

PA-2CE1/PRI-75, PA-2CE1/PRI-120, and PA-2CT1/PRI Channelized E1 and T1 Port Adapters

Description

Channelized E1 and T1 Primary Rate Interface (PRI) Integrated Services Digital Network (ISDN) port adapters (PA-2CE1/PRI-75, PA-2CE1/PRI-120, and PA-2CT1/PRI) are available on Cisco 7200 series routers, Cisco 7500 series routers, and on Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The PA-2CE1/PRI-120 (balanced 120-ohm) and PA-2E1/PRI-75 (unbalanced 75-ohm) provide up to two channelized E1 interfaces to connect to channel service units (CSUs), and can transmit and receive data bidirectionally at the E1 rate of 2.048 Mbps. The PA-2CT1/PRI provides up to two channelized T1 interfaces to connect to CSUs, and can transmit and receive data bidirectionally at the T1 rate of 1.544 Mbps. The interfaces use a 15-pin, D-shell receptacle. The PA-2CE1/PRI-75 and PA-2E1/PRI-120 use G.703 serial interface cables, and the PA-2CT1/PRI uses standard serial cables (null-modem and straight-through).

Platform

This feature is supported on these platforms:

- Cisco 7200 series
- Cisco 7500 series
- Cisco 7000 series with the RSP7000 and RSP7000CI

Configuration Tasks

For information on how to configure a basic channelized E1 controller on the PA-2CE1/PRI-75 and PA-2CE1/PRI-120 port adapters, refer to “Configure Channelized E1” section in the “Configuring Interfaces” chapter in the *Configuration Fundamentals Configuration Guide*. For information on how to configure a basic channelized E1 ISDN PRI, refer to the “Configure Channelized E1 ISDN PRI” section in the “Configuring ISDN” chapter in the *Wide-Area Networking Configuration Guide*.

For information on how to configure a basic channelized T1 controller on the PA-2CT1/PRI port adapter, refer to the “Configure Channelized T1” section in the “Configuring Interfaces” chapter in the *Configuration Fundamentals Configuration Guide*. For information on how to configure a basic channelized T1 ISDN PRI, refer to the “Configure Channelized T1 ISDN PRI” section in the “Configuring ISDN” chapter in the *Wide-Area Networking Configuration Guide*.

Note When a channelized E1 or T1 port adapter is used for ISDN PRI, it can support dial-on-demand routing (DDR). For more information on DDR, refer to the “Configuring DDR” chapter in the *Wide-Area Networking Configuration Guide*.

A channelized E1 controller can have up to 31 serial interfaces (numbered 0 to 30), and a channelized T1 controller can have up to 24 serial interfaces (numbered 0 to 23). After you define the channel groups or PRI groups, you can configure each group as a serial interface. For information on how to configure a serial interface, refer to the “Configure a Synchronous Serial Interface” section in the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide*.

For information on other commands that can be used by the PA-2CE1/PRI-75 and PA-2CE1/PRI-120 interfaces, refer to the Cisco IOS Release 11.2 configuration guides.

Configuration Examples

The following example shows how to configure a basic channelized E1 PRI ISDN port adapter. In this example, the controller is enabled, timeslots are assigned to the PRI group, and the ISDN switch type used on all ISDN interfaces on the router is a switch for the European community (primary-net5). The PRI group timeslots of 1, 3, 4, 5, and 7 (the B channels) are selected to map to timeslot 16 (the D channel), which is recognized by the system as timeslot 15.

```
Router# configure terminal
Router (config)# isdn switch-type primary-net5
Router (config)# controller e1 3/1/1
Router (config-controller)# framing crc4
Router (config-controller)# linecode hdb3
Router (config-controller)# pri-group timeslots 1,3-5,7
Router (config-controller)# exit
Router (config)# interface serial 3/1/1:15
Router (config-if)# ip address 1.1.15.1 255.255.255.0
Router (config-if)# exit
Router (config)# exit
Router#
```

The following example shows how to configure a basic channelized T1 PRI ISDN port adapter. In this example, the controller is enabled, timeslots are assigned to the PRI group, and the ISDN switch type used on all ISDN interfaces on the router is for the United States switch (primary-5ess). The PRI group timeslots of 1, 3, 4, 5, and 7 (the B channels) are selected to map to timeslot 24 (the D channel), which is recognized by the system as timeslot 23.

```
Router# configure terminal
Router (config)# isdn switch-type- primary-5ess
Router (config)# controller 11 3/1/1
Router (config-controller)# framing esf
Router (config-controller)# linecode b8zs
Router (config-controller)# pri-group timeslots 1,3-5,7
Router (config-controller)# exit
Router (config)# interface serial 3/1/1:23
Router (config-if)# ip address 1.1.15.1 255.255.255.0
Router (config-if)# exit
Router (config)# exit
Router#
```

Note You might also need to enter other configuration commands depending on the requirements for your system configuration and the protocols you plan to route on the interface. For more information, refer to the Cisco IOS Release 11.2 configuration guides.

