



1/2 Port Channelized T1/E1 PRI Network Module (NM-1CE1T1-PRI and NM-2CE1T1-PRI)

The NM-1CE1T1-PRI (1-port) and NM-2CE1T1-PRI (2-port) network modules provide support for T1, E1, and ISDN primary rate interface (PRI) network connections in a network module form factor. This feature (referred to in this document as NM-xCE1T1-PRI) offers attachment of one T1, E1, or ISDN PRI line on the 1-port module and two T1, E1, or ISDN PRI lines on the 2-port version.

This new feature (NM-xCE1T1-PRI) enables you to configure a single network module as either a T1 interface or an E1 interface on the same card. The configuration of a T1 or E1 interface and the change from one to the other is controlled by the **card type** command. Additionally, when in E1 mode, the module can be configured between channelized E1, ISDN PRI, E1-CAS-R2 (for modems, not for voice), balanced and unbalanced, and structured (G.704) versus unstructured (G.703) modes. In T1 mode, the module can be configured for channelized T1, T1-CAS, and as a CSU/DSU.



Note

After you insert the NM-xCE1T1-PRI feature network module into the router chassis, you *must* use the **card type** command in the command-line interface (CLI) to configure the NM-xCE1T1-PRI feature. The controller will not be detected and cannot be configured until you use the **card type** command.

Configuration of the T1 or E1 interface can be customized using command-line interface (CLI) commands. In E1 mode, each port can be individually set to 120-ohm or 75-ohm termination. Each port has RJ-48C connectors, and there is one bantam jack that is shared by each port (for 2-port cards) for monitoring.

Feature Specifications for the 1/2 Port Channelized T1/E1 PRI Network Module

Feature History

Release	Modification
12.3(1)	This feature was introduced in Cisco IOS Release 12.3(1).

Supported Platforms

Cisco 2610XM, Cisco 2611XM, Cisco 2620XM, Cisco 2621XM, Cisco 2650XM, Cisco 2651XM, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.

This feature is not supported on the Cisco 3620 and Cisco 3640 platforms. For the Cisco 2600 series, only the Cisco 2610-2651XM series and Cisco 2691 are supported. Cisco 2610-2651 (non-XM) are not supported.



Corporate Headquarters:
Cisco Systems, Inc., 170 West Tasman Drive, San Jose, CA 95134-1706 USA

Copyright © 2003 Cisco Systems, Inc. All rights reserved.

Finding Support Information for Platforms and Cisco IOS Software Images

Use Cisco Feature Navigator to find information about platform support and Cisco IOS software image support. Access Cisco Feature Navigator at <http://www.cisco.com/go/fn>. You must have an account on Cisco.com. If you do not have an account or have forgotten your username or password, click **Cancel** at the login dialog box and follow the instructions that appear.

Contents

- [Information About NM-xCE1T1-PRI Support, page 2](#)
- [How to Configure the NM-xCE1T1-PRI Feature, page 3](#)
- [Configuration Examples for NM-xCE1T1-PRI Support, page 12](#)
- [Additional References, page 15](#)
- [Command Reference, page 17](#)
- [Glossary, page 28](#)

Information About NM-xCE1T1-PRI Support

After you insert the NM-xCE1T1-PRI feature network module into the router chassis, you must use the **card type** command in the command-line interface (CLI) to configure the NM-xCE1T1-PRI feature. The controller will not be detected and cannot be configured until you use the **card type** command.

If the **card type** command is used to make subsequent changes, these changes will take effect only if you use the **reload** command after changing the card type.

The bantam jack can be connected only to one port at a time.

The NM-xCE1T1-PRI feature will not support channel service unit (CSU) DTE loopback or CSU network loopback modes. Because the CSU is integrated into the framer, there is no need or way to support CSU loopbacks.

To configure the NM-xCE1T1-PRI feature, you need to understand the following concepts:

- [NM-xCE1T1-PRI Feature Driver Software, page 2](#)
- [NM-xCE1T1-PRI Feature Supported Functions, page 2](#)

NM-xCE1T1-PRI Feature Driver Software

The driver software for the NM-xCE1T1-PRI feature provides for the transmission and reception of packets over channelized E1 and T1 circuits. Driver functions are as follows:

- Network Management Interface (MIB support)
- New CLI for 75-ohm and 120-ohm line termination for E1
- New CLI for specifying the card type (T1/E1)

NM-xCE1T1-PRI Feature Supported Functions

This section summarizes the functions supported by the NM-xCE1T1-PRI feature.

- Two card versions:
 - 1-port T1 (DSU/CSU), E1 and G.703 (balanced and unbalanced)
 - 2-port T1 (DSU/CSU), E1 and G.703 (balanced and unbalanced)
- Four LEDs per port defined as Carrier Detect, Remote Alarm, Local Alarm, and Loopback
- Three LEDs per port defined as T1-100, E1-120, and E1-75
- RJ-48 connectors with transition cable breakout to physical media type
- T1 CSU and DSU line buildouts, E1 short haul and long haul
- T1 SF and ESF framing
- ANSI T1.403 Annex B/V.54 loopup/loopdown code recognition, network loopback, and user-initiated loopbacks
- E1 structured (ITU G.704) and unstructured (ITU G.703) operation
- AMI, B8ZS, and HDB3 line coding
- Two bantam jacks for TX and RX monitor with two LEDs defined as P0, P1 (port selected)

