



**JUNOS® Software**

## **Routing Matrix with a TX Matrix Router Feature Guide**

*Release 9.6*

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## **Part 1**

# **Routing Matrix with a TX Matrix Router**

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- Configuring a Routing Matrix with a TX Matrix Router on page 9
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## Chapter 1

# Routing Matrix with a TX Matrix Router Concepts and Reference Material

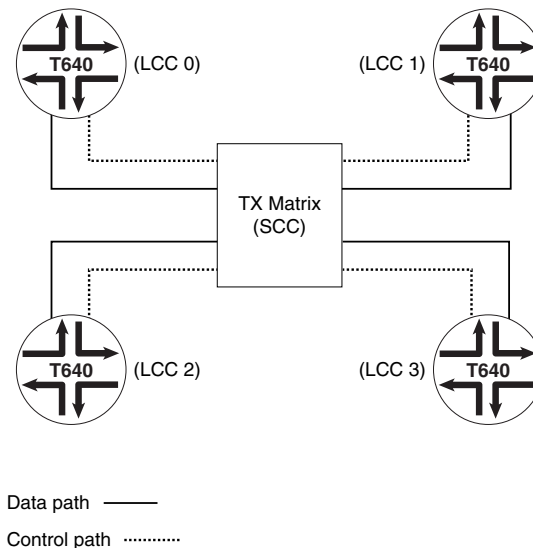
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- System Requirements for the Routing Matrix with a TX Matrix Router on page 6
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### Overview of the Routing Matrix with a TX Matrix Router

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The routing matrix with a TX Matrix router is the first multichassis product from Juniper Networks. The T640 and T320 routers were the first core routers that provided scalable bandwidth and intelligent networking features with a capacity of 80 to 640 gigabits per second (Gbps) of throughput. A key part of the T Series design was the ability to scale individual T640 routers to 2.5 terabits of bandwidth by combining them in a multichassis configuration. Such scalability is now available with the routing matrix.

The physical system of a routing matrix consists of one TX Matrix router and from one to four T640 routers, as shown in Figure 1 on page 4. A key element of the routing matrix design is the ability to migrate existing T640 routers and connect them with the TX Matrix router through fiber-optic cables and Switch Interface Boards (SIBs).

**Figure 1: Routing Matrix with a TX Matrix Router Architecture**

The TX Matrix router connection between the T640 routers uses a scalable, three-stage switch fabric. This system architecture provides terabit bandwidth expansion capacity and eliminates the use of subscriber line cards to connect devices within points of presence (POPs). As a result, the primary application for the routing matrix is to collapse aggregation and core layers in large POPs and central offices.

The routing matrix appears as a single router to the operator and utilizes the existing JUNOS command-line interface (CLI) for configuration and management. To manage this multichassis system, some enhancements have been made to the CLI that allow you to select the amount of output you wish to receive when you issue operational commands. You can specify the entire routing matrix, the TX Matrix router, a specific T640 router and its Flexible PIC Concentrators (FPCs), or a combination thereof.

Similarly, you can limit which portions of the routing matrix are modified during configuration or maintenance procedures (for example, performing software upgrades or halting Routing Engines).

### **Identifying Routing Matrix with a TX Matrix Router Components**

A routing matrix with a TX Matrix router contains two types of chassis:

- TX Matrix router—

There is only one TX Matrix router per routing matrix. It is referred to as the switch-card chassis (scc) in the JUNOS CLI.

- T640 routers—

There can be one to four T640 routers in a routing matrix. These are referred to as line-card chassis 0 through 3 (lcc0–lcc3) in the JUNOS CLI. The T640 router number is set by the hardware. See the *TX Matrix Router Hardware Guide* for further information on installing and connecting the hardware.



## Viewing the Routing Matrix with a TX Matrix Router as a Single Router

Even though a routing matrix with a TX Matrix router can be comprised of five separate physical components (a TX Matrix router and up to four T640 routers), it is best if you consider a routing matrix as a single router. When you issue configuration and operational commands on the TX Matrix router, your view of the routing matrix shows a single routing device with a high number of FPCs and PICs. For a detailed discussion of FPC numbering in a routing matrix with a TX Matrix router, see “Routing Matrix with a TX Matrix Router FPC Numbering” on page 5.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - System Requirements for the Routing Matrix with a TX Matrix Router on page 6
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Routing Matrix with a TX Matrix Router FPC Numbering

A routing matrix with a TX Matrix router can contain up to four T640 routers, and each T640 router can contain up to eight FPCs (numbered 0 through 7). Therefore, the routing matrix as a whole can consist of up to 32 FPCs (numbered 0 through 31).

Each T640 router is assigned a number (LCCs 0 through 3) that depends upon the hardware setup and connectivity to the TX Matrix router. Table 1 on page 5 shows the basic correspondence between the FPC hardware slot numbers in T640 routers and the FPC assignments recognized by a routing matrix.

