

PA-4R-DTR Dedicated Token Ring Port Adapter

Description

The Dedicated Token Ring port adapter (PA-4R-DTR) 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-DTR provides up to four IBM Token Ring or IEEE 802.5 Token Ring interfaces. Each Token Ring interface can be set for 4 Mbps or 16 Mbps half-duplex or full-duplex operation and can operate as a standard Token Ring station or as a concentrator port. The default for all interfaces is Token Ring station mode with half-duplex 16-Mbps operation. The PA-4R-DTR connects over Type 1 lobe or Type 3 lobe cables, with each interface providing an RJ-45 receptacle.

Platforms

This feature is supported on the following 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-DTR port adapter, refer to the *4-Port Dedicated Token Ring Port Adapter Installation and Configuration* publication or to “Configure a Token Ring Interface” section in the “Configuring Interfaces” chapter of the *Configuration Fundamentals Configuration Guide.s*

In addition to the commands in the “Configure a Token Ring Interface” section, each PA-4R-DTR port adapter interface can also be separately configured to operate as a concentrator port. By default, the PA-4R-DTR operates as a standard Token Ring station.

Following are the configuration and maintenance tasks described in this section:

- Enable Token Ring Concentrator Port
- Monitor and Maintain the Port

For information on other commands that can be used by the PA-4R-DTR interface, refer to the Cisco IOS Release 11.3 configuration guides.

Enable Token Ring Concentrator Port

To enable an interface to operate as a concentrator port, perform the following task in interface configuration mode:

Task	Command
Specify concentrator port operation.	port

Monitor and Maintain the Port

To monitor the Token Ring Concentrator Port, perform one or more of the following tasks in EXEC mode:

Task	Command
Display internal state information about the Token Ring interfaces in the system.	show controllers token
Provide high-level statistics for a particular interface.	show interface token

Configuration Example

The following example enables full-duplex mode on PA-4R-DTR interface 3/0/0, and configures the interface to operate as a concentrator port:

```
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)# port
router(config-if)# exit
router(config)#
```

Each PA-4R-DTR 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 11.3 Command Reference.

- port
- show controllers token
- show interfaces tokenring

port

To enable an interface on a PA-4R-DTR to operate as a concentrator port, use the **port** interface configuration command. Use the **no** form of this command to restore the default station mode.

port
no port

Syntax Description

This command has no arguments or keywords.

Default

Station mode.

Command Mode

Interface configuration

Usage Guidelines

This command first appeared in Cisco IOS Release 11.3(3)T.

By default, the interfaces of the PA-4R-DTR operate as Token Ring stations. Station mode is the typical operating mode. Use this command to enable an interface to operate as a concentrator port.

Example

The following example configures the PA-4R-DTR ports to operate in concentrator mode on a Cisco 7000 series router:

```
router# configure terminal
router(config)# interface tokenring 3/0/0
router(config-if)# port
```

show controllers token

To display information about memory management, error counters, the CSC-IR, CSC-2R or CSC-R16M Token Ring interface cards, PA-4R, PA-4R-FDX, or the PA-4R-DTR dedicated Token Ring port adapter, use the **show controllers token** privileged EXEC command:

show controllers token

Syntax Description

This command has no arguments or keywords.

Default

None.

Command Mode

Privileged EXEC

Usage Guidelines

This command first appeared in Cisco IOS Release 10.0.

The information was modified in Cisco IOS Release 11.3(3)T to include the PA-4R-FDX full-duplex Token Ring port adapter

Depending on the board being used, the output can vary. This command also displays information that is proprietary to Cisco. Thus, the information that the **show controllers token** command displays is of primary use to Cisco technical personnel. Information that is useful to users can be obtained using the **show interfaces tokenring** command.

Example

The following is sample output on the PA-4R-DTR from the **show controllers** command:

```
router #show controller token 4/0
```

```
Interface TokenRing4/0 state: up
Data from IDB:
  Current MAC address: 0008.2a36.1a04, Burned in MAC address: 0008.2a36.1a04
  Group address: 80000000
  Functional address: 08000000, enables: CDP
  Ring mode: 0000, enables:

Last Ring Status: none
  Stats: soft: 0/0, hard: 0/0, sig loss: 0/0, throttle: 0/0
         tx beacon: 0/0, wire fault 0/0, recovery: 0/0
         only station: 0/0, remote removal: 0/0
Interface failures: 0
```

The current operating mode can be one of the following: classic Token Ring station (standard half-duplex Token Ring station), DTR station (full-duplex Token Ring station), and DTR concentrator (concentrator port). In this case, the current operating mode is classic Token Ring station:

```
Current operating mode:
Classic token ring station
```

