ATM Mode for Two-Wire or Four-Wire SHDSL

This document describes the ATM Mode for Two-Wire or Four-Wire SHDSL feature on the Cisco 1700 series, Cisco 1800 series, Cisco 26xxXM, Cisco 2691, Cisco 2800, Cisco 3700 series, and Cisco 3800 series routers.

The ATM Mode for Two-Wire or Four-Wire SHDSL feature adds 4-wire support in fixed line-rate mode only on a WIC-1SHDSL-V2 or WIC-1SHDSL-V3 interface card. 2-wire mode supports 2-wire line-rate and auto line-rate. This feature builds on the existing features of the Multirate Symmetrical High-Speed Digital Subscriber Line (G.SHDSL) feature supported on the 1-port G.SHDSL WAN interface card (WIC-1SHDSL). The 4-wire feature of G.991.2 doubles the bandwidth in ATM mode and increases usable distance over two pairs of wires.

The WIC-1SHDSL-V2 and WIC-1SHDSL-V3 support ATM on 2-wire and 4-wire line mode. Embedded Operation Channel (EOC) messages support for customer premises equipment (CPE) is provided for 2-wire and 4-wire modes.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and 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 table.

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

Prerequisites for ATM Mode for Two-Wire or Four-Wire SHDSL

- A G.SHDSL WIC must be installed in the router to match the DSL service to be configured.
- Minimum memory recommendations are shown in the table below.

Table 1: Minimum Memory Recommendations for ATM Mode for Two-Wire or Four-Wire SHDSL

Platform Name	Image Name	Flash Memory Recommended	DRAM Memory Recommended
Cisco 1700 Series	IOS IP BASE	16 MB	64 MB
Cisco 1800 Series	IOS IP BASE	16 MB	64 MB
Cisco 2610XM, Cisco 2611XM, Cisco 2620XM, Cisco 2621XM, Cisco 2650XM, Cisco 2651XM	IOS IP BASE	16 MB	64 MB
Cisco 2691	IOS IP BASE	32 MB	128 MB
Cisco 2800 Series	IOS IP BASE	32 MB	128 MB
Cisco 3725	IOS IP BASE	32 MB	128 MB
Cisco 3745	IOS IP BASE	32 MB	128 MB
Cisco 3800 Series	IOS IP BASE	32 MB	128 MB

Restrictions for ATM Mode for Two-Wire or Four-Wire SHDSL

- The *auto* parameter of the **line-mode** command on the WIC-1SHDSL-V2 is supported only in Cisco IOS Release 12.3(4)XG1 and later releases.
- The **standard** and **enhanced** keywords of the **line-mode 4-wire** command on the WIC-1SHDSL-V3 are supported only in Cisco IOS Release 12.4(2)XA and later releases.
- The WIC-1SHDSL-V2 and WIC-1SHDSL-V3 ATM mode for SHDSL does not support ATM adaptation layer 1 (AAL1) and/or circuit emulation service.
- ATM adaptation layer 2 (AAL2) is not supported on Cisco 1700 series, Cisco 1800 series, and Cisco 2801 routers.
- The ATM mode for SHDSL does not interface with AIM-ATM.

- The ATM mode for SHDSL does not support available bit rate (ABR) class of service (CoS).
- The ATM mode for SHDSL only supports 23 private virtual circuits (PVC) per WIC.
- The WIC-1SHDSL-V2 and WIC-1SHDSL-V3 should be inserted only into onboard WIC slots or NM-2W, NM-1FE2W, NM-1FE1R2W, NM-2FE2W, NM-1FE2W-V2, or NM-2FE2W-V2 network modules. This WIC is not supported in NM-1E2W, NM-1E1R-2W, or NM-2E2W combination network modules.
- The WIC-1SHDSL and WIC-1SHDSL-V3 do not support T1/E1 mode.

Note The WIC-1SHDSL-V2 supports T1/E1 mode in 2-wire mode only, and only on certain routers with specific Cisco IOS images. For information about T1/E1 support on the WIC-1SHDSL-V2, see the T1/E1 Mode for SHDSL document.

Information About ATM Mode for Two-Wire or Four-Wire SHDSL

SHDSL Features

Supported SHDSL features are as follows:

- ITU G.991.2 support (full support for Annex A and B)
  - Dying gasp (ITU G.991.2) is supported.
  - Terminating wetting current is supported.
  - 2-wire mode supports speeds from 192 kbps to 2.304 Mbps in increments of 64 kbps in both fixed and auto line-rate.
  - 4-wire mode supports speeds from 384 kbps to 4.608 Mbps in increments of 128 kbps in fixed line-rate only and provides increased rate capability and greater reach.
- 4-wire mode supports both enhanced and standard mode.
- 2-wire and 4-wire auto-detection is supported.
- Diagnostic loopback mode is supported.
- Annex modes A-B, A-B-ANFP, and B-ANFP are supported

ATM Features

The supported ATM features in this release are:

- Provide ATM traffic management to enable service providers to manage their core ATM network infrastructures.
- Support ATM Class of Service features constant bit rate (CBR), variable bit rate-nonreal time (VBR-nrt), variable bit rate-real time (VBR-rt), unspecified bit rate (UBR), and unspecified bit rate plus (UBR+).

- Operate back-to-back or through a digital subscriber line access multiplexer (DSLAM).
- Provide toll-quality Voice over IP delivery over AAL5.
- Support VoATM over AAL2, but AAL2 is not supported on the Cisco 1700 series routers.
- Support VoATM over AAL5.
- Support FS OAM loopback and continuity check (oversubscription).

Interface and Controller Numbering on the Cisco 1721 Router

If a WIC-1SHDSL-V2 or WIC-1SHDSL-V3 is installed in a Cisco 1721 router, the interfaces and controllers are assigned numbers based on a numbering scheme that is different from the slot numbering scheme on other Cisco routers. This is because the Cisco 1721 router assigns only a slot number without also assigning a port number. Other Cisco routers typically use a slot and port number combination.

If a WIC-1SHDSL-V2 or WIC-1SHDSL-V3 (the DSL controller) is installed in slot 0, the ATM interfaces (ADSL/SHDSL) will be numbered relative to the DSL controller in slot 0. See the table below for examples of the slot numbering scheme on the Cisco 1721 router.

With an ATM card in slot 0, the WIC-1SHDSL-V2 or WIC-1SHDSL-V3 in slot 1 will be numbered relative to the number of ports in slot 0.

If both slots are occupied by DSL controllers, the logical interfaces configured on each controller will have the same number as the slot occupied by the DSL controller. All logical interfaces on the WIC-1SHDSL-V2 will have the same number as the DSL controller.

Table 2: Examples of Slot Numbering on the Cisco 1721 Router

Interface Cards and Controllers Installed	Slot Numbering Assignment

A WIC-1SHDSL-V2 or WIC-1SHDSL-V3 is in slot 0, and an ADSL/SHDSL WIC is in slot 1.	For WIC-1SHDSL-V2 or WIC-1SHDSL-V3:
	`controller dsl 0`
	`interface atm 0`
	For ADSL/SHDSL:
	`interface atm 1`

An ATM card is in slot 0, and a WIC-1SHDSL-V2 or WIC-1SHDSL-V3 is in slot 1. The WIC-1SHDSL-V2 or WIC-1SHDSL-V3 will be numbered relative to the ports in slot 0.	For ADSL/SHDSL:
	`interface atm 0`
	For WIC-1SHDSL-V2 or WIC-1SHDSL-V3:
	`controller dsl 1`
	`interface atm 1`

Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers

This section describes the interface numbering scheme for Cisco 2800 and Cisco 3800 series routers. If an interface card is installed in a Cisco 2800 series or Cisco 3800 series router, the interfaces must use a

triple-number scheme to identify them. This triple-number assignment is different from the standard interface numbering scheme on other Cisco routers.

The table below shows the interface numbering for the onboard Fast Ethernet ports and the interface slots on Cisco 2800 and Cisco 3800 series routers.

Table 3: Interface Numbering on Cisco 2800 Series and Cisco 3800 Series Router

Port/Slot	Interface Numbering	Example
Fast Ethernet ports (onboard)	0/0, 0/1	FE 0/0, 0/1
Slot 1	Slot 0/0/0	FE 0/0/0, 0/0/1, 0/0/2, 0/0/3
Slot 2	Slot 0/1/0	(Serial 2T) Serial 0/1/0, 0/1/1
Slot 3	Slot 0/2/0	FE 0/2/0
Slot 4	Slot 0/3/0	(G.SHDSL) ATM 0/3/0

How to Configure ATM Mode for Two-Wire or Four-Wire SHDSL

Configuring G.SHDSL Service

This section details how to configure the ATM Mode for Two-Wire or Four-Wire SHDSL feature for G.SHDSL service.

To configure G.SHDSL service in ATM mode on a Cisco router containing a G.SHDSL WIC, complete the steps in the Summary Steps or the Detailed Steps, beginning in global configuration mode.

Before You Begin

The following list of prerequisites should be followed for this configuration:

- A G.SHDSL WIC must be installed in the router to match the DSL service to be configured.
- Routers may be set up for back-to-back operation as shown in the figure below, or they may be connected to a DSLAM.

