This document describes how to remove and replace an I/O card (IOC) on a Juniper Networks SRX 5800 or SRX 5600 services gateway. The illustrations in this document show the SRX 5600 services gateway, but the instructions apply to both SRX 5800 and SRX 5600 services gateways.

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I/O Cards (IOCs)

The I/O cards (IOCs) are optimized for Ethernet density and are capable of supporting up to 40 Gigabit Ethernet or four 10-Gigabit Ethernet ports (see Figure 1 on page 2). The IOC assembly combines packet forwarding and Ethernet interfaces on a single board, with four 10-Gbps Packet Forwarding Engines. Each Packet Forwarding Engine consists of one I-chip for Layer 3 processing and one Layer 2 network processor. The IOCs interface with the power supplies and Switch Control Boards (SCBs).

The services gateway has a total of 12 slots. You can install IOCs in any of the slots numbered 0 through 5 on an SRX 5600 services gateway, and 0 through 5, 2/6, and 7 through 11 on an SRX 5800 services gateway, left to right.

The slots at the middle of the SRX 5800 card cage or at the bottom of the SRX 5600 card cage, numbered 0 and 1, are reserved for SCBs. IOCs install in the front of the device (see Figure 2 on page 3). You can install any combination of IOC types in the device.

If a slot is not occupied by a card, a blank panel must be installed to shield the empty slot and to allow cooling air to circulate properly through the services gateway.

Figure 1 on page 2 shows the IOCs supported on the SRX 5600 and SRX 5800 services gateways.

Figure 1: IOCs Supported On the SRX 5600 and SRX 5800

IOC 40x1GE

IOC 4x10GE
IOC Components

Each IOC consists of the following components:

- IOC cover, which functions as a ground plane and a stiffener.
- Fabric interfaces.
- Two Gigabit Ethernet interfaces that allow control information, route information, and statistics to be sent between the Routing Engine and the CPU on the IOCs.
- Two interfaces from the SCBs that enable the boards to be powered on and controlled.
- Physical IOC connectors.
- Packet Forwarding Engines.
- Midplane connectors and power circuitry.
- Processor subsystem, which includes a 1.2-GHz CPU, system controller, and 1 GB of SDRAM.
- LEDs on the 4–port 10–Gigabit Ethernet faceplate indicate the port status. LEDs are labeled top to bottom 0/0 through 0/3 (see Table 1 on page 3).
- LEDs on the 40–port Gigabit Ethernet faceplate indicate the port status. LEDs are labeled horizontally and left to right 0/0 through 0/5, 1/0 through 1/5, 2/0 through 2/5, and 3/0 through 3/5 (see Table 2 on page 4).

Table 1: 4-port 10–Gigabit Ethernet IOC LEDs

<table>
<thead>
<tr>
<th>Label</th>
<th>Color</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK/FAIL</td>
<td>Green</td>
<td>On steadily</td>
<td>IOC is functioning normally.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>On steadily</td>
<td>IOC has failed.</td>
</tr>
</tbody>
</table>
Table 1: 4-port 10–Gigabit Ethernet IOC LEDs (continued)

<table>
<thead>
<tr>
<th>Label</th>
<th>Color</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TUNNEL</td>
<td>Green</td>
<td>Off</td>
<td>Normal operating mode.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>On steadily</td>
<td>Port configured in tunnel mode.</td>
</tr>
<tr>
<td>LINK</td>
<td>Green</td>
<td>On steadily</td>
<td>Link is active.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Off</td>
<td>No link.</td>
</tr>
</tbody>
</table>

Table 2: 40-port Gigabit Ethernet IOC LEDs

<table>
<thead>
<tr>
<th>Label</th>
<th>Color</th>
<th>State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>OK/FAIL</td>
<td>Green</td>
<td>On steadily</td>
<td>IOC is functioning normally.</td>
</tr>
<tr>
<td></td>
<td>Red</td>
<td>On steadily</td>
<td>IOC has failed.</td>
</tr>
<tr>
<td>LINK</td>
<td>Green</td>
<td>On steadily</td>
<td>Link is active.</td>
</tr>
<tr>
<td></td>
<td>Off</td>
<td></td>
<td>No link.</td>
</tr>
</tbody>
</table>

Two LEDs, located on the craft interface above the IOC, display the status of the IOC and are labeled OK and FAIL. For more information on the IOC LEDs located on the craft interface, see the SRX 5800 Services Gateway Hardware Guide or SRX 5600 Services Gateway Hardware Guide.

