



1-Port ADSL WAN Interface for the Cisco IAD2420 Series

Feature History

| Release | Modification |
|------------|--|
| 12.1(5)XR1 | This feature was introduced on the Cisco IAD2420 series. |
| 12.2(4)T | This feature was integrated into Cisco IOS Release 12.2(4)T. |

This feature module describes the 1-port Asymmetric Digital Subscriber Line Wide Area Network (ADSL WAN) Interface for the Cisco IAD2420 Series. It describes the benefits of the new feature, supported platforms, configuration, related documents, and provides command reference information.

This document includes the following sections:

- [Feature Overview, page 1](#)
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Feature Overview

The ADSL 1-port WAN interface provides asymmetric digital subscriber line (ADSL) high-speed digital data transfer between a single customer premises equipment (CPE) subscriber and the central office.

The ADSL WAN interface is compatible with the Alcatel Digital Subscriber Line Access Multiplexer (DSLAM), the Cisco 6260 DSLAM with Flexi-line cards and the Cisco 6130 DSLAM with Flexi-line cards. It supports Asynchronous Transfer Mode (ATM) Adaptation Layer (AAL5 and AAL2) and various classes of Quality of Service (QoS) for both voice and data service.



Note

ADSL is a last-mile access technology, which has an asymmetrical data rate running over a single copper wire pair.

Figure 1, Figure 2, and Figure 3 show examples of typical deployment scenarios for the Cisco IAD2423.

Figure 1 *ADSL WAN Interface with Analog FXS User Interface*

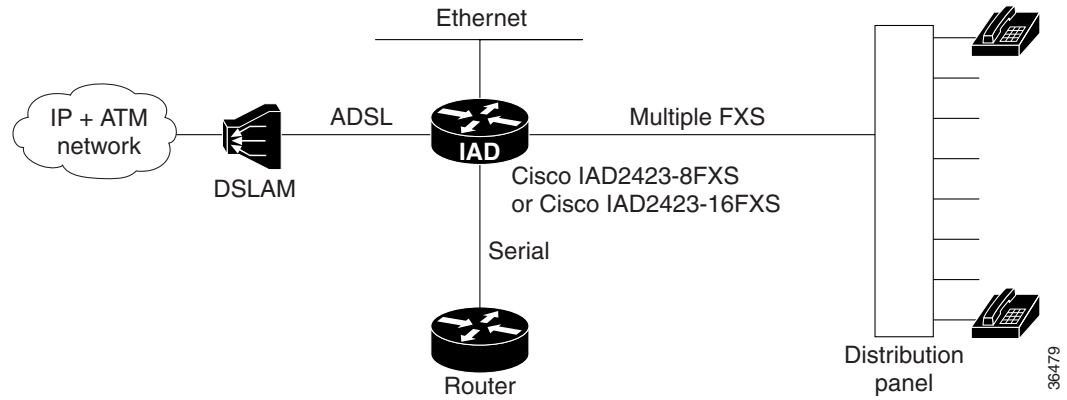


Figure 2 *ADSL WAN Interface with T1 Interface to a PBX*

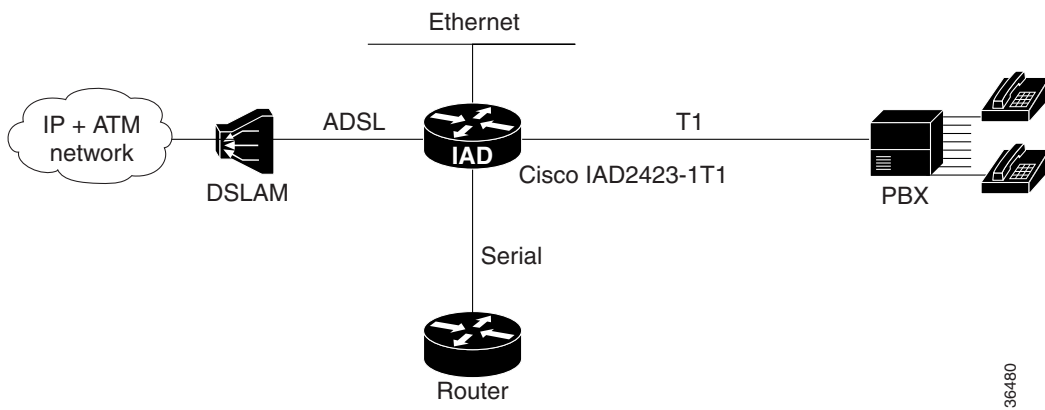
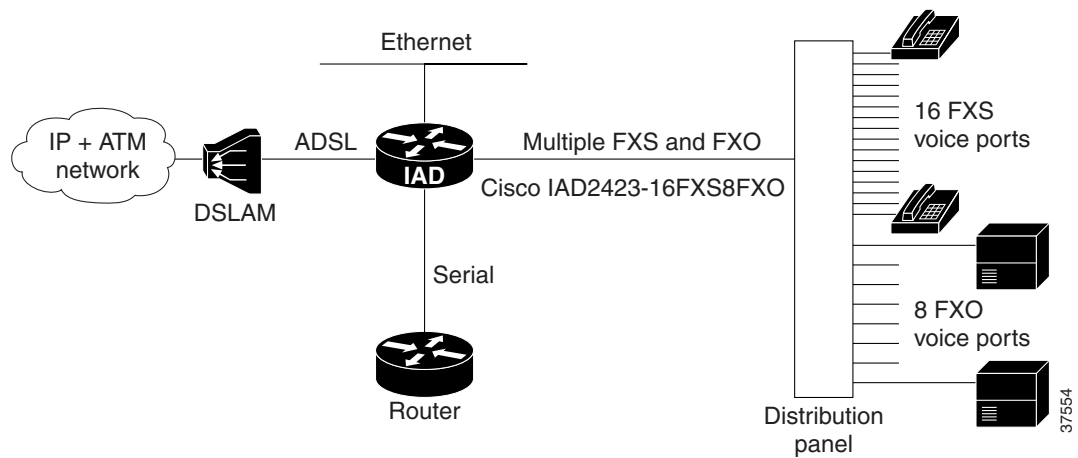