Figure 1: Back-to-Back Setup

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **controller dsl** *slot* / *port*
4. **line-term** {**co** | **cpe**]
5. **dsl-mode shdsl symmetric annex** *mode*
6. **ignore-error-duration** *seconds*
7. **mode atm**
8. **For CPE:**
9. **line-rate** {*rate*| **auto**}
10. **exit**
11. **interface atm** *slot /port*
12. **ip address** *ip-address subnet-mask*
13. **atm ilmi-keepalive** [*seconds*]
14. **pvc** [*name*] *vpi/vci*
15. **protocol** *protocol* [*protocol-address*]
16. **vbr-rt** *peak-rate average-cell-rate burst*
17. **encapsulation aal2** | **aal5ciscoppp** | **aal5mux** | **aal5nlpid** | **aal5snap**| **aal5autoppp**
18. **exit**
19. **exit**
20. **exit**
21. **show interface atm** *slot* / *port*
22. exit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**controller dsl** *slot* / *port* **Example:** `Router(config)# controller dsl 0/1`	Enters controller configuration mode. The keywords and arguments are as follows: • **dsl** --The type of controller.

	Command or Action	Purpose
		• *slot/port* --The backplane slot number and port number for the interface being configured.
Step 4	**line-term** {**co** | **cpe**] **Example:** `Router(config-controller)# line-term cpe`	Configures the DSL controller line termination as follows: • **co** --Central office. • **cpe** --Customer premises equipment.
Step 5	**dsl-mode shdsl symmetric annex** *mode* **Example:** `Router(config-controller)# dsl-mode shdsl symmetric annex A`	Sets the DSL operating mode parameters. The valid values are: • A: Supports Annex A of G.991.2 standard for North America. This is the default. • B: Supports Annex B of G.991.2 standard for Europe. • A-B: Supports Annex A or B. For CPE mode only. CO mode is not supported. Selected when the line trains. • A-B-ANFP: Supports Annex A or B-ANFP. For CPE mode only. CO mode is not supported. Selected when the line trains. • B-ANFP: Supports Annex B-ANFP.
Step 6	**ignore-error-duration** *seconds* **Example:** `Router(config-controller)# ignore-error-duration 15`	(Optional) Permits the router to ignore errors for a given amount of time while the line is being trained when connected to a controller with a different chipset type. • *seconds* --Number of seconds for which errors are ignored. The range is 15 to 30 seconds. If this value is omitted, an error message appears.
Step 7	**mode atm** **Example:** `Router(config-controller)# mode atm`	Enables ATM encapsulation and creates a logical ATM interface slot/port. **Note** If the **no mode atm** command is used to leave ATM mode, the router must be rebooted to clear the mode.
Step 8	**For CPE:** **Example:** **line-mode** [**4-wire** [**enhanced** | **standard**] | **2-wire** *line-number* | **auto**} **Example:**	(Optional) Configures the controller to operate in 2-wire or 4-wire mode. The 2-wire mode is the default if this step is not configured or if the mode is not specified. • **2-wire** --Configures the controller to operate in 2-wire mode. This is the default if this step is omitted or if the mode is not specified. • **4-wire** --Configures the controller to operate in 4-wire mode. • **enhanced**--Configures 4-wire mode to exchange handshake status on both wire pairs. This is the default if the handshake mode is not specified.

	Command or Action	Purpose
	Example: **For CO:** **Example:** **line-mode** {**4-wire** [**enhanced** | **standard**] | **2-wire** *line-number*} **Example:** **Example:** `Router(config-controller)# line-mode 4-wire enhanced` **Example:**	• **standard**--Configures 4-wire mode to exchange handshake status on the master wire pair only. • *line-number* --For 2-wire mode only, specifies the pair of wires used. Valid values are **line-zero** (default)or **line-one**. Line-zero choose RJ-11 pin 1 and pin 2; line-one chooses RJ-11 pin 3 and pin 4. • **auto** --Configures the line mode to be automatically detected for the CPE. This option is not available for configuring the CO.
Step 9	**line-rate** {*rate*| **auto**} **Example:** `Router(config-controller)# line-rate 1024`	**Note** Perform this step only if line-mode was not set to *auto* in Step 8. Specifies the DSL line rate for the SHDSL port. Auto mode is supported only in 2-wire mode. The argument is as follows: • auto--Allows the controller to select the rate. This option is available only in 2-wire mode. • *rate* --Sets the DSL line rate. The supported line rates are as follows: • For 2-wire mode--192, 256, 320, 384, 448, 512, 576, 640, 704, 768, 832, 896, 960, 1024, 1088, 1152, 1216, 1280, 1344, 1408, 1472, 1536, 1600, 1664, 1728, 1792, 1856, 1920, 1984, 2048, 2112, 2176, 2240, and 2304 • For 4-wire mode--384, 512, 640, 768, 896, 1024, 1152, 1280, 1408, 1536, 1664, 1792, 1920, 2048, 2176, 2304, 2432, 2560, 2688, 2816, 2944, 3072, 3200, 3328, 3456, 3584, 3712, 3840, 3968, 4096, 4224, 4352, 4480, and 4608. **Note** The configured line rate is the data rate available. Third-party equipment may use a line rate that includes an additional SHDSL overhead of 8 kbps for 2-wire mode or 16 kbps for 4-wire mode.

	Command or Action	Purpose
Step 10	**exit** **Example:** `Router(config-controller)# exit`	Exits controller configuration mode.
Step 11	**interface atm** *slot /port* **Example:** `Router(config)# interface atm 1/0`	Enters ATM configuration mode for interface ATM 0 in slot 1. The keywords and arguments are as follows: • *slot* --The backplane slot number for the interface being configured. • *port* --The backplane port number for the interface being configured. **Note** If a slot has two subslots for WIC modules and no ATM interface is present in subslot 0, the WIC will take ATM x/0 as its interface number even if placed in subslot 1 (ATMx/1). If a two-port WIC is present in subslot 0, the WIC will use ATM x/2 as its interface number. This subslot number is pertinent to all interface commands such as **show interface atm** and **show dsl interface atm**.
Step 12	**ip address** *ip-address subnet-mask* **Example:** `Router(config-if)# ip address 192.168.10.25 255.255.255.0`	Assigns an IP address to the DSL ATM interface.
Step 13	**atm ilmi-keepalive** [*seconds*] **Example:** `Router(config-if)# atm ilmi-keepalive 5`	(Optional) Enables Integrated Local Management Interface (ILMI) keepalives. • *seconds* --The number of seconds between keepalives. • If you enable ILMI keepalives without specifying the seconds, the default time interval is 3 seconds.
Step 14	**pvc** [*name*] *vpi/vci* **Example:** `Router(config-if)# pvc [name] vpi/vci`	Enters atm-virtual-circuit (interface-atm-vc) configuration mode, and configures a new ATM permanent virtual circuit (PVC) by assigning a name (optional) and VPI/VCI numbers. The default traffic shaping is an unspecified bit rate (UBR); the default encapsulation is AAL5+LLC/SNAP. • *name* --(Optional) Name of the PVC or map. The name can be up to 15 characters long. • *vpi/* -- ATM network virtual path identifier (VPI) for this PVC. The absence of the "/" and a VPI value causes the VPI value to default to 0. Value ranges: • • Cisco 2600 and Cisco 3600 series routers using Inverse Multiplexing for ATM (IMA): 0 to 15, 64 to 79, 128 to 143, and 192 to 207

	Command or Action	Purpose
		The *vpi* and *vci* arguments cannot both be set to 0; if one is 0, the other cannot be 0. • *vci* --ATM network virtual channel identifier (VCI) for this PVC. This value ranges from 0 to 1 less than the maximum value set for this interface by the **atm vc-per-vp** command. Typically, lower values from 0 to 31 are reserved for specific traffic (for example, F4 OAM, SVC signaling, ILMI, and so on) and should not be used. The VCI is a 16-bit field in the header of the ATM cell. The VCI value is unique only on a single link, not throughout the ATM network, because it has local significance only. The *vpi* and *vci* arguments cannot both be set to 0; if one is 0, the other cannot be 0.
Step 15	**protocol** *protocol* [*protocol-address*] **Example:** `Router(config-if-vc)# protocol ip 192.168.0.4`	(Optional) Enables IP connectivity and creates a point-to-point IP address for the virtual circuit (VC). • *protocol* --Choose the **ip** protocol for this configuration. • *protocol-address* --Destination address that is being mapped to a permanent virtual circuit (PVC).
Step 16	**vbr-rt** *peak-rate average-cell-rate burst* **Example:** `Router(config-if-vc)# vbr-rt peak-rate average-cell-rate burst`	(Optional) Configures the PVC for real-time variable bit rate (VBR) traffic shaping. • *peak rate* --Peak cell rate (PCR). • *average-cell-rate* --Average cell rate (ACR). • *burst* --Burst size in cells.
Step 17	**encapsulation aal2** | **aal5ciscoppp** | **aal5mux** | **aal5nlpid** | **aal5snap**| **aal5autoppp** **Example:** `Router(config-if-vc)# encapsulation aal2`	(Optional) Configures the ATM adaptation layer (AAL) and encapsulation type. • **aal2** --AAL2. • **aal5ciscoppp** --Cisco PPP over AAL5. • **aal5mux** --AAL5+MUX. • **aal5nlpid** --AAL5+NLPID. • **aal5snap** --AAL5+LLC/SNAP. • **aal5autoppp** --PPP autosense over AAL5. The default is **aal5snap**.