Handling and Storing Cards

This section explains how to avoid damaging the cards (IOCs, SPCs, and host subsystems) that you install into the services gateway. Many components on the cards are fragile.

CAUTION: Failure to handle cards as specified in this document can cause irreparable damage.

This section discusses how to hold cards in both the vertical and horizontal positions. Regardless of orientation, this section uses the same terms for all four edges of the card (see Figure 3 on page 5):

- **Faceplate**—Edge of the card that has connectors to which you connect cables or sockets for SFP or XFP transceivers
- **Connector edge**—Edge opposite the faceplate; this edge has the connectors that attach to the midplane
- **Top edge**—Edge at the top of the card when it is vertical
- **Bottom edge**—Edge at the bottom of the card when it is vertical
NOTE: The instructions in this section apply to all card types.

Figure 3: Card Edges

Holding a Card

When you carry a card, you can hold it either vertically or horizontally.

NOTE: A card weighs up to 13.1 lb (5.9 kg). Be prepared to accept the full weight of the card as you lift it.

To hold a card vertically:

1. Orient the card so that the faceplate faces you. To verify orientation, confirm that the text on the card is right-side up and the electromagnetic interference (EMI) strip is on the right-hand side.

2. Place one hand around the card faceplate about a quarter of the way down from the top edge. To avoid deforming the EMI shielding strip, do not press hard on it.

3. Place your other hand at the bottom edge of the card.

If the card is horizontal before you grasp it, place your left hand around the faceplate and your right hand along the bottom edge.
To hold a card horizontally:

1. Orient the card so that the faceplate faces you.
2. Grasp the top edge with your left hand and the bottom edge with your right hand.

You can rest the faceplate of the card against your body as you carry it.

As you carry the card, do not bump it against anything. Card components are fragile.

Never hold or grasp the card anywhere except places that this document indicates. In particular, never grasp the connector edge, especially at the power connector in the corner where the connector and bottom edges meet (see Figure 4 on page 6).

**Figure 4: Do Not Grasp the Connector Edge**

Do not hold connector edge.
Never carry the card by the faceplate with only one hand.

Do not rest any edge of a card directly against a hard surface (see Figure 5 on page 7).

Do not stack cards.

**Figure 5: Do Not Rest the Card on an Edge**

If you must rest the card temporarily on an edge while changing its orientation between vertical and horizontal, use your hand as a cushion between the edge and the surface.

**Storing a Card**

You must store a card as follows:

- In the device chassis
- In the container in which a spare card is shipped
- Horizontally and sheet metal side down

When you store a card on a horizontal surface or in the shipping container, always place it inside an antistatic bag. Because the card is heavy, and because antistatic bags are fragile, inserting the card into the bag is easier with two people. To do this, one person holds the card in the horizontal position with the faceplate facing the body, and the other person slides the opening of the bag over the card connector edge.
If you must insert the card into a bag by yourself, first lay the card horizontally on a flat, stable surface, sheet metal side down. Orient the card with the faceplate facing you. Carefully insert the card connector edge into the opening of the bag, and pull the bag toward you to cover the card.

Never stack a card under or on top of any other component.

Replacing IOCs

IOCs are installed in the front of the services gateway. The IOCs are hot-insertable and hot-removable. When you remove an IOC, the services gateway continues to function, although the IOC being removed no longer functions. Before replacing an IOC, review the information in “Holding a Card” on page 5. To replace an IOC, use the following procedures:
- Removing an IOC on page 8
- Installing an IOC on page 10

Removing an IOC

An IOC weighs up to 13.1 lb (5.9 kg). Be prepared to accept its full weight.

To remove an IOC (see Figure 6 on page 10):
1. Have ready a replacement IOC or blank panel and an antistatic mat for the IOC. Also have ready rubber safety caps for each IOC you are removing that uses an optical interface.
2. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see “Preventing Electrostatic Discharge Damage” on page 12.
3. Label the cables connected to each port on the IOC so that you can later reconnect the cables to the correct ports.
4. Use one of the following methods to take the IOC offline:
   - Press and hold the corresponding online button on the craft interface. The green OK LED next to the button begins to blink. Hold the button down until the LED goes off.
   - Issue the following CLI command:

     ```
     user@host>request chassis fpc slot slot-number offline
     ```

     For more information about the command, see the JUNOS System Basics and Services Command Reference.

