



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.

History for the ATM Mode for Two-Wire or Four-Wire SHDSL Feature

Feature History

Release	Modification
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 .
12.3(4)XG	This feature (WIC-1SHDSL-V2) was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
12.3(7)T	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.
12.3(4)XG1	Support for the auto line-mode feature was added.
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.
12.3(14)T	Support was added for Cisco 1800 series routers and the Cisco 2801 integrated services router.

12.4(2)XA	Support was added for the WIC-1SHDSL-V3 interface card.
12.4(5)	Support for the WIC-1SHDSL-V3 interface card was integrated into the Cisco IOS Release 12.4(5)

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

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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 [Table 1](#).

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

This section provides information about the ATM mode for SHDSL feature.

- [SHDSL Features, page 3](#)
- [ATM Features, page 4](#)
- [Interface and Controller Numbering on the Cisco 1721 Router, page 4](#)
- [Interface Numbering on Cisco 2800 and Cisco 3800 Series Routers, page 5](#)

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 [Table 2](#) 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: <pre>controller dsl 0 interface atm 0</pre> For ADSL/SHDSL: <pre>interface atm 1</pre>
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: <pre>interface atm 0</pre> For WIC-1SHDSL-V2 or WIC-1SHDSL-V3: <pre>controller dsl 1 interface atm 1</pre>

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.

[Table 3](#) 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

To configure the ATM Mode for Two-Wire or Four-Wire SHDSL feature, perform the following tasks:

- [Configuring G.SHDSL Service, page 6](#) (required)
- [Verifying the ATM Configuration, page 12](#) (optional)
- [Verifying DSL Configuration, page 16](#) (optional)
- [Troubleshooting Tasks, page 21](#) (optional)

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.

Prerequisites

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 [Figure 1](#), 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. **line-mode [2-wire | 4-wire | auto]**
9. **line-rate [rate / auto]**



Note Perform this step only if line-mode is not set to *auto*.

10. **exit**
11. **interface atm** *slot/port*
12. **ip address** *IP-address subnet-mask*
13. **atm ilmi-keepalive** [*seconds*]
14. **pvc** [*name*] *vpilvci*
15. **protocol** *protocol* [*protocol-address*]
16. **vbr-rt** *peak-rate average-cell-rate burst*
17. **encapsulation** {*aal2* | *aal5ciscoppp* | *aal5mux* | *aal5nlpid* | *aal5snap* | *aal5autopp*}
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. <ul style="list-style-type: none">Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	controller dsl <i>slot/port</i> Example: Router(config)# controller dsl 0/1	Enters controller configuration mode. The keywords and arguments are as follows: <ul style="list-style-type: none">dsl—The type of controller.<i>slot/port</i>—The backplane slot number and port number for the interface being configured.
Step 4	line-term { <i>co</i> <i>cpe</i> } Example: Router(config-controller)# line-term <i>cpe</i>	Configures the DSL controller line termination as follows: <ul style="list-style-type: none">co—Central office.cpe—Customer premises equipment.

Command or Action	Purpose
<p>Step 5</p> <pre>dsl-mode shdsl symmetric annex mode</pre> <p>Example: Router(config-controller)# dsl-mode shdsl symmetric annex A</p>	<p>Sets the DSL operating mode parameters. The valid values are:</p> <ul style="list-style-type: none"> • 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.
<p>Step 6</p> <pre>ignore-error-duration (seconds)</pre> <p>Example: Router(config-controller)# ignore-error-duration 15</p>	<p>(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.</p> <ul style="list-style-type: none"> • <i>seconds</i>—Number of seconds for which errors are ignored. The range is 15 to 30 seconds. If this value is omitted, an error message appears.
<p>Step 7</p> <pre>mode atm</pre> <p>Example: Router(config-controller)# mode atm</p>	<p>Enables ATM encapsulation and creates a logical ATM interface slot/port.</p> <p>Note If the no mode atm command is used to leave ATM mode, the router must be rebooted to clear the mode.</p>
<p>Step 8</p> <p>For CPE:</p> <pre>line-mode [4-wire [enhanced standard] 2-wire line-number auto]</pre> <p>For CO:</p> <pre>line-mode {4-wire [enhanced standard] 2-wire line-number}</pre> <p>Example: Router(config-controller)# line-mode 4-wire enhanced</p>	<p>(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.</p> <ul style="list-style-type: none"> • 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. <ul style="list-style-type: none"> – enhanced—Configures 4-wire mode to exchange handshake status on both wire pairs. This is the default if the handshake mode is not specified. – standard—Configures 4-wire mode to exchange handshake status on the master wire pair only. • <i>line-number</i>—For 2-wire mode only, specifies the pair of wires used. Valid values are line-zero (default) or line-one. Line-zero chooses 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.

	Command or Action	Purpose
Step 9	<p><code>line-rate {rate auto}</code></p> <p>Example: Router(config-controller)# <code>line-rate 1024</code></p>	<p>Note Perform this step only if line-mode was not set to <i>auto</i> in Step 8.</p> <p>Specifies the DSL line rate for the SHDSL port. Auto mode is supported only in 2-wire mode. The argument is as follows:</p> <ul style="list-style-type: none"> • <i>auto</i>—Allows the controller to select the rate. This option is available only in 2-wire mode. • <i>rate</i>—Sets the DSL line rate. The supported line rates are as follows: <ul style="list-style-type: none"> – 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. <p>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.</p>
Step 10	<p><code>exit</code></p> <p>Example: Router(config-controller)# <code>exit</code></p>	<p>Exits controller configuration mode.</p>
Step 11	<p><code>interface atm slot/port</code></p> <p>Example: Router(config)# <code>interface atm 1/0</code></p>	<p>Enters ATM configuration mode for interface ATM 0 in slot 1.</p> <p>The keywords and arguments are as follows:</p> <ul style="list-style-type: none"> • <i>slot</i>—The backplane slot number for the interface being configured. • <i>port</i>—The backplane port number for the interface being configured. <p>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).</p> <p>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.</p>

