



Octal-Port DMT ATU-C over ISDN

Feature History

Cisco IOS Release	Modification
12.2(12)DA	The line card was enhanced to support operation with Cisco SOHO 76 customer premises equipment (CPEs), Cisco 826 CPEs, and Alcatel-based CPEs.
12.2(5)DA	This feature was introduced on the Cisco 6015 digital subscriber line access multiplexer (DSLAM) and the Cisco 6260 DSLAM.

This document describes the Cisco IOS support for the Octal-Port DMT ATU-C over ISDN (8xDMT over ISDN) line card. It also includes information on new and modified Cisco IOS software commands.

This document includes the following sections:

- [Feature Overview, page 1](#)
- [Supported Platforms, page 4](#)
- [Supported Standards, MIBs, and RFCs, page 4](#)
- [Prerequisites, page 5](#)
- [Configuration Tasks, page 5](#)
- [Configuration Examples, page 8](#)
- [Command Reference, page 9](#)
- [Glossary, page 25](#)

Feature Overview

The 8xDMT over ISDN line card provides high port density for the Cisco 6015 DSLAM and the Cisco 6260 DSLAM. The line card:

- Supports eight asymmetric digital subscriber line (ADSL) modem connections per line card.
- Converts ADSL modulation from the line card into digital data streams to and from the NI-2 card.
- Negotiates the line rate with the CPE when it trains and bases the rate on line quality and distance.
- Provides subscriber and port provisioning through digital subscriber line (DSL) profiles.
 - Allows single latency—fast or interleaved path selection
 - Supports trellis encoding

Benefits

G.dmt Support (ITU G.922.1), Annex B/ETSI

G.dmt support is provided through both the Management Information Base (MIB) and the command line interface (CLI).

G.hs Support (ITU G.994.1)

G.hs support is provided through both the MIB and the CLI.

Fast or Interleaved Path Selection

You can configure the parameters for either the fast or interleaved path using the DSL profile configuration commands. Although you can configure both paths, only one path will actually be enabled (dual latency is not supported at this time). Thus, the maximum bit rate for the unused path must be zero. For example, to configure and use the fast path, you must specify nonzero maximum bit rates for the fast path. After you configure the maximum bit rates for the fast path, the rates for the interleave path must be zero. Cisco IOS software ensures that only one path is enabled at a given time.

The fast path provides improved latency characteristics for applications that cannot tolerate latency (for example, voice). Before you migrate from interleaved mode to fast path, determine if the deployed CPEs offer support for the feature.

Trellis Encoding

Trellis encoding improves performance in a noisy environment. It enables you to transmit at faster line rates with lower error rates, thus providing faster overall throughput in a moderately noisy environment.

By default, the 8xDMT over ISDN line card automatically configures itself for the type of trellis encoding supported on the CPE. It is no longer necessary to enable trellis encoding in the DSL profile.

Enhanced Line Quality Monitoring and Management

The 8xDMT over ISDN line card improves the manageability of Discrete Multi-Tone (DMT) ports on supported DSLAMs. The following commands are used to configure this functionality:

- **dmt minrate-blocking**

DMT minrate-blocking customizes the DMT port reaction to lines that train below configured minimum bit rates. Formerly, a line that trained below the configured minimum bit rate generated a minor alarm, but the DMT port remained active. The **dmt minrate-blocking** command prevents DMT ports from training when bit rates fall below the configured minimum threshold specified in the **dmt bitrate minimum** command.



Note If the bit rates on a DMT port violate the minimum allowed bit rates specified in the **dmt bitrate minimum** command, the default configuration (DMT minrate-blocking turned off) generates a minor alarm (if alarms are enabled in the DSL profile).

- **dmt rate-adaptation**

The **dmt rate-adaptation** command causes the signal-to-noise ratio (SNR) to be monitored on DSL lines. When enabled, software monitors the upstream and downstream DMT ports for low SNR margins. When the actual upstream or downstream margin falls below the DMT rate-adaptation margin for the duration of the configured rate-adaptation interval, the line drops and attempts to retrain. If the line is able to retrain, it trains to a lower bit rate with improved SNR margins.

Restrictions

Line Card Intermixing

The 8xDMT over ISDN line card is supported in chassis halves in the Cisco 6015 DSLAM and in chassis quadrants in the Cisco 6260 DSLAM. If a chassis section (half or quadrant) contains 8xDMT over ISDN line cards, you can install other types of supported line cards in other chassis sections; however, you can install only 4xDMT over ISDN (Annex B) line cards in the same section as the 8xDMT over ISDN line cards.

CPE Operation

See the “CPEs” section on page 4 for information about operating requirements for Alcatel-based CPEs and Cisco SOHO 76 and 826 CPEs.

Minimum Line Length

Use line lengths greater than 100 meters.

Maximum Downstream Rate

Provision the maximum downstream rate to 7616 kbps or less.

Overhead Framing Mode

Modes 0, 1, and 2 are not supported. Only framing mode 3 is supported.

CPE Data Line Removal

Do *not* remove the data line from the CPE modem while voice traffic is present because the ISDN line could momentarily drop and terminate the voice line.

Interleaving Delay Parameter

Do *not* select a zero interleaving delay parameter because that parameter is likely to create a high-bit error rate with long loops. Use the default parameter.

Bit Swapping

Bit swapping is not supported.

Related Documents

A list of all DSL hardware-related documentation is available at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/dsl_prod/index.htm

A list of all Cisco IOS DSL software-related documentation is available at the following URL:

http://www.cisco.com/univercd/cc/td/doc/product/dsl_prod/ios_dsl/index.htm

In the ATM software-related documentation, look for information about the Cisco LightStream 1010, which uses the same software base as the NI-2 DSL systems. It is available at the following URL:

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

Supported Platforms

DSLAMs

The 8xDMT over ISDN line card is supported by Cisco 6015 DSLAM and Cisco 6260 DSLAM platforms with NI-2. [Table 1](#) lists the total available ADSL modem connections that each chassis supports.