Note For additional examples, refer to the “Interface Configuration Examples” section of the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide*.

Command Reference

This section documents modified commands. All other commands used with this feature are documented in the Cisco IOS Release 11.2 command references.

- **controller**
- **show controllers e1**
- **show controllers t1**

controller

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

controller [**t1** | **e1**] *slot/port* (Cisco 7200 series)

controller [**t1** | **e1**] *slot/port-adapter/port* (Cisco 7000 series and Cisco 7500 series)

controller [**t1** | **e1**] *number* (Cisco 4000 series)

Syntax Description

t1	T1 controller.
e1	E1 controller.
<i>slot</i>	Backplane slot number. <ul style="list-style-type: none"> • On the Cisco 7000, the slot numbers are 0, 1, 2, 3, or 4 from left to right. • On the Cisco 7010, the slot number can be 0, 1, or 2 from bottom to top. • On the Cisco 7200 series, the slot number can be 1 to 6 on the Cisco 7206 and 1 to 4 on the Cisco 7204. • On the Cisco 7505, the slot number can be 0, 1, 2, or 3 from bottom to top. • On the Cisco 7507, the slot number can be 0 and 1 (CyBus0) and 4 through 6 (Cybus1), from left to right. • On the Cisco 7513, the slot numbers are 0 through 5 (CyBus 0) and 8 through 12 (CyBus 1), from left to right.
<i>port</i>	Port number of the interface. Ports on each interface processor are numbered from the top down.

port-adapter Port adapter number on the VIP2, either 0 or 1.

number Network interface module (NIM) number, in the range 0 through 2.

Default

No T1 or E1 controller is configured.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0 (for the Cisco 7000 series and Cisco 7500 series).

This command first appeared in Cisco IOS Release 11.0 (for the Cisco 4000 series).

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include information on Cisco 7200 series and Cisco 7500 series routers.

This command is used in configurations where the router 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.

This command is used only on a Cisco 7000 series, Cisco 7200 series, and Cisco 7500 series, or Cisco 4000 series router.

Example

In the following example, the MIP in slot 4, port 0 of a Cisco 7000 series router is configured as a T1 controller:

```
controller t1 4/0
```

In the following example, NIM 0 of a Cisco 4000 series router is configured as a T1 controller:

```
controller t1 0
```

In the following example, a PA-2CE1/PRI port adapter in a Cisco 7500 series router is configured as a E1 controller:

```
controller e1 3/1/0
```

Related Commands

channel-group
clear controller
clock source (controller)
framing
linecode
show controllers e1
show controller t1

show controllers e1

To display information about the E1 links, use the **show controllers e1** privileged EXEC command.

show controllers e1 [*slot/port*] (Cisco 7200 series)

show controllers e1 [*slot/port-adapter/port*] (Cisco 7000 series and Cisco 7500 series)

show controllers e1 [*number*] (Cisco 4000 series)

Syntax Description

<i>slot</i>	(Optional) Backplane slot number; value can be 0, 1, 2, 3, or 4. On the Cisco 7200 series, the slot number can be 1 to 6 on the Cisco 7206 and 1 to 4 on the Cisco 7204.
<i>port</i>	(Optional) Port number of the controller; value can be 0 or 1.
<i>port-adapter</i>	Port adapter number on the VIP2, either 0 or 1.
<i>number</i>	Network Processor Module (NPM) number, in the range 0 through 2.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 11.0.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include information on the Cisco 7200 series and Cisco 7500 series routers.

E1 links are supported by the network processor module (NPM) on Cisco 4000 series routers, the Channelized E1 Primary Rate Interface (PRI) Integrated Services Digital Network (ISDN) port adapters (PA-2CE1/PRI-75 and PA-2CE1/PRI-120) on Cisco 7200 series routers, Cisco 7500 series routers, and Cisco 7000 series routers with the RSP7000 and RSP7000CI, and the MultiChannel Interface Processor (MIP) on Cisco 7000 series and Cisco 7500 series routers.

