

PA-4R-FDX Token Ring Full-Duplex Port Adapter

Description

The Token Ring full-duplex port adapter (PA-4R-FDX) is available on Cisco 7500 series routers, Cisco 7200 series routers, and Cisco 7000 series routers with the 7000 Series Route Switch Processor (RSP7000) and 7000 Series Chassis Interface (RSP7000CI).

The PA-4R-FDX provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces that can be set for 4 Mbps or 16 Mbps half-duplex or full-duplex operation and early token release. The default for all interfaces is half-duplex 4-Mbps operation with early token release disabled. The PA-4R-FDX connects over Type 1 lobe or Type 3 lobe cables and provides a DB-9 (PC type) receptacle.

Platforms

This feature is supported on these platforms:

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

Configuration Tasks

For information on how to configure the PA-4R-FDX port adapter, refer to the “Configure a Token Ring Interface” section in the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide*.

In addition to the commands in the “Configure a Token Ring Interface” section, the PA-4R-FDX port adapter can also be configured for full-duplex. To enable full-duplex mode on the PA-4R-FDX port adapter, perform the following task in interface configuration mode:

Task	Command
Enable full-duplex on the PA-4R-FDX port adapter.	full-duplex or no half-duplex

For information on other commands that can be used by the PA-4R-FDX interface, refer to the Cisco IOS Release 11.2 configuration guides.

Configuration Example

The following example enables full-duplex mode on PA-4R-FDX interface 3:

```
router(config)# interface tokenring 3/0/0
router(config-if)# ip address 1.1.1.10 255.255.255.0
router(config-if)# full-duplex
router(config-if)# ring-speed 16
router(config-if)# exit
router(config)#
```

Each PA-4R-FDX port adapter interface must be configured for the same ring speed as the ring to which it is connected, either 4 or 16 Mbps. If the interface is set for a different speed, it will cause the ring to beacon, which effectively brings the ring down and makes it inoperable.

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.

- **full-duplex**
- **half-duplex**
- **show interfaces tokenring**

full-duplex

To specify full-duplex mode, use the **full-duplex** interface configuration command. Use the **no** form of this command to restore the default half-duplex mode.

full-duplex
no full-duplex

Syntax Description

This command has no arguments or keywords.

Default

Half-duplex mode.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include the PA-4R-FDX port adapter.

Use this command if your equipment on the other end is capable of full-duplex mode.

Full-duplex mode is supported on the following interfaces:

- Fast Ethernet Interface Processors (FEIP)
- Token Ring full-duplex port adapters (PA-4R-FDX) on Cisco 7200 series routers, Cisco 7500 series routers, and Cisco 7000 series routers with the RSP7000 and RSP7000CI
- FDDI full-duplex, single-mode port adapters (PA-F/FD-SM) and FDDI full-duplex, multimode port adapters (PA-F/FD-MM) on the Cisco 7200 series, Cisco 7500 series routers, and Cisco 7000 series routers with the RSP7000 and RSP7000CI
- Serial interfaces that use bisynchronous tunneling

To enable half-duplex mode, use the **no full-duplex** or **half-duplex** commands.

If the interface does not support full-duplex, an informational message similar to the one shown below is displayed, and no changes are made to the interface. To determine if the interface supports full-duplex, use the **show interfaces** command. For example, the following message is displayed for the PA-4R-FDX if the interface does not support full-duplex:

```
%TokenRing5/0 interface does not support full-duplex.
```

Full-duplex on the FDDI full-duplex port adapters (PA-F/FD-SM and PA-F/FD-MM) allows an FDDI ring with exactly two stations to transform the ring into a full-duplex, point-to-point topology. In order to operate in full-duplex mode, there must be only two stations on the ring, the two stations must be capable of operating in full-duplex mode, and both stations must complete a full-duplex autoconfiguration protocol. There is no FDDI token in full-duplex mode.

Full-duplex autoconfiguration protocol allows an FDDI station to dynamically and automatically operate in either half-duplex (or ring) or full-duplex mode, and ensures that the stations fall back to ring mode when a configuration change occurs, such as a third station joining the ring.

After booting up, the FDDI stations begin operation in half-duplex mode. While the station performs the full-duplex autoconfiguration protocol, the station continues to provide data-link services to its users. Under normal conditions, the transition between half-duplex mode and full-duplex mode is transparent to the data-link users. The data-link services provided by full-duplex mode are functionally the same as the services provided by half-duplex mode.

If you change the full-duplex configuration (for example from disabled to enabled) on supported interfaces, the interface resets.

Examples

The following example configures full-duplex mode on a Cisco 7000 series router:

```
interface fastethernet 0/1
  full-duplex
```

The following example specifies full-duplex binary synchronous communications (BSC) mode:

```
interface serial 0
  encapsulation bstun
  full-duplex
```

The following example enables full-duplex mode on FDDI interface 0:

```
interface fddi 0/1/0
  full-duplex
```

Related Commands

half-duplex
interface fastethernet
interface fddi
interface serial

half-duplex

To specify half-duplex mode, use the **half-duplex** interface configuration command. Use the **no** form of this command to reset the interface for full-duplex mode.

half-duplex
no half-duplex

Syntax Description

This command has no arguments or keywords.

