

T1 CAS Support for the Cisco 3640 Digital Modem Network Module

Feature Summary

The Digital Modem Network Module for the Cisco 3640 router is a high-density digital network module containing 6, 12, 18, 24, or 30 digital (MICA) modems. These modems, along with the T1 (or E1) port module, provide a direct digital connection to an Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) channel. The T1 CAS feature enables these network modules to support voice call transmission using channelized T1 lines (CT1) with channel associated signaling (CAS).

CAS is a form of signaling used on a T1 line. With CAS, a signaling element is dedicated to each channel in the T1 frame. This type of signaling is sometimes called Robbed Bit Signaling (RBS) because a bit is taken out (or robbed) from the user's data stream to provide signaling information to and from the switch. The T1 CAS feature enables the modems on the Digital Network Modem Module to receive and transmit incoming and outgoing call signaling (such as on-hook and off-hook) through each T1 controller that is configured for a channelized T1 line.

Benefits

The T1 CAS feature enables you, as the Enterprise customer, to use T1 CAS signaling with the Digital Modem Network Module for the Cisco 3640 router.

List of Terms

E1—European digital carrier facility used for transmitting data through the telephone hierarchy. The transmission rate for E1 is 2.048 Mbps.

Integrated Services Digital Network (ISDN)—Communication protocols supported by telephone companies to permit telephone networks to carry voice and traffic.

K56 Flex—Proprietary modem standard proposed by Rockwell International allowing full-duplex communications with asymmetrical data rates up to 53 kbps. K56 Flex allows the digital modem to transmit data at up to 53 kbps and receive data at up to V.34+ speeds.

Modem ISDN Channel Aggregation (MICA)—72-pin Telebit modem card capable of handling up to six modem sessions.

Pulse Code Modulation (PCM)—Transmission of analog information in digital form through sampling and then encoding the samples with a fixed number of bits. All analog data sent to and from the digital modem has been encoded via PCM.

Primary Rate Interface (PRI)—Associated with ISDN. For T1, PRI consists of 23 B (bearer) channels and 1 D (data) channel. For E1, PRI consists of 30 B channels and 1 D channel.

T1—North American digital carrier facility used for transmission of data through the telephone hierarchy. The transmission rate for T1 is 1.544 Mbps.

V.34—ITU-T standard that defines how modems should operate at 28.8 kbps.

V.34+—ITU-T standard that defines how modems should operate at speeds up to 33.6 kbps.

V.90—ITU-T modem standard for 56 kbps connections.

Platforms

This feature is supported on the Cisco 3640 router.

Prerequisites

Before you configure a modem interface, complete the following prerequisite tasks:

- Install a T1 network module and another module (such as Ethernet) to provide connectivity to the LAN. Digital modem network modules do not provide physical network interfaces of their own, but instead handle analog calls passing through the T1 network module. If the T1 module has two ports, it is capable of concurrently handling digital ISDN data and remote voice-channel (analog) modem connections. The digital modem module provides a pool of available modems that can be used for both incoming and outgoing calls.

For information on how to install a T1 network module, refer to the *1-Port and 2-Port ISDN-PRI Network Module Configuration Note*. For information on how to install an Ethernet module, refer to the *1-Port Ethernet Network Module Configuration Note* or the *4-Port Ethernet Network Module Configuration Note*. For other modules, refer to the specific configuration notes pertaining to them.

Note The T1 module must be hardware revision -03; earlier revisions are incompatible with digital modem modules. For more information, refer to the “Software and Hardware Requirements” section in the *Digital Modem Network Module Configuration Notes*.

- Install the Digital Modem Network Module in a chassis slot. For information on how to correctly install this network module, refer to the “Installing a Digital Modem Network Module in a Chassis Slot” section in the *Digital Modem Network Module Configuration Note*.
- Complete basic device configuration, including host name, username, protocol, and security configuration. For more information about basic device configuration, refer to the *Cisco 3640 Installation and Configuration Guide*.
- Make sure that you have the following T1 CAS information:
 - Line code
 - Framing type
 - Signaling type

Supported MIBs and RFCs

No RFCs are supported by this feature.