5. Disconnect the cables from the IOC. If the IOC uses fiber-optic cable, immediately cover each transceiver and the end of each cable with a rubber safety cap. Arrange the disconnected cables in the cable management system to prevent the cables from developing stress points.
**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.

**CAUTION:** Do not leave a fiber-optic transceiver uncovered except when inserting or removing cable. The safety cap keeps the port clean and prevents accidental exposure to laser light.

**CAUTION:** Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

6. Simultaneously turn both of the ejector handles counterclockwise to unseat the IOC.
7. Grasp the handles and slide the IOC straight out of the card cage halfway.
8. Place one hand around the front of the IOC and the other hand under it to support it. Slide the IOC completely out of the chassis, and place it on the antistatic mat or in the electrostatic bag.

**CAUTION:** The weight of the IOC is concentrated in the back end. Be prepared to accept the full weight—up to 13.1 lb (5.9 kg)—as you slide the IOC out of the chassis.

When the IOC is out of the chassis, do not hold it by the ejector handles, bus bars, or edge connectors. They cannot support its weight.

Do not stack IOCs on top of one another after removal. Place each one individually in an electrostatic bag or on its own antistatic mat on a flat, stable surface.

9. If you are not reinstalling an IOC into the emptied slot within a short time, install a blank panel over the slot to maintain proper airflow in the card cage.

**CAUTION:** After removing an IOC from the chassis, wait at least 30 seconds before reinserting it, removing an IOC from a different slot, or inserting an IOC into a different slot.
Figure 6: Removing an IOC

Installing an IOC

To install an IOC (see Figure 7 on page 11):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see “Preventing Electrostatic Discharge Damage” on page 12.

2. Place the IOC on an antistatic mat or remove it from its electrostatic bag.

3. Identify the slot on the services gateway where it will be installed.

4. Verify that each fiber-optic transceiver is covered with a rubber safety cap. If it does not, cover the transceiver with a safety cap.

5. Orient the IOC so that the faceplate faces you.

6. Lift the IOC into place and carefully align the sides of the IOC with the guides inside the card cage.

7. Slide the IOC all the way into the card cage until you feel resistance.

8. Grasp both ejector handles and rotate them clockwise simultaneously until the IOC is fully seated.

9. If the IOC uses fiber-optic cable, remove the rubber safety cap from each transceiver and cable.

**WARNING:** Do not look directly into a fiber-optic transceiver or into the ends of fiber-optic cables. Fiber-optic transceivers and fiber-optic cable connected to a transceiver emit laser light that can damage your eyes.

10. Insert the appropriate cables into the cable connector ports on each IOC (see Figure 8 on page 12). Secure the cables so that they are not supporting their own weight. Place excess cable out of the way in a neatly coiled loop, using the cable management system. Placing fasteners on a loop helps to maintain its shape.
**CAUTION:** Do not let fiber-optic cable hang free from the connector. Do not allow fastened loops of cable to dangle, which stresses the cable at the fastening point.

**CAUTION:** Avoid bending fiber-optic cable beyond its minimum bend radius. An arc smaller than a few inches in diameter can damage the cable and cause problems that are difficult to diagnose.

11. Use one of the following methods to bring the IOC online:

- Press and hold the corresponding online button on the craft interface until the green **OK** LED next to the button lights steadily, in about 5 seconds.
- Issue the following CLI command:

```bash
user@host> request chassis fpc slot slot-number online
```

For more information about the command, see the *JUNOS System Basics and Services Command Reference*.

**CAUTION:** After the **OK** LED turns green, wait at least 30 seconds before removing the IOC again, removing an IOC from a different slot, or inserting an IOC in a different slot.

You can also verify that the IOC is functioning correctly by issuing the `show chassis fpc` and `show chassis fpc pic-status` commands, as described in the *JUNOS System Basics and Services Command Reference*.

