G.SHDSL Symmetric DSL Support for Cisco IAD2420 Series IAD

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.

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.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the "Feature Information for G.SHDSL Symmetric DSL Support" section on page 10.

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

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Prerequisites for G.SHDSL Symmetric DSL Support

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

Restrictions for G.SHDSL Symmetric DSL Support

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

Information About G.SHDSL Symmetric DSL Support

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.

How to Configure G.SHDSL Symmetric DSL Support

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

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)# controller shdsl 0`	Enters controller configuration mode and the controller number.
Step 2	`Router(config-ctrl)# mode atm`	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)# annex {a | b}`	Specifies the regional operating parameters. Enter **a** for North America and **b** for Europe. The default is **a**.
Step 4	`Router(config-ctrl)# line-rate {auto | rate}`	Specifies the DSL line rate for the SHDSL port. The range is 192 to 2312 kbps. The default is **auto** (negotiated between the SHDSL port and the DSLAM). **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.
Step 5	`Router(config-ctrl)# exit`	Exits from controller configuration mode.
Step 6	`Router(config)# interface atm 0`	Enters ATM configuration mode for interface ATM 0.
Step 7	`Router(config-if)# ip-address IP-address`	Assigns an IP address to the DSL ATM interface.
Step 8	`Router(config-if)# atm ilmi-keepalive seconds`	(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)# pvc [name] vpi/vci`	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)# protocol ip IP-address`	(Optional) Enables IP connectivity and creates a point-to-point IP address for the VC.
Step 11	`Router(config-if-vc)# vbr-rt peak-rate average-rate burst`	(Optional) Configures the PVC for real-time variable bit rate (VBR) traffic shaping. • Peak rate = peak information rate (PIR) • Average rate = average information rate (AIR) • Burst = burst size in cells

	Command	Purpose
Step 12	`Router(config-if-vc)# encapsulation {aal1 | aal2 | aal5ciscoppp | aal5mux | aal5nlpid | aal5snap}`	(Optional) Configures the ATM adaptation layer (AAL) and encapsulation type. • Use the **aal2** keyword for AAL2 • Use the **aal5ciscoppp** keyword for Cisco PPP over AAL5 • Use the **aal5mux** keyword for AAL5+MUX • Use the **aal5nlpid** keyword for AAL5+NLPID • Use the **aal5snap** keyword for AAL5+LLC/SNAP (the default)
Step 13	`Router(config-if-vc)# exit`	Exits from interface-ATM-VC configuration mode.
Step 14	`Router(config-if)# shutdown`	Ensures that the ATM interface is shut down.
Step 15	`Router(config-if)# no shutdown`	Activates the ATM interface.
Step 16	`Router(config-if)# exit`	Exits from ATM interface configuration mode.
Step 17	`Router(config)# exit`	Exits from global configuration mode.
Step 18	`Router> show interface atm 0`	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 Examples for G.SHDSL Symmetric DSL Support

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
```

Additional References

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Commands List, All Releases*
Voice configuration	• Cisco IOS Voice, Video, and Fax Configuration Guide, Release 12.2 • Cisco IOS Voice, Video, and Fax Command Reference, Release 12.2
Configuring IP	*Cisco IOS IP Configuration Guide*, Release 12.2.
Configuring ATM	"Configuring ATM" in the *Cisco IOS Wide-Area Networking Configuration Guide*, Release 12.2.
Configuring a DSLAM	*Configuration Guide for Cisco DSLAMs with NI-2*
Installing and configuring Cisco IAD2420 series IAD hardware and software	http://www.cisco.com/univercd/cc/td/doc/product/access/iad/iad2420/index.htm

Standards

Standard	Title
Supports ITU-T G.991.2	*SHDSL*

MIBs

MIB	MIBs Link
• None	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None	—

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for G.SHDSL Symmetric DSL Support

Table 1 lists the release history for this feature.

Use Cisco Feature Navigator to find information about platform support and software image support. Cisco Feature Navigator enables you to determine which software images support a specific software release, feature set, or platform. To access Cisco Feature Navigator, go to http://www.cisco.com/go/cfn. An account on Cisco.com is not required.

Note Table 1 lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Table 1 Feature Information for G.SHDSL Symmetric DSL Support

Feature Name	Releases	Feature Information
G.SHDSL Symmetric DSL Support	12.2(4)T3 12.2(8)T	In Cisco IOS Release 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. In Cisco IOS Release 12.2(8)T, the G.SHDSL feature was expanded to the Cisco IAD2420 series IADs. The following commands were introduced or modified: **controller shdsl 0**, **mode atm**, **show controller shdsl 0**.

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.