This feature supports the following Management Information Bases (MIBs):

- CISCO-MODEM-MGMT-MIB
- CISCO-POP-MGMT-MIB

For descriptions of supported MIBs and how to use MIBs, see Cisco's MIB website on CCO at <http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml>.

Configuration Tasks

Complete the following tasks to configure the digital modem module interfaces:

- Configure the T1 Network Module for T1 CAS
- Configure the Loopback Interface
- Configure the LAN Interface
- Create the Group Asynchronous Interface
- Configure the Default IP Pool Information
- Configure Modem Lines for Dial-In and Dial-Out

These tasks are described in the following sections.

Configure the T1 Network Module for T1 CAS

The first step in configuring a digital modem interface is to configure CAS on a channelized T1 controller corresponding to the telephone signaling service in your area. The Cisco 3600 series T1 network modules can have either one or two ports; if the network module installed in your device has two ports, you need to apply the following procedure to both ports.

Configure Channelized T1 CAS

To configure CAS on a channelized T1 controller, perform the following tasks, beginning in global configuration mode:

Task	Command
Specify a controller type and define its location in the Cisco 3640.	controller t1 <i>slot/port</i>
Specify the clock source for the selected module.	clock source line
Define the framing characteristics as extended superframe format (ESF).	framing esf
Define the line code as binary 8 zero substitution (B8ZS).	linecode b8zs
Configure CAS. This command specifies the time slots on the T1 line to be allocated to CAS service.	cas-group <i>channel timeslots range type signal</i>

Note The values used in this procedure for the **framing** and **linecode** commands are examples only. Use the framing type and line encoding specified by your T1 service provider.

For more information about configuring ISDN PRI on a channelized T1 controller, refer to the “Configure ISDN PRI” section of the Cisco IOS Release 11.3 *Dial Solutions Configuration Guide*.

Note Any router configured for CAS support must be connected to a switch configured for the same signaling type.

Configure the Loopback Interface

The loopback 0 interface is the interface dial-in users access when dialing in to the network. Usually, all dial-in users are assigned to a single IP subnet. This subnet can be identified with the loopback 0 interface, a logical interface whose network number can be borrowed by each asynchronous dial-in interface.

To configure the loopback 0 interface, perform the following tasks, beginning in global configuration mode:

Task	Command
Select the loopback 0 interface.	interface Loopback <i>number</i>
Assign an IP address and subnet mask to the loopback 0 interface.	ip address <i>ip-address ip-address mask</i>

Configure the LAN Interface

The next task you need to perform is to configure the LAN interfaces on your Cisco 3600 series router. For the purpose of this procedure, we are showing how to configure an Ethernet interface. If the interface you are configuring is different, refer to the “Configuring LAN Interfaces” chapter in the Cisco IOS Release 11.3 *Configuration Fundamentals Configuration Guide* or to the configuration notes that came with your module.

To configure an Ethernet interface, perform the following tasks, beginning in global configuration mode:

Task	Command
Select the Ethernet interface.	interface ethernet <i>slot/port</i>
Assign an IP address and subnet mask to the Ethernet interface.	ip address <i>ip-address ip-address mask</i>
Enable this interface.	no shutdown

Note The Ethernet and loopback interfaces should be on different subnets.

Create the Group Asynchronous Interface

A group asynchronous interface is a parent interface that applies protocol characteristics to specified, associated asynchronous interfaces. After you create a group asynchronous interface, all associated asynchronous interfaces (called members) can be configured through it. Group asynchronous interfaces can speed configuration time and help you maintain interface configuration consistency.