Table 1 Number of Available Modem Connections for Each Chassis

Chassis	Number of Available 8xDMT over ISDN Slots	Total ADSL Modem Connections
Cisco 6015 DSLAM	6	48
Cisco 6260 DSLAM	30	240

CPEs

The 8xDMT over ISDN line card supports the following types of CPEs:

- Arescom 800 and 1000 series CPEs
- Cisco SOHO 76 and 826 CPEs
- Alcatel-based CPEs



Note Alcatel-based CPEs and Cisco SOHO 76 and 826 CPEs require Cisco IOS Release 12.2(4)YA2 or later. We also recommend that you issue the command **dsl operating-mode annexb-ur2** at the CPE to enable DMT operating mode on these CPEs.



Note A correct firmware version does not guarantee operation with third-party CPEs. Some hardware variations can affect performance and error rates. Before provisioning service, test the operation of CPEs with the 8xDMT over ISDN line card in the targeted deployment model.

POTS Splitter

The 8xDMT over ISDN line card is designed for use in a configuration with an ISDN POTS splitter. The line card provisions one modem directly and is physically connected to one specific subscriber line through the POTS splitter. Telco equipment includes DMT/ISDN splitters to separate or combine ISDN and DMT signals at the CO and at the customer site.

ADC Telecommunications supplies POTS splitters for the ETSI Annex B splitter, types 2B1Q or 4B3T. Check with a Cisco customer representative to verify ISDN POTS splitter compatibility with the 8xDMT over ISDN line card.

Supported Standards, MIBs, and RFCs

Standards

The ATU-C transceiver complies with the following standards:

- ITU G.992.1, Annex B (ADSL/ISDN)
- ITU G.994.1. (G.hs)

- ETSI TS 101 388 V.1.1.1/TM6(98)12 (draft)
- ETSI TS 102 080 v1.3.2—Support for 2B1Q and 4B3T ISDN

Standard MIBS

- IETF RFC 1695, Definitions of Managed Objects for ATM Management Version 8.0 using SMIPv2
- IETF RFC 2662, Definitions of Managed Objects for the ADSL Line
- ADSL Forum TR-006, SNMP-based ADSL Line MIB
- ADSL Forum TR-014, DMT Line Code Specific MIB

Cisco MIBS

- CISCO-ADSL-LINE-MIB
- CISCO-ADSL-DMT-LINE-MIB

To obtain lists of supported MIBs by platform and Cisco IOS release and to download MIBs, go to the Cisco MIB page at the following URL:

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

Prerequisites

The 8xDMT over ISDN line card is supported by the following DSLAMs with Cisco IOS Release 12.2(5)DA or later installed:

- Cisco 6015 DSLAM
- Cisco 6260 DSLAM



Note

If you are upgrading from Cisco IOS Release 12.1(5)DA1 or earlier images on the NI-2 card to Release 12.2(5)DA or later, you must reformat the boot flash memory on the NI-2 card. See the *Release Notes for Cisco IOS Release 12.2(5)DA* for instructions.



Note

If you are using an Alcatel-based CPE, a Cisco SOHO 76 CPE, or a Cisco 826 CPE, see the operational requirements for those CPEs in the “CPEs” section on page 4.

Configuration Tasks

The following sections describe how to configure the 8xDMT over ISDN line card for operation:

- [Preprovisioning a Slot for use with the 8xDMT over ISDN Line Card, page 6](#) (optional)
- [Creating and Associating a DSL Profile with Each Port, page 6](#) (required)
- [Modifying a DSL Profile, page 7](#) (optional)

Preprovisioning a Slot for use with the 8xDMT over ISDN Line Card

In global configuration mode, use the following commands to preprovision a slot for the 8xDMT over ISDN line card:

	Command	Purpose
Step 1	DSLAM(config)# slot 1 ATUC-1-DMT8-I	Associates the 8xDMT over ISDN line card with the specified slot.
Step 2	DSLAM(config)# dsl-profile 8xDMT/ISDN	Creates a DSL profile named 8xDMT/ISDN.
Step 3	DSLAM(cfg-dsl-profile)# exit	Returns you to global configuration mode.
Step 4	DSLAM(config)# interface atm1/1	Enters interface configuration mode on the interface associated with the specified port. Specify the port that you want to assign the profile to. Repeat this process for each port that you want to assign a DSL profile to.
Step 5	DSLAM(config-if)# dsl profile 8xDMT/ISDN	Associates the DSL profile named 8xDMT/ISDN with the interface atm1/1.
Step 6	DSLAM(config-if)# exit	Returns you to global configuration mode.



Tip

After you have completed these steps, insert the 8xDMT over ISDN line card to activate the line card with your preprovisioned configuration.

Verifying the Preprovisioned Slot

Use the **show running-configuration** command to verify that the slot is preprovisioned correctly.

Creating and Associating a DSL Profile with Each Port

Before you start this configuration task, install the 8xDMT over ISDN line card. Refer to the *Octal-Port DMT ATU-C Over ISDN Line Card FRU Installation and Replacement Notes* for information on installing the 8xDMT over ISDN line card.

In global configuration mode, use the following commands to associate a DSL profile with a port:

	Command	Purpose
Step 1	DSLAM(config)# dsl-profile 8xDMT/ISDN	Creates a profile or selects an existing profile that you want to attach to the selected port. The profile name 8xDMT/ISDN is used as an example.
Step 2	DSLAM(cfg-dsl-profile)# exit	Returns you to global configuration mode.
Step 3	DSLAM(config)# interface atm1/1	Enters interface configuration mode on the port where you intend to associate the 8xDMT/ISDN DSL profile. Repeat this process for each port that you want to assign a DSL profile to.

