

Chapter 16

Monitoring PICs

You monitor and maintain Physical Interface Cards (PICs) to ensure that they receive incoming packets from the network and transmit outgoing packets to the network. (See Table 48.)

Table 48: Checklist for Monitoring PICs

Monitor PIC Tasks	Command or Action
Understanding PICs on page 184	
PIC Location, Row, and Slot Numbering on page 185	
Checking the PIC Status on page 186	
1. Display the PIC Media Type and FPC Status on page 186	show chassis fpc pic-status show chassis pic pic-slot # fpc-slot #
2. Display the PIC Interface Status Information on page 187	show interfaces terse
3. Check the PIC LED States on page 188	Check the PIC port LEDs.
Checking PIC Alarms on page 189	
1. Check Current Chassis Alarms on page 189	show chassis alarms show chassis craft-interface
2. Display Error Messages in the System Log File on page 190	show log messages match PIC
Verifying PIC Failure on page 190	
1. Perform a PIC Swap Test on page 190	Replace the PIC with one that you know works, then use the show chassis fpc pic-status command.
2. Display PIC Hardware Information on page 191	show chassis hardware
3. Locate the PIC Serial Number ID Label on page 192	Look on the right side of the top of the PIC if horizontally oriented. Look on the left side of the PIC if vertically oriented.
Replacing a PIC on page 195	See “Return the Failed Component” on page 86. Follow the procedure in the appropriate router hardware guide. See also the appropriate PIC guide.

Understanding PICs

Purpose Inspect PICs to ensure that data packets are received from and transmitted to the network for supported media types.

What Is a PIC A PIC is an interface card through which network cables carry data transmissions to and from the network plug. A PIC installs into a Flexible PIC Concentrator (FPC).

PICs are hot-removable and hot-insertable. Removing or inserting a PIC causes a brief interruption of forwarding performance. Each PIC has an ejector lever at the bottom of its faceplate that allows for easy removal from the router.

Table 49 lists some PIC characteristics for each routing platform. A PIC performs framing and line-speed signaling for its media type.