Figure 3 *ADSL WAN Interface with FXS or FXO Interface*



Benefits

- Enables business class broadband service with voice integration, scalable performance, flexibility, and security.
- Aggregates both ADSL and other transport options onto a single platform.
- Provides both POTS and ADSL high-speed digital data transmissions between the customer premise equipment (CPE) and the central office (CO).
- Supports ITU G.992.1 (or G.DMT, which specifies full-rate ADSL). Supports and complies with ANSI T1.413 issue 2, and ITU G.992.1 (G.DMT for full-rate ADSL).
- Supports ATM AAL5 and AAL2 services and applications, 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]).
- Provides ATM traffic management and Quality of Service (QoS) features to enable service providers to manage their core ATM network infrastructures.

Restrictions

The ADSL WAN interface does not support dual latency. When the ADSL link is intended to support both voice and data traffic simultaneously, the link should be configured for either all fast-path data or all interleave data with an interleave depth of zero to insure that latency is minimized. In addition, the total supported data rate must be reduced to adjust for the reduced coding gain, which is usually present with high-latency traffic.

Related Documents

- [Release Notes for Cisco IAD2420 Series for Cisco IOS Release 12.1\(5\)XR](#)
- [Cross-Platform Release Notes for Cisco IOS Release 12.2\(4\)T](#)
- [Cisco IAD2420 Series Software Configuration Guide](#)
- [Cisco IAD2420 Series Hardware Installation Guide](#)
- [Cisco IAD2420 Series Regulatory Compliance and Safety Information](#)
- [Cisco IOS Multiservice Applications Configuration Guide](#), Release 12.1
- [Cisco IOS Multiservice Applications Command Reference](#), Release 12.1
- [Cisco IOS Wide-Area Networking Configuration Guide](#), Release 12.1

Supported Platforms

- Cisco IAD2423-8FXS
- Cisco IAD2423-16FXS
- Cisco IAD2423-1T1
- Cisco IAD2423-16FXS8FXO

Determining Platform Support Through Feature Navigator

Cisco IOS software is packaged in feature sets that support specific platforms. To get updated information regarding platform support for this feature, access Feature Navigator. Feature Navigator dynamically updates the list of supported platforms as new platform support is added for the feature.

Feature Navigator is a web-based tool that enables you to quickly determine which Cisco IOS software images support a specific set of features and which features are supported in a specific Cisco IOS image.

To access Feature Navigator, you must have an account on Cisco.com. If you have forgotten or lost your account information, send a blank e-mail to cco-locksmith@cisco.com. An automatic check will verify that your e-mail address is registered with Cisco.com. If the check is successful, account details with a new random password will be e-mailed to you. Qualified users can establish an account on Cisco.com by following the directions at <http://www.cisco.com/register>.

Feature Navigator is updated regularly when major Cisco IOS software releases and technology releases occur. For the most current information, go to the Feature Navigator home page at the following URL:

<http://www.cisco.com/go/fn>

**Note**

As of Cisco IOS Release 12.1(5)XR, Feature Navigator does not support features included in this limited-lifetime release.

Supported Standards, MIBs, and RFCs

Standards

- ITU G.992.1 (G.DMT)
- ITU G.992.2 (G.Lite)
- T1.413 Issue 2 (ANSI)
- AAL5 (ATM Adaptation Layer 5)
- AAL2 (ATM Adaptation Layer 2)
- UNI3.1 PVC

MIBs

- ATM Interface MIB

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

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

RFCs

- RFC 1483 (Multiprotocol over ATM)
- RFC 2364 (PPP over ATM)

Prerequisites

- The ADSL WAN interface requires Cisco IOS Release 12.1(5)XR, Cisco IOS Release 12.2(4)T, or a later release. All plus images support the ADSL WAN interface.

Configuration Tasks

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

- [Configuring the ADSL ATM Interface](#) (required)
- [Configuring ATM for AAL2 Voice](#) (optional)
- [Configuring RSVP over an ATM Network](#) (optional)

Configuring the ADSL ATM Interface

If your Cisco IAD has an ADSL port, a default ATM configuration is automatically in effect when the Cisco IAD is first powered on. If your Cisco IAD has a T1-WAN port, a default ATM configuration takes effect when you enter the mode `atm controller` command. The default ATM configuration has the following operating parameters:

- ADSL port only.
 - Operating mode is auto—The ADSL interface operates in the mode specified by the remote DSL access multiplexer (DSLAM).
- T1-WAN port and ADSL port.
 - Maximum VPIs per VCI (`atm vc-per-vc`)—1024.
 - No IP address.
 - ATM UNI Version 4.0 is assigned.
 - ATM ILMI keepalive is disabled.
 - No ATM PVCs are configured