To configure a group asynchronous interface, perform the following tasks, beginning in global configuration mode:

Task	Command
Create a group asynchronous interface.	interface group-async <i>number</i>
Enable IP processing on the loopback interface without assigning an explicit IP address to the interface.	ip unnumbered Loopback <i>number</i>
Set the Point-to-Point Protocol (PPP) as the encapsulation method used by this interface.	encapsulation ppp
Enable SLIP and PPP EXEC commands on this interface.	async mode interactive
Specify an IP address from the defined IP address pool to be returned to a remote peer connecting to this interface.	peer default ip address pool <i>name</i>
Disable CDP on this interface.	no cdp enable
Associate one or more interfaces to the group interface so that all associated interfaces can be configured through the group interface.	group-range <i>start-range end-range</i>

For more information about group asynchronous interfaces, refer to the “Asynchronous Configuration Task List” section of the Cisco IOS Release 11.3 *Dial Solutions Configuration Guide*.

Configure the Default IP Pool Information

You need to set a range of IP addresses in the default IP pool. These IP addresses are used for dial-in users. To set the range of addresses, perform the following tasks in global configuration mode:

Task	Command
Set the range of addresses in the default IP pool to be assigned to inbound callers.	ip pool local default <i>low-ip-address</i> <i>[high-ip-address]</i>
Define a default gateway (router) when IP routing is disabled.	ip default gateway <i>number</i>
Forward packets destined for a subnet of a network that has no network default route.	ip classless

For more information about defining IP pool information, refer to the Cisco IOS Release 11.3 *Network Protocols Configuration Guide, Part 1*.

Configure Modem Lines for Dial-In and Dial-Out

The final task in configuring the digital modem network module for T1 CAS is to configure the modem lines for dial-in and dial-out.

Configure the Modem for Dial-In

To configure the modem lines for dial-in, perform the following tasks, beginning in global configuration mode:

Task	Command
Select the modem lines for dial-in and switch to the line configuration mode.	line <i>start-range end-range</i>
Set the router to display a login prompt to modem callers.	autoseect during-login
Set the router to shift automatically to PPP mode if it detects an incoming PPP packet.	autoselect ppp
Configure the line for both incoming and outgoing calls.	modem inout

Configure the Modem for Dial-Out

To configure the modem lines for dial-out, perform the following tasks, beginning in global configuration mode:

Task	Command
Select the modem lines for dial-out and switch to the line configuration mode.	line <i>start-range end-range</i>
Set the router to use previously-defined rotary group.	rotary <i>number</i>
Configure the router to accept inbound Telnet connections.	transport input telnet

This configuration procedure ensures that a user trying to dial out using Telnet is connected to the first free line in the rotary group.

