

PA-8B-ST and PA-4B-U Basic Rate Interface Port Adapters

Description

Basic Rate Interface (BRI) Integrated Services Digital Network (ISDN) port adapters (PA-8B-ST and PA-4B-U) are available on Cisco 7200 series routers.

The PA-8B-ST port adapter provides up to eight S/T-type BRI interfaces used to connect to an ISDN WAN through an external Network Termination 1 (NT1) device. The PA-4B-U provides up to four BRI interfaces used to connect to an ISDN WAN through its internal NTI device. Each PA-8B-ST and PA-4B-U interface consists of two bearer (B) channels that can transmit and receive data at the rate of 64 kbps, full-duplex, and one data (D) channel that can transmit and receive data at the rate of 16 kbps, full-duplex. The interfaces use an RJ-45 receptacle and standard straight-through twisted-pair cable.

The B channels are used for transmitting user data. The D channel is used for call setup control and network connection teardown, and provides the communication from the router to the ISDN switch. The B and D channels are presented to the system as serial interfaces that support High-Level Data Link Control (HDLC) and Point-to-Point protocol (PPP) encapsulation. The PA-8B-ST and PA-4B-U port adapters also support dial-on-demand routing (DDR).

Platform

This feature is supported on the Cisco 7200 series routers.

Configuration Tasks

For information on how to configure the PA-8B-ST and PA-4B-U port adapters, refer to the “Configuring ISDN” chapter in the *Wide-Area Networking Configuration Guide*.

The commands listed in the “Configure an ISDN BRI” section of the “Configuring ISDN” chapter in the *Wide-Area Networking Configuration Guide* allow you to specify the Cisco 7200 series slot and port number. The following commands use the syntax shown below for the PA-8B-ST and PA-4B-U port adapters:

- **interface bri** *slot/port* (for the Cisco 7200 series)
- **show controllers bri** *slot/port* (for the Cisco 7200 series)
- **show interfaces bri** *slot/port* (for the Cisco 7200 series)

For information on other commands that can be used by the PA-8B-ST and PA-4B-U interfaces, refer to the Cisco IOS Release 11.2 configuration guides.

Configuration Examples

For examples of configuring BRI interface, refer to the “ISDN Configuration Examples” section of the “Configuring ISDN” chapter in the *Wide-Area Networking 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.

- **interface bri**
- **show controllers bri**
- **show interfaces bri**

interface bri

To configure a Basic Rate Interface (BRI) interface and enter interface configuration mode, use the **interface bri** global configuration command.

```
interface bri number  
interface bri slot/port (Cisco 7200 series)
```

To configure a BRI subinterface only, use the following form of the **interface bri** global configuration command:

```
interface bri number.subinterface-number [multipoint | point-to-point]  
interface bri slot/port.subinterface-number [multipoint | point-to-point] (Cisco 7200 series)
```

Syntax Description

<i>number</i>	Port, connector, or interface card number. The numbers are assigned at the factory at the time of installation or when added to a system, and can be displayed with the show interfaces command.
<i>slot/port</i>	On the Cisco 7200 series, slot location and port number of the interface.
<i>.subinterface-number</i>	Subinterface number in the range 1 to 4294967293. The number that precedes the period (.) must match the number this subinterface belongs to.
multipoint point-to-point	(Optional) Specifies a multipoint or point-to-point subinterface. The default is multipoint .

Default

The default mode for subinterfaces is **multipoint**.

Command Mode

Global configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include slot/port syntax for the PA-8B-ST and PA-4B-U port adapters on Cisco 7200 series routers.

Subinterfaces can be configured to support partially meshed Frame Relay networks. (Refer to the “Configuring Frame Relay” chapter in the *Wide-Area Networking Configuration Guide*.)