Command or Action	Purpose
<p>Step 12 <code>ip address ip-address subnet-mask</code></p> <p>Example: Router(config-if)# <code>ip address 192.168.10.25 255.255.255.0</code></p>	<p>Assigns an IP address to the DSL ATM interface.</p>
<p>Step 13 <code>atm ilmi-keepalive [seconds]</code></p> <p>Example: Router(config-if)# <code>atm ilmi-keepalive 5</code></p>	<p>(Optional) Enables Integrated Local Management Interface (ILMI) keepalives.</p> <ul style="list-style-type: none"> <code>seconds</code>—The number of seconds between keepalives. If you enable ILMI keepalives without specifying the seconds, the default time interval is 3 seconds.
<p>Step 14 <code>pvc [name] vpi/vci</code></p> <p>Example: Router(config-if)# <code>pvc [name] vpi/vci</code></p>	<p>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.</p> <p>The default traffic shaping is an unspecified bit rate (UBR); the default encapsulation is AAL5+LLC/SNAP.</p> <ul style="list-style-type: none"> <code>name</code>—(Optional) Name of the PVC or map. The name can be up to 15 characters long. <code>vpi</code>— 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. <p>Value ranges:</p> <ul style="list-style-type: none"> 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 <p>The <code>vpi</code> and <code>vci</code> arguments cannot both be set to 0; if one is 0, the other cannot be 0.</p> <ul style="list-style-type: none"> <code>vci</code>—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-vc 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. <p>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.</p> <p>The <code>vpi</code> and <code>vci</code> arguments cannot both be set to 0; if one is 0, the other cannot be 0.</p>

	Command or Action	Purpose
Step 15	<p><code>protocol protocol [protocol-address]</code></p> <p>Example: Router(config-if-vc)# <code>protocol ip 192.168.0.4</code></p>	<p>(Optional) Enables IP connectivity and creates a point-to-point IP address for the virtual circuit (VC).</p> <ul style="list-style-type: none"> • <i>protocol</i>—Choose the ip protocol for this configuration. • <i>protocol-address</i>—Destination address that is being mapped to a permanent virtual circuit (PVC).
Step 16	<p><code>vbr-rt peak-rate average-cell-rate burst</code></p> <p>Example: Router(config-if-vc)# <code>vbr-rt peak-rate average-cell-rate burst</code></p>	<p>(Optional) Configures the PVC for real-time variable bit rate (VBR) traffic shaping.</p> <ul style="list-style-type: none"> • <i>peak rate</i>—Peak cell rate (PCR). • <i>average-cell-rate</i>—Average cell rate (ACR). • <i>burst</i>—Burst size in cells.
Step 17	<p><code>encapsulation {aal2 aal5ciscoPPP aal5mux aal5nlpid aal5snap aal5autoppP}</code></p> <p>Example: Router(config-if-vc)# <code>encapsulation aal2</code></p>	<p>(Optional) Configures the ATM adaptation layer (AAL) and encapsulation type.</p> <ul style="list-style-type: none"> • aal2—AAL2. • aal5ciscoPPP—Cisco PPP over AAL5. • aal5mux—AAL5+MUX. • aal5nlpid—AAL5+NLPID. • aal5snap—AAL5+LLC/SNAP. • aal5autoppP—PPP autosense over AAL5. <p>The default is aal5snap.</p>
Step 18	<p><code>exit</code></p> <p>Example: Router(config-if-vc)# <code>exit</code></p>	Exits interface-atm-vc configuration mode.
Step 19	<p><code>exit</code></p> <p>Example: Router(config-if)# <code>exit</code></p>	Exits ATM interface configuration mode.
Step 20	<p><code>exit</code></p> <p>Example: Router(config)# <code>exit</code></p>	Exits global configuration mode.

	Command or Action	Purpose
Step 21	<pre>show interface atm slot/port</pre> <p>Example: Router# <code>show interface atm 1/0</code></p>	<p>Displays the ATM interface configuration.</p> <p>The keywords and arguments are as follows:</p> <ul style="list-style-type: none"> <i>slot</i>—The backplane slot number for the interface being configured. <i>port</i>—The backplane port number for the interface being configured.
Step 22	<pre>exit</pre> <p>Example: Router# <code>exit</code></p>	<p>Exits privileged EXEC mode.</p>

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	<code>enable</code> Example: Router> <code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none">• Enter your password if prompted.
Step 2	<code>show running-config</code> Example: Router# <code>show running-config</code>	Displays current running configuration and the status for all controllers.
Step 3	<code>show controllers atm slot/port</code> Example: Router# <code>show controllers atm 0/1</code>	Displays ATM controller statistics. The keywords and arguments are as follows: <ul style="list-style-type: none">• <i>slot</i>—The backplane slot number for the interface being configured.• <i>port</i>—The backplane port number for the interface being configured.
Step 4	<code>show atm vc</code> Example: Router# <code>show atm vc</code>	Displays PVC status.
Step 5	<code>debug atm events</code> Example: Router# <code>debug atm events</code>	Identifies ATM-related events as they are generated.
Step 6	<code>debug atm errors</code> Example: Router# <code>debug atm errors</code>	Identifies interfaces with ATM errors.
Step 7	<code>show interface atm slot/port</code> Example: Router# <code>show interface atm 0/1</code>	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: <ul style="list-style-type: none">• <i>slot</i>—The backplane slot number for the interface being configured.• <i>port</i>—The backplane port number for the interface being configured.
Step 8	<code>exit</code> Router# <code>exit</code>	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 DSL/SAR
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
```

Burst		VCD /					Peak	Avg/Min			
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				
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	