Table 49: PIC Characteristics Per Routing Platform

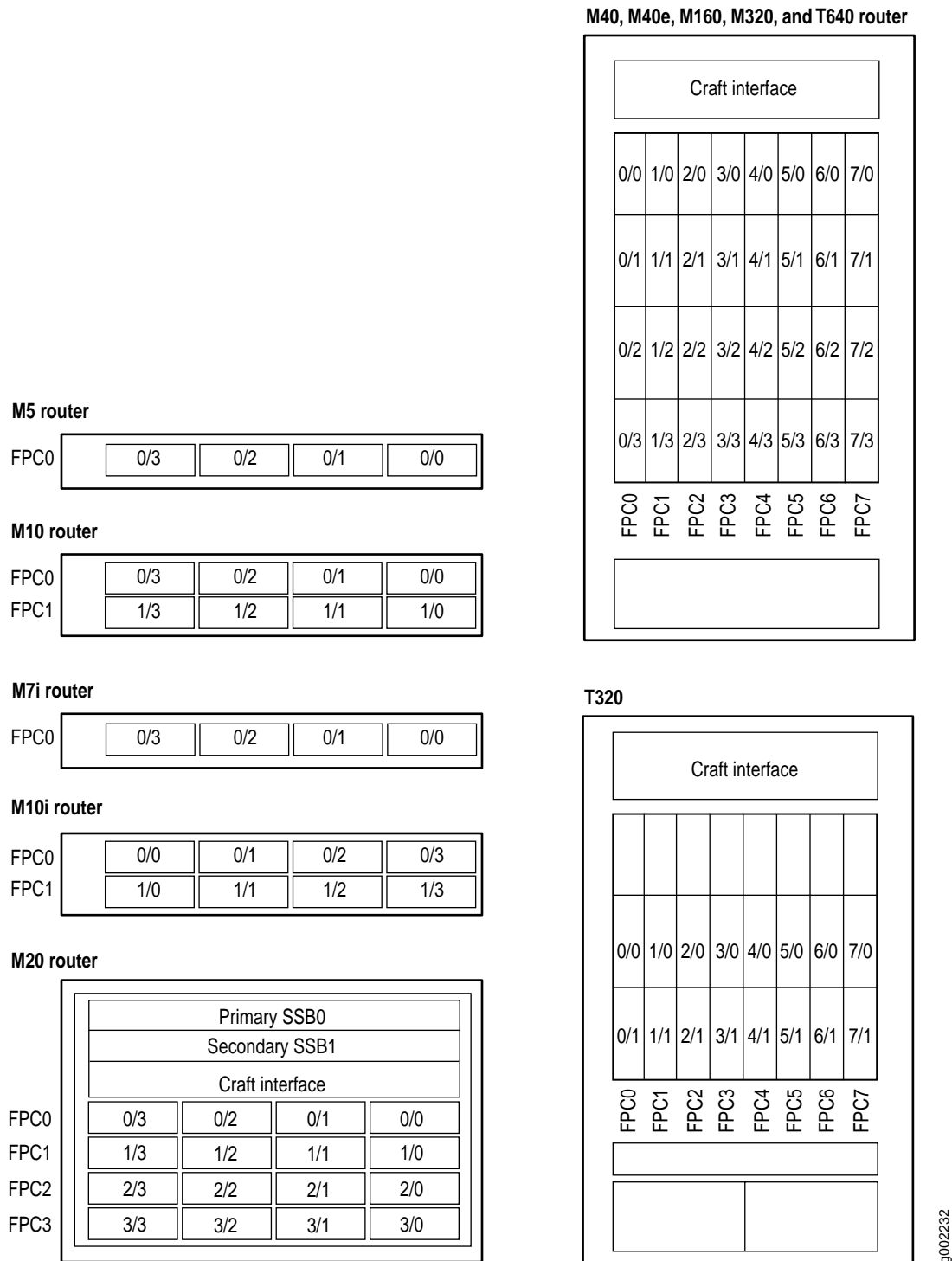
PIC Characteristic	M5/ M10	M7i	M10i	M20	M40	M40e	M160	M320	T320	T640
Single-wide PICs per FPC	4/8	4	8	16	32	32	32	32	16 (2 PICs per FPC)	32
Accepts Quad-wide PIC	Yes, M10 Internet router only	Yes	Yes, FPC not required	Yes, FPC not required	No	Yes, FPC not required	N/A	2 PICs per FPC3	N/A	N/A

Before transmitting outgoing data packets, the PICs encapsulate packets received from the FPCs. Each PIC is equipped with an application-specific integrated circuit (ASIC) that performs control functions specific to the PIC's media type.

For a listing of PICs supported for each routing platform, see the appropriate router hardware guide and the router PIC guide.

Figure 65 on page 185 shows the PIC location in each router and the corresponding row and slot numbering.

Figure 65: PIC Location, Row, and Slot Numbering



See Also “Monitoring FPCs” on page 163

Checking the PIC Status

Steps To Take To check the PIC status, follow these steps:

1. Display the PIC Media Type and FPC Status on page 186
2. Display the PIC Interface Status Information on page 187
3. Check the PIC LED States on page 188

Step 1: Display the PIC Media Type and FPC Status

Action To display the PIC media type and FPC status, use the following JUNOS command-line interface (CLI) operational mode command:

```
user@host> show chassis fpc pic-status
```

Sample Output user@host> show chassis fpc pic-status

```
Slot 0 Online
  PIC 0 1x OC-12 SONET, MM
  PIC 1 4x OC-3 SONET, SMIR
  PIC 2 4x E1, BNC
  PIC 3 1x CSTM1, SMIR
Slot 1 Online
  PIC 0 4x CT3
Slot 2 Online
  PIC 0 1x Tunnel
Slot 4 Online
Slot 5 Offline
Slot 6 Online
  PIC 0 1x OC-192 12xMM VSR
```

What It Means The command output displays the status for all FPCs installed in the router and a description of the PICs installed in each FPC, including the number of ports, media type, mode, and reach. The FPCs in slots 0, 1, 2, 4, and 6 are online. The FPC in slot 5 is offline. The PICs installed in the router include SONET, E1, Channelized STM1, CT3, Tunnel, and OC192 media PICs.