How to Configure the NM-xCE1T1-PRI Feature

This section describes the commands used to configure the NM-xCE1T1-PRI feature:

- [Configuring an NM-xCE1T1-PRI Card for a T1 Interface, page 3](#)
- [Configuring an NM-xCE1T1-PRI Card for an E1 Interface, page 5](#)
- [Configuring a T1 or E1 Interface for Bantam-Jack Monitoring, page 7](#)
- [Verifying NM-xCE1T1-PRI Support, page 9](#)

Configuring an NM-xCE1T1-PRI Card for a T1 Interface

Perform this task to select and configure a network module card as T1.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **card type t1 slot**
4. **controller t1 slot/port**
5. **linecode {ami | b8zs}**
6. **framing {sf | esf}**
7. **clock source {line | internal}**
8. **pri-group [timeslots range]**
9. **exit**
10. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example: Router> enable</p>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<p>configure terminal</p> <p>Example: Router# configure terminal</p>	<p>Enters global configuration mode.</p>
Step 3	<p>card type t1 slot</p> <p>Example: Router(config)# card type t1 1</p>	<p>Sets or changes the card type.</p> <ul style="list-style-type: none"> When the command is used for the first time, the configuration takes effect immediately. A subsequent change in the card type will not take effect unless you enter the reload command or reboot the router.
Step 4	<p>controller t1 slot/port</p> <p>Example: Router(config)# controller t1 1/0</p>	<p>Enters controller configuration mode and identifies the controller type (T1) and a slot and port for configuration commands that specifically apply to the T1 interface.</p> <ul style="list-style-type: none"> The card type command must be entered before this command can be used.
Step 5	<p>linecode {ami b8zs}</p> <p>Example: Router(config-controller)# linecode b8zs</p>	<p>Specifies a line encoding for a controller.</p> <ul style="list-style-type: none"> The controller command must be entered before this command can be used. Line-code value for T1 can be ami or b8zs.
Step 6	<p>framing {sf esf}</p> <p>Example: Router(config-controller)# framing esf</p>	<p>Specifies a frame type.</p> <ul style="list-style-type: none"> The controller command must be entered before this command can be used. The frame type can be specified as sf for superframe or esf for extended superframe for T1 controllers.
Step 7	<p>clock source {line internal}</p> <p>Example: Router(config-controller)# clock source line</p>	<p>Sets the clock source for a T1 controller.</p> <ul style="list-style-type: none"> The clocking argument can have a value of line or internal. <ul style="list-style-type: none"> A value of line means the source is the loop. A value of internal means the source is the local oscillator if the card is not participating in the backplane timing domain.

	Command or Action	Purpose
Step 8	<p>pri-group [timeslots range]</p> <p>Example: Router(config-controller)# pri-group timeslots 1-5</p>	<p>Specifies that the controller should be set up as a PRI interface.</p> <ul style="list-style-type: none"> For T1, the last defined channel is the D channel. If a controller is configured as PRI, individual channel groups cannot be configured on that controller. The controller command must be entered before this command can be used. <p>Note To specify that the controller should be set up as a channel group, use the channel-group command here instead of the pri-group command. For more information, see the “Configuring an NM-xCE1T1-PRI Card for an E1 Interface” section on page 5.</p>
Step 9	<p>exit</p> <p>Example: Router# exit</p>	<p>Exits the controller configuration mode and returns the router to privileged EXEC mode.</p>
Step 10	<p>copy running-config startup-config</p> <p>Example: Router# copy running-config startup-config</p>	<p>Saves the new configuration parameters to the permanent configuration file.</p> <ul style="list-style-type: none"> This command can be abbreviated to copy run start.

Configuring an NM-xCE1T1-PRI Card for an E1 Interface

Perform this task to select and configure an NM-xCE1T1-PRI network module card as E1.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **card type e1 slot**
4. **controller e1 slot/port**
5. **linecode {ami | hdb3}**
6. **framing {crc4 | no-crc4}**
7. **clock source {line | internal}**
8. **channel-group channel-number {timeslots range [speed {56 | 64}] | unframed}**
9. **line termination {75-ohm | 120-ohm}**
10. **exit**
11. **copy running-config startup-config**

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>enable</code> Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> Enter your password if prompted.
Step 2	<code>configure terminal</code> Example: Router# configure terminal	Enters global configuration mode.
Step 3	<code>card type e1 slot</code> Example: Router(config)# card type e1 1	Sets or changes the card type. <ul style="list-style-type: none"> When the command is used for the first time, the configuration takes effect immediately. A subsequent change in the card type will not take effect unless you enter the reload command or reboot the router.
Step 4	<code>controller e1 slot/port</code> Example: Router(config)# controller e1 1/0	Enters controller configuration mode and identifies the controller type (E1) and a slot and port for configuration commands that specifically apply to the E1 interface. <ul style="list-style-type: none"> The card type command must be entered before this command can be used.
Step 5	<code>linecode {ami hdb3}</code> Example: Router(config-controller)# linecode hdb3	Specifies a line encoding for a controller. <ul style="list-style-type: none"> The controller command must be entered before this command can be used. Linecode value for E1 can be ami or hdb3.
Step 6	<code>framing {crc4 no-crc4}</code> Example: Router(config-controller)# framing crc4	Selects a frame type. <ul style="list-style-type: none"> The controller command must be entered before this command. The framing value can be crc4 or no crc4 for E1 controllers.
Step 7	<code>clock source {line internal}</code> Example: Router(config-controller)# clock source line	Sets the clock source for an E1 controller. <ul style="list-style-type: none"> The clocking argument can have a value of line or internal. <ul style="list-style-type: none"> A value of line means the source is the loop. A value of internal means the source is the local oscillator if the card is not participating in the backplane timing domain.