```
Router# show atm vc
```

Interface		VCD /					Peak	Avg/Min		Burst	Sts
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: DSL/SAR, 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 Periodic 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; CTRLLE 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

DSL SAR Register	Value	Notes
s dram_refresh:	0x410FFFF	Expected value: 0x428xxxx
intr_event_reg:	0xC0	TMR.
intr_enable_reg:	0x13C	FIFO.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
DSL/SAR Interrupts:0x0
Last Addr:0x12E14
```

```
Router# show controllers atm 1/0
```

```
Interface ATM1/0 is up
  Hardware is DSL/SAR (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”](#) section 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	<code>enable</code> Example: Router> <code>enable</code>	Enables privileged EXEC mode. <ul style="list-style-type: none">Enter your password if prompted.
Step 2	<code>show running-config</code> Example: Router# <code>show running-config</code>	Displays the current running configuration and the status for all controllers.
Step 3	<code>show controller dsl slot/port</code> Example: Router# <code>show controller dsl 0/2</code>	Displays the DSL controller status. The keywords and arguments are as follows: <ul style="list-style-type: none"><code>slot</code>—The backplane slot number for the interface being configured.<code>port</code>—The backplane port number for the interface being configured.
Step 4	<code>debug xdsl application</code> Example: Router# <code>debug dsl application</code>	Displays output of the DSL if the DSL does not come up.
Step 5	<code>debug xdsl eoc</code> Example: Router# <code>debug xdsl eoc</code>	Displays what is in the embedded operation channel (EOC) messages.
Step 6	<code>debug xdsl error</code> Example: Router# <code>debug xdsl error</code>	Displays error messages.
Step 7	<code>exit</code> Router# <code>exit</code>	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_dsilsar: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   FIFO.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
DSL SAR 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 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 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  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

The following are configuration examples for the ATM Mode for Two-Wire or Four-Wire SHDSL feature:

- [Router A: CPE Configuration Example](#)
- [Router B: CO Configuration Example](#)

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
<ul style="list-style-type: none"> ATM MIB HDSL2-SHDSL-LINE-MIB(RFC3276) G.SHDSL MIB 	<p>To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:</p> <p>http://www.cisco.com/go/mibs</p>

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

Command Reference

This section documents modified commands only.

Modified Commands

- [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`

controller dsl

To configure the digital subscriber line (DSL) controller and enter controller configuration mode, use the **controller dsl** command in global configuration mode. This command does not have a **no** form.

controller dsl *slot/port*

Syntax	Description
<i>slot</i>	Slot number of the DSL controller. Valid numbers are 0 and 1.
<i>port</i>	Port number of the DSL controller. Valid numbers are 0 and 1. The slash mark (/) is required between the <i>slot</i> argument and the <i>port</i> argument.

Defaults No default behavior or values.

Command Modes Global configuration

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
	12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines This command is used to enter controller configuration mode for the controller in the specified slot and port. If the controller is present, it is automatically set to a default set of values, including customer premises equipment (CPE) mode and annex A.

The central office (CO) and CPE sides of the link must be configured the same in order for a connection to be made. This command is available only when the WIC-1SHDSL-V2 is installed.

Examples The following example shows how to enter DSL controller configuration mode on the controller in slot 1 and port 0:

```
Router(config)# controller dsl 1/0
Router(config-controller)#
```

Related Commands	Command	Description
	controller shdsl	Configures the controller status.
	debug xdsl application	Displays status of the xDSL if the DSL does not activate as expected.
	debug xdsl driver	Displays status when the drivers are downloaded and installed.

Command	Description
debug xdsl eoc	Displays the contents of the embedded operations channel messages.
debug xdsl error	Displays the errors of xDSL process and firmware.
show controller dsl	Displays the DSL controller status and the controller number.

dsl-mode shdsl symmetric annex

To specify the operating mode of the digital subscriber line (DSL) controller, use the **dsl-mode shdsl symmetric annex** command in controller configuration mode. To return the DSL to the default Annex A, use the **no** form of this command.

dsl-mode shdsl symmetric annex *mode*

Syntax Description	<i>mode</i>	Sets the DSL operating mode. The valid values are: <ul style="list-style-type: none"> • a: Supports Annex A of the G.991.2 standard for North America. This is the default. • b: Supports Annex B of the G.991.2 standard for Europe. • a-b: Supports Annex A or B. For CPE mode only. Not supported in CO mode. Selected when the line trains. • a-b-anfp: Supports Annex A or B–ANFP. For CPE mode only. Not supported in CO mode. Selected when the line trains. • b-anfp: Supports Annex B–ANFP.
Defaults	The annex defaults to A for North America.	
Command Modes	Controller configuration	
Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	Support for the following additional annex parameters was integrated into Cisco IOS Release 12.3(11)T to support Cisco 1700, Cisco 2600, Cisco 2800, Cisco 3700, and Cisco 3800 series routers: <ul style="list-style-type: none"> • b • a-b • a-b-anfp • b-anfp
	12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines

This command is used to configure the DSL controller interface to operate in a specified DSL mode and to set regional operating parameters. The **shdsl** keyword is used to set the mode to SHDSL and configures multirate, high-speed DSL per ITU G.991.2. The **symmetric** keyword configures the controller to symmetric mode. The **annex** keyword configures the controller to use regional operating parameters. The regional operating parameters default to North America.

Examples

The following example displays the use of the **controller dsl 0/0** command to configure the controller in the router configured on the central office (CO) side. Use the **dsl-mode shdsl symmetric annex b** command to configure the controller for multirate, high-speed DSL with symmetric mode for European operating parameters.

```
Router# configure terminal
```

```
Router(config)# controller dsl 0/0
Router(config-controller)# line-term co
Router(config-controller)# dsl-mode shdsl symmetric annex b
Router(config-controller)# mode atm
Router(config-controller)#
00:22:07: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to down
```

```
Router(config-controller)# line-mode 4-wire
00:23:25: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
00:23:31: %LINK-3-UPDOWN: Interface ATM0/0, changed state to up
00:23:32: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, changed state to up
```

Related Commands

Command	Description
controller dsl	Configures the DSL controller.

ignore-error-duration

To ignore initial train-up errors when the DSL controller is connected to DSLAMs with chipsets other than Globespan, use the **ignore-error-duration** command in controller configuration mode. To set the error duration to the default of 0 seconds, use the **no** form of the command.

ignore-error-duration *seconds*

Syntax Description	<i>seconds</i>	Sets the time in seconds for which errors will be ignored during training of the line. Range is from 15 to 30 seconds.
---------------------------	----------------	--

Defaults	0 seconds
-----------------	-----------

Command Modes	Controller configuration
----------------------	--------------------------

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was implemented on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines	This command is used to ignore initial train-up errors when connected to DSLAMs with chipsets other than Globespan. Use the time period of 15 to 30 seconds to allow the line to train without being affected by errors that result because of the line training.
-------------------------	---

Examples	The following example sets the time during which errors will be ignored to 15 seconds:
-----------------	--