	Command or Action	Purpose
Step 18	**exit** **Example:** `Router(config-if-vc)# exit`	Exits interface-atm-vc configuration mode.
Step 19	**exit** **Example:** `Router(config-if)# exit`	Exits ATM interface configuration mode.
Step 20	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.
Step 21	**show interface atm** *slot* / *port* **Example:** `Router# show interface atm 1/0`	Displays the ATM interface configuration. The keywords and arguments are as follows: • *slot* --The backplane slot number for the interface being configured. • *port* --The backplane port number for the interface being configured.
Step 22	exit **Example:** `Router# exit`	Exits privileged EXEC mode.

Examples

Example of the Configuration Before Configuring ATM Mode:

```
controller DSL 0/0
 line-term cpe
```

Example for 4-wire ATM, Annex B, and Line Rate 3200

```
controller DSL 0/1
 mode atm
 line-term cpe
 line-mode 4-wire enhanced
 dsl-mode shdsl symmetric annex B
 line-rate 3200
```

What to Do Next

The next task is to verify the ATM mode or DSL mode for the router.

Verifying the ATM Configuration

Perform the steps in this section to verify the ATM configuration.

SUMMARY STEPS

1. **enable**
2. **show running-config**
3. show controllers atm *slot*/*port*
4. show atm vc
5. debug atm events
6. debug atm errors
7. show interface atm *slot/port*
8. exit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show running-config** **Example:** `Router# show running-config`	Displays current running configuration and the status for all controllers.
Step 3	show controllers atm *slot*/*port* **Example:** `Router# show controllers atm 0/1`	Displays ATM controller statistics. The keywords and arguments are as follows: • *slot* --The backplane slot number for the interface being configured. • *port* --The backplane port number for the interface being configured.

	Command or Action	Purpose
Step 4	show atm vc **Example:** `Router# show atm vc`	Displays PVC status.
Step 5	debug atm events **Example:** `Router# debug atm events`	Identifies ATM-related events as they are generated.
Step 6	debug atm errors **Example:** `Router# debug atm errors`	Identifies interfaces with ATM errors.
Step 7	show interface atm *slot/port* **Example:** `Router# show interface atm 0/1`	Displays the status of the ATM interface. Ensure that the ATM slot/port and the line protocol are up. The keywords and arguments are as follows: • *slot* --The backplane slot number for the interface being configured. • *port* --The backplane port number for the interface being configured.
Step 8	exit **Example:** **Example:** `Router# exit`	Exits privileged EXEC mode.

Examples

The following example shows how the **show interface atm**command is used and that the ATM slot/port and line protocol are up:

```
Router# show
 interfaces
 atm
 0/0
ATM0/0 is up, line protocol is up
  Hardware is DSLSAR
  MTU 4470 bytes, sub MTU 4470, BW 4608 Kbit, DLY 110 usec,
```

```
     reliability 0/255, txload 1/255, rxload 1/255
  Encapsulation ATM, loopback not set
  Encapsulation(s): AAL5 , PVC mode
  23 maximum active VCs, 256 VCs per VP, 1 current VCCs
  VC Auto Creation Disabled.
  VC idle disconnect time: 300 seconds
  Last input never, output never, 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: Per VC Queueing
  30 second input rate 0 bits/sec, 0 packets/sec
  30 second output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 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
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 1 interface resets
     0 output buffer failures, 0 output buffers swapped out
3725# show
 atm
 vc
           VCD /                                          Peak  Avg/Min
Burst
Interface  Name         VPI   VCI  Type   Encaps   SC   Kbps   Kbps
Cells  Sts
0/0.1      1             2   100  PVC    MUX      VBR    2000   2000 0   UP
0/1.1      1             2   100  PVC    SNAP     CBR    4608 UP
0/2.1      1             2   100  PVC    SNAP     VBR    4608   4200 0   UP
1/0.1      1             2   100  PVC    SNAP     VBR    4608   4608 0   UP
3725#
Router# show atm vc
            VCD /                                      Peak  Avg/Min Burst
Interface   Name       VPI   VCI  Type   Encaps   SC   Kbps   Kbps   Cells  Sts
1/0.3      2            9    36   PVC    MUX      UBR     800                UP
1/0.2      1            9    37   PVC    SNAP     UBR     800                UP
3725# show controllers atm
0
/
0
Interface: ATM0/0, Hardware: DSLSAR, State: up
IDB:     645F4B98  Instance: 645F646C  reg_dslsar:3C200000  wic_regs:
3C200080
PHY Inst:0         Ser0Inst: 645DFC8C  Ser1Inst:  645EA608  us_bwidth:4608
Slot:    0         Unit:     0         Subunit:   0         pkt Size: 4528
VCperVP: 256       max_vp:   256       max_vc:    65536     total vc: 1
rct_size:65536     vpivcibit:16        connTblVCI:8         vpi_bits: 8
vpvc_sel:3         enabled:  0         throttled: 0         cell drops: 0
Last Peridic Timer 00:44:26.872(2666872)
Parallel reads to TCQ:0  tx count reset = 0, periodic safe start = 0
Attempts to overwrite SCC txring: 0
Host Controller lockup recovery Info:
       recovery count1= 0, recovery count2= 0
Saved Host Controller Info to check any lockup:
      scc = 0, output_qcount = 0, head:0,
      buf addr = 0x00000000, serial outputs = 0
      scc = 1, output_qcount = 0, head:54,
      buf addr = 0x00000000, serial outputs = 212
Serial idb(AAL5) output_qcount:0 max:40
Serial idb(RAW) output_qcount:0, max:40
Sar ctrl queue: max depth = 0, current queue depth = 0, drops = 0, urun
cnt = 0, total cnt = 106
Serial idb tx count: AAL5: 0, RAW: 212, Drop count:AAL5: 0, RAW: 0
Host Controller Clock rate Info:
SCC Clockrates:
        SCC0 = 1000000 (ATM0/0)
        SCC1 = 8000000 (ATM0/0)
        SCC2 = 1000000 (ATM0/1)
        SCC3 = 1000000 (ATM0/2)
        SCC4 = 5300000 (ATM0/1)
        SCC5 = 8000000 (ATM0/2)
        SCC6 = 0
        SCC7 = 0
WIC    Register   Value      Notes
```

```
---------------   ---------- ----------
FPGA Dev ID (LB)  0x53       'S'
FPGA Dev ID (UB)  0x4E       'N'
FPGA Revision     0xA7
WIC Config Reg    0x35       WIC / VIC select = WIC;
                             CTRLE addr bit 8 = 0;
                             NTR Enable = 0;
                             OK LED on;
                             LOOPBACK LED off;
                             CD LED on;
WIC Config Reg2   0x07       Gen bus error on bad G.SHDSL ATM/T1/E1 access
Int 0 Enable Reg  0x01       G.SHDSL ATM/T1/E1 normal interrupt enabled
                             G.SHDSL ATM/T1/E1 error interrupt disabled
DSLSAR Register   Value      Notes
---------------   ---------- ----------
sdram_refresh:    0x410FFFF  Expected value: 0x428xxxx
intr_event_reg:   0xC0       TMR.
intr_enable_reg:  0x13C      FIFOF.FBQE.RQAF.RPQAF.TSQAF.
config:           0x660D0A20 UTOPIA.RXEN.RegulateXmit.RMCell.TXEN.
                             Rx Buffer size: 8192.  RCT: Large, VPI Bits:
8.
status:           0x0
clkPerCell:       814121   (line rate: 4608 Kbps)
Pre-timer Count:  461
rcid_tableBase:   0x0
rct_base:         0x10000
tstBase1:         0x13C28    TST boot jump.
rawCellBase:      0x14300    (0/128) slots used.
rpq_base:         0x16000
tsqb(Tx Stat Q):  0x17000
fbq_base:         0x17880    (fbq_count: 128)
txChanQueue:      0x18000
rxBuffers:        0x30000
txBuffers:        0x130000
Lookup Error cnt: 0x0
Invalid Cell cnt: 0x0
SCCA Rx Errors:   0x0
SCCB Rx Errors:   0x0
Drop Pkt Count:   0x0
Total Tx Count:   0x0
Total Rx Count:   0x0
Timer:            0x73A141
DSLSAR Interrupts:0x0
       Last Addr:0x12E14
Router# show controllers
 atm

1
/
0
Interface ATM1/0 is up
  Hardware is DSLSAR (with Globespan G.SHDSL Module)
IDB:    62586758  Instance:6258E054  reg_dslsar:3C810000  wic_regs:3C810080
PHY Inst:62588490  Ser0Inst:62573074  Ser1Inst: 6257CBD8  us_bwidth:800
Slot:   1         Unit:    1         Subunit:  0         pkt Size:4496
VCperVP:256       max_vp:  256       max_vc:   65536     total vc:2
rct_size:65536     vpivcibit:16        connTblVCI:8         vpi_bits:8
vpvc_sel:3         enabled: 0         throttled:0
WIC    Register   Value      Notes
---------------   ---------- ----------
WIC Config Reg    0x45       WIC / VIC select = WIC;
                             CTRLE addr bit 8 = 1;
                             OK LED on;
                             LOOPBACK LED off;
                             CD LED on;
WIC Config Reg2   0x07       Gen bus error on bad ADSL access
Int 0 Enable Reg  0x03       ADSL normal interrupt enabled
                             ADSL error interrupt enabled
```

What to Do Next

Verify the configuration using the detailed steps in the Verifying DSL Configuration, on page 16.