In the example, PIC 0 is one-port, SONET, OC12, and multimode.

For more detailed information about PIC types, see the appropriate router PIC guide.

Alternative Actions To check PIC status including port information, use the show chassis pic pic-slot # fpc-slot # CLI command. The command output for an M10i router displays the PIC type, ASIC type, operating status, PIC version, and how long the PIC has been online. Additionally, the command output displays the PIC port number, type, small form-factor pluggable transceiver (SFP) vendor, and part number information.

```
user@host> show chassis pic pic-slot 0 fpc-slot 1
```

Sample Output

```

user@host> show chassis pic pic-slot 0 fpc-slot 1
PIC fpc slot 1 pic slot 0 information:
  Type          1x OC-48 SONET SFP
  ASIC type      D chip
  State          Online
  PIC version    1.1
  Uptime        7 days, 13 hours, 29 minutes, 51 seconds

PIC Port Information:
  Port   Cable   SFP      SFP Vendor
  Number Type      Vendor Name  Part Number
  0      OC48 SHORT REACH SumitomoElectric SCP6828-J1-ANE
  1      UNKNOWN CABLE
  2      UNKNOWN CABLE
  3      UNKNOWN CABLE

```

To check the PIC media type and status for a particular FPC, use the `show chassis fpc pic-status fpc-slot` command.

To display PIC hardware information, including the media type description, use the `show chassis hardware` command.

Syntax `show chassis fpc <pic-status <fpc-slot>>`
`show chassis hardware`

Step 2: Display the PIC Interface Status Information

Action To display the status of each configured interface, use the following JUNOS CLI operational mode command:

```
user@host> show interfaces terse
```

Sample Output

```

user@host> show interfaces terse
Interface  Adman Link Port Local      Remote
so-0/0/0   up   up
so-0/0/0.0 up   up   inet 192.168.36.201  --> 192.168.36.200
so-0/1/0   up   down
so-0/1/1   up   down
e1-0/2/0   up   down
e1-0/2/1   up   down
t1-1/0/0:1 up   down
t1-1/0/0:2 up   down
gr-2/0/0   up   up
ip-2/0/0   up   up
[...Output truncated...]

```

What It Means The command output shows the names of all interfaces configured on the router. The interface name indicates the *media type-fpc/pic/port* (for example, `so-0/0/0.0`). It shows whether the interface is on (up) or off (down) and whether the link state is up or down. Additionally, the output shows the protocol configured on that interface and the local address of the interface, as well as the address of the remote side of a connection for point-to-point interfaces. Refer to the PIC for port numbering.

A line in the sample output shows the status of a SONET interface on FPC 0, PIC 0, port 0, and logical unit number 0. The status of the interface is up. The link status is up. The protocol configured on the interface is `inet`. The local interface IP address is 192.168.36.201 and the remote IP address is 192.168.36.200.

The interface is configured with a /32 subnet. If you configure the interface with a different subnet, the output will be different.

For more detailed information about monitoring interfaces, see the *JUNOS Network Interfaces and Class of Service Configuration Guide*.

Alternative Actions To view more detailed information about a particular interface, use the `show interfaces interface-name brief` command. The command output shows the interface status, link-level type, loopback, device flags, interface flags, keepalive settings, keepalive input, active alarms, and defects.

To view interface status information, use the `show interface descriptions` command. This command displays the interface status and the description given when configured on the router.