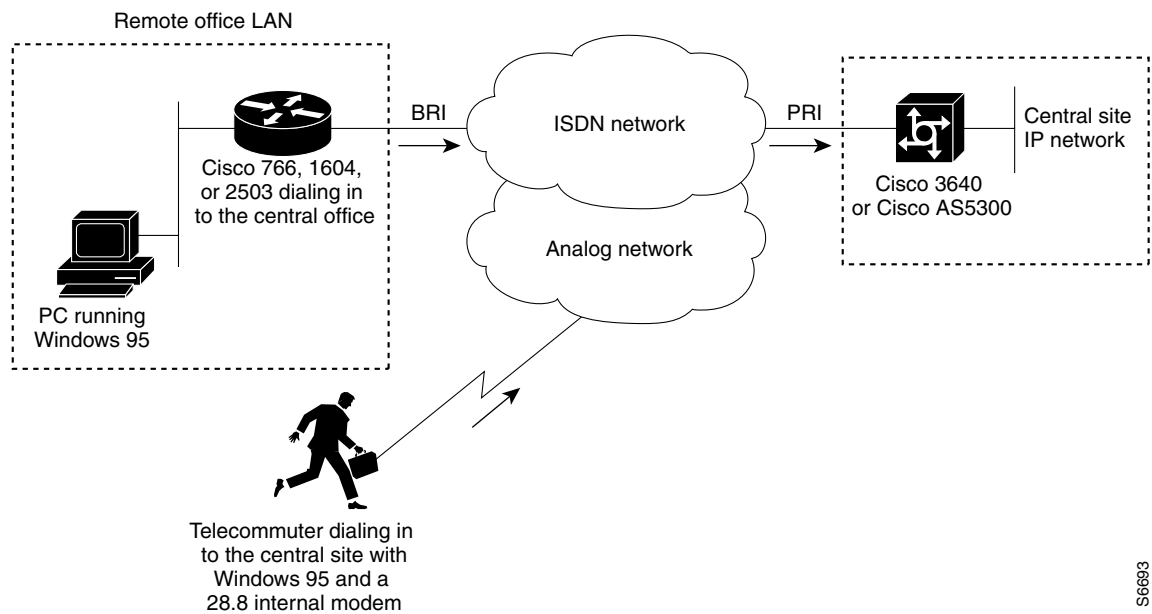
Configuration Example

Cisco 3640 Central Site Configuration to Support ISDN and Modem Calls

This section provides a sample configuration that allows remote LANs and standalone remote users with modems to dial in to a central site. Figure 1 shows the network topology.

In this example, the remote office places digital calls. The telecommuter places analog calls. The remote office router can be any Cisco router with a BRI interface, such as a Cisco 766, 1604, or 2503. The central office gateway router is a Cisco 3640 (or Cisco AS5300), which supports both T1 CAS and analog connections.

Figure 1 Remote Office and Telecommuter Dialing In to a Central Site



S6693

The Cisco 3640 has the following hardware configuration for this scenario:

- One 2-port T1 network module installed in slot 1
- One digital modem network module installed in slot 2 and slot 3
- One 1-port Ethernet network module installed in slot 0

Following is the configuration for the Cisco 3640.

```

!
version 11.2
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
no service udp-small-servers
no service tcp-small-servers
!
hostname NAS
!
aaa new-model
aaa authentication login default local
aaa authentication login console enable
aaa authentication login vty local
aaa authentication login dialin local
aaa authentication ppp default local
aaa authentication ppp dialin if-needed local
enable secret cisco
!
username admin password cisco
username remotelan1 password dialpass1
username remotelan2 password dialpass2
username PCuser1 password dialpass3
username PCuser2 password dialpass4
async-bootp dns-server 10.1.3.1 10.1.3.2
isdn switch-type primary-5ess
!
controller T1 1/0
framing esf

```

Configuration Example

```
clock source line
linecode b8zs
cas-group 0 timeslots 1-24 type fxs-loopstart
!
controller T1 1/1
framing esf
clock source line
linecode b8zs
cas-group 0 timeslots 1-24 type fxs-loopstart
!
interface Loopback0
ip address 10.1.2.254 255.255.255.0
!
interface Ethernet0/0
ip address 10.1.1.10 255.255.255.0
ip summary address eigrp 10 10.1.2.0 255.255.255.0
!
interface Group-Async1
ip unnumbered Loopback0
encapsulation ppp
async mode interactive
peer default ip address pool dialin_pool
no cdp enable
ppp authentication chap pap dialin
group-range 65 88
!
interface Group-Async2
ip unnumbered Loopback0
encapsulation ppp
async mode interactive
peer default ip address pool dialin_pool
no cdp enable
ppp authentication chap pap dialin
group-range 97 120
!
interface Dialer0
ip unnumbered Loopback0
no ip mroute-cache
encapsulation ppp
peer default ip address pool dialin_pool
dialer in-band
dialer-group 1
no fair-queue
no cdp enable
ppp authentication chap pap dialin
ppp multilink
!
router eigrp 10
network 10.0.0.0
passive-interface Dialer0
no auto-summary
!
ip local pool dialin_pool 10.1.2.1 10.1.2.50
ip default-gateway 10.1.1.1
ip classless
!
dialer-list 1 protocol ip permit
!
line con 0
login authentication console
line 65 88
autoselect ppp
autoselect during-login
login authentication dialin
modem DialIn
```

```
line 97 120
  autoselect ppp
  autoselect during-login
  login authentication dialin
  modem DialIn
line aux 0
  login authentication console
line vty 0 4
  login authentication vty
  transport input telnet rlogin
!
end
```