	Command	Purpose
Step 4	DSLAM(config-if)# dsl profile 8xDMT/ISDN	Assigns the DSL profile 8xDMT/ISDN to the interface atm1/1.
Step 5	DSLAM(config-if)# exit	Returns you to global configuration mode.

Verifying the DSL Profiles

You can use the **show dsl profile** *profile-name* command or the **show running-configuration** command to verify that the DSL profile is attached to a port.



Tip

If no DSL profile appears in the **show running-configuration** command output, the default DSL profile is enabled.

Modifying a DSL Profile

We recommend that you use the default DSL profile values. To modify a profile, use the following commands in global configuration mode. These commands modify the default bit rate for the fast path, change the signal-to-noise ratio, and change the DMT check bytes in your DSL profile:



Caution

Before migrating from interleaved mode to fast path, determine whether the deployed CPEs support the fast path feature.

	Command	Purpose
Step 1	DSLAM(config)# dsl-profile 8xDMT/ISDN	Enters DSL profile configuration mode.
Step 2	DSLAM(cfg-dsl-profile)# dmt bitrate maximum fast downstream 3200 upstream 640	Sets a DMT bit rate of 3200 kbps downstream and 640 kbps upstream on the fast path. Automatically configures the interleaved path to 0 kbps.
Step 3	DSLAM(cfg-dsl-profile)# dmt check-bytes fast downstream 0 upstream 0	Sets the upstream and downstream FEC check (redundancy) bytes to 0.
Step 4	DSLAM(cfg-dsl-profile)# dmt margin downstream 12 upstream 6	Sets the downstream and upstream SNR margins for a DSL profile.
Step 5	DSLAM(cfg-dsl-profile)# exit	Returns you to global configuration mode.

Troubleshooting Tips

Cisco.com is a starting point for all technical assistance. Customers and partners can obtain documentation, troubleshooting tips, and sample configurations from online tools.

For Cisco.com registered users, additional troubleshooting information is available at the following TAC web site:

http://www.cisco.com/kobayashi/support/tac/tsa/launch_tsa.html

Also see the “[Monitoring and Maintaining the 8xDMT over ISDN Line Card](#)” section on page 8.

Monitoring and Maintaining the 8xDMT over ISDN Line Card

Use the following commands to monitor and maintain the 8xDMT over ISDN line card:

Command	Purpose
DSLAM# <code>show dsl interface atm slot/port</code>	These commands display basic information about the DSL link, including port status, DSL statistics, line errors, and line cards detected.
DSLAM# <code>show dsl status DMT</code>	
DSLAM# <code>show facility-alarm status</code>	Displays active major and minor alarms and the user-configurable alarm thresholds for temperature. If an LED or bell indicates an alarm condition, you can use the <code>show facility-alarm status</code> command to determine the cause of the alarm. Note To display alarms, you must turn on the alarms in the profile.
DSLAM# <code>show hardware</code>	Shows information on each of the slots in the chassis and indicates the presence of line cards, fan trays, and power entry modules (PEMs).

Configuration Examples

The following example shows how to create a profile named 8xDMT/ISDN. In the profile, default profile values are used for any parameters not specified.

```
Current configuration : 7333 bytes
!
version 12.2
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
service internal
!
hostname DSLAM
!
boot system flash ni2-dsl-mz
slot 1 ATUC-1-DMT8-I
slot 2 ATUC-1-DMT8-I
slot 3 ATUC-1-DMT8-I
slot 10 NI-2-155MM-155MM
slot 14 ATUC-1-DMT8-I
enable password cisco
!
dsl-profile default
!
dsl-profile 8xDMT/ISDN
dmt operating-mode g992-1
dmt training-mode standard
dmt encoding trellis
dmt bitrate maximum interleaved downstream 7616 upstream 1024
!
no dsl atuc-1-4dmt rx-attenuation
network-clock-select 1 ATM0/1
redundancy
ip subnet-zero
no ip routing
!
Interface atm1/1
dsl profile 8xDMT/ISDN
```

Command Reference

This section documents the new and modified commands that are specific to the 8xDMT over ISDN line card. All other commands used with the line card are documented in the *Command Reference for Cisco DSLAMS with NI-2*. For information on other Cisco IOS commands that can be used on the NI-2 DSL systems, see the *Cisco ATM Switch Router Command Reference*.

alarms

To enable alarms in profile command mode, use the **alarms** command. To disable alarms, use the **no** form of the command.

alarms

no alarms

Syntax Description This command has no keywords or arguments.

Defaults Disabled.

Command Modes Profile configuration.

Command History	Cisco IOS Release	Modification
	12.0(5)DA	This command was introduced.
	12.1(6)DA	Conditions that cause alarms were added.
	12.2(5)DA	Support for 8xDMT over ISDN was added.

Usage Guidelines The command affects minor alarms for DSL subscriber ports only. The alarms that this command controls apply to these event classes:

- Near end LOS
- Near end interleaved LOCD
- Near end fast LOCD
- Near end LOF
- No CPE detected
- Bit rates below configured minimum
- Subscriber port failure
- Upstream or downstream bit rate not above minimum bit rate

Enabling or disabling alarms affects the specified profile only. For example, if you disable alarms on the default profile, other profiles are unaffected.

Use **alarms** and **no alarms** to enable and disable minor alarms related to DSL subscriber ports. If these alarms are disabled, no notification appears if alarm conditions exist. (Notification methods include console messages, LEDs, the output of the **show facility-alarm** command, and relay alarm signals to external systems for audible or visible alarms.) However, you can track the condition of DSL ports on which alarms are disabled, including conditions that ordinarily trigger alarms, using the **show dsl interface atm slot# /port#** command.

