



# G.SHDSL Symmetric DSL Support for Cisco IAD2420 Series IAD

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## Feature History

Release	Modification
12.2(4)T3	The Multirate Symmetrical High-Speed Digital Subscriber Line (G.SHDSL) feature was supported on the G.SHDSL one-port WAN interface on the Cisco 2600 series and Cisco 3600 series routers.
12.2(8)T	The Multirate Symmetrical High-Speed Digital Subscriber Line (G.SHDSL) feature was expanded to the Cisco IAD2420 series IADs.

This document describes the Multirate Symmetrical High-Speed Digital Subscriber Line (G.SHDSL) feature supported on the Cisco IAD2420 series integrated access devices (IADs) in Cisco IOS Release 12.2(8)T.

This document includes the following sections:

- [Feature Overview, page 2](#)
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## Feature Overview

G.SHDSL is ATM-based, multirate, high-speed (up to 2.3 MB), symmetrical digital subscriber line technology for data transfer between a single customer premises equipment (CPE) subscriber and a central office (CO). G.SHDSL refers to the approved standard officially designated in ITU-T G.991.2.

The Cisco IAD2420 series IADs support G.SHDSL in the following models: IAD2424-8FXS, IAD2424-16FXS, IAD2424-16FXS8FXO, and IAD2424-1T1. These models are compatible with the Cisco 6160 and Cisco 6260 Digital Subscriber Line Access Multiplexers (DSLAM). The DSLAM must be equipped with compatible G.SHDSL line cards.

The Cisco IAD2424 IAD supports ATM Adaption Layer 2 (AAL2), ATM Adaption Layer 5 (AAL5), and quality of service (QoS) features for both voice and data services.

## Benefits

- Enables business class broadband service with voice integration, scalable performance, flexibility, and security.
- Aggregates G.SHDSL and other transport options into a single box.
- Provides G.SHDSL high-speed digital data transmissions between CPE and the CO.
- Supports AAL2 and AAL5 services and applications (including voice), ATM class of service (constant bit rate [CBR], variable bit rate-nonreal time [VBR-nrt], variable bit rate-real time [VBR-rt], and unspecified bit rate [UBR and UBR+]).
- Provides ATM traffic management and quality of service (QoS) features to enable service providers to manage their core ATM network infrastructures.

## Restrictions

- The wetting current function is not supported as part of G.SHDSL.

## Related Documents

For more information about voice configuration, see the following documents:

- *Cisco IOS Voice, Video, and Fax Configuration Guide*, Release 12.2
- *Cisco IOS Voice, Video, and Fax Command Reference*, Release 12.2

For more information about configuring IP, see the *Cisco IOS IP Configuration Guide*, Release 12.2.

For more information about configuring ATM, see “Configuring ATM” in the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2.

For information about configuring a DSLAM, see the *Configuration Guide for Cisco DSLAMs with NI-2*.

For information about installing and configuring Cisco IAD2420 series IAD hardware and software, see the documents listed at the following URL:

<http://www.cisco.com/univercd/cc/td/doc/product/access/iad/iad2420/index.htm>

## Supported Platforms

- Cisco IAD2420 series IADs

## Supported Standards, MIBs, and RFCs

### Standards

- Supports ITU-T G.991.2 (SHDSL).

### MIBs

- No new or modified MIBs are supported by this feature.

To obtain lists of supported MIBs by platform and Cisco IOS release, and to download MIB modules, go to the Cisco MIB web site on Cisco.com at the following URL:

<http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

### RFCs

- No new or modified RFCs are supported by this feature.

## Prerequisites

A compatible G.SHDSL line card must be installed in the DSLAM.

## Configuration Tasks

See the following sections for configuration tasks for the G.SHDSL feature. Each task in the list is identified as either required or optional.

- [Configuring G.SHDSL on Cisco IAD2420 Series IADs](#) (required)
- [Verifying ATM Configuration](#) (optional)
- [Verifying Your Configuration](#) (optional)