**Table 1: FPC Correspondence Between T640 Routers and the Routing Matrix with a TX Matrix Router**

T640 Router	T640 FPC Range	Routing Matrix FPC Range
LCC 0	0–7	0–7
LCC 1	0–7	8–15
LCC 2	0–7	16–23
LCC 3	0–7	24–31

To easily convert FPC numbers in the T640 routers to the correct FPC number in a routing matrix, use the conversion chart shown in Table 2 on page 6. You can use the converted FPC number to configure the interfaces on the TX Matrix router in your routing matrix.

**Table 2: T640 to Routing Matrix with a TX Matrix Router FPC Conversion Chart**

FPC Numbering	T640 Routers							
	<b>LCC 0</b>							
<b>T640 FPC Slots</b>	0	1	2	3	4	5	6	7
<b>Routing Matrix FPC Slots Equivalent</b>	0	1	2	3	4	5	6	7
	<b>LCC 1</b>							
<b>T640 FPC Slots</b>	0	1	2	3	4	5	6	7
<b>Routing Matrix FPC Slots Equivalent</b>	8	9	10	11	12	13	14	15
	<b>LCC 2</b>							
<b>T640 FPC Slots</b>	0	1	2	3	4	5	6	7
<b>Routing Matrix FPC Slots Equivalent</b>	16	17	18	19	20	21	22	23
	<b>LCC 3</b>							
<b>T640 FPC Slots</b>	0	1	2	3	4	5	6	7
<b>Routing Matrix FPC Slots Equivalent</b>	24	25	26	27	28	29	30	31

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Adjusting the Configuration to Accommodate Increased FPC Numbers in a Routing Matrix with a TX Matrix Router on page 14
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## System Requirements for the Routing Matrix with a TX Matrix Router

To implement the TX Matrix router, your system must meet these minimum requirements:

- JUNOS Release 7.0 or later
- One TX Matrix router
- Two Juniper Networks T640 routers
- Physical Interface Cards (PICs) of your choice (To view a list of supported PICs, see the *T640 Router PIC Guide*)

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Terms and Acronyms for the Routing Matrix

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### L

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**line-card chassis (LCC)** A T640 router or T1600 router installed in a routing matrix.

### R

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**routing matrix** A high capacity, multichassis router. The routing matrix with a TX Matrix router combines multiple T640 routers with a TX Matrix router switch fabric. The routing matrix with a TX Matrix Plus router combines multiple T1600 routers with a TX Matrix Plus router switch fabric.

### S

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**Switch Interface Board (SIB)** On T640 and T1600 routers and on TX Matrix router and TX Matrix Plus routers, a switch fabric plane component that forwards packets from a source Packet Forwarding Engine to a destination Packet Forwarding Engine.

**switch-card chassis (SCC)** A TX Matrix router installed in a routing matrix.

**switch-fabric chassis (SFC)** A TX Matrix Plus router installed in a routing matrix.

### T

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**TX Matrix Plus router** A high-speed centralized switch fabric that connects multiple T1600 routers in a routing matrix.

**TX Matrix router** A high-speed centralized switch fabric that connects multiple T640 routers in a routing matrix.



## Chapter 2

# Configuring a Routing Matrix with a TX Matrix Router

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## Roadmap to Configuring a Routing Matrix with a TX Matrix Router

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When you configure the routing matrix with a TX Matrix router, you should do some or all of the following:

- You must connect to the Routing Engines of the routing matrix. For information on how to do this, see “Connecting to a Routing Matrix with a TX Matrix Router” on page 11.
- You must configure groups that support the components of the routing matrix. Groups offer a simple way to establish hostnames, management interfaces, and default routes. For more information on how to do this, see “Configuring Groups to Support a Routing Matrix with a TX Matrix Router Components” on page 12.
- You can adjust the configuration to accommodate the number of FPCs installed on the routing matrix. For information on FPC numbering, see “Routing Matrix with a TX Matrix Router FPC Numbering” on page 5. For information on configuring the routing matrix to accommodate FPCs, see “Adjusting the Configuration to Accommodate Increased FPC Numbers in a Routing Matrix with a TX Matrix Router” on page 14.
- You can configure protocols and other features on the routing matrix. Other than the expanded range of FPC numbers for interfaces and the requirement to create groups for the T640 routers, you can configure protocols in exactly the same manner as you would for other Juniper Networks routers.
- For T640 routers, you can configure PIC-specific features, create an alarm for nodes that do not come online, and take a node offline. For more information, see “Option: Configuring Chassis-Specific Statements for a Routing Matrix with a TX Matrix Router” on page 15.
- As with every JUNOS router, you must commit configurations on the routing matrix before they take effect. For information on how to do this, see “Committing Configurations on a Routing Matrix with a TX Matrix Router” on page 16.
- When you upgrade the software on the routing matrix, the new image is loaded on the TX Matrix and distributed to all T640 routers. For more information, see “Upgrading the Software for a Routing Matrix with a TX Matrix Router” on page 17.
- For information about managing system processes in the routing matrix, see “Managing System Processes in the Routing Matrix with a TX Matrix Router” on page 36.
- For information about rebooting the routing matrix or halting routing matrix software components, see “Rebooting and Halting Routing Matrix with a TX Matrix Router Components” on page 37.
- For information about enabling or temporarily disabling routing matrix hardware components, see “Enabling and Disabling Specific Routing Matrix with a TX Matrix Router Hardware Components” on page 38.