You can suppress minimum bit rate alarms without disabling other alarms for the profile.



Note

The `alarms` command has no effect on critical alarms, major alarms, or minor alarms related to subsystems other than the DSL subscriber ports.

Examples

In this example, the command enables alarms for the default profile:

```
DSLAM# configure terminal
DSLAM(config)# dsl-profile default
DSLAM(cfg-dsl-profile)# alarms
```

Related Commands

Command	Description
dsl-profile <i>profile name</i>	Selects an existing DSL profile for modification.
show dsl interface atm <i>slot# /port#</i>	Displays DSL, DMT, and ATM status for a port.
show dsl profile	Displays a specific profile, all ports to which the profile is currently attached, and those port settings.
show facility-alarm status	Displays the current major and minor alarm status, if any, and display the configuration of the alarm thresholds.

dmt bitrate

To set the maximum and minimum allowed bit rates for the fast or interleaved DMT profile parameters, use the **dmt bitrate** profile configuration command. To reset this command to the default value, use the **no** form of this command.

dmt bitrate maximum {fast | interleaved} downstream *dmt-bitrate* upstream *dmt-bitrate*

dmt bitrate minimum {fast | interleaved} downstream *dmt-bitrate* upstream *dmt-bitrate*

Syntax Description

<i>dmt-bitrate</i>	The DMT bit rate must be a multiple of 32 kbps. If you enter a value that is not a multiple of 32 kbps, the system rejects and aborts the command. See the allowed ranges and default values in “Usage Guidelines.”
fast	Specify the DMT fast latency path.
interleaved	Specify the DMT interleaved latency path.

Defaults

- The default **no dmt bitrate maximum interleaved** sets the maximum downstream and upstream interleaved bit rate to 640 and 128 kbps respectively. This command causes the port to retrain.
- The default **no dmt bitrate maximum fast** sets both the maximum downstream and upstream fastpath bit rates to zero. This command causes the port to retrain.
- The default **no dmt bitrate minimum interleaved** sets both the minimum downstream and upstream interleaved bit rates to zero. This command does not cause the port to retrain.
- The default **no dmt bitrate minimum fast** sets both the minimum downstream and upstream fastpath bit rates to zero. This command does not cause the port to retrain.

Command Modes

Profile configuration

Command History

Cisco IOS Release	Modification
12.0(5)DA	This command was introduced.
12.1(5)DA	The fast keyword was added.
12.2(5)DA	Support for the 8xDMT over ISDN line card was added.

Usage Guidelines

Only the alarm subsystem uses the minimum bit rate settings. Cisco IOS software asserts an alarm if the line card trains at a rate below the configured minimum bit rate. However, if you disable alarms, no alarm occurs. See *Alarms* in *Chapter 2* of the *Command Reference for Cisco DSLAMS with NI-2* for more information on enabling and disabling alarms.

If alarms are enabled for the profile, you can set the DMT bit rate to 0 to disable the associated minimum DMT bit rate alarm.

Table 2 lists the allowable DMT bit rate ranges and default values.

Table 2 Allowable Ranges and Default Values for DMT Bit Rates

Configuration Parameters		Downstream Bit Rate			Upstream Bit Rate		
Configuration Parameter	Data Path	Aggregate Range (kbps)	Path Range (kbps)	Path Default (kbps)	Aggregate Range (kbps)	Path Range (kbps)	Path Default (kbps)
DMT bit rate max	Fast	7616 to 32	7616 to 32	0	1024 to 32	1024 to 0	0
DMT bit rate min	Fast	7616 to 32	7616 to 0	0	1024 to 32	1024 to 0	0
DMT bit rate max	Interleaved	7616 to 32	7616 to 32	640	1024 to 32	1024 to 0	128
DMT bit rate min	Interleaved	7616 to 32	7616 to 0	128	1024 to 0	1024 to 0	0



Caution

This command causes the port to retrain when you change the value of the bit rate parameter.

Setting a parameter to its current value does not cause a retrain. If a port is training when you change the parameter, the port stops training and retrains to the new parameter.

Examples

The following command example sets the maximum interleaved bit rate of the default profile to 3200 kbps downstream and 640 kbps upstream:

```
DSLAM# configure terminal
DSLAM(config)# dsl-profile default
DSLAM(cfg-dsl-profile)# dmt bitrate maximum interleaved downstream 3200 upstream 640
```

Related Commands

Command	Description
show dsl profile	Displays a specific profile, all ports to which the profile is currently attached, and those port settings.

dmt check-bytes

To set upstream and downstream FEC check (redundancy) bytes, use the **dmt-checkbytes** profile configuration command. To reset this command to the default value, use the **no** form of this command.

dmt check-bytes {fast | interleaved} downstream bytes upstream bytes

Syntax Description

<i>bytes</i>	Enter the upstream and downstream FEC check bytes. The allowed values are 0, 2, 4, 6, 8, 10, 12, 14, and 16.
fast	Specify the DMT fast latency path.
interleaved	Specify the DMT interleaved latency path.

Defaults

Interleaved Downstream and Upstream: 16
Fast Downstream and Upstream: 0

Command Modes

Profile configuration

Command History

Cisco IOS Release	Modification
12.0(5)DA	This command was introduced.
12.1(6)DA	The fast keyword was added.
12.2(5)DA	Support for the 8xDMT over ISDN line card was added.

Usage Guidelines



Caution

This command causes the port to retrain when you change the *check-bytes* parameter.

Setting a parameter to its current value does not cause a retrain. If a port is training when you change the parameter, the port untrains and retrains to the new parameter.

Conditions on the line, the configured bit rate, and the capabilities of the ATU-R CPE affect the achievable value for this parameter. As a result, the check-bytes value to which the line trains might be smaller than the value you configure. If you want to use more check bytes than the system allows, use the **dmt bitrate** command to reduce the bit rate.