## Configuring G.SHDSL on Cisco IAD2420 Series IADs

To configure G.SHDSL service on the Cisco IAD2420 series IAD that supports G.SHDSL, complete the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Router(config)# <b>controller shdsl 0</b>	Enters controller configuration mode and the controller number.
Step 2	Router(config-ctrl)# <b>mode atm</b>	Enables ATM encapsulation and creates logical ATM interface 0. Controller framing is automatically set to Extended SuperFrame (ESF). The line code is automatically set to B8ZS.
Step 3	Router(config-ctrl)# <b>annex {a   b}</b>	Specifies the regional operating parameters. Enter <b>a</b> for North America and <b>b</b> for Europe. The default is <b>a</b> .
Step 4	Router(config-ctrl)# <b>line-rate {auto   rate}</b>	Specifies the DSL line rate for the SHDSL port. The range is 192 to 2312 kbps. The default is <b>auto</b> (negotiated between the SHDSL port and the DSLAM).  <b>Note</b> If different DSL line rates are configured at opposite ends of the DSL uplink, the actual DSL line rate is always the lower rate.  <b>Note</b> The maximum peak cell rate is 8 kbps less than the line rate.
Step 5	Router(config-ctrl)# <b>exit</b>	Exits from controller configuration mode.
Step 6	Router(config)# <b>interface atm 0</b>	Enters ATM configuration mode for interface ATM 0.
Step 7	Router(config-if)# <b>ip-address IP-address</b>	Assigns an IP address to the DSL ATM interface.
Step 8	Router(config-if)# <b>atm ilmi-keepalive seconds</b>	(Optional) Enables Integrated Local Management Interface (ILMI) keepalives.  If you enable ILMI keepalives without specifying the number of seconds, the default time interval is 3 seconds.
Step 9	Router(config-if)# <b>pvc [name] vpi/vci</b>	Enters atm-virtual-circuit (interface-atm-vc) configuration mode, and configures a new ATM PVC by assigning a name (optional) and VPI/VCI numbers.  The default traffic shaping is UBR; the default encapsulation is AAL5+LLC/SNAP.
Step 10	Router(config-if-vc)# <b>protocol ip IP-address</b>	(Optional) Enables IP connectivity and creates a point-to-point IP address for the VC.
Step 11	Router(config-if-vc)# <b>vbr-rt peak-rate average-rate burst</b>	(Optional) Configures the PVC for real-time variable bit rate (VBR) traffic shaping. <ul style="list-style-type: none"> <li>• Peak rate = peak information rate (PIR)</li> <li>• Average rate = average information rate (AIR)</li> <li>• Burst = burst size in cells</li> </ul>

	Command	Purpose
<b>Step 12</b>	Router(config-if-vc)# <b>encapsulation</b> { <b>aal1</b>   <b>aal2</b>   <b>aal5ciscopp</b>   <b>aal5mux</b>   <b>aal5nlpid</b>   <b>aal5snap</b> }	(Optional) Configures the ATM adaptation layer (AAL) and encapsulation type. <ul style="list-style-type: none"> <li>• Use the <b>aal2</b> keyword for AAL2</li> <li>• Use the <b>aal5ciscopp</b> keyword for Cisco PPP over AAL5</li> <li>• Use the <b>aal5mux</b> keyword for AAL5+MUX</li> <li>• Use the <b>aal5nlpid</b> keyword for AAL5+NLPID</li> <li>• Use the <b>aal5snap</b> keyword for AAL5+LLC/SNAP (the default)</li> </ul>
<b>Step 13</b>	Router(config-if-vc)# <b>exit</b>	Exits from interface-ATM-VC configuration mode.
<b>Step 14</b>	Router(config-if)# <b>shutdown</b>	Ensures that the ATM interface is shut down.
<b>Step 15</b>	Router(config-if)# <b>no shutdown</b>	Activates the ATM interface.
<b>Step 16</b>	Router(config-if)# <b>exit</b>	Exits from ATM interface configuration mode.
<b>Step 17</b>	Router(config)# <b>exit</b>	Exits from global configuration mode.
<b>Step 18</b>	Router> <b>show interface atm 0</b>	Verifies the ATM interface configuration.

## Verifying ATM Configuration

You can verify the ATM interface configuration by doing the following:

- To verify the ATM interface configuration, enter the **show interface atm 0** command in EXEC mode.

```
Router# show interface atm 0
```

```
ATM0 is up, line protocol is up
Hardware is DSLSAR (with Globespan G.SHDSL Module)
MTU 4470 bytes, sub MTU 4470, BW 800 Kbit, DLY 2560 usec,
    reliability 255/255, txload 1/255, rxload 1/255
Encapsulation ATM, loopback not set
Keepalive not supported
Encapsulation(s):AAL5 AAL2, PVC mode
24 maximum active VCs, 256 VCs per VP, 2 current VCCs
VC idle disconnect time:300 seconds
Last input never, output 00:00:01, output hang never
Last clearing of "show interface" counters 03:16:00
Queueing strategy:fifo
Output queue 0/40, 0 drops; input queue 0/75, 0 drops
30 second input rate 0 bits/sec, 0 packets/sec
30 second output rate 0 bits/sec, 0 packets/sec
2527 packets input, 57116 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
10798 packets output, 892801 bytes, 0 underruns
0 output errors, 0 collisions, 0 interface resets
0 output buffer failures, 0 output buffers swapped out
```