- For information about managing files on the routing matrix, see “Managing Files on Routing Engines in a Routing Matrix with a TX Matrix Router” on page 41.
- For information about commonly used commands for the routing matrix, see “Miscellaneous Commands for a Routing Matrix with a TX Matrix Router” on page 42.

**Related Topics**

- Routing Matrix with a TX Matrix Router Solutions Page
- Overview of the Routing Matrix with a TX Matrix Router on page 3
- System Requirements for the Routing Matrix with a TX Matrix Router on page 6
- Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Connecting to a Routing Matrix with a TX Matrix Router

---

The TX Matrix router and every T640 router can each be configured with two Routing Engines to provide redundancy and graceful Routing Engine switchover capabilities. You can connect to each Routing Engine in the following ways:

- Console/AUX—Asynchronous access via the console and auxiliary ports on the TX Matrix router or T640 router Connector Interface Panel (CIP).
- Management Ethernet—Telnet access via the Fast Ethernet ports on the TX Matrix router or T640 router CIPs.
- CLI login from one Routing Engine to another—All Routing Engines in the routing matrix with a TX Matrix router are connected to their respective control boards, which in turn are connected to the CIP on the TX Matrix router (see the *TX Matrix Router Hardware Guide* for more details). After you log in to one Routing Engine, you can connect to another Routing Engine as follows:

```
user@router> request routing-engine login ?
```

Possible completions:

backup	Log in to backup RE
lcc	Log in to LCC (0..3)
master	Log in to master RE
other-routing-engine	Log in to the other Routing Engine
re0	Log in to RE0
re1	Log in to RE1

```
user@router> request routing-engine login lcc ?
```

Possible completions:

<lcc>	Log in to LCC (0..3)
-------	----------------------

```
user@router> request routing-engine login lcc 0 ?
```

Possible completions:

backup	Log in to backup RE
master	Log in to master RE
re0	Log in to RE0
re1	Log in to RE1



**NOTE:** Because the routing matrix appears as a single router, we recommend that you access the master Routing Engine of the TX Matrix router to perform all configuration tasks for the routing matrix. Under normal operating conditions, you do not need to access or configure the T640 router directly. If you access a Routing Engine on a T640 router, the following warning is displayed:

```
user@router> request routing-engine login lcc 0 re0

--- JUNOS 7.0-20040625.1 built 2004-06-25 19:51:38 UTC
%
% cli
warning: This chassis is a Line Card Chassis (LCC) in a multichassis
system.
warning: Use of interactive commands should be limited to debugging.
warning: Normal CLI access is provided by the Switch Card Chassis (SCC).
warning: Use 'request routing-engine login scc' to log into the SCC.
```

To manage the backup Routing Engines on all components (for example, to upgrade JUNOS Software), log in to the TX Matrix router backup Routing Engine and perform the necessary operations.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Configuring Groups to Support a Routing Matrix with a TX Matrix Router Components

For easy maintenance of the chassis in a routing matrix with a TX Matrix router, you can add a configuration group for each Routing Engine in the T640 router and TX Matrix router. The configuration groups added to the TX Matrix router configuration offer a simple way to establish hostnames, management interfaces, and default routes. In the example below, groups **re0** and **re1** refer to the TX Matrix router Routing Engines, while groups **lcc0-re0** and **lcc0-re1** refer to the Routing Engines on T640 router LCC0. To configure groups for the TX Matrix router, include the **re0** and **re1** statements at the **[edit groups]** hierarchy level. To configure groups for the T640 router, include the **lccnumber-re0** and **lccnumber-re1** statements at the **[edit groups]** hierarchy level.

```
[edit]
groups {
  re0 {
    system {
      host-name hostname-scc-re0;
      backup-router ip-address;
    }
    interfaces {
```



```

        fxp0 {
            unit 0 {
                family inet {
                    address ip-address;
                }
            }
        }
    }
}
re1 {
    system {
        host-name hostname-scc-re1;
        backup-router ip-address;
    }
    interfaces {
        fxp0 {
            unit 0 {
                family inet {
                    address ip-address;
                }
            }
        }
    }
}
lcc0-re0 {
    system {
        host-name hostname-lcc0-re0;
        backup-router ip-address;
    }
    interfaces {
        fxp0 {
            unit 0 {
                family inet {
                    address ip-address;
                }
            }
        }
    }
}
lcc0-re1 {
    system {
        host-name hostname-lcc0-re1;
        backup-router ip-address;
    }
    interfaces {
        fxp0 {
            unit 0 {
                family inet {
                    address ip-address;
                }
            }
        }
    }
}
}
apply-groups [ re0 re1 lcc0-re0 lcc0-re1 ];

```

Note that apply groups can be nested. For example, any configuration statements that are common to `lcc0-re0` and `lcc0-re1` can be put into a separate group and then added as an apply group to the `lcc0-re0` and `lcc0-re1` groups, which in turn are applied to the main configuration.