Example

The following example configures BRI 0 to call and receive calls from two sites, use Point-to-Point Protocol (PPP) encapsulation on outgoing calls, and use Challenge Handshake Authentication Protocol (CHAP) authentication on incoming calls:

```
interface bri 0
 encapsulation ppp
 no keepalive
 dialer map ip 131.108.36.10 name EB1 234
 dialer map ip 131.108 36.9 name EB2 456
 dialer-group 1
 isdn spid1 0146334600
 isdn spid2 0146334610
 isdn T200 1000
 ppp authentication chap
```

Related Commands

dialer map
dialer-group
encapsulation ppp
isdn spid1
isdn spid2
ppp authentication chap
ppp authentication pap
show interfaces bri

show controllers bri

To display information about the ISDN Basic Rate Interface (BRI), use the **show controllers bri** privileged EXEC command.

```
show controllers bri number  
show controllers bri slotport (Cisco 7200 series)
```

Syntax Description

number Interface number. The value is 0 through 7 if the router has one BRI network interface module (NIM), or 0 through 15 if the router has two BRI NIMs.

slotport On the Cisco 7200 series, slot location and port number of the interface.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include slot/port syntax for the PA-8B-ST and PA-4B-U port adapters on Cisco 7200 series routers.

Sample Displays

The following is sample output from the **show controllers bri** command:

```
Router# show controllers bri 0  
BRI unit 0  
D Chan Info:  
Layer 1 is ACTIVATED  
idb 0x32089C, ds 0x3267D8, reset_mask 0x2  
buffer size 1524  
RX ring with 2 entries at 0x2101600: Rxhead 0  
00 pak=0x4122E8 ds=0x412444 status=D000 pak_size=0  
01 pak=0x410C20 ds=0x410D7C status=F000 pak_size=0  
TX ring with 1 entries at 0x2101640: tx_count = 0, tx_head = 0, tx_tail = 0  
00 pak=0x000000 ds=0x000000 status=7C00 pak_size=0  
0 missed datagrams, 0 overruns, 0 bad frame addresses  
0 bad datagram encapsulations, 0 memory errors  
0 transmitter underruns  
B1 Chan Info:  
Layer 1 is ACTIVATED  
idb 0x3224E8, ds 0x3268C8, reset_mask 0x0  
buffer size 1524  
RX ring with 8 entries at 0x2101400: Rxhead 0  
00 pak=0x421FC0 ds=0x42211C status=D000 pak_size=0  
01 pak=0x4085E8 ds=0x408744 status=D000 pak_size=0  
02 pak=0x422EF0 ds=0x42304C status=D000 pak_size=0  
03 pak=0x4148E0 ds=0x414A3C status=D000 pak_size=0  
04 pak=0x424D50 ds=0x424EAC status=D000 pak_size=0  
05 pak=0x423688 ds=0x4237E4 status=D000 pak_size=0  
06 pak=0x41AB98 ds=0x41ACF4 status=D000 pak_size=0  
07 pak=0x41A400 ds=0x41A55C status=F000 pak_size=0  
TX ring with 4 entries at 0x2101440: tx_count = 0, tx_head = 0, tx_tail = 0
```

```

00 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
01 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
02 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
03 pak=0x000000 ds=0x000000 status=7C00 pak_size=0
0 missed datagrams, 0 overruns, 0 bad frame addresses
0 bad datagram encapsulations, 0 memory errors
0 transmitter underruns
B2 Chan Info:
Layer 1 is ACTIVATED
idb 0x324520, ds 0x3269B8, reset_mask 0x2
buffer size 1524
RX ring with 8 entries at 0x2101500: Rxhead 0
00 pak=0x40FCF0 ds=0x40FE4C status=D000 pak_size=0
01 pak=0x40E628 ds=0x40E784 status=D000 pak_size=0
02 pak=0x40F558 ds=0x40F6B4 status=D000 pak_size=0
03 pak=0x413218 ds=0x413374 status=D000 pak_size=0
04 pak=0x40EDC0 ds=0x40EF1C status=D000 pak_size=0
05 pak=0x4113B8 ds=0x411514 status=D000 pak_size=0
06 pak=0x416ED8 ds=0x417034 status=D000 pak_size=0
07 pak=0x416740 ds=0x41689C status=F000 pak_size=0
TX ring with 4 entries at 0x2101540: tx_count = 0, tx_head = 0, tx_tail = 0
00 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
01 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
02 pak=0x000000 ds=0x000000 status=5C00 pak_size=0
03 pak=0x000000 ds=0x000000 status=7C00 pak_size=0
0 missed datagrams, 0 overruns, 0 bad frame addresses
0 bad datagram encapsulations, 0 memory errors
0 transmitter underruns

```

Table 33 describes the significant fields in the display.