To configure the ADSL ATM interface, follow these steps:

| | Command | Purpose |
|---------------|---|---|
| Step 1 | Router> enable Password: Router# | Enters privileged EXEC mode by entering the enable command. |
| Step 2 | Router# config terminal Router(config)# | Enters configuration mode by entering the config terminal command. |
| Step 3 | Router(config)# controller t1 0 | Enter controller configuration mode and enter the controller number. The controller number for the T1-WAN port is 0. Note This step is only necessary if you have a T1 interface. |

| | Command | Purpose |
|---------|--|---|
| Step 4 | Router(config-ctrl)# mode atm | Enable ATM encapsulation and create logical ATM interface 0. Controller framing is automatically set to Extended SuperFrame (ESF). The linecode is automatically set to B8ZS. Note This step is only necessary if you have a T1 interface. |
| Step 5 | Router(config-ctrl)# exit Router(config)# interface atm 0 Router(config-if)# | Return to configuration mode. Enter configuration mode for ATM 0. |
| Step 6 | Router(config-if)# ip address <i>IP-address</i> | (Optional) Assigns an IP address to the ADSL ATM interface. |
| Step 7 | Router(config-if)# atm uni-version <i>version-number</i> | (Optional) Assign an ATM user network interface (UNI) version number. |
| Step 8 | Router(config-if)# atm ilmi-keepalive <i>seconds</i> | (Optional) Enable Integrated Local Management Interface (ILMI) keepalives. Note The default value is 3 seconds. |
| Step 9 | Router(config-if)# pvc [<i>name</i>] <i>vpi/vci</i> | Enters atm-virtual-circuit configuration mode, and configures a new permanent virtual circuit (PVC). Assigning a name is optional. Note The default traffic shaping is UBR and the default encapsulation is AAL5+LLC/SNAP. |
| Step 10 | Router(config-if-vc)# protocol ip <i>IP-address</i> | (Optional) Enable IP and create a point-to-point IP address for the virtual circuit (VC). |
| Step 11 | Router(config-if-vc)# vbr-rt <i>peak-rate average-rate burst</i> | (Optional) Configure the PVC for real-time variable bit rate (VBR) traffic shaping. <ul style="list-style-type: none"> • Peak rate—peak information rate (PIR) • Average rate—average information rate (AIR) • Burst—burst size in cells |
| Step 12 | Router(config-if-vc)# encapsulation { aal1 aal2 aal5cisco aal5mux aal5snap } | (Optional) Configure the ATM adaptation layer (AAL) and encapsulation type. <ul style="list-style-type: none"> • aal1 for AAL1 • aal2 for AAL2 • aal5cisco for Cisco PPP over AAL5 • aal5mux for AAL5+MUX • aal5nlpid for AAL5+NLPID • aal5snap for AAL5+LLC/SNAP (default) |

| | Command | Purpose |
|----------------|--|---|
| Step 13 | Router(config-if-vc)# exit Note Repeat steps 9 thru 12 for each ATM PVC to be configured. | Exit for interface-ATM-VC configuration mode. |
| Step 14 | Router(config-if)# dsl operating-mode {ansi-dmt auto itu-dmt splitterless} | Configure the ADSL interface mode. <ul style="list-style-type: none"> • ansi-dmt—ANSI full rate mode per T1.413 (ITU G dmt Issue 1) • auto—Automatic detection mode (default) • itu-dmt—ITU full rate mode (ITU G dmt Issue 1) • splitterless—G.lite mode per ITU G.992.2 |
| Step 15 | Router(config-if)# no shutdown | Activate the ATM interface. |
| Step 16 | Router(config-if)# exit | Exit from the ATM interface configuration mode. |
| Step 17 | Router(config)# exit | Exit from the global configuration mode. |
| Step 18 | Router> show interface atm 0 | Verify the ATM interface configuration. |

Configuring ATM for AAL2 Voice

This feature enables the Cisco IAD2423 to carry voice traffic (for example, telephone calls and faxes) over ATM networks using AAL2. AAL2 is the most bandwidth-efficient standards-based trunking method for transporting compressed voice, voice-band data, circuit-mode data, and frame-mode data over ATM infrastructures.

For configuration information, refer to the Cisco IOS Release 12.1(2)T feature module, *Voice over ATM with AAL2 Trunking on Cisco MC3810 Series Concentrators*, located on the World Wide Web at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121newft/121t/121t2/dt_aal2v.htm

Configuring RSVP over an ATM Network

The RSVP-ATM Quality of Service (QoS) Interworking feature provides support for Controlled Load Service using RSVP over an ATM core network. This feature requires the ability to signal for establishment of switched virtual circuits (SVCs) across the ATM cloud in response to RSVP reservation messages. To meet this requirement, RSVP over ATM supports mapping of RSVP sessions to ATM SVCs.

RSVP-ATM QoS Interworking allows you to:

- Configure an interface or subinterface to dynamically create SVCs in response to RSVP reservation requests. To ensure defined QoS, these SVCs are established having QoS profiles consistent with the mapped RSVP flow specifications (flowspecs).
- Attach Distributed Weighted Random Early Detection (DWRED) group definitions to the PA-A3 ATM PA interface to support per-VC DWRED drop policy. Use of per-VC DWRED ensures that if packets must be dropped, then best-effort packets are dropped first and not those that conform to the appropriate QoS determined by the RSVP's token bucket.

- Configure the IP Precedence and type of service (ToS) values to be used for packets that conform to or exceed QoS profiles. As part of its input processing, RSVP uses the values that you specify to set the ToS and IP Precedence bits on incoming packets. If per-VC DWRED is configured, it then uses the ToS and IP Precedence bit settings on the output interface of the same router in determining which packets to drop. Also, interfaces on downstream routers use these settings in processing packets.

