

This section explains some of the key output messages from the `show controller vdsl 0/0/0` command.

Refer to the following table:

Output message	Description
Controller VDSL 0/0/0 is UP	State of the controller
Daemon Status: UP	State of internal IOS DSL Daemon
Chip Vendor ID: 'META' 'BDCM'.	SFP Metanoia Chip information
Chip Vendor Specific: 0x0000 0x0762	SFP Metanoia Chip Information burnt in EEPROM programming
Chip Vendor Country: 0xB500 0xB500	SFP Metanoia Chip information
Modem Vendor ID: 'META'	SFP Metanoia Chip information
Modem Vendor Specific: 0x0000 0x0000	SFP Metanoia Chip information
Modem Vendor Country: 0xB500 0x0000	SFP Metanoia Chip information
Serial Number Near: MET2023000A V5311TR 1_62_8463	SFP Metanoia Chip information
Serial Number Far:	SFP Metanoia Chip information, ignore if empty, Serial Number Near is the value required
Modem Version Near: 1_62_8463 MT5311.	Modem Firmware information
Modem Version Far: <value>	Ignore if empty, the above Near version is what is important
Modem Status: TC Sync (Showtime!)	Shows L1 SFP auto-negotiation status.  When SFP is shut/no shut, you see following auto-negotiation sequence:  Idle , Handshake, Training, Showtime! Showtime implies auto-neg complete
DSL Config Mode: AUTO	Always in AUTO mode, no specific CLI to configure for ADSL2/2+, VDSL2
Trained Mode: G.992.3 (ADSL2) Annex A	Specifies ITU and Annex type

Output message	Description
TC Mode: PTM	Always in Packet Transfer Mode, even for ADSL2/+. The SFP is already translating ATM to Ethernet frames.
SRA: enabled enabled.	Default is enabled
Bit swap: enabled enabled.	Default is enabled

## L1 Training Logs

To configure the device perform the following:

```
Router#configure terminal
Router#service internal
Router#logging console
Router#exit
```

To configure debug, perform the following:

```
Router#debug vdsl sfp debug | error | event | info | packet For SFP level debugging
Router#debug vdsl controller 0/0/0 dump internal {dir} For L1 debugging
```

When the L1 debug dump starts you should see the following:

```
%VDSL_SFP_MGR-5-DUMP_START: Dump internal info started on interface GigabitEthernet0/0/0
```




---

**Important** At this point, the device is unusable. Wait approximately 10 minutes until it completes.

---

At that point you should see the following:

```
%VDSL_SFP_MGR-4-DUMP_DONE: Dump internal info done, please shut/no shut on interface
GigabitEthernet0/0/0 to recover
```

To recover the device into normal operational mode, perform the following:

```
Router#configure terminal
Router#interface g0/0/0
Router#shut
Router#no shut
Router#exit
```

Provide directory logs saved in bootflash: to Cisco.




---

**Note** Cisco recommends that each time you start a new log or debug, save it to a new directory rather than append to the existing information.

---

To enable Metanoia SFP debug commands, perform the following:

```
Router#configure terminal
Router#service internal
Router#exit
Router#test vdsl rawcli "basic show summary 1" This command shows the L1 auto-negotiation
```

```

status
Link time Rate US/DS Mode Status Annex TxPkts/RxPkts
773 1089/23628 ADSL2+ Showtime AnnexA 470/338

```



**Note** test vdsl rawcli “basic show summary 1” - port number 1 is for G0/0/0; port number 2 for G0/0/1

```

Router#test vdsl option 6 0x0 If functional, State = 2 should display. This command shows
basic L1 bringup of DSL SFP and it's states. Provide to Cisco for L1 troubleshooting.
Debug flags: 0x8000
Seq 0: slot=0 slot_port=0 bay=0 port=0 Name:MetaMgr0_0_0
MetanoiaPort=0 SFP type: 1 State: 2 cnt=855
MAC:00:00:00:00:00:00 Choice:0
hw interface:GigabitEthernet0/0/0 sw interface:GigabitEthernet0/0/0
Firmware file: /etc/SFP_V5311-T-R_CSP.b, size=491520, version=1_62_8463
SFP version: 1_62_8463
Notification Seq: 0x1 cnt: 0xB3 Stat Cycle:255
VDSL State: 5
EBM Tx: 21039 Rx: 21031
EBM Wait Timeout: 8 Rx Loss: 0
G994 vid CO: BDCM CPE: META
Serial No CO: CPE: MET2023000A V5311TR 1_62_8463
Version CO: CPE: 1_62_8463 MT5311
Capability CO: 000000000001000000 CPE: 000000000001000000
Line Attn: UP: 65535 DOWN: 13

```

Tips for resetting the SFP:

- Ideally g0/0/0 shut/no shut will work in most cases (for example: after firmware upgrade, hot OIR, etc).

For hard reload of SFP, perform the following:

```
Router#hw-module subslot 0/0 reload
```

This option will force the entire subslot to reload, including the software module. So if connectivity is via telnet/ssh you might lose access for 1-2 minutes, and then all messages/syslogs buffered will print out.