Syntax `show interfaces terse <interface-name>`
`show interfaces <interface-name> brief`

Step 3: Check the PIC LED States

For PICs that have a physical port, the LEDs indicate the status of the physical link. If the LED is green, the physical link is up. If the LED is red or amber, the physical link is down. Usually, when the LED is red, the receive port is not receiving a signal. If the LED is amber, the receive port is getting a remote alarm from the device.

For PICs with no physical port, such as a tunnel or encryption PIC, the LED indicates the status of the PIC.

The Tunnel PIC, which has no ports, has a single LED. Each LED has four different states, described in Table 50.

Table 50: Tunnel PIC LEDs

Color	State	Description
Red	Fail	The FPC has detected a PIC failure.
Green	Normal	The port is functioning normally.
Amber	Problem detected; still functioning	To track the problem, use the CLI.
None	Not enabled	The port is not enabled or the PIC is offline.

For M7i and M10i routers, most PICs have an LED labeled STATUS on the PIC faceplate. Some PICs have additional LEDs, often one per port. The meaning of the LED states differs for various PICs. For more information, see the appropriate router PIC guide.

Checking PIC Alarms

Steps To Take To check for PIC alarms, follow these steps:

1. Check Current Chassis Alarms on page 189
2. Display Error Messages in the System Log File on page 190

Step 1: Check Current Chassis Alarms

Action To display current PIC alarms, use the following CLI command:

```
user@host> show chassis alarms
```

Sample Output

```
user@host> show chassis alarms
1 alarms currently active
Alarm time      Class Description
2002-04-08 10:01:20 PDT Major PIC 0/2 failed to initialize
```

What It Means The command output displays the alarm time, severity level, and description.

Alternative Action You can also display PIC alarms by using the following CLI command:

```
user@host> show chassis craft-interface
```

```
user@host> show chassis craft-interface
Red alarm:  LED on, relay on
Yellow alarm: LED off, relay off
Host OK LED: On
Host fail LED: Off
```

```
FPCs  0 1 2 3 4 5 6 7
```

```
-----
Green  * . . * . . . .
Red    . . . . .
```

LCD screen:

```
+-----+
|myrouter|
|1 Alarm active|
|R: PIC 0/2 FAILED|
|         |
+-----+
```

Step 2: Display Error Messages in the System Log File

Action To display PIC error messages in the system log file, use the following CLI command:

```
user@host> show log messages | match PIC
```

Sample Output

```
user@host> show log messages | match PIC
Apr  8 10:01:20 aspirin scb CM: PIC 0/2, ID 0x0206, hardware error, offlined
Apr  8 10:01:20 aspirin alarmd[2671]: Alarm set: FPC color=RED, class=CHASSIS, reason=PIC 0/2 failed to initialize
Apr  8 10:01:20 aspirin fpc0 PIC: PIC 2 discovery error (1)
Apr  8 10:01:20 aspirin fpc0 CMFPC: Hardware error discovering PIC 2, ID 0x0206
Apr  8 10:01:21 aspirin scb CM: ALARM SET: (Major) Slot 0: PIC 0/2 failed to initialize
```

What It Means When a PIC fails, the messages system log file records the time the failure or event occurred, the severity level, a code, and a message description. Use the show log messages command to browse error messages that are generated at least 5 minutes before and after a PIC event. You can also use the show log messages | match PIC command to view specific PIC error messages with common information. Use this information to diagnose a PIC problem and to let the Juniper Networks Technical Assistance Center (JTAC) know what error messages were generated and the router events prior to the problem. For more information about system log messages, see the *JUNOS System Log Messages Reference*.