For configuration information, refer to, *Configuring RSVP-ATM QoS Interworking*, located on the World Wide Web at:

http://www.cisco.com/univercd/cc/td/doc/product/software/ios121/121cgr/qos_c/qcprt5/qcdrsatm.htm

Verifying the ATM Interface Configuration

To display ATM-specific information about an ATM interface, use the **show interface atm** privileged EXEC command.

```
Router# show interface atm 0
ATM0 is up, line protocol is up
  Hardware is PQUICC Atom1 (with Alcatel ADSL Module)
  Internet address is 15.15.15.3/24
  MTU 4470 bytes, sub MTU 4470, BW 832 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ATM, loopback not set
  Keepalive not supported
  Encapsulation(s):, PVC mode
  512 maximum active VCs, 8 current VCCs
  VC idle disconnect time: 300 seconds
  Last input 3d23h, 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
    343791 packets input, 209797720 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
    5051487 packets output, 464110057 bytes, 0 underruns
    0 output errors, 0 collisions, 1 interface resets
    0 output buffer failures, 0 output buffers swapped out
```

To display DSL information about an ADSL interface, use the **show dsl interface atm** privileged EXEC command.

```
Router# show dsl interface atm 0
Alcatel 20150 chipset information
          ATU-R (DS)                      ATU-C (US)
Modem Status: Showtime (DMTDSL_SHOWTIME)
DSL Mode:      ITU G.992.1 (G.DMT)
ITU STD NUM:   0x01                          0x1
Vendor ID:     'ALCB'                          'ALCB'
Vendor Specific: 0x0000                       0x0000
Vendor Country: 0x00                          0x0F
Capacity Used: 85%                             98%
Noise Margin:  13.5 dB                          7.0 dB
Output Power:  9.5 dBm                          12.0 dBm
Attenuation:   1.5 dB                            3.5 dB
Defect Status: None                             None
Last Fail Code: None
Selftest Result: 0x00
Subfunction:   0x15
```

```

Interrupts:      5940 (0 spurious)
PHY Access Err: 0
Activations:    1
SW Version:     3.670
FW Version:     0x1A04
    
```

| | Interleave | Fast | Interleave | Fast |
|------------------|------------|------|------------|------|
| Speed (kbps): | 0 | 8128 | 0 | 864 |
| Reed-Solomon EC: | 0 | 0 | 0 | 0 |
| CRC Errors: | 0 | 0 | 0 | 7 |
| Header Errors: | 0 | 0 | 0 | 2 |
| Bit Errors: | 0 | 0 | | |
| BER Valid sec: | 0 | 0 | | |
| BER Invalid sec: | 0 | 0 | | |

```

DMT Bits Per Bin
00: 0 0 0 0 0 0 0 7 6 7 9 A B C C C
10: C C C C C C B B B B A 9 A 9 0 0
20: 0 0 0 0 0 0 2 2 3 4 4 5 6 6 7 7
30: 7 8 8 8 9 9 9 A A A A A B B B
40: B B B B B B B B B B A B B B B
50: B B B B B B B B B B B 2 B B B
60: B B B B B B B B B B B B B B B
70: B B B B B B B B B B B B B B B
80: B B B B B B B B B B B B B B B
90: B B B B B B B B B B B B B B B
A0: B B B B B B B B B B B B B B B
B0: B B B B B B B B B B B A B A A
C0: A A A A A A A A A A A A A A A
D0: A A A A A A A A A A A 9 9 9 9
E0: 9 9 9 9 9 9 9 9 9 9 8 8 8 8
F0: 8 8 8 8 8 8 7 7 7 7 6 6 5 4 4
    
```

Troubleshooting Tips

To troubleshoot ADSL line problems, follow these steps:

- Step 1** Check the carrier detect LED on the card. It will be off when the ADSL carrier is not detected. If it is off, it is a physical problem probably due to a bad cable or the problem with ADSL line or WAN service.
- Step 2** Make sure the ATM0 interface is not administratively shut down and the cable is good.
- Step 3** If the **show interface atm 0** command shows the interface as down, it means the Cisco IAD2423 sees the ADSL carrier but cannot train up with the Digital Subscriber Line Access Multiplexer (DSLAM) at the central office (CO).

Turn on **debug atm events** (you need to turn on terminal monitor if you are in a telnet session to the router) and look at the output:

The ADSL activation stages are shown below:

| | |
|---------|----------------------------------|
| STOP | in shutdown state |
| INIT | initialization |
| DLOAD_1 | init and downloading first image |
| DLOAD_2 | downloading second image |

| | |
|----------|--|
| STOP | in shutdown state |
| DO-OPEN | requesting activation with central office (CO) |
| SHOWTIME | activation succeeded |

When in DO_OPEN state, look for the modem state for the progress information:

| | |
|--------------------|--|
| Modem state = 0x0 | modem down |
| Modem state = 0x8 | modem waiting to hear from CO |
| Modem state = 0x10 | modem heard from CO, now training |
| Modem state = 0x20 | modem activation completed, link is up |

The following is a sample debug output:

```
*Mar 1 00:08:21.771: DSL: SM: [DMTDSL_DO_OPEN -> DMTDSL_INIT]
*Mar 1 00:08:23.771: DSL: SM: [DMTDSL_INIT -> DMTDSL_DLOAD_1]
*Mar 1 00:08:23.771: DSL: Downloading asw_init_2_5_8.bin
*Mar 1 00:08:23.771: DSL: Downloaded 2 blocks... Finished!
*Mar 1 00:08:23.775: DSL: Sent command 0x14
*Mar 1 00:08:26.275: DSL: Received 1 timer events during wait
*Mar 1 00:08:27.711: DSL: Received response: 0x80
*Mar 1 00:08:27.715: DSL: SM: [DMTDSL_DLOAD_1 -> DMTDSL_DLOAD_2]
*Mar 1 00:08:27.715: DSL: Downloading asw_r2_5_8.bin
*Mar 1 00:08:27.791: DSL: Downloaded 100 blocks
*Mar 1 00:08:27.863: DSL: Downloaded 200 blocks
*Mar 1 00:08:27.935: DSL: Downloaded 300 blocks
*Mar 1 00:08:27.975: DSL: Downloaded 354 blocks... Finished!
*Mar 1 00:08:27.975: DSL: Sent command 0x14
*Mar 1 00:08:29.991: DSL: SM: [DMTDSL_DLOAD_2 -> DMTDSL_DO_OPEN]
*Mar 1 00:08:29.991: DSL: Send ADSL_OPEN command.
*Mar 1 00:08:29.991: DSL: Using subfunction 0x2
*Mar 1 00:08:29.991: DSL: Sent command 0x3
*Mar 1 00:08:32.491: DSL: 1: Modem state = 0x8
*Mar 1 00:08:34.991: DSL: 2: Modem state = 0x8
*Mar 1 00:08:37.491: DSL: 3: Modem state = 0x10
*Mar 1 00:08:39.991: DSL: 4: Modem state = 0x10
*Mar 1 00:08:42.491: DSL: 5: Modem state = 0x10
*Mar 1 00:08:44.991: DSL: 6: Modem state = 0x10
*Mar 1 00:08:46.003: DSL: Received response: 0x24
*Mar 1 00:08:46.003: DSL: Showtime!
*Mar 1 00:08:46.007: DSL: Sent command 0x11
*Mar 1 00:08:46.011: DSL: Received response: 0x61
*Mar 1 00:08:46.011: DSL: Read firmware revision 0x1A04
*Mar 1 00:08:46.011: DSL: SM: [DMTDSL_DO_OPEN -> DMTDSL_SHOWTIME]
```