Table 33 Show Controllers BRI Field Descriptions

Field	Description
BRI unit 0	Interface type and unit number.
Chan Info	D- and B-channel numbers.
Layer 1 is ACTIVATED	Status can be DEACTIVATED, PENDING ACTIVATION, or ACTIVATED.
idb ds reset_mask	Information about internal data structures and parameters.
buffer size	Number of bytes allocated for buffers.
RX ring with - entries at -	Information about the Receiver Queue.
Rxhead	Start of the Receiver Queue.
pak ds status pak_size	Information about internal data structures and parameters.
TX ring with - entries at -	Information about the Transmitter Queue.
tx_count	Number of packets to transmit.
tx_head	Start of the transmit list.
tx_tail	End of the transmit list.
missed datagrams	Incoming packets missed due to internal errors.

Table 33 Show Controllers BRI Field Descriptions (Continued)

Field	Description
overruns	Number of times the receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
bad frame addresses	Frames received with a cyclic redundancy check (CRC) error and noninteger number of octets.
bad datagram encapsulations	Packets received with bad encapsulation.
memory errors	Internal direct memory access (DMA) memory errors.
transmitter underruns	Number of times that the transmitter has been running faster than the router can handle.

The following is a partial sample output from the **show controllers bri** command on a Cisco 7200 series router:

```

BRI slot 2 interface 0 with integrated NT1
Layer 1 is ACTIVATED. (ISDN L1 State F7)
Master clock for slot 2 is bri interface 0.
Total chip configuration successes: 193, failures: 0, timeouts: 0
D Channel Information:
  Channel state: UP Channel IDB: 6092AC64
  RX ring entries: 5, buffer size 512
  RX descriptor ring: head = 165F4D8, tail = 165F508
  RX buffer ring: head = 6093A260, tail = 6093A290
  00 params=0x2000000 status=0x0 data ptr=0x1650F84 next ptr=0x165F4D8
  01 params=0x2000000 status=0xC0080000 data ptr=0x1651884 next ptr=0x165F4E8
  02 params=0x2000000 status=0xC0080000 data ptr=0x1651644 next ptr=0x165F4F8
  03 params=0x2000000 status=0x0 data ptr=0x1651404 next ptr=0x165F508
  04 params=0x4200000 status=0x0 data ptr=0x16511C4 next ptr=0x165F4C8
  TX ring entries: 5, in use: 0, buffer size 512
  TX descriptor ring: head = 3C2049C0, tail = 3C2049C0
  TX buffer ring: head = 608EC0C4, tail = 608EC0C4
  00 params=0x80000000 data ptr=0x00000000 next ptr=0x4D0049A8
  01 params=0x80000000 data ptr=0x00000000 next ptr=0x4D0049B4
  02 params=0x80000000 data ptr=0x00000000 next ptr=0x4D0049C0
  03 params=0xC0000000 data ptr=0x00000000 next ptr=0x4D0049CC
  04 params=0x0 data ptr=0x00000000 next ptr=0x4D00499C
List of timeslots (sw): 2
    
```

Table 34 describes the significant fields in the display.

Table 34 Show Controllers BRI Field Descriptions

Field	Description
BRI slot 2 interface 0 with integrated NTI	Interface type and slot and port number.
Layer 1 is ACTIVATED	Status can be DEACTIVATED, PENDING ACTIVATION, or ACTIVATED.
Master clock	The first interface that comes up on an MBRI port adapter holds the master clock. This clock is used for all interfaces on that port adapter. If the master clock interface goes down, the second interface that came up becomes the master clock interface.
Total chip configuration successes	Counters of successful chip configuration.