For more information about configuration groups, see the *JUNOS CLI User Guide*.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Adjusting the Configuration to Accommodate Increased FPC Numbers in a Routing Matrix with a TX Matrix Router

---

You must adjust the routing matrix with a TX Matrix router configuration to accommodate increased FPC numbers.

For example, if you have a Gigabit Ethernet interface installed in FPC slot 7, PIC slot 0, port 0 of T640 router LCC 3, you can configure this interface on the TX Matrix router by including the `ge-31/0/0` statement at the `[edit interfaces]` hierarchy level.

```
[edit]
interfaces {
  ge-31/0/0 {
    unit 0 {
      family inet {
        address ip-address;
      }
    }
  }
}
```

For more information about physically connecting T640 routers and a TX Matrix router together in a routing matrix, see the *TX Matrix Router Hardware Guide*. For more information about the interface-naming conventions for a routing matrix, see the *JUNOS Network Interfaces Configuration Guide*.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Routing Matrix with a TX Matrix Router FPC Numbering on page 5
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Configuring Protocols and Other Features for a Routing Matrix with a TX Matrix Router

---

Other than the expanded range of FPC numbers for interfaces and the requirement to create groups for the T640 routers, the configuration of a routing matrix with a TX Matrix router is exactly the same as for all other Juniper Networks routers. You can configure routing protocols, Multiprotocol Label Switching (MPLS) applications, virtual private networks (VPNs), routing and forwarding options, and other software features as usual.

For more information on configuring JUNOS-based routers, see the JUNOS configuration guides.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Option: Configuring Chassis-Specific Statements for a Routing Matrix with a TX Matrix Router

---

You can configure PIC-specific features, such as SONET/SDH framing, on specific T640 routers within the routing matrix with a TX Matrix router. To do so, include the `lcc lcc-number` statement at the `[edit chassis]` hierarchy level and specify the chassis-specific feature to configure.

```
[edit]
chassis {
  lcc lcc-number {
    fpc slot-number { # Use the T640 router FPC hardware slot number.
      pic pic-number {
        ...
      }
    }
  }
}
```



**NOTE:** When you include statements at the `[edit chassis lcc lcc-number]` hierarchy level, specify the actual FPC hardware slot number as labeled on the T640 router chassis. Do not use the routing matrix-based FPC number shown in Table 2 on page 6.

By default, the JUNOS Software allows all T640 routers in the routing matrix to come online. Optionally, you can configure the TX Matrix router to generate an alarm if the T640 routers in the routing matrix do not come online. To configure, include the `online-expected` statement at the `[edit chassis lcc number]` hierarchy level on the TX Matrix router.

```
[edit chassis lcc number]
online-expected;
```

If you do not want a T640 router to be part of the routing matrix, you can configure it to be offline. This is useful when you are performing maintenance on a T640 router. To configure a T640 router so that it is offline, include the **offline** statement at the `[edit chassis lcc number]` hierarchy level.

```
[edit chassis lcc number]
offline;
```

When you are ready to bring the T640 router back online, delete the **offline** configuration statement at the `[edit chassis lcc number]` hierarchy level.



**NOTE:** If you do not configure the **online-expected** or **offline** statement, any T640 router that is part of the routing matrix is allowed to come online. However, if a T640 router does not come online, the TX Matrix router does not generate an alarm.

For more information about chassis-specific statements, see the *JUNOS System Basics Configuration Guide*.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Committing Configurations on a Routing Matrix with a TX Matrix Router

You must commit configuration changes for a routing matrix with a TX Matrix router on the TX Matrix router rather than on the individual T640 routers. If you commit a configuration directly on a T640 router within a routing matrix, the configuration is not distributed to the TX Matrix router or the other T640 routers in the routing matrix. Conversely, all configuration changes you commit on the TX Matrix router are distributed to all the T640 routers in the routing matrix and override any changes committed directly on a T640 router.