Configuration Examples

The following sample shows a Cisco IAD2423 configuration:

```
Building configuration...

Current configuration : 3187 bytes
!
version 12.1
no service single-slot-reload-enable
no service pad
service timestamps debug datetime msec
service timestamps log uptime
no service password-encryption
!
hostname Router
!
no logging buffered
logging rate-limit console 10 except errors
enable password mortify
!
network-clock base-rate 56k
network-clock-select 2 system(SCB)
ip subnet-zero
!
!
no ip finger
no ip domain-lookup
ip host newrouter 12.2.63.7
ip host motley 222.255.254.254
!
ip audit notify log
ip audit po max-events 100
frame-relay switching
!
voice-card 0
!
interface Ethernet0
 ip address 1.7.18.127 255.255.0.0
 ip helper-address 222.255.254.254
 no ip route-cache
 no ip mroute-cache
 load-interval 30
 no cdp enable
!
interface Serial0
 no ip address
 encapsulation frame-relay
 no ip route-cache
 no ip mroute-cache
 no keepalive
 shutdown
 no fair-queue
 no arp frame-relay
 frame-relay traffic-shaping
 frame-relay interface-dlci 200
 class fr801
 frame-relay ip rtp header-compression
!
interface ATM0
 ip address 15.15.15.3 255.255.255.0
 load-interval 30
 no atm ilmi-keepalive
```

```

pvc 25/35
  encapsulation aal5snap
!
pvc 110/110
  encapsulation aal2
!
pvc 111/111
  protocol ip 15.15.15.2
  encapsulation aal5snap
!
pvc 120/120
  encapsulation aal2
!
dsl operating-mode itu-dmt
!
no ip classless
ip route 0.0.0.0 0.0.0.0 1.3.0.1
ip route 163.69.0.0 255.255.0.0 163.22.124.1
ip route 222.255.254.254 255.255.255.255 Ethernet0
no ip http server
!
!
map-class frame-relay fr801
  no frame-relay adaptive-shaping
  frame-relay cir 100000
  frame-relay bc 1000
  frame-relay mincir 100000
  frame-relay fair-queue
!
map-class frame-relay fr38
  frame-relay traffic-rate 1500000 1500000
  no frame-relay adaptive-shaping
  frame-relay cir 1500000
  frame-relay mincir 1500000
!
map-class frame-relay voice
!
map-class frame-relay 801
logging trap debugging
no cdp run
call rsvp-sync
!
voice-port 1/1
!
voice-port 1/2
!
voice-port 1/3
!
voice-port 1/4
!
voice-port 1/5
  connection plar 702
!
voice-port 1/6
  connection plar 702
!
mgcp modem passthrough voip mode ca
no mgcp timer receive-rtcp
!
mgcp profile default
!
dial-peer cor custom
!
!

```

```
!  
dial-peer voice 1001 pots  
  destination-pattern 1001  
  port 1/1  
!  
dial-peer voice 2001 voatm  
  destination-pattern 2001  
  session protocol aal2-trunk  
  session target ATM0 pvc 110/110 101  
  signal-type trans  
  codec aal2-profile custom 110 g711ulaw  
  no vad  
!  
dial-peer voice 701 pots  
  destination-pattern 701  
  port 1/1  
!  
dial-peer voice 702 pots  
  destination-pattern 702  
  port 1/2  
!  
dial-peer voice 703 pots  
  destination-pattern 703  
  port 1/3  
!  
dial-peer voice 704 pots  
  destination-pattern 704  
  port 1/4  
!  
dial-peer voice 705 pots  
  destination-pattern 705  
  port 1/5  
!  
dial-peer voice 706 pots  
  destination-pattern 706  
  port 1/6  
!  
dial-peer voice 9999 voip  
  destination-pattern 2222  
  session target ipv4:12.12.12.2  
  signal-type ext-signal  
!  
dial-peer voice 9998 voip  
  destination-pattern 2223  
  session target ipv4:123.123.123.123  
  signal-type ext-signal  
!  
dial-peer voice 1000 voip  
  signal-type ext-signal  
!  
!  
line con 0  
  exec-timeout 0 0  
  privilege level 15  
  transport input none  
line aux 0  
line 2 3  
line vty 0 4  
  privilege level 15  
  no login  
!  
end
```

Command Reference

This section documents new or modified commands. All other commands used with this feature are documented in the Cisco IOS Release 12.1 command reference publications.