The MAC state indicates the state of the token ring MAC layer protocol. The state can be not inserted (not connected to any ring), inserting (currently entering a ring), and inserted (connected to an active token ring):

```

MAC state: inserted
Duplex: half
Access protocol: TKP
Ring speed: 16 Mbps
Ring monitor role: Standby monitor

Internal controller data:
MAC microcode version: 0.240
Hawkeye ASIC revision: 0
Node address: 0008.2a36.1a04
Functional address: 08000000, Group address: 80000000
Hawkeye ASIC registers:
  last hisr: 0004h, himr: 00002ABFh, inpace: 0000h
  utility: 6316h, txphthre: 1010h, rxtxdmathre: 2828h
  dmactrl: 0000E004h, earlyrxthre: 0000h, llcstop: 0000h
  reset: 0000h
  txhidescstart: 4B0A45C0h, txlodescstart: 00000000h
  rxdescstart: 4B0A4180h, srbctrl: 0038h, descipoll: 0100h
  congestcnt: 0000h
Hawkeye transmit error counts:
  Underrun: 0/0
Hawkeye receive error counts:
  Out of descriptors: 0/0, Giants: 0/0
  Corrupted frames: 0/0, CRC errors: 0/0
  FIFO overflow: 0/0
Device driver ring buffer data:
  Transmit ring:
    Descriptors outstanding (curr/max): 0/256
    Head pointer: 7   Tail pointer: 7
  Receive ring:
    Ring size: 64 descriptors
    Head pointer: 7
Internal controller soft error counts:
  Line errors: 0/0, Internal errors: 0/0
  Burst errors: 0/0, ARI/FCI errors: 0/0
  Abort errors: 0/0, Lost frame errors: 0/0
  Copy errors: 0/0, Receiver congestion: 0/0
  Token errors: 0/0, Frequency errors: 0/0
Internal controller SMT state:
Adapter MAC:      0008.2a36.1a04, Physical drop:      00000000
NAUN address:    0060.3ebb.0a21, NAUN drop:          00000000
Last beacon src: 0000.0000.0000, Last poll:         0060.3ebb.0a21
Last MVID:       0006, Last attn code:             0000
Txmit priority: 0007, Auth funct class:           FFFF
Monitor error:  0000, Front end errors:            0000
Correlator:      0000, Soft error timer:           00C8
Local ring:      0000, Ring status:              0000
Beacon rcv type: 0000, Beacon txmit type:         0000
Last beacon type: 0000, Bcn station NAUN:         0000.0000.0000
Beacon drop:     00000000, Phantom support:       0000
Access prot req: 0000, Access prot resp:          0000
Policy flags:    0110, Protocol event state:000D
Ctrl ring state: 0001, Protocol join state:         0000
Reserved:        0000, Protocol mon state:         0000
router#

```

Following is an example of the **show controller token** output for a Token Ring interface in a full-duplex port mode:

```

router#show controllers token 4/1

Interface TokenRing4/1 state: up
  Data from IDB:
    Current MAC address: 0008.2a36.1a84, Burned in MAC address: 0008.2a36.1a84
    Group address: 80000000
    Functional address: 08000000, enables: CDP
    Ring mode: 0000, enables:

  Last Ring Status: none
    Stats: soft: 0/0, hard: 0/0, sig loss: 0/0, throttle: 0/0
          tx beacon: 0/0, wire fault 0/0, recovery: 0/0
          only station: 0/0, remote removal: 0/0
  Interface failures: 0

  Current operating mode:
    DTR concentrator
      MAC state: port open, station connected
      Mode: port
      Duplex: full
      Access protocol: TXI
      Ring speed: 16 Mbps
      Ring monitor role: Standby monitor

  Internal controller data:
    MAC microcode version: 0.240
    Hawkeye ASIC revision: 0
    Node address: 0008.2a36.1a84
    Functional address: 08000000, Group address: 80000000
    Hawkeye ASIC registers:
      last hisr: 0008h, himr: 00002ABFh, inpace: 0000h
      utility: 6316h, txphtre: 1010h, rtxxdmathre: 2828h
      dmactrl: 0000E004h, earlyrxthre: 0000h, llcstop: 0000h
      reset: 0000h
      txhidescstart: 4B0A5A40h, txlodescstart: 00000000h
      rxdescstart: 4B0A5600h, srbctrl: 0038h, descipoll: 0100h
      congestcnt: 0000h
    Hawkeye transmit error counts:
      Underrun: 0/0
    Hawkeye receive error counts:
      Out of descriptors: 0/0, Giants: 0/0
      Corrupted frames: 0/0, CRC errors: 0/0
      FIFO overflow: 0/0
    Device driver ring buffer data:
      Transmit ring:
        Descriptors outstanding (curr/max): 0/256
        Head pointer: 5   Tail pointer: 5
      Receive ring:
        Ring size: 64 descriptors
        Head pointer: 2
    Internal controller soft error counts:
      Line errors: 0/0, Internal errors: 0/0
      Burst errors: 0/0, ARI/FCI errors: 0/0
      Abort errors: 0/0, Lost frame errors: 0/0
      Copy errors: 0/0, Receiver congestion: 0/0
      Token errors: 0/0, Frequency errors: 0/0
    Internal controller SMT state:
      Adapter MAC:      0008.2a36.1a84, Physical drop:      00000000
      NAUN address:    0008.2a36.1a44, NAUN drop:          00000000
      Last beacon src: 0000.0000.0000, Last poll:         0000.0000.0000
      Last MVID:      0006, Last attn code:             0000
      Txmit priority: 0007, Auth funct class:           FFFF