There are two main ways to commit configurations on a TX Matrix router. When you issue the **commit synchronize** command, you synchronize the configurations of both the primary and backup Routing Engines on the TX Matrix router and the primary and backup Routing Engines of all the associated T640 routers.

```
user@router# commit synchronize
scc-re0:
configuration check succeeds
lcc0-re1:
commit complete
lcc0-re0:
commit complete
lcc1-re1:
commit complete
```

```
lcc1-re0:
commit complete
scc-re1:
commit complete
scc-re0:
commit complete
```

If you issue the basic form of the **commit** command on the TX Matrix router, this action updates only the master Routing Engines of the TX Matrix router and the T640 routers in the routing matrix.

```
user@router# commit
scc-re0:
configuration check succeeds
lcc0-re0:
commit complete
lcc1-re0:
commit complete
scc-re0:
commit complete
```

#### Related Topics

- Routing Matrix with a TX Matrix Router Solutions Page
- Overview of the Routing Matrix with a TX Matrix Router on page 3
- Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
- Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Upgrading the Software for a Routing Matrix with a TX Matrix Router

By default, when you upgrade software on the TX Matrix router (scc), the new image is loaded onto the TX Matrix router (scc) and distributed to all T640 routers (lcc) in the routing matrix. To avoid unnecessary network disruption during the upgrade, ensure the following before beginning the upgrade process:



**NOTE:** Throughout this document, we use the term TX Matrix router to refer to the switch-card chassis (SCC) and T640 router to refer to the line-card chassis (LCC).

- A minimum of free disk space and DRAM on each Routing Engine. The software upgrade will fail on any Routing Engine without the required amount of free disk space and DRAM. To determine the amount of disk space currently available on all Routing Engines of the routing matrix, use the CLI **show system storage** command. To determine the amount of DRAM currently available on all the Routing Engines in the routing matrix, use the CLI **show chassis routing-engine** command.
- The master Routing Engines of the TX Matrix router (scc) and T640 routers (lcc) are all on **re0** or are all on **re1**.
- The backup Routing Engines of the TX Matrix router (scc) and T640 routers (lcc) are all on **re1** or are all on **re0**.

- All master Routing Engines in all routers run the same version of software. This is necessary for the routing matrix to operate.
- All master and backup Routing Engines run the same version of software before beginning the upgrade procedure. Different versions of the JUNOS Software can have incompatible message formats especially if you turn on GRES. Because the steps in the process include changing mastership, running the same version of software is recommended.
- The same Routing Engine model is used within a TX Matrix router (**scc**) and within a T640 router (**lcc**) of a routing matrix. For example, a routing matrix with an **scc** using two RE-A-2000s and an **lcc** using two RE-1600s is supported. However, an **scc** or an **lcc** with two different Routing Engine models is *not* supported. We suggest that all Routing Engines are the same model throughout all routers in the routing matrix. To determine the Routing Engine type, use the CLI `show chassis hardware | match routing` command.



**NOTE:** It is considered best practice to make sure that all master Routing Engines are **re0** and all backup Routing Engines are **re1** (or vice versa). For the purposes of this document, the master Routing Engine is **re0** and the backup Routing Engine is **re1**.

---

On the TX Matrix router, perform a JUNOS Software upgrade on each Routing Engine separately to avoid unnecessary disruption to network operation. Install the new JUNOS Software release on the backup Routing Engine (**re1**) while keeping the currently running software version on the master Routing Engine (**re0**).

After making sure that the new software version is running correctly on the backup Routing Engine (**re1**), switch mastership over to **re1**, install the new software on the new backup Routing Engine (**re0**) and then revert mastership from **re1** back to **re0**. These changes are propagated to all of the T640 routers in the routing matrix.

To upgrade the JUNOS Software for a routing matrix, perform the following tasks:

- Disabling GRES on the Routing Matrix with a TX Matrix Router on page 18
- Installing Software on All Backup Routing Engines of a Routing Matrix with a TX Matrix Router on page 20
- Loading the New JUNOS Software Version on the Backup Routing Engines of the Routing Matrix with a TX Matrix Router on page 27
- Installing Software on the Master Routing Engines of a Routing Matrix with a TX Matrix Router on page 29
- Finalizing the Installation for a Routing Engine with a TX Matrix Router on page 34

## **Disabling GRES on the Routing Matrix with a TX Matrix Router**

Before upgrading the software on the routing matrix with a TX Matrix router, you must disable graceful Routing Engine switchover (GRES) on all the routers in the routing matrix. To disable GRES, perform the following steps on the TX Matrix router:

1. Log in to the master Routing Engine's (**scc-re0**) console.

```
login: root
Password: xxx
```

```
— JUNOS 9.5R2.1 built 2009-06-05 08:52:23 UTC
%
```

2. Enter the JUNOS Software CLI configuration mode:
  - a. Start the CLI from the shell prompt using the cli command:

```
% cli
{master}
user@host-scc-re0>
```

- b. Launch configuration mode:

```
{master}
user@host-scc-re0> configure
Entering configuration mode

{master} [edit]
user@host-scc-re0 #
```

3. Disable Routing Engine redundancy and verify that the configuration is removed:

```
{master}[edit]
user@host-scc-re0# show chassis
redundancy {
    graceful-switchover;
}

{master}[edit]
user@host-scc-re0# delete chassis redundancy
{master}[edit]
user@host-scc-re0# show chassis
```

4. Save the configuration change on all Routing Engines in the routing matrix and exit the CLI configuration mode:

```
{master}[edit]
user@host-scc-re0# commit synchronize and-quit
scc-re0:
configuration check succeeds
lcc0-re1:
commit complete
lcc0-re0:
commit complete
lcc2-re1:
commit complete
lcc2-re0:
commit complete
scc-re1:
commit complete
scc-re0:
commit complete
```

```
user@host-scc-re0>
```

## ***Installing Software on All Backup Routing Engines of a Routing Matrix with a TX Matrix Router***

Install the new JUNOS Software release on all backup Routing Engines (**re1**) of the TX Matrix router while keeping the currently running software version on the master Routing Engines (**re0**). This enables the master Routing Engines (**re0**) to continue operations, minimizing the disruption to the routing matrix with a TX Matrix router and your network.

