



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, 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.



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Finding Support Information for Platforms and Cisco IOS Software Images

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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-xCE1T1PRI 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	enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	card type t1 slot Example: Router(config)# card type t1 1	Sets or changes the card type. - 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 slot/port Example: Router(config)# controller t1 1/0	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. The card type command must be entered before this command can be used.
Step 5	linecode {ami b8zs} Example: Router(config-controller)# linecode b8zs	Specifies a line encoding for a controller. - The controller command must be entered before this command can be used. - Line-code value for T1 can be ami or b8zs.
Step 6	framing {sf esf} Example: Router(config-controller)# framing esf	Specifies a frame type. - 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	clock source {line internal} Example: Router(config-controller)# clock source line	Sets the clock source for a T1 controller. - The clocking argument can have a value of line or internal. - 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	pri-group <i>[timeslots range]</i> Example: Router(config-controller)# pri-group timeslots 1-5	Specifies that the controller should be set up as a PRI interface. - 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. 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.
Step 9	exit Example: Router# exit	Exits the controller configuration mode and returns the router to privileged EXEC mode.
Step 10	copy running-config startup-config Example: Router# copy running-config startup-config	Saves the new configuration parameters to the permanent configuration file. 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	enable Example: Router> enable	Enables privileged EXEC mode. Enter your password if prompted.
Step 2	configure terminal Example: Router# configure terminal	Enters global configuration mode.
Step 3	card type e1 slot Example: Router(config)# card type e1 1	Sets or changes the card type. - 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 e1 slot/port 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. The card type command must be entered before this command can be used.
Step 5	linecode {ami hdb3} Example: Router(config-controller)# linecode hdb3	Specifies a line encoding for a controller. - The controller command must be entered before this command can be used. - Linecode value for E1 can be ami or hdb3.
Step 6	framing {crc4 no-crc4} Example: Router(config-controller)# framing crc4	Selects a frame type. - The controller command must be entered before this command. - The framing value can be crc4 or no crc4 for E1 controllers.
Step 7	clock source {line internal} Example: Router(config-controller)# clock source line	Sets the clock source for an E1 controller. - The clocking argument can have a value of line or internal. - 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	channel-group <i>channel-number</i> {<i>timeslots range</i> [<i>speed</i> {56 64}} unframed} Example: Router(config-controller)# channel-group 1 unframed	Specifies that the controller should be set up as a channelized interface. - 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. 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.
Step 9	line-termination {75-ohm 120-ohm} Example: Router(config-controller)# line-termination 120-ohm	Configures the E1 line interface for 120-ohm or 75-ohm termination. - The controller command must be entered before this command can be used. - Line termination is configurable only for E1.
Step 10	exit Example: Router# exit	Exits the controller configuration mode and returns the router to privileged EXEC mode.
Step 11	copy running-config startup-config Example: Router# copy running-config startup-config	Saves the new configuration parameters to the permanent configuration file. 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. 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. - 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. 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. Only one port can be monitored at a time.

	Command or Action	Purpose
Step 6	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.
	Example: Router(config-controller)# no bantam-jack enable	- 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	Exits controller configuration mode and returns the router to privileged EXEC mode.
	Example: Router# exit	

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	Enables privileged EXEC mode.
	Example: Router> enable	Enter your password if prompted.
Step 2	show controller {t1 e1}	Displays the RFC 1406 MIB statistics about the T1 or E1 port, card revision information, alarm status, and port configuration.
	Example: Router# show controller t1	

	Command or Action	Purpose
Step 3	show interfaces serial <i>slot/port:[channel-group]</i> Example: Router# show interfaces serial 1/0:23	Displays statistics for channels and channel groups created within a T1 or E1 controller, which are treated as serial interfaces. - 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	show pci bridge slot-number Example: Router# show pci bridge 1	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.

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</i> (July 1988)
AT&T Publication 54016	<i>Requirements for Interfacing Digital Terminal Equipment to Services Employing the Extended Super Frame Format</i>

MIBs

MIBs	MIBs Link
- CISCO-ICSUDSU-MIB - RFC 1406 MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

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

Technical Assistance

Description	Link
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.	http://www.cisco.com/public/support/tac/home.shtml

Command Reference

The following new and modified commands are pertinent to this feature. To see the command pages for these commands and other commands used with this feature, go to the *Cisco IOS Master Commands List*, Release 12.4, at <http://www.cisco.com/univercd/cc/td/doc/product/software/ios124/124mindx/124index.htm>.

- **bantam-jack enable**
- **card type**
- **channel-group**
- **controller**
- **pri-group**

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.

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