Verifying DSL Configuration

Perform the steps in this section to verify the DSL configuration.

SUMMARY STEPS

1. **enable**
2. **show running-config**
3. **show controller dsl** *slot/port*
4. debug xdsl application
5. debug xdsl eoc
6. debug xdsl error
7. exit

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show running-config** **Example:** `Router# show running-config`	Displays the current running configuration and the status for all controllers.
Step 3	**show controller dsl** *slot/port* **Example:** `Router# show controller dsl 0/2`	Displays the DSL controller status. The keywords and arguments are as follows: • *slot* --The backplane slot number for the interface being configured. • *port* --The backplane port number for the interface being configured.
Step 4	debug xdsl application **Example:** `Router# debug dsl application`	Displays output of the DSL if the DSL does not come up.

	Command or Action	Purpose
Step 5	debug xdsl eoc **Example:** `Router# debug xdsl eoc`	Displays what is in the embedded operation channel (EOC) messages.
Step 6	debug xdsl error **Example:** `Router# debug xdsl error`	Displays error messages.
Step 7	exit **Example:** **Example:** `Router# exit`	Exits privileged EXEC mode.

Examples

The following example shows how to verify 4-wire ATM mode in line zero (CPE):

```
Router# show controller dsl 0/0
DSL 0/0 controller UP
 Globespan xDSL controller chipset
 Line Mode: Four Wire
 DSL mode: Trained with SHDSL Annex B
 Frame mode: Utopia
 Configured Line rate: 4608Kbps
 Line Re-activated 9 times after system bootup
 LOSW Defect alarm: ACTIVE
 CRC per second alarm: ACTIVE
 Line termination: CPE
 FPGA Revision: 0xB3

Line 0 statistics

        Current 15 min counters
                CRC : 0 LOSW Defect : 0 ES : 0  SES : 0 UAS : 25

        Previous 15 min counters
                CRC : 0 LOSW Defect : 0 ES : 0  SES : 0 UAS : 0

        Current 24 hr counters
                CRC : 0 LOSW Defect : 4 ES : 0  SES : 0 UAS : 25

        Previous 24 hr counters
                CRC : 5 LOSW Defect : 4 ES : 1  SES : 0 UAS : 19

Line 1 statistics

        Current 15 min counters
```

```
                CRC : 0 LOSW Defect : 0 ES : 0  SES : 0 UAS : 25

        Previous 15 min counters
                CRC : 0 LOSW Defect : 0 ES : 0  SES : 0 UAS : 0

        Current 24 hr counters
                CRC : 0 LOSW Defect : 0 ES : 0  SES : 0 UAS : 25

        Previous 24 hr counters
                CRC : 6 LOSW Defect : 4 ES : 1  SES : 0 UAS : 19

 Line-0 status
 Chipset Version:  0
 Firmware Version:  R3.0.1
 Modem Status:  Data, Status 1
 Last Fail Mode:  No Failure status:0x0
 Line rate:  2312 Kbps
 Framer Sync Status: In Sync
 Rcv Clock Status: In the Range
 Loop Attenuation:  0.0 dB
 Transmit Power:  9.5 dB
 Receiver Gain:  19.5420 dB
 SNR Sampling:  37.6080 dB
 Line-1 status
 Chipset Version:  0
 Firmware Version:  R3.0.1
 Modem Status:  Data, Status 1
 Last Fail Mode:  No Failure status:0x0
 Line rate:  2312 Kbps
 Framer Sync Status: In Sync
 Rcv Clock Status: In the Range
 Loop Attenuation:  0.0 dB
 Transmit Power:  9.5 dB
 Receiver Gain:  19.5420 dB
 SNR Sampling:  37.6080 dB
 Dying Gasp: Present
```

Sample Output--Building Configuration

```
Router> show running-config
Current configuration : 3183 bytes
!
version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3725
!
boot-start-marker
boot system flash c3725-is-mz.0424
boot system tftp shriv/c3725-is-mz.new 223.255.254.254
boot-end-marker
!
!
memory-size iomem 25
no network-clock-participate slot 1
no network-clock-participate slot 2
no network-clock-participate wic 0
no network-clock-participate wic 1
no network-clock-participate wic 2
no network-clock-participate aim 0
no network-clock-participate aim 1
no aaa new-model
ip subnet-zero
ip cef
!
!
!
!
!
```

```
!
!
controller DSL 0/0
 mode atm
 line-term co
 line-mode 4-wire
 dsl-mode shdsl symmetric annex B
 line-rate 4608
!
controller DSL 0/1
 mode atm
 line-term co
 line-mode 4-wire
 dsl-mode shdsl symmetric annex B
 line-rate 4608
controller DSL 0/2
 mode atm
 line-term co
 line-mode 4-wire
 dsl-mode shdsl symmetric annex B
 line-rate 4608
!
controller DSL 1/0
 mode atm
 line-term co
 line-mode 4-wire
 dsl-mode shdsl symmetric annex B
 line-rate 4608
!
!
!
interface ATM0/0
 no ip address
 load-interval 30
 no atm ilmi-keepalive
 clock rate aal5 8000000
!
interface ATM0/0.1 point-to-point
 ip address 5.0.0.1 255.0.0.0
 pvc 2/100
  vbr-rt 2000 2000
  oam-pvc 0
  encapsulation aal5mux ip
 !
!
interface FastEthernet0/0
 ip address 1.3.208.25 255.255.0.0
 duplex auto
 speed auto
 no cdp enable
!
interface ATM0/1
 no ip address
 load-interval 30
 no atm ilmi-keepalive
 clock rate aal5 5300000
!
interface ATM0/1.1 point-to-point
 ip address 6.0.0.1 255.0.0.0
 pvc 2/100
  cbr 4608
 !
!
interface FastEthernet0/1
 mac-address 0000.0000.0011
 ip address 70.0.0.2 255.0.0.0 secondary
 ip address 90.0.0.2 255.0.0.0 secondary
 ip address 50.0.0.2 255.0.0.0
 load-interval 30
 speed 100
 full-duplex
 no cdp enable
!
```

```
interface ATM0/2
 no ip address
 no atm ilmi-keepalive
 clock rate aal5 8000000
!
interface ATM0/2.1 point-to-point
 ip address 7.0.0.1 255.0.0.0
 pvc 2/100
  vbr-nrt 4608 4200
 !
!
interface ATM1/0
 no ip address
 load-interval 30
 no atm ilmi-keepalive
 clock rate aal5 5300000
!
interface ATM1/0.1 point-to-point
 ip address 8.0.0.1 255.0.0.0
 pvc 2/100
  vbr-nrt 4608 4608
 !
!
interface FastEthernet1/0
 no ip address
 shutdown
 duplex auto
 speed auto
 no cdp enable
!
interface FastEthernet1/1
 no ip address
 shutdown
 duplex auto
 speed auto
 no cdp enable
!
ip default-gateway 172.19.163.44
ip classless
ip route 60.0.0.0 255.0.0.0 ATM1/0.1
ip route 80.0.0.0 255.0.0.0 ATM0/1.1
ip route 223.255.254.254 255.255.255.255 FastEthernet0/0
ip route 223.255.254.254 255.255.255.255 1.3.0.1
ip http server
!
!
access-list 101 permit ip host 20.0.0.2 host 20.0.0.1
snmp-server community public RO
snmp-server enable traps tty
no cdp run
!
!
!
control-plane
!
!
!
!
!
!
!
alias exec c conf t
!
line con 0
 exec-timeout 0 0
 privilege level 15
line aux 0
line vty 0 4
 exec-timeout 0 0
 privilege level 15
 no login
!
end
```

Troubleshooting Tasks

The following commands verify hardware on the router:

- **show version** --Lists the modules installed in the router. If DSL controllers are installed, the output displays the following line:
  - 1 DSL controller --Indicates one DSL controller is installed in the router

and one of the following lines:

- • 1 ATM network interface(s) --If the DSL controller is configured for mode ATM
  - 1 Channelized T1/PRI port(s) --If the DSL controller is configured for mode T1