To install the software on all of the backup Routing Engines (**re1**), perform the following steps:

1. Log in to the backup TX Matrix router (**re1**) Routing Engine's console.

For more information on logging in to the Routing Engine through the console port, see the administration manual for your particular router.

2. To upgrade software for all the backup Routing Engines (**re1**) in the routing matrix, issue the **request system software add** command. Below is an example of the **request system software add** command and the output as the software is being added.

```
user@host-scc-re1> request system software add
/var/tmp/jinstall-9.6B2.7-domestic-signed.tgz
Pushing bundle to lcc0-re1
Pushing bundle to lcc2-re1

Validating on lcc0-re1
Checking compatibility with configuration
Initializing...
Using jbase-9.6B1.8
Verified manifest signed by PackageProduction_9_6_0
Using /var/tmp/jinstall-9.6B2.7-domestic-signed.tgz
Verified jinstall-9.6B2.7-domestic.tgz signed by PackageProduction_9_6_0
Using jinstall-9.6B2.7-domestic.tgz
Using jbundle-9.6B2.7-domestic.tgz
Checking jbundle requirements on /
Using jbase-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using /var/validate/chroot/tmp/jbundle/jboot-9.6B2.7.tgz
Using jkernel-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jcrypto-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jpfe-9.6B2.7.tgz
Using jdocs-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jroute-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jservices-9.6B2.7.tgz
Auto-deleting old jservices-voice ...
Removing /opt/sdk/jservices-voice ...
Removing jservices-voice-bsg-9.6B1.8.tgz from /var/sw/pkg ...
```



```

Notifying mspd ...
Installing new jservices-voice ...
Verified jservices-voice-bsg-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /var/sw/pkg ...
Creating /opt/sdk/jservices-voice ...
Storing jservices-voice-bsg-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-voice/jservices-voice-bsg ->
/var/sw/pkg/jservices-voice-bsg-9.6B2.7.tgz...
Auto-deleting old jservices-bgf ...
Removing /opt/sdk/jservices-bgf ...
Removing jservices-bgf-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-bgf ...
Verified jservices-bgf-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-bgf ...
Storing jservices-bgf-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-bgf/jservices-bgf-pic ->
/var/sw/pkg/jservices-bgf-pic-9.6B2.7.tgz...
Auto-deleting old jservices-aac1 ...
Removing /opt/sdk/jservices-aac1 ...
Removing jservices-aac1-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-aac1 ...
Verified jservices-aac1-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-aac1 ...
Storing jservices-aac1-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-aac1/jservices-aac1-pic ->
/var/sw/pkg/jservices-aac1-pic-9.6B2.7.tgz...
Auto-deleting old jservices-llpdf ...
Removing /opt/sdk/jservices-llpdf ...
Removing jservices-llpdf-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-llpdf ...
Verified jservices-llpdf-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-llpdf ...
Storing jservices-llpdf-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-llpdf/jservices-llpdf-pic ->
/var/sw/pkg/jservices-llpdf-pic-9.6B2.7.tgz...
Auto-deleting old jservices-sfw ...
Removing /opt/sdk/jservices-sfw ...
Removing jservices-sfw-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-sfw ...
Verified jservices-sfw-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-sfw ...
Storing jservices-sfw-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-sfw/jservices-sfw-pic ->
/var/sw/pkg/jservices-sfw-pic-9.6B2.7.tgz...
Auto-deleting old jservices-appid ...
Removing /opt/sdk/jservices-appid ...
Removing jservices-appid-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-appid ...
Verified jservices-appid-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-appid ...
Storing jservices-appid-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-appid/jservices-appid-pic ->
/var/sw/pkg/jservices-appid-pic-9.6B2.7.tgz...
Auto-deleting old jservices-idp ...
Removing /opt/sdk/jservices-idp ...
Removing jservices-idp-pic-9.6B1.8.tgz from /var/sw/pkg ...