Use the command **show dsl interface atm slot# /port#** to display the configured and actual check-bytes values for the connection.

Examples

The following command example sets the interleaved FEC check bytes for the default profile to 12 downstream and 6 upstream.

```
DSLAM# configure terminal
DSLAM(config)# dsl-profile default
DSLAM(cfg-dsl-profile)# dmt check-bytes interleaved downstream 12 upstream 6
```

Related Commands

None.

dmt margin

To set upstream and downstream signal-to-noise ratio (SNR) margins for a DMT profile, use the **dmt margin** command. To reset this command to the default value, use the **no** form of this command.

dmt margin downstream *dmt-margin* **upstream** *dmt-margin*

Syntax Description	<i>dmt-margin</i>	Enter the upstream and downstream SNR margins in decibels. The range is 0 to 15.
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Defaults	Downstream: 6 dB Upstream: 6 dB
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Command Modes	Profile configuration
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Command History	Cisco IOS Release	Modification
	12.0(5)DA	This command was introduced.

Usage Guidelines



Caution

This command causes the port to retrain when you change the parameter.

Setting a parameter to its current value does not cause a retrain. If a port is training when you change this value, the port untrains and retrains to the new value.

Examples

The following command example sets the SNR margins of the default profile to 12 dB downstream and 6 dB upstream:

```
DSLAM# configure terminal
DSLAM(config)# dsl-profile default
DSLAM(cfg-dsl-profile)# dmt margin downstream 12 upstream 6
```

Related Commands	None.
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dmt minrate-blocking

To force a port *not* to retrain when actual bit rates fall below the values configured in the **dmt bitrate minimum** command, use the **dmt minrate-blocking** command. To disable dmt minrate-blocking, use the **no** form of the command.

dmt minrate-blocking

Syntax Description This command has no arguments or keywords.

Defaults The default configuration, **no dmt minrate-blocking**, generates a minor alarm when the bit rates on a DMT port violate the minimum allowed bit rates specified in the **dmt bitrate minimum** command (if alarms are enabled in the DSL profile).

Command Modes DSL profile configuration

Command History	Cisco IOS Release	Modification
	12.1(6)DA	This command was introduced.

Usage Guidelines To specify the bit rate below which a DMT port will not retrain, use the **dmt bitrate minimum** command.

Examples The following command example enables **dmt minrate-blocking**:

```
DSLAM# configure terminal
DSLAM(config)# dsl-profile 8xDMT/ISDN
DSLAM(cfg-dsl-profile)# dmt minrate-blocking
```

Related Commands None.

dmt overhead-framing

To set the overhead framing mode, use the **dmt overhead-framing** command. To reset this command to the default value, use the **no** form of this command.

dmt overhead-framing {mode0 | mode1 | mode2 | mode3}

Syntax Description	mode0	Full overhead framing with asynchronous bit-to-modem timing.
	mode1	Full overhead framing with synchronous bit-to-modem timing.
	mode2	Reduced overhead framing with separate fast and sync bytes in the fast and interleaved latency buffers respectively.
	mode3	Reduced overhead framing with merged fast and sync bytes, using either the fast or interleaved latency buffer.

Defaults Mode3 is the only supported mode. If you specify another mode, the mode is forced to mode3.

Command Modes Profile configuration

Command History	Cisco IOS Release	Modification
	12.0(5)DA	This command was introduced.
	12.2(5)DA	Support for the 8xDMT over ISDN line card was added.

Usage Guidelines



Note

Conditions on the line and the capabilities of the ATU-R CPE affect the achievable value for this parameter. As a result, the overhead framing value to which the line trains might not be the same as the value you configure.

There are two types of ADSL framing:

- Full overhead
- Reduced overhead

There are also two versions of full overhead:

- Asynchronous
- Synchronous

The ADSL framing mode is Mode 3 which specifies reduced overhead framing with merged fast and sync bytes using either the fast or interleaved latency buffer.

There is one overhead byte per frame.

If, during the training sequence, the ATU-R indicates a lower framing structure value than that specified by the ATU-C, the ATU-C falls back to the framing structure number indicated by the ATU-R.

Management requirements drive the determination of overhead (full or reduced). Full overhead provides more bandwidth to the embedded operations channel (EOC), enabling higher polling rates. However, reduced overhead provides enough EOC bandwidth to satisfy typical applications.

The **dmt overhead-framing** command does not cause port retrain when you change the parameter.

Examples

The following command example sets the overhead framing mode in the profile named 8xDMT/ISDN:

```
DSLAM# configure terminal
DSLAM(config)# dsl-profile 8xDMT/ISDN
DSLAM(cfg-dsl-profile)# dmt overhead-framing mode3
```

Related Commands

Command	Description
show dsl profile	Displays a specific profile, all ports to which the profile is currently attached, and those port settings.

dmt rate-adaptation enable

DMT rate adaptation monitors upstream and downstream DMT ports for signal-to-noise ratio (SNR) margins during specified time intervals. If an unacceptable SNR margin is detected, the port is retrained at a lower bit rate to improve the SNR margins. To enable rate adaptation on a DMT port, use the **dmt rate-adaptation enable** command at the DSL profile configuration prompt. To disable dmt rate adaptation, use the **no** form of the command.

dmt rate-adaptation enable

This command has no arguments or keywords.

Defaults

Enabling dmt rate-adaptation assigns the default values to **dmt rate-adaptation interval** and **dmt rate-adaptation margin** commands. For information on the default values of **dmt rate-adaptation interval** and **dmt rate-adaptation margin**, see the “[dmt rate-adaptation interval](#)” section on page 20 and the “[dmt rate-adaptation margin](#)” section on page 22.