	Command or Action	Purpose
Step 8	<p>channel-group <i>channel-number</i> {<i>timeslots range</i> [<i>speed</i> {56 64}] unframed}</p> <p>Example: Router(config-controller)# channel-group 1 unframed</p>	<p>Specifies that the controller should be set up as a channelized interface.</p> <ul style="list-style-type: none"> Defines the time slots that belong to each E1 circuit. When a T1 data line is configured, channel-group numbers can be values from 0 to 23. When an E1 data line is configured, channel-group numbers can be values from 0 to 30. The unframed keyword specifies that all 32 time slots are used for data. None of the 32 time slots are used for framing signals. The controller command must be entered before this command can be used. <p>Note To specify that the controller should be set up as a PRI group, use the pri-group command here instead of the channel-group command. For more information, see the “Configuring an NM-xCE1T1-PRI Card for a T1 Interface” section on page 3.</p>
Step 9	<p>line-termination {75-ohm 120-ohm}</p> <p>Example: Router(config-controller)# line-termination 120-ohm</p>	<p>Configures the E1 line interface for 120-ohm or 75-ohm termination.</p> <ul style="list-style-type: none"> The controller command must be entered before this command can be used. Line termination is configurable only for E1.
Step 10	<p>exit</p> <p>Example: Router# exit</p>	<p>Exits the controller configuration mode and returns the router to privileged EXEC mode.</p>
Step 11	<p>copy running-config startup-config</p> <p>Example: Router# copy running-config startup-config</p>	<p>Saves the new configuration parameters to the permanent configuration file.</p> <ul style="list-style-type: none"> This command can be abbreviated to copy run start.

Configuring a T1 or E1 Interface for Bantam-Jack Monitoring

Perform this task to enable monitoring of the TX and RX lines of a T1 or E1 port on the onboard bantam jack.



Note

Only one port can be monitored at a time. Disable the bantam-jack monitoring if you are not *actively* monitoring the TX and RX activity for a port.

SUMMARY STEPS

1. enable

2. **configure terminal**
3. **card type {t1 | e1} slot**
4. **controller {t1 | e1} slot/port**
5. **bantam-jack enable**
6. **no bantam-jack enable**
7. **exit**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	card type {t1 e1} slot Example: Router(config)# card type e1 1	Sets or changes the card type. <ul style="list-style-type: none"> • When the command is used for the first time, the configuration takes effect immediately. • A subsequent change in the card type will not take effect unless you enter the reload command or reboot the router.
Step 4	controller {t1 e1} slot/port Example: Router(config)# controller e1 1/0	Enters controller configuration mode and identifies the controller type (T1 or E1) and a slot and port for configuration commands that specifically apply to the T1 or E1 interface. <ul style="list-style-type: none"> • The card type command must be entered before this command can be used.
Step 5	bantam-jack enable Example: Router(config-controller)# bantam-jack enable	Monitors the TX and RX lines of a T1 or E1 port on the onboard bantam jack. <ul style="list-style-type: none"> • Only one port can be monitored at a time.

	Command or Action	Purpose
Step 6	no bantam-jack enable Example: Router(config-controller)# no bantam-jack enable	Disables the monitoring function of the TX and RX lines of a T1 or E1 port on the onboard bantam jack. <ul style="list-style-type: none"> • Only one port can be monitored at a time. • Always disable the monitoring function of the TX and RX lines when you are not actively monitoring the lines.
Step 7	exit Example: Router# exit	Exits controller configuration mode and returns the router to privileged EXEC mode.

Verifying NM-xCE1T1-PRI Support

To examine the state of the T1 or E1 line, use the **show controller** and **show interface** commands.

SUMMARY STEPS

1. **enable**
2. **show controller {t1 | e1}**
3. **show interfaces serial slot/port:[channel-group]**
4. **show pci bridge slot-number**

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	show controller {t1 e1} Example: Router# show controller t1	Displays the RFC 1406 MIB statistics about the T1 or E1 port, card revision information, alarm status, and port configuration.

	Command or Action	Purpose
Step 3	<pre>show interfaces serial slot/port: [channel-group]</pre> <p>Example: Router# show interfaces serial 1/0:23</p>	<p>Displays statistics for channels and channel groups created within a T1 or E1 controller, which are treated as serial interfaces.</p> <ul style="list-style-type: none"> The range of slot numbers is dependent on the host router. The port can be either 0 or 1. Channel-group values range from 0 to 23 for T1 controllers and from 0 to 30 for E1 controllers. The channel group is the number parameter defined in the channel-group command. If no <i>channel-group</i> value is entered, all the interfaces are displayed.
Step 4	<pre>show pci bridge slot-number</pre> <p>Example: Router# show pci bridge 1</p>	<p>Displays peripheral component interconnect (PCI) configuration information about the port module in a particular slot, including any bridges on both the host router and the network module.</p>

Examples

This section describes commands that can be used to examine the state of the T1 or E1 lines.