- For an SHDSL port, to verify the SHDSL controller status and view the statistics, enter the **show controller shdsl 0** command in EXEC mode.

```
Router# show controller shdsl 0

SHDSL 0 controller UP
SLOT 3: Globespan xDSL controller chipset
Frame mode: Serial ATM
Configured Line rate: 1160Kbps
Line Re-activated 0 times after system bootup
LOSW Defect alarm: None
CRC per second alarm: None
Line termination: CPE
FPGA Revision: 9

      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: 7

      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: 7

Chipset Version: 1
Firmware Version: R1.2
Modem Status: Data
Line rate: 1160 Kbps
Framer Sync Status: In Sync
Rcv Clock Status: In the Range
Loop Attenuation: 0.0 dB
Transmit Power: 13.5 dB
Receiver Gain: 11.420 dB
SNR Sampling: 40
Last Fail Mode: No Failure
```

- To verify the SHDSL controller status and view the statistics, change state to administratively down and enter the **show controller shdsl 0** command in EXEC mode.

```
Router#
Router# conf t

Enter configuration commands, one per line. End with CNTL/Z.
iad1(config)#contr shds 0
iad1(config-controller)#shut
iad1(config-controller)#
01:30:46: %CONTROLLER-5-UPDOWN: Controller SHDSL 0, changed state to administratively
down
01:30:49: %LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0, changed state to down
iad1(config-controller)#end
Router# show controller shdsl 0

SHDSL 0 controller ADMINDOWN
SLOT 3: Globespan xDSL controller chipset
Frame mode: Serial ATM
Configured Line rate: 1160Kbps
Line Re-activated 2 times after system bootup
```

```

LOSW Defect alarm: None
CRC per second alarm: None
Line termination: CPE
FPGA Revision: 9

    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: 7

    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

Chipset Version: 1
Firmware Version: R1.2
Modem Status: Idle
```

## Verifying Your Configuration

You can perform the following tests at any time to verify the hardware or software configuration of the Cisco IAD2420 series IADs:

- Display the hardware configuration with the **show version** command.
- Display T1 and SHDSL controllers with the **show controllers** command.
- Display the running configuration with the **show running-config** command
- Display the configuration stored in NVRAM using the **show startup-config** command.

## Configuration Example

The following example shows a typical running configuration with the initial configuration tasks completed:

```
Router#
Router# show running config

Building configuration...

Current configuration : 1654 bytes
!
version 12.2
no service single-slot-reload-enable
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router
!
boot system flash:c2420-a2i8sv5-mz.1.0.9
logging rate-limit console 10 except errors
!
```

```

network-clock base-rate 56k
ip subnet-zero
!
!
!
ip audit notify log
ip audit po max-events 100
no ip dhcp-client network-discovery
lcp max-session-starts 0
!
!
!
no voice confirmation-tone
voice-card 0
!
!
!
controller SHDSL 0
mode atm
!
controller T1 1
mode cas
framing esf
clock source loop-timed
linecode b8zs
ds0-group 1 timeslots 1-24 type e&m-immediate-start
!
!
!
interface Loopback0
ip address 3.3.3.3 255.255.0.0
!
interface Ethernet0
ip address 1.3.95.50 255.255.0.0
no ip mroute-cache
!
interface Serial0
bandwidth 10000000
ip address 180.100.9.11 255.255.255.0
no keepalive
!
interface ATM0
no ip address
ip mroute-cache
atm idle-cell-format itu
atm enable-payload-scrambling
no atm ilmi-keepalive
pvc 110/110
vbr-rt 2304 2304 65535
vcci 2
encapsulation aal2
!
!
router eigrp 10
network 10.0.0.0
network 180.100.0.0
no auto-summary
no eigrp log-neighbor-changes
!
ip classless
ip route 0.0.0.0 0.0.0.0 1.3.0.1
ip route 2.2.2.2 255.255.255.255 10.10.10.2
no ip http server

```

```
!  
call rsvp-sync  
!  
voice-port 1:1  
!  
mgcp  
mgcp call-agent 1.4.173.1 service-type mgcp version 0.1  
mgcp tse payload 100  
no mgcp timer receive-rtcp  
mgcp timer net-cont-test 3000  
!  
mgcp profile default  
!  
dial-peer cor custom  
!  
!  
!  
dial-peer voice 1 pots  
  application mgcpapp  
  port 1:1  
!  
!  
line con 0  
  exec-timeout 0 0  
line aux 0  
line 2 3  
line vty 0 4  
  login  
!  
end
```

## Command Reference

This section documents new commands. All other commands used with this feature are documented in the Cisco IOS Release 12.2 command reference publications:

- The “Configuring ATM” section of the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2
- The “ATM Commands” section of the *Cisco IOS Wide-Area Networking Command Reference*, Release 12.2
- [controller shdsl 0](#)
- [mode atm](#)
- [show controller shdsl 0](#)

# controller shdsl

To configure the controller mode on the controller, use the **controller shdsl** command in global configuration mode.