```
Router(config)# controller dsl 4/0
Router(config-controller)# ignore-error-duration 15
```

Related Commands	Command	Description
	controller dsl	Configures the DSL controller.

line-mode

To configure the mode of the controller for the Symmetrical High-Speed Digital Subscriber Line (SHDSL) port, use the **line-mode** command in controller configuration mode. To return to the default two-wire mode, use the **no** form of this command.

line-mode [2-wire | 4-wire [enhanced | standard] | auto]

no line-mode

Syntax Description		
	2-wire	(Optional) Configures the controller to operate in two-wire mode.
	4-wire	(Optional) Configures the controller to operate in four-wire mode.
	enhanced	(Optional) Configures 4-wire mode to exchange handshake status on both wire pairs. This is the default if the handshake mode is not specified.
	standard	(Optional) Configures 4-wire mode to exchange handshake status on the master wire pair only.
	auto	(Optional) Configures the controller to automatically operate in the mode to match the other line termination. This mode is compatible with a remote host that is in one of the following modes: <ul style="list-style-type: none"> • line-mode 2-wire line 0 • line-mode 2-wire line 1 • line-mode 4-wire enhanced

Defaults The default is two-wire mode if this command is omitted or if the **4-wire** keyword is omitted.

Command Modes Controller configuration

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
	12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was implemented on Cisco 1800 series routers.
	12.4(2)XA	The enhanced and standard keywords were added to four-wire mode.

Usage Guidelines This command is used to configure the controller for two-wire or four-wire mode.



Note To operate in four-wire mode for SHDSL, the **line-mode 4-wire** command must be set.

Examples

The following example shows how to configure the controller mode of DSL on the controller in slot 4 and port 0 to operate in four-wire mode:

```
Router(config)# controller dsl 4/0
Router(config-controller)# line-mode 4-wire
```

The following example shows how to configure the controller in slot 1 and port 0. The router is set to terminate as CPE with the line mode automatically selecting between two-wire mode and four-wire mode. The line rate has not been set to the value of 4608 before and displays the output from the router.

```
Router(config)# controller dsl 1/0
Router(config-controller)# line-term cpe
Router(config-controller)# line-mode auto
No change in line mode

Router(config-controller)# line-rate 4608
Router(config-controller)#
*Jun 15 17:39:49.680: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state to down
*Jun 15 17:39:51.680: %LINK-3-UPDOWN: Interface ATM1/0, changed state to down
*Jun 15 17:39:52.680: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, changed state to down
*Jun 15 17:40:15.588: DSL 1/0 controller Link up! line rate: 4608 Kbps

*Jun 15 17:40:15.588: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state to up
*Jun 15 17:40:27.504: %LINK-3-UPDOWN: Interface ATM1/0, changed state to up
*Jun 15 17:40:28.504: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, changed state to up
Router(config-controller)# exit
```

Related Commands

Command	Description
line-rate	Specifies a line rate for the DSL controller.
line-term	Specifies a termination for a line.

line-rate

To specify a line rate for the DSL controller, use the **line-rate** command in controller configuration mode.

line-rate {**auto** | *rate*}

Syntax Description	auto	rate
	Allows the controller to select the rate. This option is available only in two-wire mode.	DSL line rate, in kbps. The line will train at the selected rate plus 8 kbps of DSL framing overhead. The supported line rates are as follows: <ul style="list-style-type: none"> • For two-wire mode: <ul style="list-style-type: none"> – 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 four-wire mode: <ul style="list-style-type: none"> – 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

Defaults No default behavior or values.

Command Modes Controller configuration

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was implemented on Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
	12.(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines This command does not have a **no** form.

This command specifies the DSL line rate for the Symmetrical High-Speed Digital Subscriber Line (SHDSL) port. Use this command to configure the line rate in two-wire or four-wire mode. The SHDSL rate is in kbps, but the line trains at the selected rate plus two times the 8 kbps of DSL framing overhead.

**Note**

Automatic rate mode (auto) is used only in two-wire mode. It is not available in four-wire mode.

**Note**

If different DSL line rates are configured at opposite ends of the DSL uplink, the actual DSL line rate is always the lower rate.

**Note**

The maximum peak cell rate is 8 kbps less than the line rate.

Examples

The following example shows how to configure the controller in slot 1 and port 0. The router is set to terminate as CPE with the line mode automatically selecting between two-wire mode and four-wire mode. The line rate has not been set to the value of 4608 before and displays the output from the router.

```
Router(config)# controller dsl 1/0
Router(config-controller)# line-term cpe
Router(config-controller)# line-mode auto
No change in line mode

Router(config-controller)# line-rate 4608
Router(config-controller)#
*Jun 15 17:39:49.680: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
*Jun 15 17:39:51.680: %LINK-3-UPDOWN: Interface ATM1/0, changed state to down
*Jun 15 17:39:52.680: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, cn
*Jun 15 17:40:15.588: DSL 1/0 controller Link up! line rate: 4608 Kbps

*Jun 15 17:40:15.588: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tp
*Jun 15 17:40:27.504: %LINK-3-UPDOWN: Interface ATM1/0, changed state to up
*Jun 15 17:40:28.504: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, cp
Router(config-controller)# exit
```

The following example displays the **line-mode** command selecting four-wire mode, which is different from the previous line mode of the router as indicated by the router output, and then the line rate is selected. The rate of 4608 is selected, and the output of the router is shown.