- [dsl operating-mode](#)
- [show dsl interface atm](#)

dsl operating-mode

To modify the operating mode of the digital subscriber line for an ATM interface, use the **dsl operating-mode** interface configuration mode command.

dsl operating-mode {auto | ansi-dmt | itu-dmt | splitterless}

| Syntax Description | auto | Configure the ADSL line after auto-negotiating with the DSLAM located at the Central Office. |
|--------------------|---------------------|--|
| | ansi-dmt | Configure the ADSL line to train in the ANSI T1.413 Issue 2 mode. |
| | itu-dmt | Configure the ADSL line to train in the G.992.1 mode. |
| | splitterless | Configure the ADSL line to train in the G.992.2 mode (G.lite). |

Defaults The DSL operating mode is set to **auto**.

Command Modes Interface configuration

| Command History | Release | Modification |
|-----------------|------------|---|
| | 12.1(3)XJ | This command was introduced on the Cisco 1700 series routers. |
| | 12.1(5)XR1 | This command was first supported on the Cisco IAD2420 Series. |
| | 12.2(4)T | This command was integrated into Cisco IOS 12.2(4)T. |

Usage Guidelines This configuration command applies to a specific ATM interface. The interface to which it applies must be specified before using the command.

Examples

```
Router(config)# int atm 0
Router(config-if)# dsl operating-mode itu-dmt
Router(config-if)# end
Router#
```

| Related Commands | Command | Description |
|------------------|--|--|
| | show dsl interface atm | Show all of the ADSL-specific information for a specified ATM interface. |

show dsl interface atm

To show the ADSL-specific information for a specified ATM interface, use the EXEC mode **show dsl interface atm** command.

show dsl interface atm *number*

| Syntax | Description |
|---------------|----------------|
| <i>number</i> | ATM interface. |

Defaults No default values.

Command Modes EXEC

| Command History | Release | Modification |
|-----------------|------------|---|
| | 12.1(3)XJ | This command was introduced on the Cisco 1700 series routers. |
| | 12.1(5)XR1 | This command was introduced on the Cisco IAD2420 Series. |
| | 12.2(4)T | This command was integrated into Cisco IOS 12.2(4)T. |

Usage Guidelines Use the **show dsl interface** command to view the status or results of a line test and to get information on port status, alarms, LIMO version, configured and actual transmission rates, and transmission errors.

Examples This command shows all of the ADSL specific information for the ATM interface requested.

```
Router# show dsl int atm0
Alcatel 20150 chipset information
                ATU-R (DS)                ATU-C (US)
Modem Status:   Showtime (DMTDSL_SHOWTIME)
DSL Mode:       ITU G.992.1 (G.DMT)
ITU STD NUM:    0x01                        0x1
Vendor ID:      'ALCB'                      'ALCB'
Vendor Specific: 0x0000                    0x0000
Vendor Country: 0x00                        0x0F
Capacity Used:  85%                        98%
Noise Margin:   13.5 dB                     7.0 dB
Output Power:   9.5 dBm                     12.0 dBm
Attenuation:    1.5 dB                       3.5 dB
Defect Status:  None                         None
Last Fail Code: None
Selftest Result: 0x00
Subfunction:    0x15
Interrupts:     5940 (0 spurious)
PHY Access Err: 0
Activations:    1
SW Version:     3.670
FW Version:     0x1A04
```

```

Speed (kbps):           Interleave           Fast           Interleave           Fast
Reed-Solomon EC:       0           8128           0           864
CRC Errors:             0           0             0           7
Header Errors:         0           0             0           2
Bit Errors:             0           0
BER Valid sec:         0           0
BER Invalid sec:       0           0

```

```

DMT Bits Per Bin
00: 0 0 0 0 0 0 0 7 6 7 9 A B C C C
10: C C C C C C B B B B A 9 A 9 0 0
20: 0 0 0 0 0 0 2 2 3 4 4 5 6 6 7 7
30: 7 8 8 8 9 9 9 A A A A A A B B B
40: B B B B B B B B B B A B B B B
50: B B B B B B B B B B B 2 B B B
60: B B B B B B B B B B B B B B B
70: B B B B B B B B B B B B B B B
80: B B B B B B B B B B B B B B B
90: B B B B B B B B B B B B B B B
A0: B B B B B B B B B B B B B B B
B0: B B B B B B B B B B B A B A A
C0: A A A A A A A A A A A A A A A
D0: A A A A A A A A A A 9 9 9 9 9
E0: 9 9 9 9 9 9 9 9 9 9 8 8 8 8
F0: 8 8 8 8 8 8 7 7 7 6 6 5 5 4 4

```

Table 1 describes significant fields in the example output.

Table 1 show dsl interface atm Fields and Descriptions

| Field | Description |
|---------------|---|
| Modem Status: | The possible states are listed below for the status: DMTDSL_INVALID: Error state. DMTDSL_STOP: Admin down state. DMTDSL_INIT: go here to restart line. DMTDSL_CHK_HW: confirm required HW exists. DMTDSL_DLOAD_1: download the init.bin file. DMTDSL_DLOAD_2: download operational firmware. DMTDSL_MODE_CHK: did download work okay? DMTDSL_DO_OPEN: Issue ADSL_OPEN command. DMTDSL_RE_OPEN: cycle the link. retry open. DMTDSL_ACTIVATING: Waiting for activation to succeed. DMTDSL_LOOPBACK: Activation done. we're in lpbck. DMTDSL_SHOWTIME: Activation succeeded. we're up. |