## controller shdsl 0

Syntax Description	shdsl	The controller is configured for shdsl mode.
	0	The controller number defaults to 0.

**Defaults** The default for the controller number is 0.

**Command Modes** Global configuration

Command History	Release	Modification
	11.3(5)AAA	This command was introduced.
	12.2(8)T	This command was implemented on Cisco IAD2420 series IADs.

**Usage Guidelines** This command is used to configure the controller mode and the controller number.

**Examples** The following example shows how to enter the controller mode of SHDSL on controller number 0 and configure the ATM mode:

```
Router# controller shdsl 0
Router# mode atm
```

Related Commands	Command	Description
	show controller shdsl 0	Displays the controller status and statistics.

# mode atm

To set the mode of the T1/E1 controller and enter specific configuration commands for each mode type, use the **mode** command in controller configuration mode. To restore the default mode of the controller, use the **no** form of this command.

**mode atm**

**no mode atm**

## Syntax Description

<b>atm</b>	Places the controller into ATM mode and creates an ATM interface (ATM 0) on the Cisco IAD24210 series.  ATM mode is supported only on controller 0.
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## Defaults

The default is that no mode is configured.

## Command Modes

Controller configuration

## Command History

Release	Modification
11.3(1)MA	This command was introduced.
12.2(8)T	This command was implemented in Cisco IAD2420 series IADs.

## Usage Guidelines

This command applies to the Cisco IAD2420 series IADs with support for G.SHDSL.

## Examples

The following example shows how to enter the controller mode of SHDSL on controller number 0 and configure the ATM mode:

```
Router# controller shdsl 0
Router# mode atm
```

## Related Commands

Command	Description
<b>channel-group</b>	Defines the time slots that belong to each T1 circuit.
<b>tdm-group</b>	Configures a list of time slots for creating clear channel groups (pass-through) for time-division multiplexing cross-connect.

# show controller shdsl 0

To display the controller mode of the controller, use the **show controller shdsl 0** command in global configuration mode.

**show controller shdsl 0**

Syntax Description	shdsl	The controller is configured for shdsl mode.
	0	The controller number defaults to 0.

**Defaults** The default for the controller number is 0.

**Command Modes** Global configuration

Command History	Release	Modification
	12.2(8)T	This command was introduced on Cisco IAD2420 series IADs.

**Usage Guidelines** This command is used to display the controller mode and the controller number and to view the statistics.

**Examples** The following example displays the controller mode of SHDSL on controller number 0 to verify the controller status:

```
Router# show controller shdsl 0

SHDSL 0 controller UP
SLOT 3: Globespan xDSL controller chipset
Frame mode: Serial ATM
Configured Line rate: 1160Kbps
Line Re-activated 0 times after system bootup
LOSW Defect alarm: None
CRC per second alarm: None
Line termination: CPE
FPGA Revision: 9
```

Related Commands	Command	Description
	<b>controller shdsl 0</b>	Configures the controller status and the controller number.

# Glossary

**ADSL**—Asymmetric DSL (ADSL) available through several telecommunications carriers to accommodate the need for increased bandwidth for Internet access and telecommuting applications.

**ATM**—Asynchronous Transfer Mode. International standard for cell relay in which multiple service types (such as voice, video, or data) are conveyed in fixed-length (53-byte) cells. Fixed-length cells allow cell processing to occur in hardware, thereby reducing transit delays. ATM is designed to take advantage of high-speed transmission media such as E3, SONET, and T3.

**CLI**—command line interface.

**CO**—central office. Local exchange (local switch) that terminates individual local telephone subscriber lines for switching and connects to the public network. Known as a class 5 switch office. For example, 5ESS by Lucent and DMS 100 by Nortel.

**CPE**—customer premises equipment. Devices such as channel service units, data service units, 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.

**DSL**—Digital Subscriber Line available through several telecommunications carriers to accommodate the need for increased bandwidth for Internet access and telecommuting applications.

**FXO**—Foreign Exchange Office. An FXO interface connects to a central office.

**FXS**—Foreign Exchange Station: An FXS interface connects directly to a standard telephone, supplying ring voltage, dial tone, and so on.

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

**IAD**—integrated access device. A CPE device used to combine services from various sources onto a common platform for transmission on a common transport span. Typically, an IAD combines various voice and data services such as circuit-based services like traditional telephone service and packet-switched services such as frame relay or ATM.