```
Router(config)# controller dsl 1/0
Router(config-controller)# line-mode 4-wire
Router(config-controller)#
*Jun 15 18:00:48.159: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
*Jun 15 18:00:50.159: %LINK-3-UPDOWN: Interface ATM1/0, changed state to down
*Jun 15 18:00:51.159: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, cn
Router(config-controller)#
Router(config-controller)# line-rate 4608
Router(config-controller)#
*Jun 15 18:01:36.627: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
*Jun 15 18:01:36.967: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
Router(config-controller)# exit
```

Related Commands

Command	Description
line-mode	Configures the mode of the controller.
line-term	Specifies a termination for a line.

line-term

To specify a termination for a line, use the **line-term** command in controller configuration mode.

line-term { **co** | **cpe** }

Syntax Description	co	Central office.
	cpe	Customer premises equipment. This is the default.

Defaults The default value is **cpe**.

Command Modes Controller configuration

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series and Cisco 3700 series routers.
	12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines This command does not have a no form.

This command is used to configure the line termination for use as either the central office (CO) or the customer premises equipment (CPE).

Examples The following example shows how to configure the controller in slot 1 and port 0. The router is set to terminate as CPE with the line mode automatically selecting between two-wire mode and four-wire mode.

```
Router(config)# controller ds1 1/0
Router(config-controller)# line-term cpe
Router(config-controller)# line-mode auto
No change in line mode
```

Related Commands	Command	Description
	line-mode	Configures the mode of the controller.
	line-rate	Specifies a line rate for the DSL controller.

loopback (DSL controller)

To test the controller and configure the core loopback, use the **loopback (DSL Controller)** command in controller configuration mode. To remove the loopback interface, use the **no** form of this command.

loopback {analog | digital}

no loopback

Syntax Description	analog	digital
	Loops the circuit at the analog hybrid to verify the analog loopback hardware to the analog hybrid.	Loops the circuit at the framer to verify the hardware to the framer.

Defaults No default behavior or values.

Command Modes Controller configuration

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated in Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 2800 series and Cisco 3800 series routers.
	12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Usage Guidelines Analog and digital loopbacks are local loopbacks. Digital loopbacks loop the circuit at the framer to verify the hardware to the framer, and analog loopbacks loop the circuit at the analog hybrid to verify the analog loopback hardware to the analog hybrid. The controller must be shut down before loopback can be configured.

Examples If the controller is still up, the router will prompt you to turn the controller off as shown in this example:

```
Router(config-controller)# loopback analog
Please shut down the xDSL controller
Router(config-controller)# loopback digital
Please shut down the xDSL controller
```

The following example shows the configuration of a loopback digital interface:

```
Router(config-controller)# loopback digital
```



```
Please shut down the xDSL controller
Router(config-controller)# shutdown
Router(config-controller)#
00:59:50: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to
administratively down
Router(config-controller)#
Router(config-controller)# loopback digital
Router(config-controller)# no shutdown
Apr 23 06:59:01.435: DSL 0/0 controller Link up! line rate: 4608 Kbps
o
00:59:59: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
Router(config-controller)#end
```

```
Router# show controllers dsl 0/0
```

```
DSL 0/0 controller UP
Local Digital loopback is running
Globespan xDSL controller chipset
DSL mode: SHDSL Annex B
Frame mode: Utopia
Configured Line rate: 4608Kbps
Line Re-activated 4 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: 397
```

```
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: 411
```

```
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: un checked mode, Status 83
Last Fail Mode: No Failure status:0x0
Line rate: 2312 Kbps
Framer Sync Status: In Sync
Rcv Clock Status: In the Range
```

loopback (DSL controller)

```

Loop Attenuation:  0.0 dB
Transmit Power:   13.5 dB
Receiver Gain:    936.8420 dB
SNR Sampling:     16.960 dB
Line-1 status
Chipset Version:  1
Firmware Version: A29733
Modem Status:    un checked mode, Status 83
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:   13.5 dB
Receiver Gain:    936.8420 dB
SNR Sampling:     16.3590 dB
Dying Gasp:      Present

```

Related Commands

Command	Description
show interfaces	Displays information about the loopback interface.
loopback	

show controller dsl

To display the DSL controller status and the statistics of a DSL port, use the **show controller dsl** command in privileged EXEC mode.

show controller dsl *slot/port*

Syntax Description	slot	Slot number of the DSL controller.
	<i>/port</i>	Port number of the DSL controller. The slash (/) character is required and must be entered when specifying the slot and port arguments.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was implemented on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was implemented on Cisco 1800 series routers.

Usage Guidelines This command is used to display the controller mode of the controller in the specified slot and port and to display the statistics. Use this command in troubleshooting. Use the Cisco IOS help to find the valid slot and port numbers.

Examples

Display for DSL Controller Configured in ATM 4-Wire Mode

The following example displays the status and statistics of the DSL controller in slot 1 and port 0 configured in ATM 4-wire mode:

```
Router# show controller dsl 1/0

DSL 1/0 controller UP
Globespan xDSL controller chipset
DSL mode:SHDSL Annex B
Frame mode:Utopia
Configured Line rate:4608Kbps
Line Re-activated 0 times after system bootup
LOSW Defect alarm:ACTIVE
CRC per second alarm:ACTIVE
Line termination:CO
FPGA Revision:0xAD

Line 0 statistics
```

```
show controller dsl
```

```
Current 15 min CRC:0
Current 15 min LOSW Defect:0
Current 15 min ES:0
Current 15 min SES:0
Current 15 min UAS:41

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:0
Current 15 min LOSW Defect:0
Current 15 min ES:0
Current 15 min SES:0
Current 15 min UAS:30

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: 0.600 dB
Transmit Power: 8.5 dB
Receiver Gain: 21.420 dB
SNR Sampling: 39.1570 dB
Dying Gasp:Present
```

Display for DSL Controller Configured in T1 Mode

This example shows the display of a DSL controller that has been configured in T1 mode.