```

Command Reference

Monitor error:	0000,	Front end errors:	0000
Correlator:	0000,	Soft error timer:	00C8
Local ring:	0000,	Ring status:	0000
Beacon rcv type:	0000,	Beacon txmit type:	0000
Last beacon type:	0000,	Bcn station NAUN:	0000.0000.0000
Beacon drop:	00000000,	Phantom support:	0001
Access prot req:	0002,	Access prot resp:	0000
Policy flags:	0590,	Protocol event state:	000D
Ctrl ring state:	0001,	Protocol join state:	0007
Reserved:	0000,	Protocol mon state:	0002

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 routers, 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 routers, 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 routers 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 routers, the number depends on the type of port adapter installed.
<i>port-adapter</i>	(Optional) On the Cisco 7000 series and Cisco 7500 series routers, 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 11.3(3)T 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 tokenring4/0
garfield#sh int tok4/0
TokenRing4/0 is up, line protocol is up
  Hardware is HAWKEYE, address is 0008.2a36.1a04 (bia 0008.2a36.1a04)
  Internet address is 172.20.4.2/24
  MTU 4464 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 04:00:00
  Ring speed: 16 Mbps
  Duplex: full
  Mode: DTR station
  Full duplex capable, DTR concentrator port capable
  Multiring disabled, Source Route Transparent Bridge capable
  Group Address: 0x00000000, Functional Address: 0x08000000
  Ethernet Transit OUI: 0x000000
  Last input never, output 00:00:07, 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
    3 packets output, 489 bytes, 0 underruns
    0 output errors, 0 collisions, 5 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 transitions
```

Table 1 describes significant fields shown in the display.

Table 1 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 routers, 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 and 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. "Hardware is HAWKEYE" indicates that the board is the Olicom Hawkeye Token Ring board. Hardware is IBM 2692 for the PA-4R-DTR board.
Internet address	Lists the Internet address followed by subnet mask.
MTU	Maximum transmission unit of the interface.

Table 1 Show Interfaces Tokenring Field Descriptions (Continued)

Field	Description
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.
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).
Duplex	For the PA-4R-FDX port adapter, this field indicates if the port adapter is operating in full-duplex mode or half-duplex mode.
Mode	Indicates whether or not the interface is running as a Token Ring station or as a concentrator port. Values may be one of the following: <ul style="list-style-type: none"> • Classic token ring station (standard half-duplex Token Ring station) • DTR station (full-duplex Token Ring station) • DTR concentrator port (running as a concentrator port) • DTR concentrator port, currently operating in station emulation mode (the interface is configured as a concentrator port, but is connected to another concentrator port and is an emulating station).
{Single ring/multiring node}	Indicates whether a node is enabled to collect and use source routing information field (RIF) data 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. This information is 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.

Table 1 Show Interfaces Tokenring Field Descriptions (Continued)

Field	Description
Last clearing	<p>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.</p> <p>Asterisks (***) indicate the elapsed time is too large to be displayed.</p> <p>0:00:00 indicates the counters were cleared more than 2^{31} ms (and less than 2^{32} ms) ago.</p>
Output queue, drops Input queue, drops	<p>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 because of a full queue.</p>
Five minute input rate, Five minute output rate	<p>Average number of bits and packets transmitted per second in the last 5 minutes.</p> <p>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.</p>
packets input	Total number of error-free packets received by the system.
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 check generated by the originating LAN station or far-end device does not match the check 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.

Table 1 Show Interfaces Tokenring Field Descriptions (Continued)

Field	Description
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.
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
```

What to Do Next

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-DTR port adapter, refer to the *4-Port Dedicated Token Ring Port Adapter Installation and Configuration* publication.