- **show controllers atm** --Displays the ATM controller status and statistics. The sample below shows the output in ATM mode. Actual output may vary depending on the router and the configuration.

```
Router# show controllers atm

0
/
0
Interface: ATM0/0, Hardware: DSLSAR, State: up
IDB:     645F4B98  Instance: 645F646C  reg_dslsar:3C200000  wic_regs: 3C200080
PHY Inst:0         Ser0Inst: 645DFC8C  Ser1Inst:  645EA608  us_bwidth:4608
Slot:    0         Unit:     0         Subunit:   0         pkt Size: 4528
VCperVP: 256       max_vp:   256       max_vc:    65536     total vc: 1
rct_size:65536     vpivcibit:16        connTblVCI:8         vpi_bits: 8
vpvc_sel:3         enabled:  0         throttled: 0         cell drops: 0
Last Peridic Timer 00:44:26.872(2666872)
Parallel reads to TCQ:0  tx count reset = 0, periodic safe start = 0
Attempts to overwrite SCC txring: 0
Host Controller lockup recovery Info:
       recovery count1= 0, recovery count2= 0
Saved Host Controller Info to check any lockup:
      scc = 0, output_qcount = 0, head:0,
      buf addr = 0x00000000, serial outputs = 0
      scc = 1, output_qcount = 0, head:54,
      buf addr = 0x00000000, serial outputs = 212
Serial idb(AAL5) output_qcount:0 max:40
Serial idb(RAW) output_qcount:0, max:40
Sar ctrl queue: max depth = 0, current queue depth = 0, drops = 0, urun
cnt = 0, total cnt = 106
Serial idb tx count: AAL5: 0, RAW: 212, Drop count:AAL5: 0, RAW: 0
Host Controller Clock rate Info:
SCC Clockrates:
        SCC0 = 1000000 (ATM0/0)
        SCC1 = 8000000 (ATM0/0)
        SCC2 = 1000000 (ATM0/1)
        SCC3 = 1000000 (ATM0/2)
        SCC4 = 5300000 (ATM0/1)
        SCC5 = 8000000 (ATM0/2)
        SCC6 = 0
        SCC7 = 0
WIC    Register   Value      Notes
---------------   ---------- ----------
FPGA Dev ID (LB)  0x53       'S'
FPGA Dev ID (UB)  0x4E       'N'
FPGA Revision     0xA7
WIC Config Reg    0x35       WIC / VIC select = WIC;
                             CTRLE addr bit 8 = 0;
                             NTR Enable = 0;
                             OK LED on;
```

```
                            LOOPBACK LED off;
                            CD LED on;
WIC Config Reg2   0x07      Gen bus error on bad G.SHDSL ATM/T1/E1 access
Int 0 Enable Reg  0x01      G.SHDSL ATM/T1/E1 normal interrupt enabled
                            G.SHDSL ATM/T1/E1 error interrupt disabled
DSLSAR Register   Value     Notes
---------------   ---------- ----------
sdram_refresh:    0x410FFFF  Expected value: 0x428xxxx
intr_event_reg:   0xC0       TMR.
intr_enable_reg:  0x13C      FIFOF.FBQE.RQAF.RPQAF.TSQAF.
config:           0x660D0A20 UTOPIA.RXEN.RegulateXmit.RMCell.TXEN.
                            Rx Buffer size: 8192.  RCT: Large, VPI Bits: 8.
status:           0x0
clkPerCell:       814121   (line rate: 4608 Kbps)
Pre-timer Count:  461
rcid_tableBase:   0x0
rct_base:         0x10000
tstBase1:         0x13C28    TST boot jump.
rawCellBase:      0x14300    (0/128) slots used.
rpq_base:         0x16000
tsqb(Tx Stat Q):  0x17000
fbq_base:         0x17880    (fbq_count: 128)
txChanQueue:      0x18000
rxBuffers:        0x30000
txBuffers:        0x130000
Lookup Error cnt: 0x0
Invalid Cell cnt: 0x0
SCCA Rx Errors:   0x0
SCCB Rx Errors:   0x0
Drop Pkt Count:   0x0
Total Tx Count:   0x0
Total Rx Count:   0x0
Timer:            0x73A141
DSLSAR Interrupts:0x0
       Last Addr:0x12E14
```

- **show controllers dsl--** Displays the DSL controller status and statistics. The sample below shows the output in T1 mode. Actual output may vary depending on the router and the configuration.

```
Router# show controllers dsl

0
/
0
 DSL 0/0 controller UP
 Globespan xDSL controller chipset
 DSL mode: SHDSL Annex B
 Frame mode: Utopia
 Configured Line rate: 4608Kbps
 Line Re-activated 5 times after system bootup
 LOSW Defect alarm: ACTIVE
 CRC per second alarm: ACTIVE
 Line termination: CO
 FPGA Revision: 0xA7
Line 0 statistics
        Current 15 min CRC: 679
        Current 15 min LOSW Defect: 8
        Current 15 min ES: 5
        Current 15 min SES: 5
        Current 15 min UAS: 441
        Previous 15 min CRC: 0
        Previous 15 min LOSW Defect: 0
        Previous 15 min ES: 0
        Previous 15 min SES: 0
        Previous 15 min UAS: 0
Line 1 statistics
        Current 15 min CRC: 577
        Current 15 min LOSW Defect: 8
        Current 15 min ES: 7
        Current 15 min SES: 4
        Current 15 min UAS: 455
```

```
        Previous 15 min CRC: 0
        Previous 15 min LOSW Defect: 0
        Previous 15 min ES: 0
        Previous 15 min SES: 0
        Previous 15 min UAS: 0
 Line-0 status
 Chipset Version:  1
 Firmware Version:  A29733
 Modem Status:  Data, Status 1
 Last Fail Mode:  No Failure status:0x0
 Line rate:  2312 Kbps
 Framer Sync Status: In Sync
 Rcv Clock Status: In the Range
 Loop Attenuation:  0.600 dB
 Transmit Power:  8.5 dB
 Receiver Gain:  21.420 dB
 SNR Sampling:  39.3690 dB
 Line-1 status
 Chipset Version:  1
 Firmware Version:  A29733
 Modem Status:  Data, Status 1
 Last Fail Mode:  No Failure status:0x0
 Line rate:  2312 Kbps
 Framer Sync Status: In Sync
 Rcv Clock Status: In the Range
 Loop Attenuation:  0.4294966256 dB
 Transmit Power:  8.5 dB
 Receiver Gain:  21.420 dB
 SNR Sampling:  39.1570 dB
 Dying Gasp: Present
```

- **debug xdsl application** --Displays output from the xDSL to see what is happening if the DSL does not come up. When the debug xdsl application command is used, resources and the buffer are used and will impact operation.

```
Router# debug xdsl application

xDSL application debugging is on
Router#
Apr 23 06:01:26.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:27.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:27.720: DSL 0/0 process_get_wakeup
Apr 23 06:01:27.720: DSL 0/0 xdsl_process_boolean_events
XDSL_LINE_UP_EVENT:
Apr 23 06:01:28.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:29.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:30.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:31.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:32.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:33.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:34.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:34.476: DSL 0/0   SNR Sampling: 42.8370 dB
Apr 23 06:01:35.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:35.476: DSL 0/0   SNR Sampling: 41.9650 dB
Apr 23 06:01:36.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:36.476: DSL 0/0   SNR Sampling: 41.2400 dB
Apr 23 06:01:37.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:37.476: DSL 0/0   SNR Sampling: 40.6180 dB
Apr 23 06:01:37.476: DSL 0/0 xdsl_background_process: one_second_timer triggers download
Apr 23 06:01:37.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:37.476: DSL 0/0 xdsl_background_process:Download boolean event received
Apr 23 06:01:37.476: DSL 0/0 xdsl_controller_reset: cdb-state=down
Apr 23 06:01:37.476: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to down
Apr 23 06:01:38.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:39.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:40.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:41.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:42.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:43.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:44.476: DSL 0/0 process_get_wakeup
```

```
Apr 23 06:01:45.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:46.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:47.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:48.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:49.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:50.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:51.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:52.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:53.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:54.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:55.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:56.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:57.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:57.796: DSL 0/0 process_get_wakeup
Apr 23 06:01:57.796: DSL 0/0 xdsl_process_boolean_events
XDSL_LINE_UP_EVENT:
Apr 23 06:01:57.812: DSL 0/0 process_get_wakeup
Apr 23 06:01:57.812: DSL 0/0 xdsl_background_process: XDSL link up boolean event received
Apr 23 06:01:57.812:  DSL 0/0 controller Link up! line rate: 4608 Kbps
Apr 23 06:01:57.812: DSL 0/0 xdsl_controller_reset: cdb-state=up
Apr 23 06:01:57.812: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
Apr 23 06:01:57.812: DSL 0/0
Apr 23 06:01:57.812:  Dslsar data rate 4608
Apr 23 06:01:57.816: DSL 0/0 TipRing 1, Xmit_Power Val 85, xmit_power 8.5
Apr 23 06:01:57.816: DSL 0/0 Mode 2, BW 4608, power_base_value 145, power_backoff 6
Apr 23 06:01:57.912: DSL 0/0 process_get_wakeup
Apr 23 06:01:57.916: DSL 0/0 process_get_wakeup
Apr 23 06:01:57.916: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:01:58.008: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.008: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.012: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.012: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:01:58.104: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.104: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.108: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.108: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:01:58.200: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.204: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.204: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.204: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:01:58.208: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.296: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.392: DSL 0/0 process_get_wakeup
Apr 23 06:01:58.476: DSL 0/0 process_get_wakeup
Apr 23 06:01:59.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:00.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:01.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:02.476: DSL 0/0 process_get_wakeup
Router#
Router#
Apr 23 06:02:02.920: DSL 0/0 process_get_wakeup
Apr 23 06:02:02.920: DSL 0/0 process_get_wakeup
Apr 23 06:02:02.920: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:02:03.016: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.016: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.016: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.016: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:02:03.020: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.112: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.208: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.304: DSL 0/0 process_get_wakeup
Apr 23 06:02:03.476: DSL 0/0 process_get_wakeup
Router#
Router#
Apr 23 06:02:04.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:04.476: DSL 0/0   SNR Sampling: 42.3790 dB
Apr 23 06:02:04.476: DSL 0/0   SNR Sampling: 42.8370 dB
Router#
Apr 23 06:02:04.476: %LINK-3-UPDOWN: Interface ATM0/0, changed state to up
Apr 23 06:02:05.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:05.476: DSL 0/0   SNR Sampling: 41.5880 dB
Apr 23 06:02:05.476: DSL 0/0   SNR Sampling: 42.3790 dB
Apr 23 06:02:05.476: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, changed state
```

```
 to up
Router#
Router#
Apr 23 06:02:06.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:06.476: DSL 0/0   SNR Sampling: 40.9180 dB
Apr 23 06:02:06.476: DSL 0/0   SNR Sampling: 41.5880 dB
Apr 23 06:02:07.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:07.476: DSL 0/0   SNR Sampling: 40.6180 dB
Apr 23 06:02:07.476: DSL 0/0   SNR Sampling: 41.2400 dBu all
Apr 23 06:02:07.912: DSL 0/0 process_get_wakeup
Apr 23 06:02:07.912: DSL 0/0 process_get_wakeup
Apr 23 06:02:07.912: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:02:08.008: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.008: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.008: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.008: DSL 0/0 xdsl_background_process: EOC boolean event received
Apr 23 06:02:08.016: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.104: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.200: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.296: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:08.476: DSL 0/0
All possible debugging has been turned off
Router#
Router#
Router#
Router#  SNR Sampling: 40.750 dB
Apr 23 06:02:08.476: DSL 0/0   SNR Sampling: 40.6180 dB
Apr 23 06:02:09.476: DSL 0/0 process_get_wakeup
Apr 23 06:02:09.476: DSL 0/0   SNR Sampling: 39.5920 dB
Apr 23 06:02:09.476: DSL 0/0   SNR Sampling: 40.3380 dB
```