Verifying PIC Failure

Steps To Take To verify PIC failure, follow these steps:

1. Perform a PIC Swap Test on page 190
2. Display PIC Hardware Information on page 191
3. Locate the PIC Serial Number ID Label on page 192

Step 1: Perform a PIC Swap Test

Action To perform a swap test on a PIC, follow these steps:

1. Ensure that the PIC is firmly seated in the FPC or the FPC slot.
2. If the PIC is firmly seated and still fails, remove it from the FPC. Follow the PIC removal procedure in the appropriate router PIC guide.
3. Check the PIC connector pins.
 - a. If a pin is bent, contact JTAC and generate a Return Material Authorization (RMA). For more information about returning a failed router part, see “Return the Failed Component” on page 86.
 - b. If no pins are bent, install a PIC that you know works into the FPC.
 - c. Check the PIC status by looking at the PIC LEDs and using the show chassis fpc pic-status command (see “Display the PIC Media Type and FPC Status” on page 186).

- If the PIC works, then the PIC you removed is defective. Contact JTAC and generate an RMA. See “Return the Failed Component” on page 86.

Step 2: Display PIC Hardware Information

Action To display PIC hardware information, use the following CLI command:

```
user@host> show chassis hardware
```

Sample Output

```
user@host> show chassis hardware
[...Output truncated...]
FPC 0      REV 03  710-001255  S/N AA9806      FPC Type 1
CPU        REV 02  710-001217  S/N AA9590
PIC 1      REV 05  750-000616  S/N AA1527      1x OC-12 ATM, MM
PIC 2      REV 05  750-000616  S/N AA1535      1x OC-12 ATM, MM
PIC 3      REV 01  750-000616  S/N AA1519      1x OC-12 ATM, MM
FPC 1      REV 02  710-001611  S/N AA9523      FPC Type 2
CPU        REV 02  710-001217  S/N AA9571
PIC 0      REV 03  750-001900  S/N AA9626      1x STM-16 SDH, SMIR
PIC 1      REV 01  710-002381  S/N AD3633      2x G/E, 1000 BASE-SX
FPC 2                      FPC Type OC192
CPU        REV 03  710-001217  S/N AB3329
PIC 0      REV 01                      1x OC-192 SM SR-2
```

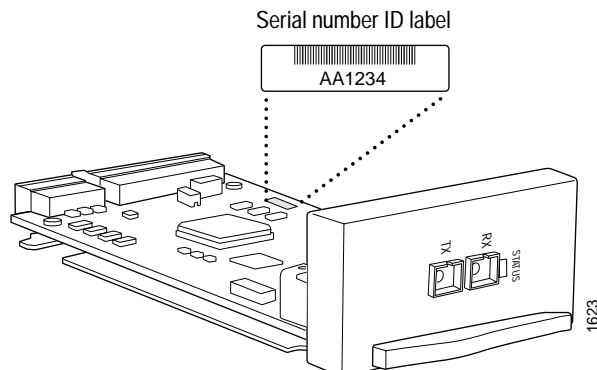
What It Means The command output displays the PIC number, revision level, part number, serial number, and media type.

Step 3: Locate the PIC Serial Number ID Label

Action To locate the PIC serial number ID label, do one of the following:

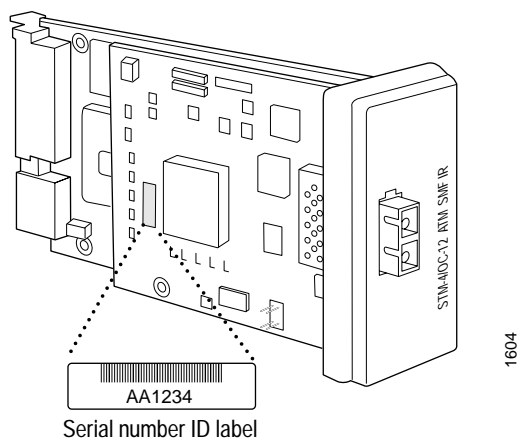
With the PIC in horizontal position, look on the right side of the top of the PIC (see Figure 66).