Default

Disabled

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.2.

This command was modified in Cisco IOS Release 11.2 P and 11.1 CA to include the PA-4R-FDX port adapter.

Half-duplex mode is supported on the following interfaces:

- SDLC interfaces
- Token Ring full-duplex port adapters (PA-4R-FDX) on Cisco 7200 series routers, Cisco 7500 series routers, and Cisco 7000 series routers with the RSP7000 and RSP7000CI
- FDDI full-duplex, single-mode port adapters (PA-F/FD-SM) and FDDI full-duplex, multimode port adapters (PA-F/FD-MM) on Cisco 7200 series, Cisco 7500 series routers, and Cisco 7000 series routers with the RSP7000 and RSP7000CI.

The **half-duplex** command is used to configure an SDLC interface for half-duplex mode. The **half-duplex** command deprecates both the **sdlc hdx** and **media-type half-duplex** commands.

To enable full-duplex mode, use the **no half-duplex** or **full-duplex** commands.

Note The **media-type half-duplex** command exists in Cisco IOS Release 11.0(5). As of Release 11.0(6), the keyword **half-duplex** was removed from the **media-type** command, and the functionality for specifying half-duplex mode was provided by the **half-duplex** command.

Example

In the following example, an SDLC interface has been configured for half-duplex mode:

```
encapsulation sdlc-primary
half-duplex
```

Related Command

full-duplex

show interfaces tokenring

To display information about the Token Ring interface and the state of source route bridging, use the **show interfaces tokenring** privileged EXEC command.

show interfaces tokenring *unit* [**accounting**]

show interfaces tokenring *slot*/*port* [**accounting**] (Cisco 7000 series and Cisco 7200 series)

show interfaces tokenring [*slot*/*port-adapter*/*port*] (ports on VIP cards in Cisco 7000 and Cisco 7500 series routers)

Syntax Description

<i>unit</i>	Must match the interface port line number.
accounting	(Optional) Displays the number of packets of each protocol type that have been sent through the interface.
<i>slot</i>	On the Cisco 7000 series, slot location of the interface processor. On the Cisco 7000, the value can be 0, 1, 2, 3, or 4. On the Cisco 7010, value can be 0, 1, or 2. On the Cisco 7200 series, slot location of the port adapter; the value can be 1, 2, 3, 4, 5, or 6.
<i>port</i>	Port number on the interface. On the Cisco 7000 series this argument is required, and the values can be 0, 1, 2, or 3. (Optional) For the VIP card this argument is optional, and the port value can be 0, 1, 2, or 3 for 4-port Token Ring interfaces. On the Cisco 7200 series, the number depends on the type of port adapter installed.
<i>port-adapter</i>	(Optional) On the Cisco 7000 series and Cisco 7500 series, specifies the ports on a VIP card. The value can be 0 or 1.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The information was modified in Cisco IOS Release 11.2 P and 11.1 CA to include the PA-4R-FDX full-duplex Token Ring port adapter.

If you do not provide values for the parameters *slot* and *port*, the command will display statistics for all the network interfaces. The optional keyword **accounting** displays the number of packets of each protocol type that have been sent through the interface.

Sample Displays

The following is sample output from the **show interfaces tokenring** command:

```
Router# show interfaces tokenring

TokenRing 0 is up, line protocol is up
Hardware is 16/4 Token Ring, address is 5500.2000.dc27 (bia 0000.3000.072b)
  Internet address is 150.136.230.203, subnet mask is 255.255.255.0
  MTU 8136 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
  ARP type: SNAP, ARP Timeout 4:00:00
  Ring speed: 16 Mbps
  Single ring node, Source Route Bridge capable
  Group Address: 0x00000000, Functional Address: 0x60840000
  Last input 0:00:01, output 0:00:01, output hang never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five minute output rate 0 bits/sec, 0 packets/sec
  16339 packets input, 1496515 bytes, 0 no buffer
    Received 9895 broadcasts, 0 runts, 0 giants
      0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    32648 packets output, 9738303 bytes, 0 underruns
  0 output errors, 0 collisions, 2 interface resets, 0 restarts
  5 transitions
```

Table 52 describes significant fields shown in the display.