- **debug xdsl driver** --Displays what is happening when the drivers are being downloaded and installed. The following example displays a sample output from the **debug xdsl driver**command:
  - 4-wire mode:

```
Router# debug xdsl driver
xDSL driver debugging is on
Router#
01:04:18: DSL 2/0 framer intr_status 0xC4
01:04:18: DSL 2/0  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/1 framer intr_status 0xC4
01:04:18: DSL 2/0  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/1  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/1  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/2 framer intr_status 0xC4
01:04:18: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/2  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 2/0 framer intr_status 0xC4
01:04:18: DSL 2/0  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/1 framer intr_status 0xC4
01:04:18: DSL 2/0  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/1 framer intr_status 0xC1
01:04:18: DSL 0/1  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/1  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 2/0 framer intr_status 0xC4
01:04:18: DSL 2/0 framer intr_status 0xC1
01:04:18: DSL 2/0  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/1 framer intr_status 0xC4
01:04:18: DSL 2/0  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/1  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/1  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/2 framer intr_status 0xC4
01:04:18: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/2
01:04:18: DSL 0/2 framer intr_status 0xC1  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/2  xdsl_gsi_int_disable(false):: 0x1
01:04:18: DSL 0/2 framer intr_status 0xC4
```

```
01:04:18: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:18: DSL 0/2  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 0/1 framer intr_status 0xC1
01:04:19: DSL 0/1  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 0/1  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 2/0 framer intr_status 0xC1
01:04:19: DSL 2/0  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 2/0  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 0/2 framer intr_status 0xC1
01:04:19: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 0/2  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 0/1 framer intr_status 0xC1
01:04:19: DSL 0/1  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 0/1  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 2/0 framer intr_status 0xC1
01:04:19: DSL 2/0  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 2/0  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 0/2 framer intr_status 0xC1
01:04:19: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 0/2  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 0/1 framer intr_status 0xC1
01:04:19: DSL 0/1  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 0/1  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 2/0 framer intr_status 0xC1
01:04:19: DSL 2/0  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 2/0  xdsl_gsi_int_disable(false):: 0x1
01:04:19: DSL 0/2 framer intr_status 0xC1
01:04:19: DSL 0/2  xdsl_gsi_int_disable(true):: 0x0
01:04:19: DSL 0/2  xdsl_gsi_int_disable(false):: 0x1
01:04:22: DSL 0/0  dsp interrupt-download next block for line-0
01:04:22: DSL 0/0 framer intr_status 0xC0
01:04:22: DSL 0/0  dsp interrupt-download next block for line-1
01:04:22: DSL 0/0 framer intr_status 0xC0
01:04:22: DSL 0/0  dsp interrupt-download next block for line-0
01:04:22: DSL 0/0 framer intr_status 0xC0
01:04:22: DSL 0/0  dsp interrupt-download next block for line-1
01:04:22: DSL 0/0 framer intr_status 0xC0
01:04:23: DSL 0/0  dsp interrupt-download next block for line-0
01:04:23: DSL 0/0 DSP interrupt disabled
01:04:23: DSL 0/0  Download completed for line-0
01:04:23: DSL 0/0 framer intr_status 0xC0
01:04:23: DSL 0/0  dsp interrupt-download next block for line-1
01:04:23: DSL 0/0 DSP interrupt disabled
01:04:23: DSL 0/0  Download completed for line-1
01:04:23: DSL 0/0 Framer interrupt enabled
01:04:23: DSL 0/0 framer intr_status 0xC0
01:04:23:  DSL 0/0 controller Link up! line rate: 4608 Kbps
01:04:23: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
01:04:23: DSL 0/0 framer intr_status 0xC4
01:04:23: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
01:04:23: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
01:04:23: DSL 0/0 framer intr_status 0xC1
01:04:23: DSL 0/0 framer intr_status 0xC4
```

- • 2-wire mode line 0:

```
Router# debug xdsl driver
xDSL driver debugging is on
00:58:22: DSL 0/0  dsp interrupt-download next block for line-0
00:58:23: DSL 0/0 framer intr_status 0xC0
00:58:24: DSL 0/0  dsp interrupt-download next block for line-0
00:58:24: DSL 0/0 framer intr_status 0xC0
00:58:37: DSL 0/0  dsp interrupt-download next block for line-0
00:58:37: DSL 0/0 framer intr_status 0xC0
00:58:38: DSL 0/0  dsp interrupt-download next block for line-0
00:58:38: DSL 0/0 framer intr_status 0xC0
00:58:38: DSL 0/0  dsp interrupt-download next block for line-0
00:58:38: DSL 0/0 DSP interrupt disabled
00:58:38: DSL 0/0  Download completed for line-0
00:58:38: DSL 0/0 Framer interrupt enabled
```

```
00:58:38: DSL 0/0 framer intr_status 0xC0
00:58:38:  DSL 0/0 controller Link up! line rate: 1600 Kbps
00:58:38: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
00:58:38:  Dslsar data rate 1600
00:58:38: DSL 0/0 framer intr_status 0xC4
00:58:38: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:58:38: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:58:38: DSL 0/0 framer intr_status 0xC4
00:58:38: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:58:38: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:58:38: DSL 0/0 framer intr_status 0xC1
00:58:38: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:58:38: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:58:38: DSL 0/0 framer intr_status 0xC4
00:58:38: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:58:38: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:58:38: DSL 0/0 framer intr_status 0xC1
00:58:38: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
```

- • 2-wire mode line 1:

```
Router# debug xdsl driver
xDSL driver debugging is on
00:55:15: DSL 0/0  dsp interrupt-download next block for line-1
00:55:15: DSL 0/0 framer intr_status 0xC0
00:55:16: DSL 0/0  dsp interrupt-download next block for line-1
00:55:16: DSL 0/0 framer intr_status 0xC0
00:55:17: DSL 0/0  dsp interrupt-download next block for line-1
00:55:17: DSL 0/0 framer intr_status 0xC0
00:55:19: DSL 0/0  dsp interrupt-download next block for line-1
00:55:19: DSL 0/0 framer intr_status 0xC0
00:55:32: DSL 0/0  dsp interrupt-download next block for line-1
00:55:32: DSL 0/0 framer intr_status 0xC0
00:55:32: DSL 0/0  dsp interrupt-download next block for line-1
00:55:32: DSL 0/0 framer intr_status 0xC0
00:55:32: DSL 0/0  dsp interrupt-download next block for line-1
00:55:32: DSL 0/0 DSP interrupt disabled
00:55:32: DSL 0/0  Download completed for line-1
00:55:32: DSL 0/0 Framer interrupt enabled
00:55:32: DSL 0/0 framer intr_status 0xC0
00:55:32:  DSL 0/0 controller Link up! line rate: 1600 Kbps
00:55:32: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
00:55:32:  Dslsar data rate 1600
00:55:46: %LINK-3-UPDOWN: Interface ATM0/0, changed state to up
00:55:47: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, changed state to up
00:56:28: DSL 0/0 framer intr_status 0xC8
00:56:28: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:56:28: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:56:28: DSL 0/0 framer intr_status 0xC8
00:56:28: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:56:28: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:56:28: DSL 0/0 framer intr_status 0xC2
00:56:28: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:56:28: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:56:33: DSL 0/0 framer intr_status 0xC8
00:56:33: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:56:33: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:56:33: DSL 0/0 framer intr_status 0xC2
00:56:33: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:56:33: DSL 0/0
00:56:33: DSL 0/0 framer intr_status 0xC8  xdsl_gsi_int_disable(false):: 0x1
00:56:33: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
00:56:33: DSL 0/0  xdsl_gsi_int_disable(false):: 0x1
00:56:33: DSL 0/0 framer intr_status 0xC8
00:56:33: DSL 0/0  xdsl_gsi_int_disable(true):: 0x0
```