```
Router# show controller ds1 0/0
```

```
DSL 0/0 controller UP
SLOT 0:Globespan xDSL controller chipset
Line Mode:Two Wire
```

```

DSL mode:SHDSL Annex A
Frame mode:T1
Line Re-activated 0 times after system bootup
LOSW Defect alarm:ACTIVE
CRC per second alarm:ACTIVE
Line termination:CPE
FPGA Revision:0xA9

```

```

Current 15 min CRC:5
Current 15 min LOSW Defect:0
Current 15 min ES:1
Current 15 min SES:0
Current 15 min UAS:570

```

```

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: 1552 Kbps
Framer Sync Status:In Sync
Rcv Clock Status:In the Range
Loop Attenuation: 0.7800 dB
Transmit Power: 7.5 dB
Receiver Gain: 22.5420 dB
SNR Sampling: 35.6120 dB
Dying Gasp:Present

```

Annex Display When Line Is Trained

The following example shows the DSL controller annex display when the line is trained:

```

Router# show controller dsl 1/0

DSL 1/0 controller UP
SLOT 0: Globespan xDSL controller chipset
DSL mode: SHDSL Trained with Annex B-ANFP

```

Annex Display When Line Is Not Trained

The following example shows the DSL controller annex display when the line is not trained:

```

Router# show controller dsl 1/0

DSL 1/0 controller DOWN
SLOT 0: Globespan xDSL controller chipset
DSL mode: Not trained

```

The following table describes the significant fields of the **show controller dsl** command.

Table 4 *show controller dsl Field Descriptions*

Field	Description
DSL ... controller ...	Describes the status of the controller in the indicated slot number.
DSL mode	Displays the DSL mode of the controller.
Frame mode	Displays the frame mode of the controller.
Configured Line rate	Displays the line rate.
LOSW Defect alarm	Displays the status of the LOSW alarm.
CRC per second alarm	Displays the status of the CRC per second alarm.
Line termination	Displays how the line is terminated.
Chipset Version	Displays the version of the chipset.
Firmware Version	Displays the version of the firmware.
Modem Status	Displays the status of the modem.
Last Fail Mode	Displays the last fail mode.
Line rate	Displays the line rate.
Framer Sync Status	Displays the framer synchronization status.
Rcv Clock Status	Displays the revision clock status.
Loop Attenuation	Displays the loop attenuation.
Transmit Power	Displays the transmit power.
Receiver Gain	Displays the receiver gain.
SNR Sampling	Displays the signal-to-noise ratio sampling.

Related Commands

Command	Description
controller dsl	Configures the controller status and the controller number.

snr margin

To set the signal-to-noise ratio (SNR) on the controller to improve the line stability, use the **snr margin** command in controller configuration mode. To reset the SNR to default settings, use the **no** form of this command.

```
snr margin { current [snr-value | disable] | snext [snr-value | disable] }
```

```
no snr margin { current | snext }
```

Syntax Description		
current	Sets the current signal-to-noise ratio on the controller. To disable the current SNR, set current to disable .	
snext	Sets the Self Near End Cross Talk (SNEXT) signal-to-noise ratio. To disable the SNEXT, set snext to disable .	
<i>snr-value</i>	(Optional) Value, in decibels (dB), for the signal-to-noise ratio on the controller or the SNEXT. Range is from -10 to 10 . The default value is 0.	
disable	(Optional) Disables the snr margin command.	

Defaults The default value for both **current** and **snext** is 0.

Command Modes Controller configuration

Command History	Release	Modification
	12.3(4)XD	This command was introduced on the Cisco 2600 series, Cisco 3600 series, and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 2800 series and Cisco 3800 series routers.
	12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Usage Guidelines The **snr margin current** command can create a more stable line by making the line train more than the current noise margin plus signal-to-noise ratio threshold during training time. If any external noise is applied that is less than the set SNR margin, the line will be stable.

The **snr margin snext** command can create a more stable line by making the line train more than the Self Near End Cross Talk (SNEXT) threshold during training time. If any external noise is applied that is less than the set SNEXT margin, the line will be stable.

Examples
SNR with SNEXT Disabled

The following example configures the signal-to-noise ratio to 5 dB on the DSL controller in slot 3 and port 0 and disables the SNEXT signal-to-ratio.

```
Router(config)# controller dsl 3/0
Router(config-controller)# snr margin current 5

Router(config)# controller dsl 3/0
Router(config-controller)# snr margin snext disable
```

SNR Margin set on CPE Router

The following example shows the **snr margin snext 5** command issued on the customer premises equipment (CPE) router.

```
Router_CPE(config)# controller dsl 1/0
Router_CPE(config-controller)# snr margin snext 5
Router_CPE(config-controller)#
*Jun 15 18:29:38.511: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tn
*Jun 15 18:29:40.511: %LINK-3-UPDOWN: Interface ATM1/0, changed state to down
*Jun 15 18:29:41.511: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, cn
*Jun 15 18:30:04.579: DSL 1/0 controller Link up! line rate: 4608 Kbps

*Jun 15 18:30:04.579: %CONTROLLER-5-UPDOWN: Controller DSL 1/0, changed state tp
*Jun 15 18:30:12.351: %LINK-3-UPDOWN: Interface ATM1/0, changed state to up
*Jun 15 18:30:13.351: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM1/0, cp
```

Status on CO Side with SNR Margin set on CPE Router

The following example is the resulting output on the router that is configured as the central office (CO) side after the **snr margin snext 5** command is entered on the CPE side.

```
Router_CO#
Jun 15 18:29:42.781: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state ton
Jun 15 18:29:44.784: %LINK-3-UPDOWN: Interface ATM0/0, changed state to down
Jun 15 18:29:45.786: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, chn
Jun 15 18:30:03.122: DSL 0/0 controller Link up! line rate: 4608 Kbps

Jun 15 18:30:03.122: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state top
Jun 15 18:30:11.456: %LINK-3-UPDOWN: Interface ATM0/0, changed state to up
Jun 15 18:30:12.458: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, chp
```


debug xdsl application

To monitor the xDSL if the digital subscriber line (DSL) does not come up, use the **debug xdsl application** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug xdsl application

no debug xdsl application

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Usage Guidelines The **debug xdsl application** command details what occurs during the Cisco IOS SHDSL process events and signal-to-noise ratio sampling of the SHDSL chip. This information can be used more for software debugging in analyzing the internal events.

Examples The following is sample output from the **debug xdsl application** command:

```
Router# debug xdsl application

xDSL application debugging is on
Router#
```

The following lines show that the application is starting on the router and waiting for a response:

```
00:47:40: DSL 0/0 process_get_wakeup
00:47:41: DSL 0/0 process_get_wakeup
00:47:42: DSL 0/0 process_get_wakeup
00:47:43: DSL 0/0 process_get_wakeup
00:47:44: DSL 0/0 process_get_wakeup
00:47:45: DSL 0/0 process_get_wakeup
00:47:46: DSL 0/0 process_get_wakeup
00:47:47: DSL 0/0 process_get_wakeup
```

```
00:47:48: DSL 0/0 process_get_wakeup
00:47:49: DSL 0/0 process_get_wakeup
00:47:49: DSL 0/0 process_get_wakeup
```

The following lines show that the controller link comes up:

```
00:47:49: DSL 0/0 xdsl_background_process: XDSL link up boolean event received
00:47:49: DSL 0/0 controller Link up! line rate: 1600 Kbps
```

The following lines show that the DSL controller comes up:

```
00:47:49: DSL 0/0 xdsl_controller_reset: cdb-state=up
00:47:49: %CONTROLLER-5-UPDOWN: Controller DSL 0/0, changed state to up
00:47:49: Dslsar data rate 1600
00:47:49: DSL 0/0 TipRing 1, Xmit_Power Val 75, xmit_power 7.5
00:47:49: DSL 0/0 Mode 2, BW 1600, power_base_value 135, power_backoff 6
00:47:50: DSL 0/0 process_get_wakeup
00:47:51: DSL 0/0 process_get_wakeup
00:47:52: DSL 0/0 process_get_wakeup
00:47:53: DSL 0/0 process_get_wakeup
00:47:54: DSL 0/0 process_get_wakeup
00:47:55: DSL 0/0 process_get_wakeup
00:47:56: DSL 0/0 process_get_wakeup
```

The following lines show signal-to-noise ratio sampling:

```
00:47:56: DSL 0/0 SNR Sampling: 42 dB
00:47:57: DSL 0/0 process_get_wakeup
00:47:57: DSL 0/0 SNR Sampling: 41 dB
00:47:58: DSL 0/0 process_get_wakeup
00:47:58: DSL 0/0 SNR Sampling: 40 dB
00:47:59: DSL 0/0 process_get_wakeup
00:47:59: DSL 0/0 SNR Sampling: 40 dB
00:48:00: DSL 0/0 process_get_wakeup
00:48:00: DSL 0/0 SNR Sampling: 39 dB
00:48:01: DSL 0/0 process_get_wakeup
00:48:01: DSL 0/0 SNR Sampling: 39 dB
00:48:02: DSL 0/0 process_get_wakeup
00:48:02: DSL 0/0 SNR Sampling: 38 dB
00:48:03: DSL 0/0 process_get_wakeup
00:48:03: DSL 0/0 SNR Sampling: 38 dB
00:48:04: DSL 0/0 process_get_wakeup
00:48:04: DSL 0/0 SNR Sampling: 38 dB
00:48:05: DSL 0/0 process_get_wakeup
00:48:05: DSL 0/0 SNR Sampling: 37 dB
00:48:06: DSL 0/0 process_get_wakeup
00:48:06: DSL 0/0 SNR Sampling: 37 dB
00:48:07: DSL 0/0 process_get_wakeup
00:48:07: DSL 0/0 SNR Sampling: 36 dB
```

The following lines show that the link comes up:

```
00:48:07: %LINK-3-UPDOWN: Interface ATM0/0, changed state to up
00:48:08: DSL 0/0 process_get_wakeup
00:48:08: DSL 0/0 SNR Sampling: 36 dB
```

The following lines show that the line protocol comes up:

```
00:48:08: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0, changed state to up
00:48:09: DSL 0/0 process_get_wakeup
00:48:09: DSL 0/0 SNR Sampling: 36 dB
00:48:10: DSL 0/0 process_get_wakeup
00:48:10: DSL 0/0 SNR Sampling: 36 dB
00:48:11: DSL 0/0 process_get_wakeup
00:48:11: DSL 0/0 SNR Sampling: 35 dB
```

```

00:48:12: DSL 0/0 process_get_wakeup
00:48:12: DSL 0/0 SNR Sampling: 36 dB
00:48:13: DSL 0/0 process_get_wakeup
00:48:13: DSL 0/0 SNR Sampling: 36 dB
00:48:14: DSL 0/0 process_get_wakeup
00:48:14: DSL 0/0 SNR Sampling: 36 dB
00:48:15: DSL 0/0 process_get_wakeup
00:48:15: DSL 0/0 SNR Sampling: 36 dB
00:48:16: DSL 0/0 process_get_wakeup
00:48:16: DSL 0/0 SNR Sampling: 36 dB
00:48:17: DSL 0/0 process_get_wakeup
00:48:17: DSL 0/0 SNR Sampling: 35 dB
00:48:18: DSL 0/0 process_get_wakeup
00:48:18: DSL 0/0 SNR Sampling: 35 dB
00:48:19: DSL 0/0 process_get_wakeup

```

Related Commands

Command	Description
debug xdsl driver	Monitors what is happening when downloading and installing the drivers.
debug xdsl eoc	Monitors what is in the embedded operations channel messages.
debug xdsl error	Monitors the errors of the xDSL process and firmware.

debug xdsl driver

To display what is happening when the drivers are downloaded and installed, use the **debug xdsl driver** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug xdsl driver

no debug xdsl driver

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 3800 series routers.
	12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Usage Guidelines Use the **debug xdsl driver** command to monitor what is happening when downloading the firmware. This debugging command displays the Globespan DSL Driver details and provides framer interrupt information and line training failure information. This information can help you understand the problems faced while downloading the firmware, why the line went down, and so forth.

Examples The following is sample output from the **debug xdsl driver** command:

```
Router# debug xdsl driver
xDSL driver debugging is on
```

The following lines show that the DSP interrupt download is running:

```
*Mar 12 08:01:04.772: DSL 0/2 dsp interrupt-download next block for line-0
*Mar 12 08:01:04.780: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:05.072: DSL 0/2 dsp interrupt-download next block for line-0
*Mar 12 08:01:05.080: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:06.484: DSL 0/2 dsp interrupt-download next block for line-0
*Mar 12 08:01:06.492: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:08.092: DSL 0/2 dsp interrupt-download next block for line-0
*Mar 12 08:01:08.096: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:19.180: DSL 0/2 dsp interrupt-download next block for line-0
```