Figure 66: PIC Serial Number ID Label (Horizontal Orientation)



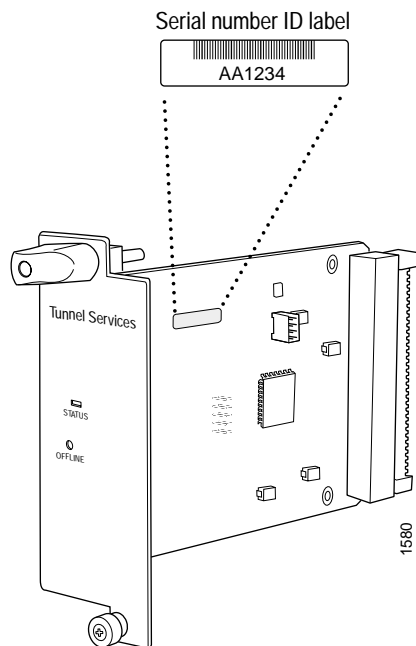
With the PIC in vertical position, look on the left side of the PIC (see Figure 67).

Figure 67: PIC Serial Number ID Label (Vertical Orientation)



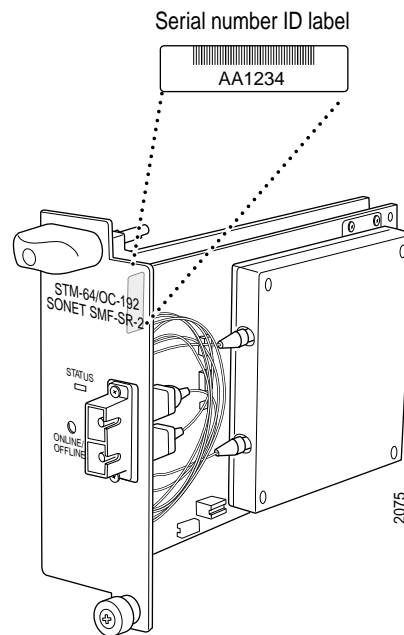
For M320 routers, the serial number ID label is located on the right side of the PIC (see Figure 68) when the PIC is vertically oriented (as it would be installed in the router). The exact location may be slightly different on different PICs, depending on the placement of components on the PIC board.

Figure 68: M320 Router Serial Number ID Label on PIC



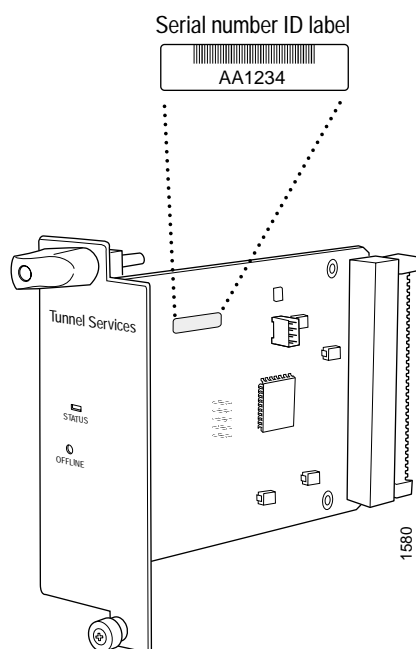
For T320 routers, the serial number ID label is located on the right side of the PIC (see Figure 69) when the PIC is vertically oriented (as it would be installed in the router). The exact location may be slightly different on different PICs, depending on the placement of components on the PIC board.

Figure 69: T320 Router Serial Number ID Label on PIC



For T640 routing nodes, the serial number label is located on the right side of the PIC (see Figure 70) when the PIC is vertically oriented (as it would be installed in the routing node). The exact location may be slightly different on different PICs, depending on the placement of components on the PIC board.

Figure 70: T640 Routing Node Serial Number Label on PIC



Replacing a PIC

Action To remove a PIC, refer to the appropriate PIC guide.

For information about returning a PIC, see “Return the Failed Component” on page 86. To replace a PIC, see the appropriate router hardware guide or PIC guide.