Table 52 Show Interfaces Tokenring Field Descriptions

Field	Description
Token Ring is up down	Interface is either currently active and inserted into ring (up) or inactive and not inserted (down). On the Cisco 7000 series, gives the interface processor type, slot number, and port number.
Token Ring is Reset	Hardware error has occurred.
Token Ring is Initializing	Hardware is up, in the process of inserting the ring.
Token Ring is Administratively Down	Hardware has been taken down by an administrator.
line protocol is {up down administratively down}	Indicates whether the software processes that handle the line protocol believe the interface is usable (that is, whether keepalives are successful).
Hardware	Hardware type. "Hardware is Token Ring" indicates that the board is a CSC-R board. "Hardware is 16/4 Token Ring" indicates that the board is a CSC-R16 board. Also shows the address of the interface.
Internet address	Lists the Internet address followed by subnet mask.
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% reliability), calculated as an exponential average over 5 minutes.

Table 52 Show Interfaces Tokenring Field Descriptions (Continued)

Field	Description
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.
ARP type:	Type of Address Resolution Protocol assigned.
Ring speed:	Speed of Token Ring—4 or 16 Mbps. For the PA-4R-FDX port adapter, this field also indicates if the port adapter is operating in full-duplex mode.
{Single ring/multiring node}	Indicates whether a node is enabled to collect and use source routing information (RIF) for routable Token Ring protocols.
Group Address:	Interface's group address, if any. The group address is a multicast address; any number of interfaces on the ring may share the same group address. Each interface may have at most one group address.
Last input	Number of hours, minutes, and seconds since the last packet was successfully received by an interface. Useful for knowing when a dead interface failed.
Last 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.
Last clearing	Time at which the counters that measure cumulative statistics (such as number of bytes transmitted and received) shown in this report were last reset to zero. Note that variables that might affect routing (for example, load and reliability) are not cleared when the counters are cleared. *** indicates the elapsed time is too large to be displayed. 0:00:00 indicates the counters were cleared more than 2 ³¹ ms (and less than 2 ³² ms) ago.
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. The 5-minute input and output rates should be used only as an approximation of traffic per second during a given 5-minute period. These rates are exponentially weighted averages with a time constant of 5 minutes. A period of four time constants must pass before the average will be within two percent of the instantaneous rate of a uniform stream of traffic over that period.
packets input	Total number of error-free packets received by the system.

Table 52 Show Interfaces Tokenring Field Descriptions (Continued)

Field	Description
bytes input	Total number of bytes, including data and MAC encapsulation, in the error free packets received by the system.
no buffers	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.
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.
CRC	Cyclic redundancy checksum generated by the originating LAN station or far-end device does not match the checksum calculated from the data received. On a LAN, this usually indicates noise or transmission problems on the LAN interface or the LAN bus itself. A high number of CRCs is usually the result of a station transmitting bad data.
frame	Number of packets received incorrectly having a CRC error and a noninteger number of octets.
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. These buffers are different than the system buffers mentioned previously in the buffer description. Broadcast storms and bursts of noise can cause the ignored count to be increased.
packets output	Total number of messages transmitted by the system.
bytes output	Total number of bytes, including data and MAC encapsulation, transmitted by the system.
underruns	Number of times that the far-end transmitter has been running faster than the near-end router's receiver 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, as 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	Because a Token Ring cannot have collisions, this statistic is nonzero only if an unusual event occurred when frames were being queued or dequeued by the system software.
interface resets	Number of times an interface has been reset. The interface may be reset by the administrator or automatically when an internal error occurs.

Table 52 Show Interfaces Tokenring Field Descriptions (Continued)

Field	Description
Restarts	Should always be zero for Token Ring interfaces.
transitions	Number of times the ring made a transition from up to down, or vice versa. A large number of transitions indicates a problem with the ring or the interface.

The following is sample output from the **show interfaces tokenring** command on a Cisco 7000 series router:

```
Router# show interfaces tokenring 2/0

TokenRing2/0 is administratively down, line protocol is down
  Hardware is cxBus Token Ring, address is 0000.3040.8b4a (bia 0000.3040.8b4a)
  MTU 8136 bytes, BW 16000 Kbit, DLY 630 usec, rely 255/255, load 1/255
  Encapsulation SNAP, loopback not set, keepalive set (10 sec)
  ARP type: SNAP, ARP Timeout 4:00:00
  Ring speed: 0 Mbps
  Single ring node, Source Route Transparent Bridge capable
  Ethernet Transit OUI: 0x0000F8
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Output queue 0/40, 0 drops; input queue 0/75, 0 drops
  Five minute input rate 0 bits/sec, 0 packets/sec
  Five 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, 1 interface resets, 0 restarts
  1 transitions
```

The following example on a Cisco 7000 series router includes the **accounting** option. When you use the accounting option, only the accounting statistics are displayed.

```
Router# show interfaces tokenring 2/0 accounting

TokenRing2/0
  Protocol    Pkts In   Chars In   Pkts Out   Chars Out
    IP          7344     4787842    1803       1535774
  Appletalk   33345    4797459    12781      1089695
    DEC MOP         0         0          127        9779
    ARP             7         420         39         2340
```

What to Do Next

For more information on the PA-4R-FDX port adapter, refer to the *PA-4R-FDX Full-Duplex Token Ring Port Adapter Installation and Configuration* publication.