```

```

Notifying mspd ...
Installing new jservices-idp ...
Verified jservices-idp-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-idp ...
Storing jservices-idp-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-idp/jservices-idp-pic ->
/var/sw/pkg/jservices-idp-pic-9.6B2.7.tgz...
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded

Validating on lcc2-re1
Checking compatibility with configuration
Initializing...
Using jbase-9.6B1.8
Verified manifest signed by PackageProduction_9_6_0
Using /var/tmp/jinstall-9.6B2.7-domestic-signed.tgz
Verified jinstall-9.6B2.7-domestic.tgz signed by PackageProduction_9_6_0
Using jinstall-9.6B2.7-domestic.tgz
Using jbundle-9.6B2.7-domestic.tgz
Checking jbundle requirements on /
Using jbase-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using /var/validate/chroot/tmp/jbundle/jboot-9.6B2.7.tgz
Using jkernel-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jcrypto-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jpfe-9.6B2.7.tgz
Using jdocs-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jroute-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jservices-9.6B2.7.tgz
Auto-deleting old jservices-voice ...
Removing /opt/sdk/jservices-voice ...
Removing jservices-voice-bsg-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-voice ...
Verified jservices-voice-bsg-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /var/sw/pkg ...
Creating /opt/sdk/jservices-voice ...
Storing jservices-voice-bsg-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-voice/jservices-voice-bsg ->
/var/sw/pkg/jservices-voice-bsg-9.6B2.7.tgz...
Auto-deleting old jservices-bgf ...
Removing /opt/sdk/jservices-bgf ...
Removing jservices-bgf-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-bgf ...
Verified jservices-bgf-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-bgf ...
Storing jservices-bgf-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-bgf/jservices-bgf-pic ->
/var/sw/pkg/jservices-bgf-pic-9.6B2.7.tgz...
Auto-deleting old jservices-aac1 ...
Removing /opt/sdk/jservices-aac1 ...
Removing jservices-aac1-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-aac1 ...

```

```

Verified jservices-aac1-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-aac1 ...
Storing jservices-aac1-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-aac1/jservices-aac1-pic ->
/var/sw/pkg/jservices-aac1-pic-9.6B2.7.tgz...
Auto-deleting old jservices-llpdf ...
Removing /opt/sdk/jservices-llpdf ...
Removing jservices-llpdf-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-llpdf ...
Verified jservices-llpdf-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-llpdf ...
Storing jservices-llpdf-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-llpdf/jservices-llpdf-pic ->
/var/sw/pkg/jservices-llpdf-pic-9.6B2.7.tgz...
Auto-deleting old jservices-sfw ...
Removing /opt/sdk/jservices-sfw ...
Removing jservices-sfw-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-sfw ...
Verified jservices-sfw-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-sfw ...
Storing jservices-sfw-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-sfw/jservices-sfw-pic ->
/var/sw/pkg/jservices-sfw-pic-9.6B2.7.tgz...
Auto-deleting old jservices-appid ...
Removing /opt/sdk/jservices-appid ...
Removing jservices-appid-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-appid ...
Verified jservices-appid-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-appid ...
Storing jservices-appid-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-appid/jservices-appid-pic ->
/var/sw/pkg/jservices-appid-pic-9.6B2.7.tgz...
Auto-deleting old jservices-idp ...
Removing /opt/sdk/jservices-idp ...
Removing jservices-idp-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-idp ...
Verified jservices-idp-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-idp ...
Storing jservices-idp-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-idp/jservices-idp-pic ->
/var/sw/pkg/jservices-idp-pic-9.6B2.7.tgz...
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded

Validating on scc-rel
Checking compatibility with configuration
Initializing...
Using jbase-9.6B1.8
Verified manifest signed by PackageProduction_9_6_0
Using /var/tmp/jinstall-9.6B2.7-domestic-signed.tgz
Verified jinstall-9.6B2.7-domestic.tgz signed by PackageProduction_9_6_0
Using jinstall-9.6B2.7-domestic.tgz
Using jbundle-9.6B2.7-domestic.tgz
Checking jbundle requirements on /
Using jbase-9.6B2.7.tgz

```

```

Verified manifest signed by PackageProduction_9_6_0
Using /var/validate/chroot/tmp/jbundle/jboot-9.6B2.7.tgz
Using jkernel-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jcrypto-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jpfe-9.6B2.7.tgz
Using jdocs-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jroute-9.6B2.7.tgz
Verified manifest signed by PackageProduction_9_6_0
Using jservices-9.6B2.7.tgz
Auto-deleting old jservices-voice ...
Removing /opt/sdk/jservices-voice ...
Removing jservices-voice-bsg-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-voice ...
Verified jservices-voice-bsg-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /var/sw/pkg ...
Creating /opt/sdk/jservices-voice ...
Storing jservices-voice-bsg-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-voice/jservices-voice-bsg ->
/var/sw/pkg/jservices-voice-bsg-9.6B2.7.tgz...
Auto-deleting old jservices-bgf ...
Removing /opt/sdk/jservices-bgf ...
Removing jservices-bgf-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-bgf ...
Verified jservices-bgf-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-bgf ...
Storing jservices-bgf-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-bgf/jservices-bgf-pic ->
/var/sw/pkg/jservices-bgf-pic-9.6B2.7.tgz...
Auto-deleting old jservices-aacl ...
Removing /opt/sdk/jservices-aacl ...
Removing jservices-aacl-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-aacl ...
Verified jservices-aacl-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-aacl ...
Storing jservices-aacl-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-aacl/jservices-aacl-pic ->
/var/sw/pkg/jservices-aacl-pic-9.6B2.7.tgz...
Auto-deleting old jservices-llpdf ...
Removing /opt/sdk/jservices-llpdf ...
Removing jservices-llpdf-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-llpdf ...
Verified jservices-llpdf-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-llpdf ...
Storing jservices-llpdf-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-llpdf/jservices-llpdf-pic ->
/var/sw/pkg/jservices-llpdf-pic-9.6B2.7.tgz...
Auto-deleting old jservices-sfw ...
Removing /opt/sdk/jservices-sfw ...
Removing jservices-sfw-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-sfw ...
Verified jservices-sfw-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-sfw ...
Storing jservices-sfw-pic-9.6B2.7.tgz in /var/sw/pkg ...