Table 1 *show dsl interface atm Fields and Descriptions (continued)*

| Field | Description |
|------------------|---|
| DSL Mode: | The supported modes are: ITU G.992.1 (G.DMT): ITU G.992.1 based dual multitone mode. ITU G.992.2 (G.Lite): A scaled down version of G.992.2, a.k.a G.Lite. ANSI T1.413: ANSI T1.413 compliance ADSL. For details, please refer to the individual standard specifications. |
| ITU STD NUM: | This is the version number corresponding to the DSL modes listed above. |
| Vendor ID: | This is the vendor number from the ADSL chipset supplied by Alcatel. |
| Vendor Specific: | N/A |
| Vendor Country: | N/A |
| Capacity Used: | This is the tone frequency band used thus far. For detail description, please refer to the standards. |
| Noise Margin: | Typically, the higher the noise margin, the higher capacity used. |
| Output Power: | The output power in dBm on the line |
| Attenuation: | The output attenuation on the line. |
| Defect Status: | If any status regarding the defect, it reports in the Defect Status field. |
| Last Fail Code: | Reports the last failure code from the defect. |
| Selftest Result: | If the self-test result is non-zero, it fails the selftest process. |
| Subfunction: | Always, 0x15. |
| Interrupts: | Counts the number of interrupts since the boot up of the ADSL DSP. |
| PHY Access Err: | This indicates whether there is any physical layer access error. |
| Activations: | Number of times that the DSL interface reset. |
| SW Version: | Software version: 3.670 means version 3.6.70. |
| FW Version: | Firmware version. 0x1A04 means 6660 or version 6.6.60. |
| Speed: | The train speed for upstream and downstream. It shows both of the interleave and fast mode. |
| Reed-Solomon EC: | It reports any Reed-Solomon error correction statistics. |
| CRC Errors: | Cyclic Redundant Check statistics. Be alarmed if this number is continuously growing. |
| Header Errors: | ATM header (header error--HEC) error reports. |
| Bit Errors: | Reports the total number of bit errors. |
| BER Valid sec: | Bit Error Rate valid seconds. |
| BER Invalid sec: | Bit Error Rate invalid seconds. |

Related Commands

| Command | Description |
|------------------------------------|--|
| dsl operating-mode | Modify the operating mode of the digital subscriber line for an ATM interface. |

Debug Commands

This section documents modified **debug** commands. All other commands used with this feature are documented in this feature module or the Cisco IOS Release 12.1 command reference publications.

- [debug atm events](#)

debug atm events

Use the **debug atm events** privileged EXEC command to display ATM events. The no form of this command disables debugging output.

debug atm events

no debug atm events

Syntax Description This command has no arguments or keywords.

Defaults The default is disabled.

Command Modes privileged EXEC

| Command History | Release | Modification |
|-----------------|------------|---|
| | 12.1(3)XJ | This command was introduced on the Cisco 1700 series routers. |
| | 12.1(5)XR1 | This command was introduced on the Cisco IAD2420 Series. |
| | 12.2(4)T | This command was integrated into Cisco IOS 12.2(4)T. |

Usage Guidelines This command displays ATM events that occur on the ATM interface processor and is useful for diagnosing problems in an ATM network. It provides an overall picture of the stability of the network. In a stable network, the debug atm events command does not return any information. If the command generates numerous messages, the messages can indicate the possible source of problems.

When configuring or making changes to a router or interface for ATM, enable debug atm events. Doing so alerts you to the progress of the changes or to any errors that might result. Also use this command periodically when you suspect network problems.

Examples The following is sample output from the debug atm events command:

```
Router# debug atm events

RESET(ATM4/0): PLIM type is 1, Rate is 100Mbps
aip_disable(ATM4/0): state=1
config(ATM4/0)
aip_love_note(ATM4/0): asr=0x201
aip_enable(ATM4/0)
aip_love_note(ATM4/0): asr=0x4000
aip_enable(ATM4/0): restarting VCs: 7
aip_setup_vc(ATM4/0): vc:1 vpi:1 vci:1
aip_love_note(ATM4/0): asr=0x200
aip_setup_vc(ATM4/0): vc:2 vpi:2 vci:2
aip_love_note(ATM4/0): asr=0x200
aip_setup_vc(ATM4/0): vc:3 vpi:3 vci:3
aip_love_note(ATM4/0): asr=0x200
```

```

aip_setup_vc(ATM4/0): vc:4 vpi:4 vci:4
aip_love_note(ATM4/0): asr=0x200
aip_setup_vc(ATM4/0): vc:6 vpi:6 vci:6
aip_love_note(ATM4/0): asr=0x200
aip_setup_vc(ATM4/0): vc:7 vpi:7 vci:7
aip_love_note(ATM4/0): asr=0x200
aip_setup_vc(ATM4/0): vc:11 vpi:11 vci:11
aip_love_note(ATM4/0): asr=0x200

```

Table 2 describes significant fields in the example output.

Table 2 *debug atm events Command Field Descriptions*

| Field | Description |
|-----------|--|
| PLIM type | Indicates the interface rate in megabits per second (Mbps). Possible values are: <ul style="list-style-type: none"> • 1 = TAXI(4B5B) 100 Mbps • 2 = SONET 155 Mbps • 3 = E3 34 Mbps |
| state | Indicates current state of the AIP. Possible values are: <ul style="list-style-type: none"> • 1 = An ENABLE will be issued soon • 0 = The AIP will remain shut down |
| asr | Defines a bitmask, which indicates actions or completions to commands. Valid bitmask values are: <ul style="list-style-type: none"> • 0x0800 = AIP crashed, reload may be required. • 0x0400 = AIP detected a carrier state change. • 0x0n00 = Command completion status. Command completion status codes are: <ul style="list-style-type: none"> - n = 8 Invalid PLIM detected - n = 4 Command failed - n = 2 Command completed successfully - n = 1 CONFIG request failed - n = 0 Invalid value |

The following line indicates that the ATM Interface Processor (AIP) was reset. The PLIM TYPE detected was 1, so the maximum rate is set to 100 Mbps.

```
RESET(ATM4/0): PLIM type is 1, Rate is 100Mbps
```

The following line indicates that the ATM Interface Processor (AIP) was given a shutdown command, but the current configuration indicates that the AIP should be up:

```
aip_disable(ATM4/0): state=1
```