**Figure 7: Installing an IOC**
Preventing Electrostatic Discharge Damage

Many services gateway hardware components are sensitive to damage from static electricity. Some components can be impaired by voltages as low as 30 V. You can easily generate potentially damaging static voltages whenever you handle plastic or foam packing material or if you move components across plastic or carpets. Observe the following guidelines to minimize the potential for electrostatic discharge (ESD) damage, which can cause intermittent or complete component failures:

- Always use an ESD wrist strap or ankle strap, and verify that it is in direct contact with your skin.

**CAUTION:** For safety, periodically check the resistance value of the ESD strap. The measurement should be in the range of 1 to 10 Mohms.

- When handling any component that has been removed from the chassis, verify that the equipment end of your ESD strap is attached to one of the ESD points on the chassis, which are shown in Figure 10 on page 13 and Figure 11 on page 14.
- Avoid contact between the component and your clothing. ESD voltages emitted from clothing can still damage components.
- When removing or installing a component, always place it component-side up on an antistatic surface, in an antistatic card rack, or into an electrostatic bag (see Figure 9 on page 13). If you are returning a component, place it into an electrostatic bag before packing it.
Electrostatic Discharge Point

Figure 10 on page 13 and Figure 11 on page 14 show the location of the ESD point on the front of each chassis.

Figure 10: Front View of a Fully Configured SRX 5600 Services Gateway Chassis
List of Technical Publications

Table 3 on page 14 lists the hardware guides and release notes for Juniper Networks SRX-series services gateways and describes the contents of each document. All documents are available at http://www.juniper.net/techpubs/.

Table 3: Technical Documentation for Supported Devices

<table>
<thead>
<tr>
<th>Book</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hardware Documentation</strong></td>
<td></td>
</tr>
<tr>
<td>SRX 5600 Services Gateway Hardware Guide</td>
<td>Describes how to install, maintain, and troubleshoot the services</td>
</tr>
<tr>
<td>or SRX 5800 Services Gateway Hardware Guide</td>
<td>gateway and components. Each services gateway type has its own</td>
</tr>
<tr>
<td></td>
<td>hardware guide.</td>
</tr>
<tr>
<td><strong>Release Notes</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Technical Documentation for Supported Devices (continued)

<table>
<thead>
<tr>
<th>Book</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>JUNOS Software for SRX-series Services Gateway Release Notes</td>
<td>Summarizes new features and known problems for a particular release of JUNOS software on SRX-series services gateways, including J-Web interface features and problems. The release notes also contain corrections and updates to the manuals and software upgrade and downgrade.</td>
</tr>
</tbody>
</table>

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need postsales technical support, you can access our tools and resources online or open a case with JTAC.

- **Product warranties**—For product warranty information, visit [http://www.juniper.net/support/warranty/](http://www.juniper.net/support/warranty/).
- **JTAC Hours of Operation** —The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- **Find CSC offerings**: [http://www.juniper.net/customers/support/](http://www.juniper.net/customers/support/)
- **Search for known bugs**: [http://www2.juniper.net/kb/](http://www2.juniper.net/kb/)
- **Find product documentation**: [http://www.juniper.net/techpubs/](http://www.juniper.net/techpubs/)
- **Find solutions and answer questions using our Knowledge Base**: [http://kb.juniper.net/](http://kb.juniper.net/)
- **Download the latest versions of software and review release notes**: [http://www.juniper.net/customers/csc/software/](http://www.juniper.net/customers/csc/software/)
- **Search technical bulletins for relevant hardware and software notifications**: [https://www.juniper.net/alerts/](https://www.juniper.net/alerts/)
- **Join and participate in the Juniper Networks Community Forum**: [http://www.juniper.net/company/communities/](http://www.juniper.net/company/communities/)
- **Open a case online in the CSC Case Management tool**: [http://www.juniper.net/cm/](http://www.juniper.net/cm/)

To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool located at [https://tools.juniper.net/SerialNumberEntitlementSearch/](https://tools.juniper.net/SerialNumberEntitlementSearch/).

Opening a Case with JTAC
You can open a case with JTAC on the Web or by telephone.

- Use the Case Management tool in the CSC at http://www.juniper.net/cm/.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, visit us at http://www.juniper.net/support/requesting-support.html.

Revision History