Table 34 Show Controllers BRI Field Descriptions (Continued)

Field	Description
failures	Counters of bad chip configuration.
timeouts	Counters of failing to initialize chip.
D Channel Information	Information related to D-channel status.
Channel state	Channel state can be UNUSED, IDLE, DOWN, STANDBY, UP, THROTTLED, ILLEGAL.
Channel IDB	Internal interface channel description.
RX (or TX) ring entries	Internal receive queue.
RX (or TX) descriptor ring	Internal receive queue to manage hardware chip
RX (or TX) buffer ring	Internal receive queue to hold inbound packets.
Rxhead	Start of the receiver queue.
params, status, data ptr, next ptr	Information about internal data structures and params.
List of timeslots (sw)	Timeslots assigned to this channel.

show interfaces bri

To display information about the BRI D channel or about one or more B channels, use the **show interfaces bri** privileged EXEC command.

show interfaces bri *number* [[:*bchannel*] | [*first*] [*last*]] [**accounting**]
show interfaces bri *slot/port* [*first*] [*last*] [**accounting**] (Cisco 7200 series)

Syntax Description

<i>number</i>	Interface number. The value is 0 through 7 if the router has one BRI NIM, or 0 through 15 if the router has two BRI NIMs. Specifying just the number will display the D channel for that BRI interface.
<i>slot/port</i>	On the Cisco 7200 series, slot location and port number of the interface.
: <i>bchannel</i>	(Optional) Specific B channel number, preceded by a colon.
<i>first</i>	(Optional) Specifies the first of the B channels; the value can be either 1 or 2.
<i>last</i>	(Optional) Specifies the last of the B channels; the value can only be 2, indicating B channels 1 and 2.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.3.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include slot/port syntax for the PA-8B-ST and PA-4B-U port adapters on Cisco 7200 series routers.

Use either the *:bchannel-number* argument or the *first* or *last* arguments to display information about specified B channels.

Use the **show interfaces bri** *number* form of the command (without the optional *:bchannel*, or *first* and *last* arguments) to obtain D-channel information.

Use the command syntax sample combinations in Table 35 to display the associated output.

Table 35 Sample Show Interfaces BRI Combinations

Command Syntax	Displays
show interfaces	All interfaces in the router
show interfaces bri 2	Channel D for BRI interface 2
show interfaces bri 4 1	Channel B1 on BRI interface 4
show interfaces bri 4 2	Channel B2 on BRI interface 4

Table 35 Sample Show Interfaces BRI Combinations (Continued)

Command Syntax	Displays
<code>show interfaces bri 4 1 2</code>	Channels B1 and B2 on BRI interface 4
<code>show interfaces bri</code>	Error message: "% Incomplete command."

Sample Displays

The following is sample output from the `show interfaces bri` command:

```
Router# show interfaces bri 0:1
BRI0:1 is down, line protocol is down
  Hardware is BRI
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set, keepalive not set
  LCP Closed
  Closed: IPCP
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/40, 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, 7 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
```

The following is sample output from the `show interfaces bri` command on a Cisco 7200 series router:

```
Router# show interfaces bri 2/0
BRI2/0 is up, line protocol is up (spoofing)
  Hardware is BRI
  Internet address is 11.1.1.3/27
  MTU 1500 bytes, BW 64 Kbit, DLY 20000 usec, rely 255/255, load 1/255
  Encapsulation PPP, loopback not set
  Last input 00:00:01, output 00:00:01, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0 (size/max/drops); Total output drops: 0
  Queueing strategy: weighted fair
  Output queue: 0/64/0 (size/threshold/drops)
    Conversations 0/1 (active/max active)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    609 packets input, 2526 bytes, 0 no buffer
  Received 0 broadcasts, 0 runts, 0 giants
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    615 packets output, 2596 bytes, 0 underruns
    0 output errors, 0 collisions, 5 interface resets
    0 output buffer failures, 0 output buffers swapped out
    3 carrier transitions
```

Table 36 describes the fields shown in the display.