Command Modes

DSL profile configuration

Command History

Cisco IOS Release	Modification
12.1(6)DA	This command was introduced.
12.2(5)DA	Support for the 8xDMT over ISDN line card was added.

Usage Guidelines

If you wish to modify the default configuration of the **dmt rate-adaptation interval** and **dmt rate-adaptation margin**, see the “[dmt rate-adaptation interval](#)” section on page 20 and the “[dmt rate-adaptation margin](#)” section on page 22.



Note

If line conditions improve, the line does not automatically drop and retrain to a higher bit rate. The administrator must execute a **shut** command then a **no shut** command on the port to retrain to a higher bit rate.

Examples

The following command example enables DMT rate-adaptation with default interval and margin values:

```
DSLAM# config terminal
DSLAM(config)# dsl-profile austin
DSLAM(cfg-dsl-profile)# dmt rate-adaptation enable
```

Related Commands

Command	Description
dmt rate-adaptation interval	Sets the upstream and downstream time intervals at which a DMT port is monitored for SNR margins.
dmt rate-adaptation margin	Sets the SNR values below which the DMT port retrains to a lower bit rate.

dmt rate-adaptation interval

To change the intervals during which a DMT port is monitored for signal-to-noise ratio (SNR) margins, use the **dmt rate-adaptation interval** command in DSL profile configuration mode. To disable **dmt rate-adaptation interval**, use the **no** form of this command.

dmt rate-adaptation interval {**downshift** [**downstream** *number-of eoc-updates*
upstream *seconds*]}

Syntax	Description
downshift	The downshift keyword indicates that a line with excessive SNR margins retrains to a lower bit rate.
downstream	The downstream keyword tells IOS to monitor downstream ports for SNR margins exceeding those specified in the dmt rate-adaptation margin command.
<i>number-of eoc-updates</i>	The <i>number-of eoc-updates</i> argument specifies the monitoring interval <i>in multiples of 6 seconds</i> on a downstream DMT port.
Note	The <i>downstream margin</i> (see the “ dmt rate-adaptation margin ” section on page 22) is obtained from the CPE through the embedded operations channel (EOC). The <i>downstream number-of eoc-updates</i> parameter specifies a number of consecutive EOC read events. Depending upon the type of CPE, EOC messages are sent once every 6 to 15 seconds (not counting EOC timeouts). Hence, a <i>downstream downshift interval</i> value of 10 on CPE reporting margins every 6 seconds results in a 1-minute monitoring interval (10 x 6 seconds). Specifying a <i>downstream downshift interval</i> value of 10 on CPEs that report margins every 15 seconds (10 x 15 seconds) yields a 2.5 minute monitoring interval.
upstream	The upstream keyword tells Cisco IOS software to monitor upstream ports for SNR margins exceeding those specified in the dmt rate-adaptation margin command.
<i>seconds</i>	The <i>seconds</i> argument specifies the monitoring interval <i>in seconds</i> on an upstream DMT port.

Defaults

Following are the default settings for the **dmt rate-adaptation interval**:

- **downstream**—10



Note A downstream value of 10 can yield a monitoring interval of 1 to 2.5 minutes.

- **upstream**—10

Command Modes

DSL profile configuration

Command History

Cisco IOS Release	Modification
12.1(6)DA	This command was introduced.
12.2(5)DA	Support for the 8xDMT over ISDN line card was added.

Usage Guidelines

Use the **dmt rate-adaptation interval** to specify the frequency at which line margins are checked on a DMT port. The **dmt rate-adaptation interval** command works in conjunction with the **dmt rate-adaptation margin** command. If, for the duration of time specified in the **dmt rate-adaptation interval** command, the actual SNR margins on a port remain lower than the margins configured in the **dmt rate-adaptation margin** command for the duration of time specified in the **dmt rate-adaptation interval** command, the line drops and retrains to a lower bit rate, to improve SNR margin quality on the line.

**Note**

If line conditions improve, the line does not automatically drop and retrain to a higher bit rate. The administrator must execute a **shut** then a **no shut** on the port to retrain to a higher bit rate.

Examples

The following command example configures a downstream monitoring interval of roughly 60 to 150 seconds, and an upstream monitoring interval of 20 seconds:

```
DSLAM# config terminal
DSLAM(config)# dsl-profile austin
DSLAM(cfg-dsl-profile)# dmt rate-adaptation interval downshift downstream 10 upstream 20
```

Related Commands

Command	Description
dmt rate-adaptation enable	Turns on rate adaptation.
dmt rate-adaptation margin	Sets the SNR margins below which a DMT port retrains to a lower bit rate.

dmt rate-adaptation margin

To configure the minimum acceptable SNR margins on a DMT port, use the **dmt rate-adaptation margin** command in DSL profile configuration mode. The minimum acceptable SNR margins on a DMT port force the port to retrain when bad margins exist for the duration of the **dmt rate-adaptation interval**. To disable **dmt rate-adaptation margin**, use the **no** form of this command.

dmt rate-adaptation margin {min [downstream *dB* upstream *dB*]}

Syntax Description

min	The min keyword specifies that you are configuring the minimum acceptable SNR margins on a port. If the port SNR drops below the configured values, the port retrains to a lower bit rate.
downstream	Specifies the minimum acceptable SNR margin for downstream traffic on a port.
<i>dB</i>	SNR margins measured in decibels. The valid range is –15 to 15.
upstream	Specifies the minimum acceptable SNR margin for upstream traffic on a port.
<i>dB</i>	SNR margins measured in decibels. The valid range is –15 to 15.

Defaults

The default configuration is derived from the **no dmt rate-adaptation enable** command. This specifies minimum upstream and downstream SNR margins of 0 dB.