- [Using the show controller Command Example, page 10](#)
- [Using the show interfaces Command Example, page 11](#)
- [Using the show interfaces Command for a Particular Slot or Port Example, page 11](#)

Using the show controller Command Example

The following is example output from a **show controller** command:

```
Router#show controller E1
E1 1/0 is up.
  Applique type is Channelized E1 - balanced
  No alarms detected.
  alarm-trigger is not set
  Framing is UNFRAMED, Line Code is HDB3, Clock Source is Line.
  Bantam Jack Enabled          <---- indicates bantam-jack monitoring is enabled
  Module type is Channelized E1/T1 PRI
  Version info Firmware: 0000001D, FPGA: 0
  Hardware revision is 0.2      , Software revision is 29
  Protocol revision is 1
  number of CLI resets is 1
  Last clearing of alarm counters 00:00:10
    receive remote alarm      : 0,
    transmit remote alarm     : 0,
    receive AIS alarm         : 0,
    transmit AIS alarm        : 0,
    loss of frame              : 0,
    loss of signal             : 0,
    Loopback test              : 0,
    transmit AIS in TS 16     : 0,
    receive LOMF alarm        : 0,
    transmit LOMF alarm       : 0,
```

```

MIB data updated every 10 seconds.
Data in current interval (10 seconds elapsed):
  0 Line Code Violations, 0 Path Code Violations
  0 Slip Secs, 0 Fr Loss Secs, 0 Line Err Secs, 0 Degraded Mins
  0 Errored Secs, 0 Bursty Err Secs, 0 Severely Err Secs, 0 Unavail Secs

```

Using the show interfaces Command Example

The following is example output from a **show interfaces** command:

```

Router# show interfaces serial 0/0:0

Serial0/0:0 is up, line protocol is up
Hardware is DSX1
Internet address is 10.0.0.1 255.0.0.0
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 9/255
Encapsulation HDLC, loopback not set, keepalive not set
Last input 0:15:34, output 0:00:00, output hang never
Last clearing of "show interface" counters never
Output queue 2/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 56000 bits/sec, 195 packets/sec
5 minute output rate 56000 bits/sec, 196 packets/sec
8728809 packets input, 338385740 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
8729371 packets output, 338413798 bytes, 0 underruns
  0 output errors, 0 collisions, 6 interface resets, 0 restarts
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up
.
.
.
Serial0/0:23 is up, line protocol is up
Hardware is DSX1
Internet address is 10.0.0.2 255.0.0.0
MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec, rely 255/255, load 9/255
Encapsulation HDLC, loopback not set, keepalive not set
Last input 0:15:34, output 0:00:00, output hang never
Last clearing of "show interface" counters never
Output queue 2/40, 0 drops; input queue 0/75, 0 drops
5 minute input rate 56000 bits/sec, 195 packets/sec
5 minute output rate 56000 bits/sec, 196 packets/sec
8728809 packets input, 338385740 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
  0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
8729371 packets output, 338413798 bytes, 0 underruns
  0 output errors, 0 collisions, 6 interface resets, 0 restarts
  0 output buffer failures, 0 output buffers swapped out
  0 carrier transitions
DCD=up DSR=up DTR=up RTS=up CTS=up

```

Using the show interfaces Command for a Particular Slot or Port Example

The following is example output from a **show interfaces** command for a particular slot or port:

```

Router# show interfaces serial 1/0:18

Serial 1/0:18 is up, line protocol is up
Hardware is DSX1
Internet address is 10.0.0.2 255.0.0.0
MTU 1500 bytes, BW 9 Kbit, DLY 100000 usec, rely 255/255, load 1/255

```

```

Encapsulation SLIP, loopback not set
DTR is pulsed for 5 seconds on reset
Last input never, output never, output hang never
Last clearing of "show interface" counters never
Output queue 0/10, 0 drops; input queue 0/75, 0 drops
5 minute input rate 0 bits/sec, 0 packets/sec
5 minute output rate 0 bits/sec, 0 packets/sec
0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    0 packets output, 0 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets, 0 restarts
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions

```

The commands to display the accounting and statistics on a particular interface will be the **show interfaces interface 1/0:18 accounting** and **show interface interface 1/0:18 stats** commands. The output for these cases will be identical to that for all other Cisco interfaces.

Configuration Examples for NM-xCE1T1-PRI Support

This section shows example configuration files for a T1 interface and an E1 interface.

- [T1 Interface Example, page 12](#)
- [E1 Interface Example, page 14](#)

T1 Interface Example

This sample configuration is for a Cisco 3745 with two cards in slots 1 and 3 configured for T1:

```

Router# show running configuration

Building configuration...

Current configuration: 1744 bytes
!
version 12.2
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname host1
!
card type t1 1
card type t1 3
!
ip subnet-zero
!
!
!
isdn switch-type primary-dms100
!
!
voice call carrier capacity active
!
!
!
!