Command Reference

This section provides information about the **cas-group** command for the Cisco 3640. All other commands used with this device are documented in the Cisco IOS Release 11.3 command references and in the Cisco IOS Release 11.3(2)T feature module “Digital Modem Network Module for the Cisco 3640.”

cas-group (controller t1)

To configure channelized T1 timeslots with channel associated signaling (also known as *robbed bit signaling*), which enables an integrated modem to receive and transmit analog calls, use the **cas-group** controller configuration command. Use the **no** form of this command to disable channel associated signaling for one or more timeslots.

```
cas-group channel timeslots range type signal  
no cas-group channel timeslots range type signal
```

Syntax Description

<i>channel</i>	Specifies a single channel group number, which can be between 0 and 23.
timeslots <i>range</i>	Specifies a timeslot range of values from 1 to 24.
type <i>signal</i>	Specifies the type of channel associated signaling. Choose one of the following signal types to configure: <ul style="list-style-type: none">• e&m-fgb—Specifies ear and mouth channel signaling with feature group b support. You can further customize this feature by specifying one of these two options:<ul style="list-style-type: none">• dtmf [dnis]—DTMF tone signaling with the option of configuring DNIS provisioning.• mf [dnis]—MF tone signaling with the option of configuring DNIS provisioning.• e&m-fgd—Specifies ear and mouth channel signaling with feature group d support.• fxs-loopstart— Specifies foreign exchange system loopstart signaling support.• fxs-groundstart—Specifies foreign exchange system ground start signaling support.• sas-loopstart—Specifies specific access station loopstart signaling support.• sas-groundstart—Specifies specific access station ground start signaling support.

Default

No channelized T1 robbed bit signaling is configured.

Command Mode

Controller configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(3)T.

Use this command to enable an integrated modem to receive and transmit incoming and outgoing call signaling (such as on-hook and off-hook) through each T1 controller that is configured for a channelized T1 line.

If you want to collect DNIS information using non-R2 tone signaling, the system must be manually configured. For non-R2 CAS signaling, DNIS collection is done only for E&M-fgb. To collect DTMF DNIS for E&M-fgb under a controller T1 configuration, use the **cas-group 0 timeslots 1-24 type e&m-fgb dtmf dnis** command. To collect MF DNIS for E&M-fgb, issue the **cas-group 0 timeslots 1-24 type e&m-fgb mf dnis** command.

Switched 56 digital calls are not supported in this feature.

Examples

The following example configures all 24 channels with ear and mouth channel signaling with feature group B support:

```
router(config)# controller T1 0
router(config-controller)# cas-group 1 timeslots 1-24 type e&m-fgb
router(config-controller)#
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 1 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 2 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 3 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 4 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 5 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 6 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 7 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 8 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 9 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 10 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 11 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 12 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 13 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 14 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 15 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 16 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 17 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 18 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 19 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 20 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 21 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 22 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 23 is up
%DSX0-5-RBSLINEUP: RBS of controller 1 timeslot 24 is up
```

The following example configures the required signaling and the digital number identification service (DNIS) over channelized T1 lines on a Cisco 3640. By configuring DNIS as part of the **cas-group** command, the system will collect DNIS digits for incoming calls.

Note Make sure that your switch provides inband address information for incoming analog calls before you enable this feature.

```
router# configure terminal  
Enter configuration commands, one per line. End with CNTL/Z.  
router(config)# controller t1 0/0  
router(config-controller)# cas-group 0 timeslots 1-24 type e&m-fgb mf dnis  
router(config-controller)# cas-group 0 timeslots 1-24 type e&m-fgb dtmf dnis  
router(config-controller)# exit  
router(config)#
```

Related Commands

None