Command Modes

DSL profile configuration

Command History

Cisco IOS Release	Modification
12.1(6)DA	This command was introduced.
12.2(5)DA	Support for the 8xDMT over ISDN line card was added.

Usage Guidelines

Use the **dmt rate-adaptation margin** command to configure the acceptable SNR margin thresholds on a specified port. The **dmt rate-adaptation margin** command works in conjunction with the **dmt rate-adaptation interval** command. If, for the duration of time specified in the **dmt rate-adaptation interval** command, the actual SNR margins on a port remain lower than the margins configured in the **dmt rate-adaptation margin** command, the line drops and retrains to a lower bit rate, to improve SNR margin quality on the line.



Note

If line conditions improve, the line does not automatically drop and retrain to a higher bit rate. The administrator must execute a **shut** then a **no shut** on the affected port to retrain to a higher bit rate.

Examples

The following command example shows how to configure **dmt rate-adaptation margin**:

```
DSLAM# configure terminal
```

slot

To provision a slot for a specific card type, or to change the line coding for a flexi line card, use the **slot** command.

slot *slot# cardtype*

Syntax Description	
<i>slot#</i>	The number of the slot you want to provision. The range is 1 to 32. Note The number of slots varies by chassis. The Cisco 6015 DSLAM has 6 slots, and the Cisco 6260 DSLAM has 30 slots.
<i>cardtype</i>	The line card type for which you want to configure the slot. The valid card types are: <ul style="list-style-type: none"> • ATUC-1-4DMT—4xDMT card • ATUC-1-4DMT-I—4xDMT over ISDN card • ATUC-1-4DMT-I-DIR—4xDMT over ISDN card, Dir. Connection • ATUC-4FLEXICAP—4xflexi card configured as CAP • ATUC-4FLEXIDMT—4xflexi card configured as DMT • ATUC-1-DMT8—8xDMT card • ATUC-1-DMT8-I—8xDMT over ISDN card • ATUC-8-DMT-1-H—8xDMT OSP card • ITUC-1-8IDSL—8xIDSL card • STUC-4-2B1Q-DIR-1—4xSDSL card • STUC-8-TCPAM—8xSHDSL card Note Some line cards do not function in all NI-2 DSL systems. Consult the hardware documentation for your DSL system to determine which line cards it supports.

Defaults None.

Command Modes Global configuration

Command History	Cisco IOS Release	Modification
	12.0(5)DA	This command was introduced.
	12.1(1)DA	New card types were added.
	12.1(6)DA	New card types were added.
	12.2(5)DA	New card types were added.

Usage Guidelines

Use the **slot** command to provision a slot for a line card.

Card mismatch error conditions include the following:

- A line card is already installed in the specified slot.
- The specified slot contains one type of card but is provisioned for another type.

If you attempt to provision an empty slot, the major alarm “MODULE-MISSING” is asserted.

The 8xDMT over ISDN line card is spectrally incompatible with both the 8-port IDSL line card and the 4-port SDSL (STU-C) line card. If you install spectrally incompatible cards in the same chassis, the lines served by those cards can suffer reduced performance. For best performance in a chassis with a mixture of line card types, always install 8xDMT over ISDN line cards on one side of the chassis and IDSL and SDSL cards on the opposite side.

Examples

The following command example provisions slot 30 for an 8xDMT over ISDN line card:

```
DSLAM# configure terminal
DSLAM(config)# slot 30 ATUC-1-DMT8-I
```

Related Commands

Command	Description
show hardware	Displays information about the physical modules in the chassis.

Glossary

ADSL—asymmetric digital subscriber line. A DSL technology in which the transmission of data from server to client is much faster than the transmission from the client to the server.

ADSL Transmission Unit—Central Office—See *ATU-C*.

ADSL Transmission Unit—Remote—See *ATU-R*.

asymmetric digital subscriber line—See *ADSL*.

Asynchronous Transfer Mode—See *ATM*.

ATM—Asynchronous Transfer Mode. A cell-based data transfer technique in which channel demand determines packet allocation. ATM offers fast packet technology, and real-time, demand-led switching for efficient use of network resources.

ATU-C—ADSL Transmission Unit—Central Office. Special electronics in support of ADSL and placed in the carrier's CO. The ATU-C has a matching unit on the subscriber premise in the form of an ATU-R. The two units, in combination, support a high data rate over UTP copper cable local loops.

ATU-R—ADSL Transmission Unit—Remote. Special electronics in support of ADSL and placed in the customer's premises. The ATU-R has a matching unit in the carrier's CO in the form of an ATU-C. The two units, in combination, support a high data rate over UTP copper cable local loops.

bridge—A device that connects two or more physical networks and forwards packets between them. Bridges can usually be made to filter packets, that is, to forward only certain traffic. Related devices are: repeaters which simply forward electrical signals from one cable to the other, and full-fledged routers which make routing decisions based on several criteria. See *router*.

CBOS—Cisco Broadband Operating System. An operating system that users access to configure and operate Cisco products.

chassis—The card cage (housing) where modules are placed.

CLI—command line interface.

CPE—customer premises equipment.

CTC—common transmit clock.

DDTS—Cisco Distributed Defect Tracking System. Cisco uses DDTS to track bugs in a variety of products, including router software, communication server software, and network management software. DDTS is also used to track bugs in some hardware and microcode products, and for bugs in some internal tools, including the automated test software and various software tools.

digital signal level 3—See *DS3*.

Distributed Defect Tracking System—See *DDTS*.

DMT—Discrete Multi-Tone. An ADSL modulation scheme defined by the ANSI T1.413 standard. DMT is a multicarrier modulation scheme where incoming data is collected and then distributed over a large number of small individual channels, each of which uses a form of Quadrature Amplitude Modulation (QAM). DMT creates the channels using a digital technique known as Discrete Fast-Fourier Transform.

downstream rate—The line rate for return messages or data transfers from the network machine to the CPE.