- **debug xdsl eoc** --Displays what is in the embedded operations channel messages. The following example shows the use of the **debug xdsl eoc** command and sample output.

```
Router# debug xdsl eoc

*Jan  3 18:34:46.824: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
*Jan  3 18:34:46.924: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:46.924: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:46.924: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:46.924: DSL 0/0: GT_FAIL
*Jan  3 18:34:46.924:   eoc_get_message for line::0
*Jan  3 18:34:46.924:  Rx EOC remove transparency:: 1F 1  0  46 10
*Jan  3 18:34:46.928: data_transparency_remove: Done, eoc packet size = 5

*Jan  3 18:34:46.928:   Good eoc packet received
*Jan  3 18:34:46.928:  incoming request eocmsgid: 1 from line 0
*Jan  3 18:34:46.928:  Tx Converted EOC message:: 21 81 1  43 43 49 53 43 4F 0  0  0  2  1
  0  E9 61
*Jan  3 18:34:46.932: data_transparency_add: eoc packet size - before 17, after 17

*Jan  3 18:34:47.020: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:47.020: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:47.020: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:47.020: DSL 0/0: GT_FAIL
*Jan  3 18:34:47.020:   eoc_get_message for line::0
*Jan  3 18:34:47.020:  Rx EOC remove transparency:: 12 2  74 8A
*Jan  3 18:34:47.024: data_transparency_remove: Done, eoc packet size = 4

*Jan  3 18:34:47.024:   Good eoc packet received
*Jan  3 18:34:47.024:  incoming request eocmsgid: 2 from line 0
*Jan  3 18:34:47.024:  Tx Converted EOC message:: 21 82 1  0  0  0  0  0  52 33 2E 30 2E
31 43 4E 53 38 44 44 30 41 41 41 43 43 49 53 43 4F 0  0  0  57 49 43 2D 53 48 44 53 4C 2D
56 32 46 4F 43 30 38 33 37 35 55 41 4C 0  31 32 2E 34 28 33 2E 35 2E 31 29 0  66 74
*Jan  3 18:34:47.044: data_transparency_add: eoc packet size - before 71, after 71

*Jan  3 18:34:47.116: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:47.116: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:47.116: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:47.116: DSL 0/0: GT_FAIL
*Jan  3 18:34:47.116:   eoc_get_message for line::0
*Jan  3 18:34:47.116:  Rx EOC remove transparency:: 12 3  0  0  6D E9
*Jan  3 18:34:47.120: data_transparency_remove: Done, eoc packet size = 6

*Jan  3 18:34:47.120:   Good eoc packet received
*Jan  3 18:34:47.120:  incoming request eocmsgid: 3 from line 0
*Jan  3 18:34:47.120:  Tx Converted EOC message:: 21 83 0  0  0  1  AC
*Jan  3 18:34:47.120: data_transparency_add: eoc packet size - before 7, after 7
GSI Tx buffer yet to transmit

*Jan  3 18:34:47.212: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:47.212: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:47.212: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:47.212: DSL 0/0: GT_FAIL
*Jan  3 18:34:47.212:   eoc_get_message for line::0
*Jan  3 18:34:47.212:  Rx EOC remove transparency:: 12 5  0  0  0  E9 0  0  0  0  0  0  0
 0  0  0  0  0  0  0  0  0  32 42
*Jan  3 18:34:47.216: data_transparency_remove: Done, eoc packet size = 24

*Jan  3 18:34:47.216:   Good eoc packet received
*Jan  3 18:34:47.216:  incoming request eocmsgid: 5 from line 0
*Jan  3 18:34:47.220:  Tx Converted EOC message:: 21 85 0  0  0  0  0  0  0  0  0  0  0  0
  0  0  0  0  0  0  0  0  0  0  1E AB
*Jan  3 18:34:47.224: data_transparency_add: eoc packet size - before 26, after 26
GSI Tx buffer yet to transmit
GSI Tx buffer yet to transmit

*Jan  3 18:34:47.224: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:47.224: DSL 0/0: Current length 40 GTI_EOM
*Jan  3 18:34:47.224: DSL 0/0: GT_FAIL
*Jan  3 18:34:51.824: xdsl_background_process:
*Jan  3 18:34:51.824:  sending request eocmsgid: 12
```

```
*Jan  3 18:34:51.824:  Tx Converted EOC message:: 21 C  C0 FF
*Jan  3 18:34:51.824: data_transparency_add: eoc packet size - before 4, after 4

*Jan  3 18:34:51.824:  size of eoc full status request :: 2
*Jan  3 18:34:51.928: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:51.928: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:51.928: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:51.928: DSL 0/0: GT_FAIL
*Jan  3 18:34:51.928:   eoc_get_message for line::0
*Jan  3 18:34:51.928:  Rx EOC remove transparency:: 12 C  A  63
*Jan  3 18:34:51.932: data_transparency_remove: Done, eoc packet size = 4

*Jan  3 18:34:51.932:   Good eoc packet received
*Jan  3 18:34:51.932:  incoming request eocmsgid: 12 from line 0
*Jan  3 18:34:51.932:  Tx Converted EOC message:: 21 8C 0  F  D3 1  0  0  5  2  46 5  1
44 59
*Jan  3 18:34:51.932: data_transparency_add: eoc packet size - before 15, after 15

*Jan  3 18:34:51.936:  size of eoc status response :: 13
*Jan  3 18:34:51.936:  Tx Converted EOC message:: 21 8C 0  10 D3 1  0  0  6  1  46 5  2
50 2C
*Jan  3 18:34:51.936: data_transparency_add: eoc packet size - before 15, after 15

*Jan  3 18:34:51.936:  size of eoc status response :: 13
*Jan  3 18:34:51.940:  Tx Converted EOC message:: 21 89 4  DB 82
*Jan  3 18:34:51.940: data_transparency_add: eoc packet size - before 5, after 5

*Jan  3 18:34:51.940:  size of eoc status response :: 3GSI Tx buffer yet to transmit
GSI Tx buffer yet to transmit

*Jan  3 18:34:52.024: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:52.024: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:52.024: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:52.024: DSL 0/0: GT_FAIL
*Jan  3 18:34:52.024:   eoc_get_message for line::0
*Jan  3 18:34:52.024:  Rx EOC remove transparency:: 12 11 6E A8
*Jan  3 18:34:52.024: data_transparency_remove: Done, eoc packet size = 4

*Jan  3 18:34:52.028:   Good eoc packet received
*Jan  3 18:34:52.028:  incoming request eocmsgid: 17 from line 0
*Jan  3 18:34:52.028:  Tx Converted EOC message:: 21 91 0  0  0  D6 56
*Jan  3 18:34:52.028: data_transparency_add: eoc packet size - before 7, after 7

*Jan  3 18:34:52.028:  size of eoc status response :: 5GSI Tx buffer yet to transmit
GSI Tx buffer yet to transmit

*Jan  3 18:34:52.120: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:52.120: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:52.120: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:52.120: DSL 0/0: GT_FAIL
*Jan  3 18:34:52.120:   eoc_get_message for line::0
*Jan  3 18:34:52.120:  Rx EOC remove transparency:: 12 8C 0  3  0  B  7  5  D8 4  5F 6  1
 27 64
*Jan  3 18:34:52.124: data_transparency_remove: Done, eoc packet size = 15

*Jan  3 18:34:52.124:   Good eoc packet received
*Jan  3 18:34:52.216: DSL 0/0: line 0 EOC Rcv  Intr :: 0x4
*Jan  3 18:34:52.216: DSL 0/0:Current length 40 GTI_OK
*Jan  3 18:34:52.216: DSL 0/0:msg rcvd line 0
*Jan  3 18:34:52.216: DSL 0/0: GT_FAIL
*Jan  3 18:34:52.216:   eoc_get_message for line::0
*Jan  3 18:34:52.216:  Rx EOC remove transparency:: 12 8C 0  5  0  3  0  0  12 3  2  26 2
 1C 4F
*Jan  3 18:34:52.220: data_transparency_remove: Done, eoc packet size = 15
```

- **debug xdsl error** --Displays error messages. The following example shows the **debug xdsl error**command.

```
Router# debug xdsl error
```

```
xDSL error debugging is on
Router#
```

Configuration Examples for ATM Mode for Two-Wire or Four-Wire SHDSL

Router A CPE Configuration Example

```
controller DSL 1/2
 mode atm
 line-term cpe
 line-mode 2-wire line-zero
 dsl-mode shdsl symmetric annex B
!
!
!
!
connect hp DSL 1/0 0 DSL 1/2 0
!
!
```