The following line indicates that a configuration command has been completed by the AIP:

```
aip_love_note(ATM4/0): asr=0x201
```

The following line indicates that the AIP was given a no shutdown command to take it out of shutdown:

```
aip_enable(ATM4/0)
```

The following line indicates that the AIP detected a carrier state change. It does not indicate that the carrier is down or up, only that it has changed.

```
aip_love_note(ATM4/0): asr=0x4000
```

The following line of output indicates that the AIP enable function is restarting all PVCs automatically:

```
aip_enable(ATM4/0): restarting VCs: 7
```

The following lines of output indicate that PVC 1 was set up and a successful completion code was returned:

```
aip_setup_vc(ATM4/0): vc:1 vpi:1 vci:1  
aip_love_note(ATM4/0): asr=0x200
```

Glossary

AAL—ATM Adaptation Layer. ATM adaptation layer. Service-dependent sublayer of the data link layer. The AAL accepts data from different applications and presents it to the ATM layer in the form of 48-byte ATM payload segments.

AAL2—ATM adaptation layer 2. ATM adaptation layer 2. One of four AALs recommended by the ITU-T. AAL2 is used for connection-oriented services that support a variable bit rate, such as some isochronous video and voice traffic.

AAL5—ATM adaptation layer 5. ATM adaptation layer 5. One of four AALs recommended by the ITU-T. AAL5 supports connection-oriented, VBR services, and is used predominantly for the transfer of classical IP over ATM and LANE traffic.

ADSL—Asymmetric Digital Subscriber Line.

ATM—Asynchronous Transfer Mode. 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. An internationally standardized implementation of cell relay technology, ATM represents the first worldwide standard to be embraced by the computer, communications, and entertainment industry. ATM is a high-bandwidth, low-delay, connection-oriented, packet-like switching and multiplexing technique for data transmission that communicates all types of information (traditionally data, burst data, voice, video, image, and cell) over a common backbone using fixed cell lengths. ATM uses a 53-byte cell format that includes a 5-byte header and 48 bytes of payload. Because of the architecture, ATM has the capability to run from 45 Mbps using a DS3 to 2.5 Gbps using an OC-48.

broadband—Transmission system that multiplexes multiple independent signals onto one cable. In telecommunications terminology, any channel having a bandwidth greater than a voice-grade channel (4 kHz).

CBR—constant bit rate. QOS class defined by the ATM Forum for ATM networks. CBR is used for connections that depend on precise clocking to ensure undistorted delivery.

CPE—customer premises equipment. Customer Premises Equipment. Devices that a subscriber is responsible for in order to make use of telecommunications. CPE includes PCs, telephones, TVs, scanners, and much more. These devices or terminating equipment---such as terminals, telephones, and modems---are generally supplied by the telephone company, installed at customer sites, and connected to the telephone company network.

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 occurs. CO refers to the physical facility that contains the telephone switching system, transmission equipment, and other support systems that provide telephone and other telecommunications services to local telephone subscribers. There are numerous types of telephone switching systems, such as 1ESS, 4ESS, 5ESS, DMS 10/100/250/500, EAX2, or GTD5 that can be housed in a central office. The central office is not to be confused with the point of presence (POP) of the interexchange carrier, even though both perform many similar functions.

DSLAM—Digital Subscriber Line Access Multiplexer. A device that concentrates traffic in DSL implementations through a process of time-division multiplexing (TDM) at the CO or remote line shelf. This device is usually located in the CO for termination of multiple customer DSL devices.

DWRED—Distributed Weighted Random Early Detection. Random Early Detection (RED) is a congestion avoidance mechanism that takes advantage of TCP's congestion control mechanism. By randomly dropping packets prior to periods of high congestion, RED tells the packet source to decrease its transmission rate. Assuming the packet source is using TCP, it will decrease its transmission rate until all the packets reach their destination, indicating that the congestion is cleared.

Weighted RED (WRED) generally drops packets selectively based on IP precedence. Packets with a higher IP precedence are less likely to be dropped than packets with a lower precedence. Thus, higher priority traffic is delivered with a higher probability than lower priority traffic. However, you can also configure WRED to ignore IP precedence when making drop decisions so that non-weighted RED behavior is achieved.

ILMI—Interim Local Management Interface. Specification developed by the ATM Forum for incorporating network-management capabilities into the ATM UNI.

POTS—plain old telephone service. Basic analog telephone service, usually associated with residential or business subscribers.

PPP over ATM—Point-to-Point Protocol. A successor to SLIP, PPP provides router-to-router and host-to-network connections over synchronous and asynchronous circuits.

PVC—permanent virtual circuit. Virtual circuit that is permanently established. PVCs save bandwidth associated with circuit establishment and tear down in situations where certain virtual circuits must exist all the time.

QoS—quality of service. Measure of performance for a transmission system that reflects its transmission quality and service availability.

RSVP—Resource Reservation Protocol. The Resource Reservation Protocol is a network-control protocol that enables Internet applications to obtain special qualities of service (QoS) for their data flows.

SVC—switched virtual circuit. Virtual circuit that is dynamically established on demand and is torn down when transmission is complete. SVCs are used in situations where data transmission is sporadic. Called a switched virtual connection in ATM terminology.

ToS—type of service. See COS.

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.

UNI—User-Network Interface. ATM Forum specification that defines an interoperability standard for the interface between ATM-based products (a router or an ATM switch) located in a private network and the ATM switches located within the public carrier network.

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.

VC—virtual circuit. Logical circuit created to ensure reliable communication between two network devices. A virtual circuit is defined by a virtual path identifier/virtual channel identifier (VPI/VCI) pair, and can be either a PVC or a SVC. Virtual circuits are used in Frame Relay and X.25. In ATM, a virtual circuit is called a virtual channel.