DS-3—Digital signal level 3. A framing specification used for transmitting digital signals at 44.736 Mb/s on a T3 facility.

DSL—digital subscriber line.

DSLAM—digital subscriber line access multiplexer. A device that concentrates digital subscriber line signals at the telephone service provider location and multiplexes them onto the broadband wide area network. Replaces ADSLAM.

EOC—embedded operations channel.

ETSI—European Telecommunications Standards Institute. ETSI is a non-profit organization producing voluntary telecommunications standards used throughout Europe, some of which have been adopted by the EC as the technical base for Directives or Regulations.

frame—A packet as it is transmitted over a serial line. The term derives from character-oriented protocols that involved the addition of special start-of-frame and end-of-frame characters for packet transmission.

FTP—File Transfer Protocol. The Internet protocol (and program) used to transfer files between hosts.

G.992.2—The ITU standard for line coding and framing for splitterless, reduced spectrum ADSL. Also known as G.lite.

G.994.1—The ITU standard for signaling, identification, and negotiation between broadband systems; an integral part of G.dmt and G.lite. Also known as G.hs.

G.997.1—The ITU standard for performance monitoring on DMT access technologies.

G.dmt—Pseudonym for G.992.1.

G.hs—Pseudonym for G.994.1 HandShake (hs).

G.lite—Pseudonym for G.992.2.

handshake—Part of the procedure to set up a data communications link. The handshake can be part of the protocol itself or an introductory process. The computers that are to talk to each other set out the conditions they can operate under. Sometimes, the handshake is just a warning that a communication is imminent.

IETF—Internet Engineering Task Force. Task force consisting of over 80 working groups responsible for developing Internet standards.

IP—Internet Protocol. The network layer protocol for the Internet Protocol suite.

IP address—The 32-bit address assigned to hosts that want to participate in a TCP/IP Internet.

ISDN—Integrated Services Digital Network. Communication protocol offered by telephone companies that permits telephone networks to carry data, voice, and other source traffic.

ITU—International Telecommunications Union; a telecommunications standards body.

LCD—loss of cell delineation.

LODS—loss of delay synchronization.

LOF—loss of frame.

loopback—A diagnostic test that returns the transmitted signal to the sending device after it has passed through a network or across a particular link. The returned signal can be compared to the transmitted signal and any discrepancies can be used to trace the fault. When trying to locate a faulty piece of equipment, you can repeat loopbacks, eliminating satisfactory equipment, until the problem is found.

LOS—loss of signal.

LPR—loss of power.

Management Information Base—See *MIB*.

MIB—Management Information Base. A collection of objects that can be accessed through a network management protocol, such as SNMP or CMIP (Common Management Information Protocol).

NI-2—A second generation network interface card.

PVC—permanent virtual connection. A fixed virtual connection between two users. The public data network equivalent of a leased line. The creation of a PVC requires no call setup or clearing procedures.

QAM—Quadrature Amplitude Modulation.

route—The path that network traffic takes from its source to its destination. The route a datagram follows can include many gateways and many physical networks. In the Internet, each datagram is routed separately.

router—A system responsible for making decisions about which of several paths network (or Internet) traffic will follow. To do this, it uses a routing protocol to gain information about the network and algorithms to choose the best route based on several criteria known as “routing metrics.” See also *bridge*.

routing table—Information stored in a router that contains network path and status information. It is used to select the most appropriate route to forward information.

Simple Network Management Protocol—See *SNMP*.

slot—A numbered location within a chassis capable of housing a module.

SNMP—Simple Network Management Protocol. The network management protocol of choice for TCP/IP-based internets.

SNR—signal-to-noise ratio.

SVC—switched virtual connection. A temporary virtual connection between two users.

T1.413—The ANSI standard for line coding and framing for full rate ADSL.

TCP—Transmission Control Protocol. The major transport protocol in the Internet suite of protocols providing reliable, connection-oriented, full-duplex streams.

Telnet—The virtual terminal protocol in the Internet suite of protocols. It allows users of one host to log in to a remote host and act as normal terminal users of that host.

TFTP—Trivial File Transfer Protocol. A simple file transfer protocol (a simplified version of FTP) that is often used to boot diskless workstations and other network devices such as routers over a network (typically a LAN). It does not offer password security.

training—The procedure used by the ATU-C and ATU-R to establish an end-to-end ADSL connection.

training mode—A characteristic of a router that allows it to use RADSL technology to adjust its line speed according to noise conditions on the transmission line.

Transmission Control Protocol—See *TCP*.

trellis encoding—A channel coding technique which provides forward error correction capability.

Trivial File Transfer Protocol—See *TFTP*.

twisted pair—Two insulated copper wires twisted together with the twists or lays varied in length to reduce potential signal interference between the pairs.

utp—unshielded twisted pair.

upstream rate—The line rate for message or data transfer from the source machine to a destination machine on the network. Also see *downstream rate*.

VC—virtual circuit. A logical circuit created to ensure reliable communication between two network devices. A virtual circuit is defined by a VPI/VCI pair, and can be either permanent (PVC) or switched (SVC). In ATM, a virtual circuit is called a virtual channel. Sometimes abbreviated VC. See also *PVC*, *SVC*, *VCI*, and *VPI*.

VCI—virtual channel identifier. A 16-bit field in the header of an ATM cell. The VCI, together with the VPI, is used to identify the next destination of a cell as it passes through to the ATM switch. Sometimes called virtual channel connection. See also *VPI*.

virtual circuit—See *VC*.

VPI—virtual path identifier. An 8-bit field in the header of an ATM cell. The VPI, together with the VCI, is used to identify the next destination of a cell as it passes through the network. See also *VCI*.