```

```
!  
!  
!  
!  
!  
mta receive maximum-recipients 0  
!  
controller T1 1/0  
    framing esf  
    linecode b8zs  
    cablelength long 0db  
    pri-group timeslots 1-24  
!  
controller T1 1/1  
    framing esf  
    linecode b8zs  
    cablelength long 0db  
    pri-group timeslots 1-24  
!  
controller T1 3/0  
    framing esf  
    linecode b8zs  
    cablelength long 0db  
    pri-group timeslots 1-24  
!  
controller T1 3/1  
    framing esf  
    linecode b8zs  
    cablelength long 0db  
    pri-group timeslots 1-24  
!  
!  
!  
!  
interface FastEthernet0/0  
    no ip address  
    shutdown  
    speed 100  
    full-duplex  
!  
interface Serial0/0  
    no ip address  
    clockrate 2000000  
!  
interface FastEthernet0/1  
    no ip address  
    duplex auto  
    speed 10  
!  
interface Serial0/1  
    no ip address  
    shutdown  
!  
interface Serial1/0:23  
    no ip address  
    isdn switch-type primary-dms100  
    no cdp enable  
!  
interface Serial1/1:23  
    no ip address  
    isdn switch-type primary-dms100  
    no cdp enable  
!  
interface FastEthernet2/0
```

```

no ip address
shutdown
duplex auto
speed auto
!
interface TokenRing2/0
no ip address
shutdown
ring-speed 16
!
interface Serial3/0:23
no ip address
isdn switch-type primary-dms100
no cdp enable
!
interface Serial3/1:23
no ip address
isdn switch-type primary-dms100
no cdp enable
!
ip classless
ip http server
ip pim bidir-enable
!
!
dialer-list 1 protocol ip permit
!
!
!
call rsvp-sync
!
!
mgcp profile default
!
dial-peer cor custom
!
!
!
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  login
!
end

```

E1 Interface Example

```

Current configuration : 1667 bytes
!
version 12.3
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname router
!
card type e1 1
no logging buffered
!

```

```
ip subnet-zero
!
!
isdn switch-type primary-net5
!
!
!
controller E1 1/0
  channel-group 1 unframed
!
controller E1 1/1
  channel-group 1 unframed
!
!
interface FastEthernet0/0
  no ip address
  duplex auto
  speed auto
!
interface FastEthernet0/1
  no ip address
  load-interval 30
  shutdown
  speed 100
  full-duplex
  no cdp enable
!
interface 1/0:1
  no ip address
!
interface 1/1:1
  no ip address
!
!
ip http server
ip classless
!
!
line con 0
  exec-timeout 0 0
line aux 0
line vty 0 4
  exec-timeout 0 0
  login
!
!
end
```

Additional References

The following sections provide additional references related to the NM-xCE1T1-PRI feature:

- [Related Documents, page 16](#)
- [Standards, page 16](#)
- [MIBs, page 16](#)
- [RFCs, page 16](#)
- [Technical Assistance, page 16](#)

Related Documents

Related Topic	Document Title
Hardware installation instructions for the 1/2 Port Channelized T1/E1 PRI Network Module	<i>Cisco Network Module Hardware Installation Guide</i>

Standards

Standards	Title
ANSI T1.403-1995	<i>Network to Customer Installation—DS1 Metallic Interface</i>
ITU Recommendation G.703	<i>Physical/Electrical Characteristics of Hierarchical Digital Interfaces (July 1988)</i>
AT&T Publication 54016	<i>Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Super Frame Format</i>

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> • CISCO-ICSUDSU-MIB • RFC 1406 MIB 	<p>To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL:</p> <p>http://www.cisco.com/go/mibs</p>

RFCs

RFCs	Title
RFC 1406	<i>Definitions of Managed Objects for the DS1 and E1 Interface Types</i>

Technical Assistance

Description	Link
<p>Technical Assistance Center (TAC) home page, containing 30,000 pages of searchable technical content, including links to products, technologies, solutions, technical tips, tools, and lots more. Registered Cisco.com users can log in from this page to access even more content.</p>	<p>http://www.cisco.com/public/support/tac/home.shtml</p>

Command Reference

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

- [bantam-jack enable](#)
- [card type](#)
- [channel-group](#)
- [controller](#)
- [pri-group](#)

bantam-jack enable

To monitor the TX and RX lines of a T1 or E1 port on the onboard bantam jack, use the **bantam-jack enable** command in controller configuration mode. To disable this capability, use the **no** form of this command.

bantam-jack enable

no bantam-jack enable

Syntax Description This command has no arguments or keywords.

Defaults The default is for the bantam jack not to be connected to any T1 or E1 port.

Command Modes Controller configuration

Command History	Release	Modification
	12.3(1)	This command was introduced.

Usage Guidelines The **controller** command must be entered before the **bantam-jack enable** command can be used. Only one port can be connected to the bantam jack at a time, and the port connected will have an illuminated LED.

The **bantam-jack enable** command cannot be saved in the startup configuration, and therefore cannot be seen in the running configuration. To see if the **bantam-jack enable** command has been configured, use the **show controller {t1 | e1}** command.

Examples The following example enables the bantam jack for a port:

```
Router(config-controller)# bantam-jack enable
```

Related Commands	Command	Description
	controller	Configures a T1 or E1 controller and enters controller configuration mode.

card type

To configure the card type, use the **card type** command in global configuration mode. To restore the default value, use the **no** form of this command.

```
card type {t1 | e1} slot
```

```
no card type {t1 | e1} slot
```

Syntax Description		
t1		Specifies T1 connectivity of 1.544 Mbps through the telephone switching network, using AMI or B8ZS coding.
e1		Specifies a wide-area digital transmission scheme used predominantly in Europe that carries data at a rate of 2.048 Mbps.
<i>slot</i>		Slot (port) number of the interface.