The NPM or MIP can query the port adapters to determine their current status. Issue a **show controllers e1** command to display statistics about the E1 link.

If you specify a slot and port number, each 15-minute period will be displayed.

This command displays controller status that is specific to the controller hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

Sample Display

The following is sample output from the **show controllers e1** command on the Cisco 7000 series:

```
Router# show controllers e1
e1 0/0 is up.
  Applique type is Channelized E1 - unbalanced
  Framing is CRC4, Line Code is HDB3
  No alarms detected.
  Data in current interval (725 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
```

```
Total Data (last 24 hours)
  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
```

Following is an example of the **show controllers e1** display including the board identifier type:

```
Router# show controllers e1
E1 4/1 is up.
No alarms detected.
Framing is CRC4, Line Code is hdb3
Data in current interval (0 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
Total Data (last 79 15 minute intervals):
  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
```

Table 29 describes the **show controllers e1** display fields.

Table 29 Show Controllers E1 Field Descriptions

Field	Description
e1 0/0 is up.	E1 controller 0 in slot 0 is operating. The controller's state can be up, down, or administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
Applique type	Shows the applique type and indicates balanced or unbalanced.
Framing is	Shows the current framing type.
Linecode is	Shows the current linecode type.
No alarms detected.	Any alarms detected by the controller are displayed here. Possible alarms are as follows: <ul style="list-style-type: none"> • Transmitter is sending remote alarm. • Transmitter is sending AIS. • Receiver has loss of signal. • Receiver is getting AIS. • Receiver has loss of frame. • Receiver has remote alarm. • Receiver has no alarms.
Data in current interval (725 seconds elapsed)	Shows the current accumulation period, which rolls into the 24 hour accumulation every 15 minutes. Accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hour accumulation buffer.
Line Code Violations	Indicates the occurrence of either a Bipolar Violation (BPV) or Excessive Zeros (EXZ) error event.
Path Code Violations	Indicates a frame synchronization bit error in the D4 and E1-noCRC formats, or a CRC error in the ESF and E1-CRC formats.
Slip Secs	Indicates the replication or deletion of the payload bits of a DS1 frame. A slip might be performed when there is a difference between the timing of a synchronous receiving terminal and the received signal.
Fr Loss Secs	Indicates the number of seconds an Out Of Frame (OOF) error is detected.

Table 29 Show Controllers E1 Field Descriptions (Continued)

Field	Description
Line Err Secs	Line Errored Seconds (LES) is a second in which one or more Line Code Violation errors are detected.
Degraded Mins	A Degraded Minute is one in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3.
Errored Secs	In ESF and E1 CRC links, an Errored Second is a second in which one of the following are detected: one or more Path Code Violations; one or more Out of Frame defects; one or more Controlled Slip events; a detected AIS defect. For SF and E1 no-CRC links, the presence of Bipolar Violations also triggers an Errored Second.
Bursty Err Secs	A second with fewer than 320 and more than 1 Path Coding Violation error, no Severely Errored Frame defects and no detected incoming AIS defects. Controlled slips are not included in this parameter.
Severely Err Secs	For ESF signals, a second with one of the following errors: 320 or more Path Code Violation errors; one or more Out of Frame defects; a detected AIS defect. For E1-CRC signals, a second with one of the following errors: 832 or more Path Code Violation errors; one or more Out of Frame defects. For E1-nonCRC signals, a second with 2048 Line Code Violations or more. For D4 signals, a count of 1-second intervals with Framing Errors, or an Out of Frame defect, or 1544 Line Code Violations.
Unavail Secs	Count of the total number of seconds on the interface.

show controllers t1

To display information about the T1 links, use the **show controllers t1** privileged EXEC command.

show controllers t1 [*slot/port*] (Cisco 7200 series)

show controllers t1 [*slot/port-adapter/port*] (Cisco 7000 series and Cisco 7500 series)

show controllers t1 [*number*] (Cisco 4000 series)

Syntax Description

<i>slot</i>	(Optional) Backplane slot number; the value can be 0, 1, 2, 3, or 4. On the Cisco 7200 series, the slot number can be 1 to 6 on the Cisco 7206 and 1 to 4 on the Cisco 7204.
<i>port</i>	(Optional) Port number of the controller; the value can be 0 or 1.
<i>port-adapter</i>	Port adapter number on the VIP2, either 0 or 1.
<i>number</i>	Network Processor Module (NPM) number, in the range 0 through 2.