```
*Mar 12 08:01:19.184: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:19.480: DSL 0/2 dsp interrupt-download next block for line-0
*Mar 12 08:01:19.484: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:19.680: DSL 0/2 dsp interrupt-download next block for line-0
```

The following lines show that the DSP interrupt has been disabled and that the framer interrupt has been enabled:

```
*Mar 12 08:01:19.680: DSL 0/2 DSP interrupt disabled
*Mar 12 08:01:19.680: DSL 0/2 Download completed for line-0
*Mar 12 08:01:19.680: DSL 0/2 Framer interrupt enabled
*Mar 12 08:01:19.680: DSL 0/2 framer intr_status 0xC0
*Mar 12 08:01:19.680: DSL 0/2 controller Link up! line rate: 2304 Kbps
```

The following lines show that the digital subscriber line (DSL) controller has come up on slot 0 and port 2:

```
*Mar 12 08:01:19.680: %CONTROLLER-5-UPDOWN: Controller DSL 0/2, changed state to up
*Mar 12 08:01:19.680: Dslsar data rate 2304
*Mar 12 08:01:22.528: %LINK-3-UPDOWN: Interface ATM0/2, changed state to up
*Mar 12 08:01:23.528: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/2, changed state to up
```

The following lines show that the framer interrupt status is running:

```
*Mar 12 08:01:23.812: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:23.816: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:23.904: DSL 0/2 framer intr_status 0xC1
*Mar 12 08:01:28.612: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:28.616: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:28.708: DSL 0/2 framer intr_status 0xC1
*Mar 12 08:01:28.804: DSL 0/2 framer intr_status 0xC1
*Mar 12 08:01:33.412: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:33.420: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:33.508: DSL 0/2 framer intr_status 0xC1
*Mar 12 08:01:33.604: DSL 0/2 framer intr_status 0xC1
*Mar 12 08:01:33.700: DSL 0/2 framer intr_status 0xC1
*Mar 12 08:01:38.212: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:38.220: DSL 0/2 framer intr_status 0xC4
*Mar 12 08:01:38.308: DSL 0/2 framer intr_status 0xC1
```

Related Commands

Command	Description
debug xdsl application	Monitors the xDSL if the DSL does not come up.
debug xdsl eoc	Monitors what is in the embedded operations channel messages.
debug xdsl error	Monitors the errors of the xDSL process and firmware.

debug xdsl eoc

To display the flow of the embedded operations channel (EOC) messages received, processed, and transmitted, use the **debug xdsl eoc** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug xdsl eoc

no debug xdsl eoc

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Examples The following is sample output from the **debug xdsl eoc** command:

```
Router# debug xdsl eoc
```

```
xDSL EOC debugging is on
Router#
```

The following lines show the embedded operations channel message being received and copied to the buffer. The `xdsl_background_process` is performed. The `data_transparency_remove` is performed.

```
00:02:55: Incoming EOC received
00:02:55: Copy the EOC to buffer
00:02:55: Incoming EOC received
00:02:55: Copy the EOC to buffer
00:02:55: End of EOC received, Notify task
00:02:55: xdsl_background_process:
00:02:55: Rx EOC remove transparency:: 12 C A 63
00:02:55: data_transparency_remove: Done, eoc packet size = 4
```

The following lines show that the packet of the embedded operations channel messages was received and verified as good. The data_transparency_add is performed.

```
00:02:55: Good eoc packet received
00:02:55: incoming request eocmsgid: 12
00:02:55: Tx Converted EOC message:: 21 8C 0 28 0 0 0 0 0 0 0 1 1 713
00:02:55: data_transparency_add: eoc packet size - before 15, after 15
```

The following lines show another embedded operations channel message coming in and copied to the buffer. The xdsl_background_process is run on this message as before.

```
00:02:55: size of eoc status response :: 13
00:02:56: Incoming EOC received
00:02:56: Copy the EOC to buffer
00:02:56: Incoming EOC received
00:02:56: Copy the EOC to buffer
00:02:56: End of EOC received, Notify task
00:02:56: xdsl_background_process:
00:02:56: Rx EOC remove transparency:: 12 C A 63
00:02:56: data_transparency_remove: Done, eoc packet size = 4
```

Related Commands	Command	Description
	debug xdsl application	Monitors the xDSL if the DSL does not come up.
	debug xdsl driver	Monitors what is happening when downloading and installing the drivers.
	debug xdsl error	Monitors the errors of the xDSL process and firmware.

debug xdsl error

To display the errors of xDSL process and firmware, use the **debug xdsl error** command in privileged EXEC mode. To disable debugging output, use the **no** form of this command.

debug xdsl error

no debug xdsl error

Syntax Description This command has no arguments or keywords.

Command Modes Privileged EXEC

Command History	Release	Modification
	12.3(4)XD	This command was introduced on Cisco 2600 series and Cisco 3700 series routers.
	12.3(4)XG	This command was integrated into the Cisco IOS Release 12.3(4)XG on the Cisco 1700 series routers.
	12.3(7)T	This command was integrated into Cisco IOS Release 12.3(7)T on Cisco 2600 series, Cisco 3631, and Cisco 3700 series routers.
	12.3(11)T	This command was integrated into Cisco IOS Release 12.3(11)T on Cisco 2800 and Cisco 3800 series routers.
	12.3(14)T	This command was integrated into Cisco IOS Release 12.3(14)T on Cisco 1800 series routers.

Usage Guidelines Use the **debug xdsl error** command to display the errors during driver initialization and any Globespan firmware API failures.

Examples The following is sample output from the **debug xdsl error** command. When the debug is enabled, a message indicates that DSL error debugging is on.

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

Related Commands	Command	Description
	debug xdsl application	Monitors the xDSL if the DSL does not come up.
	debug xdsl driver	Monitors what is happening when downloading and installing the drivers.
	debug xdsl eoc	Monitors what is in the embedded operations channel messages.

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.

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