Defaults No default behavior or values

Command Modes Global configuration

Command History	Release	Modification
	12.0(5)XE	This command was introduced.
	12.0(7)T	This command was integrated into Cisco IOS Release 12.0(7)T.
	12.3(1)	This command was integrated into Cisco IOS Release 12.3(1).

Usage Guidelines Changes made using this command do not take effect unless the **reload** command is used or the router is rebooted.

Examples The following example configures T1 data transmission on slot 1 (port 1) of the router:

```
card type t1 1
```

Related Commands	Command	Description
	controller	Configures a T1 or E1 controller and enters controller configuration mode.
	reload	Reloads the operating system.

channel-group

To configure serial WAN on a T1 or E1 interface, use the **channel-group** command in controller configuration mode. To clear a channel group, use the **no** form of this command.

Cisco 2600 Series

channel-group *channel-group-number* **timeslots** *range* [**speed** *kbps*] [**aim** *aim-slot-number*]

no channel-group *channel-group-number*

Cisco 2611 (Cisco Signaling Link Terminal [SLT])

channel-group *channel-number*

no channel-group *channel-number*

Cisco 2600XM Series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745

channel-group *channel-group-number* {**timeslots** *range* [**speed** {**56** | **64**}] | **unframed**}
[**aim** *aim-slot-number*]

no channel-group [*channel-group-number* **timeslots** *range*]

Cisco AS5350 and Cisco AS5400 Series

channel-group *channel-group-number*

no channel-group *channel-group-number*

Cisco MC3810

channel-group *channel-number* **timeslots** *range* [**speed** *kbps*]

no channel-group [*channel-number* **timeslots** *range*]

Syntax Description

<i>channel-group-number</i>	Channel-group number on the Cisco 2600 series, Cisco 2600XM, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745 routers. When a T1 data line is configured, channel-group numbers can be values from 0 to 23. When an E1 data line is configured, channel-group numbers can be values from 0 to 30. Valid values can be 0 or 1 on the Cisco AS5350 and Cisco AS5400.
timeslots <i>range</i>	Specifies one or more time slots separated by commas, or ranges of time slots belonging to the channel group separated by a dash. The first time slot is numbered 1. For a T1 controller, the time slots range from 1 to 24. For an E1 controller, the time slots range from 1 to 31. You can specify a time slot range (for example, 1-29), individual time slots separated by commas (for example 1, 3, 5), or a combination of the two (for example 1-14, 15, 17-31). See the “Examples” section for samples of different timeslot ranges.

speed {56 64}	<p>(Optional) Specifies the speed of the underlying DS0s in kilobits per second. Valid values are 56 and 64.</p> <p>The default line speed when configuring a T1 controller is 56 kbps on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and the Cisco MC3810.</p> <p>The default line speed when configuring an E1 controller is 64 kbps on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and the Cisco MC3810.</p> <p>The line speed controls real-time (VBR-RT) traffic shaping, and the maximum burst size (MBS) is 255 cells.</p>
aim <i>aim-slot-number</i>	(Optional) Directs HDLC traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 digital signaling processor (DSP) card on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.
<i>channel-number</i>	Number of the channel. Valid values can be 0 or 1 on the Cisco SLT (Cisco 2611).
unframed	Specifies the use of all 32 time slots for data. None of the 32 time slots are used for framing signals on the Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745. This is applicable to E1 only.

Defaults

The T1/E1 line is connected to the Motorola MPC-860x processor serial communication controller (SCC) or network module with two voice or WAN interface card (VIC or WIC) slots and 0/1/2 FastEthernet ports DSCC4 by default on Cisco 2600 series, Cisco 2600XM, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745 routers.

There is no default behavior or values on the Cisco SLT (Cisco 2611).

The serial interface object encapsulation is set to HDLC on a network access server (NAS) (Cisco AS5350 and Cisco AS5400 series routers).

The default line speed is 56 kbps when a T1 controller is configured on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and the Cisco MC3810.

The default line speed is 64 kbps when an E1 controller is configured on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, Cisco 3745, and the Cisco MC3810.

Command Modes

Controller configuration

Command History

Release	Modification
11.3 MA	This command was introduced on the Cisco MC3810.
12.0	This command was integrated into Cisco IOS Release 12.0 on the Cisco MC3810.
12.0(7)XE	This command was implemented on the Catalyst 6000 family switches.
12.1(1)E	This command was integrated into Cisco IOS Release 12.1(1)E.

Release	Modification
12.1(1)T	This command was modified to accommodate two channel groups on a port on 1- and 2-port T1/E1 Multiflex voice or WAN interface cards on the Cisco 2600 and Cisco 3600 series routers.
12.1(3a)E3	The number of valid values for <i>kbps</i> was changed on the Cisco MC3810; see the “Usage Guidelines” section for valid values.
12.2(11)T	This command was modified for use on the Cisco AS5350 and Cisco AS5400.
12.2(15)T	The aim keyword was added for use on the Cisco 2600 series (including the Cisco 2691), Cisco 2600XM, Cisco 3660, Cisco 3725, and Cisco 3745.
12.3(1)	The unframed keyword was added for use on the Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.