Table 36 Show Interfaces BRI Field Descriptions

Field	Description
BRI... is {up down administratively down}	Indicates whether the interface hardware is currently active (whether line signal is present) and if it has been taken down by an administrator.
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol consider the line usable (that is, whether keepalives are successful).
Hardware is	Hardware type.
Internet address is	IP address and subnet mask, followed by packet size.
MTU	Maximum transmission unit of the interface.
BW	Bandwidth of the interface in kilobits per second.
DLY	Delay of the interface in microseconds.
rely	Reliability of the interface as a fraction of 255 (255/255 is 100 percent reliability), calculated as an exponential average over 5 minutes.
load	Load on the interface as a fraction of 255 (255/255 is completely saturated), calculated as an exponential average over 5 minutes.
Encapsulation	Encapsulation method assigned to interface.
loopback	Indicates whether loopback is set or not.
keepalive	Indicates whether keepalives are set or not.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a nonfunctioning interface failed.
output	Number of hours, minutes, and seconds since the last packet was successfully transmitted by an interface.
output hang	Number of hours, minutes, and seconds (or never) since the interface was last reset because of a transmission that took too long. When the number of hours in any of the "last" fields exceeds 24 hours, the number of days and hours is printed. If that field overflows, asterisks (**) are printed.
Output queue, drops Input queue, drops	Number of packets in output and input queues. Each number is followed by a slash (/), the maximum size of the queue, and the number of packets dropped due to a full queue.
Five minute input rate Five minute output rate	Average number of bits and packets transmitted per second in the last 5 minutes.
packets input	Total number of error-free packets received by the system.
bytes	Total number of bytes, including data and media access control (MAC) encapsulation, in the error-free packets received by the system.
no buffer	Number of received packets discarded because there was no buffer space in the main system. Compare with ignored count. Broadcast storms on Ethernets and bursts of noise on serial lines are often responsible for no input buffer events.
broadcasts	Total number of broadcast or multicast packets received by the interface.

Table 36 Show Interfaces BRI Field Descriptions (Continued)

Field	Description
runts	Number of packets that are discarded because they are smaller than the medium's minimum packet size.
giants	Number of packets that are discarded because they exceed the medium's maximum packet size.
input errors	Total number of no buffer, runts, giants, CRCs, frame, overrun, ignored, and abort counts. Other input-related errors can also increment the count, so this sum may not balance with the other counts.
CRC	Cyclic redundancy checksum generated by the originating station or far-end device does not match the checksum calculated from the data received. On a serial link, CRCs usually indicate noise, gain hits, or other transmission problems on the data link.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets. On a serial line, this is usually the result of noise or other transmission problems.
overrun	Number of times the serial receiver hardware was unable to hand received data to a hardware buffer because the input rate exceeded the receiver's ability to handle the data.
ignored	Number of received packets ignored by the interface because the interface hardware ran low on internal buffers. Broadcast storms and bursts of noise can increase the ignored count.
abort	Illegal sequence of one bits on a serial interface. This usually indicates a clogging problem between the serial interface and the data link equipment.
packets output	Total number of messages transmitted by the system.
bytes	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the transmitter has been running faster than the router can handle. This may never be reported on some interfaces.
output errors	Sum of all errors that prevented the final transmission of datagrams out of the interface being examined. Note that this may not balance with the sum of the enumerated output errors, because some datagrams may have more than one error, and others may have errors that do not fall into any of the specifically tabulated categories.
collisions	Number of collisions. These can occur when you have several devices connected on a multiport line.
interface resets	Number of times an interface has been completely reset. This can happen if packets queued for transmission were not sent within several seconds. On a serial line, this can be caused by a malfunctioning modem that is not supplying the transmit clock signal or by a cable problem. If the system recognizes that the carrier detect line of a serial interface is up, but the line protocol is down, it periodically resets the interface in an effort to restart it. Interface resets can also occur when an interface is looped back or shut down.
restarts	Number of times the controller was restarted because of errors.
carrier transitions	Number of times the carrier detect signal of a serial interface has changed state. Check for modem or line problems if the carrier detect line is changing state often.

What to Do Next

For more information on the PA-8B-ST and PA-4B-U port adapters, refer to the following publications:

- *PA-8B-ST Basic Rate Interface Port Adapter Installation and Configuration*
- *PA-4B-U Basic Rate Interface Port Adapter Installation and Configuration*