Router B CO Configuration Example

```
Current configuration : 3183 bytes
!
version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3725
!
boot-start-marker
boot system flash c3725-is-mz.0424
boot system tftp shriv/c3725-is-mz.new 223.255.254.254
boot-end-marker
!
!
memory-size iomem 25
no network-clock-participate slot 1
no network-clock-participate slot 2
no network-clock-participate wic 0
no network-clock-participate wic 1
no network-clock-participate wic 2
no network-clock-participate aim 0
no network-clock-participate aim 1
no aaa new-model
ip subnet-zero
ip cef
!
!
!
!
!
!
!
controller DSL 0/0
 mode atm
 line-term co
 line-mode 4-wire enhanced
```

```
 dsl-mode shdsl symmetric annex B
 line-rate 4608
!
controller DSL 0/1
 mode atm
 line-term co
 line-mode 4-wire enhanced
 dsl-mode shdsl symmetric annex B
 line-rate 4608
controller DSL 0/2
 mode atm
 line-term co
 line-mode 4-wire enhanced
 dsl-mode shdsl symmetric annex B
 line-rate 4608
!
controller DSL 1/0
 mode atm
 line-term co
 line-mode 4-wire enhanced
 dsl-mode shdsl symmetric annex B
 line-rate 4608
!
!
!
interface ATM0/0
 no ip address
 load-interval 30
 no atm ilmi-keepalive
 clock rate aal5 8000000
!
interface ATM0/0.1 point-to-point
 ip address 5.0.0.1 255.0.0.0
 pvc 2/100
  vbr-rt 2000 2000
  oam-pvc 0
  encapsulation aal5mux ip
 !
!
interface FastEthernet0/0
 ip address 1.3.208.25 255.255.0.0
 duplex auto
 speed auto
 no cdp enable
!
interface ATM0/1
 no ip address
 load-interval 30
 no atm ilmi-keepalive
 clock rate aal5 5300000
!
interface ATM0/1.1 point-to-point
 ip address 6.0.0.1 255.0.0.0
 pvc 2/100
  cbr 4608
 !
!
interface FastEthernet0/1
 mac-address 0000.0000.0011
 ip address 70.0.0.2 255.0.0.0 secondary
 ip address 90.0.0.2 255.0.0.0 secondary
 ip address 50.0.0.2 255.0.0.0
 load-interval 30
 speed 100
 full-duplex
 no cdp enable
!
interface ATM0/2
 no ip address
 no atm ilmi-keepalive
 clock rate aal5 8000000
!
interface ATM0/2.1 point-to-point
```

```
 ip address 7.0.0.1 255.0.0.0
 pvc 2/100
  vbr-nrt 4608 4200
 !
!
interface ATM1/0
 no ip address
 load-interval 30
 no atm ilmi-keepalive
 clock rate aal5 5300000
!
interface ATM1/0.1 point-to-point
 ip address 8.0.0.1 255.0.0.0
 pvc 2/100
  vbr-nrt 4608 4608
 !
!
interface FastEthernet1/0
 no ip address
 shutdown
 duplex auto
 speed auto
 no cdp enable
!
interface FastEthernet1/1
 no ip address
 shutdown
 duplex auto
 speed auto
 no cdp enable
!
ip default-gateway 172.19.163.44
ip classless
ip route 60.0.0.0 255.0.0.0 ATM1/0.1
ip route 80.0.0.0 255.0.0.0 ATM0/1.1
ip route 223.255.254.254 255.255.255.255 FastEthernet0/0
ip route 223.255.254.254 255.255.255.255 1.3.0.1
ip http server
!
!
access-list 101 permit ip host 20.0.0.2 host 20.0.0.1
snmp-server community public RO
snmp-server enable traps tty
no cdp run
!
!
!
control-plane
!
!
!
!
!
!
!
alias exec c conf t
!
line con 0
 exec-timeout 0 0
 privilege level 15
line aux 0
line vty 0 4
 exec-timeout 0 0
 privilege level 15
 no login
!
end
```

Additional References

For additional information related to the ATM Mode for Two-Wire or Four-Wire SHDSL feature, refer to the following references.

Related Documents

Related Topic	Document Title
1-port G.SHDSL WAN interface card	1-Port G.SHDSL WAN Interface Card for Cisco 2600 Series and Cisco 3600 Series Routers, Release 12.2(8)T
Voice configuration	Cisco IOS Voice Configuration Library, Release 12.3
Voice commands	*Cisco IOS Voice Command Reference*, Release 12.3
IP configuration	*Cisco IOS IP Configuration Guide* , Release 12.3
ATM configuration	"Configuring ATM" in the *Wide-Area Networking Configuration Guide*, Release 12.3
Voice over ATM with AAL5 and AAL2 support	Voice over ATM, Release 12.3

Standards

Standards	Title
ITU-T G.991.2 (SHDSL)	Single-Pair High-Speed Digital Subscriber Line (SHDSL) Transceivers
ITU-T G.994.1 (G.HDSL)	Handshake Procedures for Digital Subscriber Line (DSL) Transceivers

MIBs

MIBs	MIBs Link
• ATM MIB • HDSL2-SHDSL-LINE-MIB(RFC3276) • G.SHDSL MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFCs	Title
No new or modified RFCs are supported by this feature and support for existing RFCs has not been modified by this feature.	--

Technical Assistance

Description	Link
Technical Assistance Center (TAC) home page, containing 30,000 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.	http://www.cisco.com/public/support/tac/home.shtml

Feature Information for ATM Mode for Two-Wire or Four-Wire SHDSL

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to . An account on Cisco.com is not required.

Table 4: Feature Information for ATM Mode for Two-Wire or Four-Wire SHDSL

Feature Name	Releases	Feature Information
ATM Mode for Two-Wire or Four-Wire SHDSL	12.3(4)XD 12.3(4)XG 12.3(7)T 12.3(4)XG1 12.3(11)T 12.3(14)T 12.4(2)XA 12.4(5)	

Feature Name	Releases	Feature Information
		In Cisco IOS Release 12.3(4)XD, this feature (WIC-1SHDSL-V2) was introduced on the Cisco 2600 series and Cisco 3700 series routers to add 4-wire support. 2-wire support was previously available in Cisco IOS Release 12.2(8)T. For more information, see the document "1-Port G.SHDSL WAN Interface Card for Cisco 2600 Series and Cisco 3600 Series Routers". This feature (WIC-1SHDSL-V2) was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers. This feature (WIC-1SHDSL-V2) was integrated into the Cisco IOS Release 12.3(7)T on the Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers. Cisco 1700 series routers do not support the WIC-1SHDSL-V2 in this release. In Cisco IOS Release 12.3(4)XG1, support for the auto line-mode feature was added. In Cisco IOS Release 12.3(11)T, support for the following was added: additional annex parameters for Cisco 1700, Cisco 2600, Cisco 2800, Cisco 3631, Cisco 3700, and Cisco 3800 series routers; the HDSL2-SHDSL-LINE-MIB (RFC3276); and support for the ATM Mode for SHDSL feature was added for Cisco 2800 series and Cisco 3800 series routers. In Cisco IOS Release 12.3(14)T, support was added for Cisco 1800 series routers and the Cisco 2801 integrated services router. In Cisco IOS Release 12.4(2)XA, support was added for the WIC-1SHDSL-V3 interface card. Support for the WIC-1SHDSL-V3 interface card was integrated into

Feature Name	Releases	Feature Information
		the Cisco IOS Release 12.4(5) The following commands were introduced or modified: **controller dsl**, **dsl-mode shdsl symmetric annex**, **ignore-error-duration**, **line-mode**, **line-rate**, **line-term**, **loopback (DSL controller)**, **show controller dsl**, **snr margin**, **debug xdsl application**, **debug xdsl driver**, **debug xdsl eoc**, **debug xdsl error**.

Glossary

ABR--available bit rate. An ATM service type in which the ATM network makes a "best effort" to meet the transmitter's bandwidth requirements. ABR uses a congestion feedback mechanism that allows the ATM network to notify the transmitters that they should reduce their rate of data transmission until the congestion decreases. Thus, ABR offers a qualitative guarantee that the transmitter's data can get to the intended receivers without unwanted cell loss.

ATM--Asynchronous Transfer Mode. A form of digitized data transmission based on fixed-length cells that can carry data, voice, and video at high speeds.

CBR--constant bit rate. A data transmission that can be represented by a nonvarying, or continuous, stream of bits or cell payloads. Applications such as voice circuits generate CBR traffic patterns. CBR is an ATM service type in which the ATM network guarantees to meet the transmitter's bandwidth and quality-of-service (QoS) requirements.

CO--central office. Local telephone company office to which all local loops in a given area connect and in which circuit switching of subscriber lines occur.

CPE--customer premises equipment. CPE includes devices, such as CSU/DSUs, modems, and ISDN terminal adapters, required to provide an electromagnetic termination for wide-area network circuits before connecting to the router or access server. This equipment was historically provided by the telephone company, but is now typically provided by the customer in North American markets.

Downstream--Refers to the transmission of data from the central office (CO or COE) to the customer premises equipment (CPE).

G.SHDSL--Multirate Symmetrical High-Speed Digital Subscriber Line.

UBR--unspecified bit rate. QoS class defined by the ATM Forum for ATM networks. UBR allows any amount of data up to a specified maximum to be sent across the network, but there are no guarantees in terms of cell loss rate and delay. Compare with ABR (available bit rate), CBR, and VBR.

Upstream--Refers to the transmission of data from the customer premises equipment (CPE) to the central office equipment (CO or COE).

VBR--variable bit rate. QOS class defined by the ATM Forum for ATM networks. VBR is subdivided into a real time (rt) class and non-real time (nrt) class.

VBR-rt--VBR-real-time is used for connections in which there is a fixed timing relationship between samples.

VBR-nrt--VBR-non-real-time is used for connections in which there is no fixed timing relationship between samples, but that still need a guaranteed QoS. Compare with ABR, CBR, and UBR.

Note Refer to the Internetworking Terms and Acronyms for terms not included in this glossary.