Usage Guidelines

Use this command to direct High-Level Data Link Control (HDLC) traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 DSP card. A channel group is created using Advanced Integration Module (AIM) HDLC resources when a **channel-group** command with the **aim** keyword is parsed during system initialization or when the command is entered during configuration. You must specify the **aim** keyword under a T1/E1 controller port to direct HDLC traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 DSP card on the Cisco 2600 series, Cisco 2600XM series, Cisco 2691, Cisco 3631, Cisco 3660, Cisco 3725, and Cisco 3745.



Note

Neither the Cisco AS5400 series NAS nor the Cisco MC3810 is supported with the integrated voice and data WAN on T1/E1 interfaces using the AIM-ATM-VOICE-30 module.

If previous **channel-group** commands are configured with the **aim** keyword, subsequent **channel-group** commands without the **aim** keyword are rejected. Similarly, if a regular **channel-group** command is followed by another **channel-group** command with the **aim** keyword implemented, the second command is rejected on the Cisco 2600 and Cisco 2600XM.

A channel group using AIM HDLC resources is deleted only when a **no channel-group** command is entered.

By default, the **channel-group** command on a NAS sets the serial interface object encapsulation to HDLC. You must override the default by entering the **encapsulation ss7** command for that serial interface object. Once you override the default, encapsulation cannot be changed again for that object. The SS7 encapsulation option is new to the **Integrated Signaling Link Terminal** feature and is available only for interface serial objects created by the **channel-group** command. The Integrated Signaling Link Terminal feature added SLT functionality on Cisco AS5350 and Cisco AS5400 platforms.

A digital SS7 link can be deleted by entering the **no channel-group channel-group-number** command on the associated T1/E1 controller. The link must first be stopped using the **no shutdown** command. It is not necessary to remove the channel ID association first.

Use the **channel-group** command in configurations where the router or access server must communicate with a T1 or E1 fractional data line. The channel group number may be arbitrarily assigned and must be unique for the controller. The time slot range must match the time slots assigned to the channel group. The service provider defines the time slots that comprise a channel group.

**Note**

Channel groups, channel-associated signaling (CAS) voice groups, and time-division multiplexing (TDM) groups all use group numbers. All group numbers configured for channel groups, CAS voice groups, and TDM groups must be unique on the local Cisco MC3810 concentrator. For example, you cannot use the same group number for a channel group and for a TDM group. Furthermore, on the Cisco MC3810, only one channel group can be configured on a controller.

The channel group number can be 0 or 1 on the Cisco SLT (Cisco 2611).

The **channel-group** command also applies to Voice over Frame Relay, Voice over ATM, and Voice over HDLC on the Cisco MC3810.

Examples

The following example shows basic configuration directing HDLC traffic from the T1/E1 interface to the AIM-ATM-VOICE-30 DSP card, starting in global configuration mode:

```
Router(config)# controller e1 1/0
Router(config-controller)# clock source internal
Router(config-controller)# channel-group 0 timeslots 1-31 aim 0
```

The following example explicitly sets the encapsulation type to PPP to override the HDLC default:

```
Router# configure terminal
Router(config)# controller t1 6/0
Router(config-controller)# channel-group 2 timeslots 3 aim 0
Router(config-controller)# exit
Router(config)# interface serial 6/0:2
Router(config-if)# encapsulation ppp
Router(config-if)# ip address 12.0.0.1 255.0.0.0
Router(config-if)# no shutdown
Router(config-if)# end
```

The following example shows how to explicitly set the encapsulation type to SS7 to override the HDLC default using the **Integrated Signaling Link Terminal** feature. This example uses an 8PRI DFC card inserted into slot 7, and DS0-timeslot 3 on trunk 5 of that card is used as an SS7 link:

```
Router# configure terminal
Router(config)# controller t1 7/5
Router(config-controller)# channel-group 2 timeslots 3
Router(config-controller)# exit
Router(config)# interface serial 7/5:2
Router(config-if)# encapsulation ss7
Router(config-if)# channel-id 0
Router(config-if)# no shutdown
Router(config-if)# end
```

The following example defines three channel groups. Channel-group 0 consists of a single time slot, channel-group 8 consists of seven time slots and runs at a speed of 64 kbps per time slot, and channel-group 12 consists of two time slots.

```
Router(config-controller)# channel-group 0 timeslots 1
Router(config-controller)# channel-group 8 timeslots 5,7,12-15,20 speed 64
Router(config-controller)# channel-group 12 timeslots 2
```

The following example configures a channel group on controller T1 0 on a Cisco MC3810:

```
Router(config)# controller T1 0
Router(config-controller)# channel-group 10 timeslots 10 64
```

**Note**

SS7 digital F-link support for the 8PRI line card requires use of a third onboard TDM stream to route trunk DS0 messages to the onboard Media Gateway Controllers (MGCs).