Command Mode

EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include information on the Cisco 7200 series and Cisco 7500 series routers.

T1 links are supported by the network processor module (NPM) on Cisco 4000 series routers, the Multichannel Interface Processor (MIP) on Cisco 7000 series routers, and the Channelized T1 Primary Rate Interface (PRI) Integrated Services Digital Network (ISDN) port adapter (PA-2CT1/PRI) on Cisco 7200 series, Cisco 7500 series, and Cisco 7000 series routers with the RSP7000 and RSP7000CI.

This command displays controller status that is specific to the controller hardware. The information displayed is generally useful for diagnostic tasks performed by technical support personnel only.

The NPM or MIP can query the port adapters to determine their current status. Issue a **show controller t1** command to display statistics about the T1 link.

If you specify a slot and port number, each 15-minute period will be displayed.

Sample Display

The following is sample output from the **show controller t1** command on the Cisco 7000 series:

```
Router# show controllers t1
T1 4/1 is up.
No alarms detected.
Framing is ESF, Line Code is AMI, Clock Source is line
Data in current interval (0 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
Total Data (last 79 15 minute intervals):
```

```

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
Router#

```

Table 30 describes the **show controllers t1** display fields.

Table 30 Show Controller T1 Field Descriptions

Field	Description
T1 0/0 is up.	T1 controller 0 in slot 0 is operating. The controller's state can be up, down, administratively down. Loopback conditions are shown by (Locally Looped) or (Remotely Looped).
No alarms detected.	Any alarms detected by the controller are displayed here. Possible alarms are as follows: Transmitter is sending remote alarm. Transmitter is sending AIS. Receiver has loss of signal. Receiver is getting AIS. Receiver has loss of frame. Receiver has remote alarm. Receiver has no alarms.
Data in current interval (725 seconds elapsed)	Shows the current accumulation period, which rolls into the 24-hour accumulation every 15 minutes. Accumulation period is from 1 to 900 seconds. The oldest 15-minute period falls off the back of the 24-hr accumulation buffer.
Line Code Violations	Indicates the occurrence of either a Bipolar Violation (BPV) or Excessive Zeros (EXZ) error event.
Path Code Violations	Indicates a frame synchronization bit error in the D4 and E1-noCRC formats, or a CRC error in the ESF and E1-CRC formats.
Slip Secs	Indicates the replication or deletion of the payload bits of a DS1 frame. A slip may be performed when there is a difference between the timing of a synchronous receiving terminal and the received signal.
Fr Loss Secs	Indicates the number of seconds an Out Of Frame (OOF) error is detected.
Line Err Secs	Line Errored Seconds (LES) is a second in which one or more Line Code Violation errors are detected.
Degraded Mins	A Degraded Minute is one in which the estimated error rate exceeds 1E-6 but does not exceed 1E-3.
Errored Secs	In ESF and E1-CRC links, an Errored Second is a second in which one of the following are detected: one or more Path Code Violations; one or more Out of Frame defects; one or more Controlled Slip events; a detected AIS defect. For D4 and E1-noCRC links, the presence of Bipolar Violations also triggers an Errored Second.
Bursty Err Secs	A second with fewer than 320 and more than 1 Path Coding Violation error, no Severely Errored Frame defects and no detected incoming AIS defects. Controlled slips are not included in this parameter.

Table 30 Show Controller T1 Field Descriptions (Continued)

Field	Description
Severely Err Secs	For ESF signals, a second with one of the following errors: 320 or more Path Code Violation errors; one or more Out of Frame defects; a detected AIS defect. For E1-CRC signals, a second with one of the following errors: 832 or more Path Code Violation errors; one or more Out of Frame defects. For E1-nonCRC signals, a second with 2048 Line Code Violations or more. For D4 signals, a count of 1-second intervals with Framing Errors, or an Out of Frame defect, or 1544 Line Code Violations.
Unavail Secs	A count of the total number of seconds on the interface.

What to Do Next

For more information on the PA-2CE1/PRI-75, PA-2CE1/PRI-120, and PA-2CT1/PRI PRI ISDN port adapters, refer to the following publications:

- *Channelized E1 Port Adapter Installation and Configuration*
- *Channelized T1 Port Adapter Installation and Configuration*