Related Commands

Command	Description
framing	Specifies the frame type for the T1 or E1 data line.
invert data	Enables channel inversion.
linecode	Specifies the line code type for the T1 or E1 line.
voice-card	Configures a card with voice processing resources and enters voice card configuration mode.

controller

To configure a T1 or E1 controller and enter controller configuration mode, use the **controller** command in global configuration mode.

```
controller {t1 | e1} slot/port
```

Syntax Description

t1	Specifies that the controller is configured as a T1 interface.
e1	Specifies that the controller is configured as an E1 interface.
<i>slot/port</i>	Backplane slot number and port number on the interface. See your hardware installation manual for the specific values and slot numbers. The slash mark is required.

Defaults

No T1 or E1 controller is configured.

Command Modes

Global configuration

Command History

Release	Modification
10.0	This command was introduced.
10.3	The e1 keyword was added.
12.3(1)	This command was integrated into Cisco IOS Release 12.3(1).

Usage Guidelines

This command is used in configurations where the router or access server is intended to communicate with a T1 or E1 fractional data line. Additional parameters for the T1 or E1 line must be configured for the controller before the T1 or E1 circuits can be configured by means of the **interface** global configuration command.

Examples

The following example configures the T1 controller in slot 1, port 1:

```
router(config)# controller t1 1/1
```

Related Commands

Command	Description
channel-group	Defines the time slots that belong to each T1 or E1 circuit.
clear controller	Resets the T1 or E1 controller.
clock source line	Sets the E1 line clock source.
linecode	Selects the linecode type for T1 or E1 line.
show controllers e1	Displays information about the E1 links.
show controllers t1 call-counters	Displays the total number of calls and call durations on a T1 controller.

pri-group

To specify ISDN PRI on a channelized T1 or E1 controller, use the **pri-group** command in controller configuration mode. To remove the ISDN PRI configuration, use the **no** form of this command.

pri-group [*timeslots range*]

no pri-group

Syntax Description	timeslots <i>range</i>	(Optional) Specifies a single range of values from 1 to 24 for T1. For E1, the allowable range is from 1 to 31. You can specify a time slot range (for example, 1-29), individual time slots separated by commas (for example 1, 3, 5), or a combination of the two (for example 1-14, 15, 17-31).
---------------------------	-------------------------------	--

Defaults No ISDN PRI group is configured.

Command Modes Controller configuration

Command History	Release	Modification
	11.0	This command was introduced.
	12.3(1)	This command was integrated into Cisco IOS Release 12.3(1).

Usage Guidelines Before you enter the **pri-group** command, you must specify an ISDN switch type for PRI and a T1 controller.



Note

Only one PRI group can be configured on a controller.

Examples The following example specifies ISDN PRI on T1 slot 1, port 0:

```
isdn switch-type primary-4ess
controllers t1 1/0
framing esf
linecode b8zs
pri-group timeslots 2-6
```

Related Commands	Command	Description
	controller	Configures a T1 or E1 controller and enters controller configuration mode.
	framing	Specifies a frame type.
	isdn switch-type	Specifies the central office switch type on the ISDN PRI interface.

Command	Description
linecode b8zs	Specifies line encoding for a controller.
interface serial	Specifies a serial interface created on a channelized E1 or channelized T1 controller (for ISDN PRI, CAS, or robbed-bit signaling).

Glossary

- AIS**—T1 alarm indication signal.
- AMI**—alternate mark inversion. A bipolar return to zero line encoding scheme.
- ANSI T1.403-1995**—Network to Customer Installation—DS1 Metallic Interface.
- ATM**—Asynchronous Transfer Mode.
- BERT**—bit error rate tester.
- BPV**—bipolar violation (AMI) same polarity as previous pulse.
- CAS**—channel-associated signaling.
- CCC**—clear channel capability (64 kbps data channels for DS1).
- CRC**—cyclic redundancy check.
- CSM**—call switching module.
- CSU**—channel service unit.
- DSP**—digital signal processor.
- DSU**—data service unit.
- E1**—European equivalent of T1, 32 channels of 64 kHz each, 1 for framing, 1 for signaling.
- ESF**—extended super frame, 24 frames per ESF, includes additional signaling.
- FAS**—frame align signal.
- FDL**—facilities data link.
- FPGA**—field programmable gate array.
- HDB3**—high density binary 3 zero suppression.
- HDLC**—High-Level Data Link Control protocol.
- LCV**—line code violation—occurrence of BPV.
- LIU**—line interface unit.
- LOS**—loss of signal.
- MARS**—modular access routers.
- MIB**—Management Information Base.
- OOF**—out of frame (G.706) Consecutive frame alignment signals received in error.
- PCI**—peripheral component interconnect. Specification that defines the PCI local bus.
- PCV**—path code violation—(unframed) frame sync bit error, (framed) CRC.
- PRI**—Primary Rate Interface.
- SES**—severely errored second.
- SF**—Super frame, or D4 framing, 12 frames per super frame for in-band signaling extraction.
- T1**—North American channelized TDM with 24 channels of 64 kHz each plus 8 kHz frame.


Note

Refer to the [Internetworking Terms and Acronyms](#) for terms not included in this glossary.

CCVP, the Cisco logo, and Welcome to the Human Network are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn is a service mark of Cisco Systems, Inc.; and Access Registrar, Aironet, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, iQuick Study, LightStream, Linksys, MeetingPlace, MGX, Networkers, Networking Academy, Network Registrar, PIX, ProConnect, ScriptShare, SMARTnet, StackWise, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0711R)

Copyright © 2003 Cisco Systems, Inc. All rights reserved.