```

```

Link: /opt/sdk/jservices-sfw/jservices-sfw-pic ->
/var/sw/pkg/jservices-sfw-pic-9.6B2.7.tgz...
Auto-deleting old jservices-appid ...
Removing /opt/sdk/jservices-appid ...
Removing jservices-appid-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-appid ...
Verified jservices-appid-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-appid ...
Storing jservices-appid-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-appid/jservices-appid-pic ->
/var/sw/pkg/jservices-appid-pic-9.6B2.7.tgz...
Auto-deleting old jservices-idp ...
Removing /opt/sdk/jservices-idp ...
Removing jservices-idp-pic-9.6B1.8.tgz from /var/sw/pkg ...
Notifying mspd ...
Installing new jservices-idp ...
Verified jservices-idp-pic-9.6B2.7.tgz signed by PackageProduction_9_6_0
Creating /opt/sdk/jservices-idp ...
Storing jservices-idp-pic-9.6B2.7.tgz in /var/sw/pkg ...
Link: /opt/sdk/jservices-idp/jservices-idp-pic ->
/var/sw/pkg/jservices-idp-pic-9.6B2.7.tgz...
Hardware Database regeneration succeeded
Validating against /config/juniper.conf.gz
mgd: commit complete
Validation succeeded
Done with validate on all chassis

```

```

1cc0-rel:
Installing package '/var/tmp/jinstall-9.6B2.7-domestic-signed.tgz' ...
Verified jinstall-9.6B2.7-domestic.tgz signed by PackageProduction_9_6_0
Adding jinstall...
Verified manifest signed by PackageProduction_9_6_0

```

```

WARNING: This package will load JUNOS 9.6B2.7 software.
WARNING: It will save JUNOS configuration files, and SSH keys
WARNING: (if configured), but erase all other files and information
WARNING: stored on this machine. It will attempt to preserve dumps
WARNING: and log files, but this can not be guaranteed. This is the
WARNING: pre-installation stage and all the software is loaded when
WARNING: you reboot the system.

```

```

Saving the config files ...
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...

```

```

WARNING: A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use
the
WARNING: 'request system reboot' command when software installation
is
WARNING: complete. To abort the installation, do not reboot your
system,
WARNING: instead use the 'request system software delete jinstall'
WARNING: command as soon as this operation completes.

```

```

Saving package file in /var/sw/pkg/jinstall-9.6B2.7-domestic-signed.tgz
...
Saving state for rollback ...

```

```

1cc2-rel:

```

```
Installing package '/var/tmp/jinstall-9.6B2.7-domestic-signed.tgz' ...
Verified jinstall-9.6B2.7-domestic.tgz signed by PackageProduction_9_6_0
Adding jinstall...
Verified manifest signed by PackageProduction_9_6_0
```

```
WARNING: This package will load JUNOS 9.6B2.7 software.
WARNING: It will save JUNOS configuration files, and SSH keys
WARNING: (if configured), but erase all other files and information
WARNING: stored on this machine. It will attempt to preserve dumps
WARNING: and log files, but this can not be guaranteed. This is the
WARNING: pre-installation stage and all the software is loaded when
WARNING: you reboot the system.
```

```
Saving the config files ...
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...
```

```
WARNING: A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use
the
WARNING: 'request system reboot' command when software installation
is
WARNING: complete. To abort the installation, do not reboot your
system,
WARNING: instead use the 'request system software delete jinstall'
WARNING: command as soon as this operation completes.
```

```
Saving package file in /var/sw/pkg/jinstall-9.6B2.7-domestic-signed.tgz
...
Saving state for rollback ...
```

```
scc-rel:
Installing package '/var/tmp/jinstall-9.6B2.7-domestic-signed.tgz' ...
Verified jinstall-9.6B2.7-domestic.tgz signed by PackageProduction_9_6_0
Adding jinstall...
Verified manifest signed by PackageProduction_9_6_0
```

```
WARNING: This package will load JUNOS 9.6B2.7 software.
WARNING: It will save JUNOS configuration files, and SSH keys
WARNING: (if configured), but erase all other files and information
WARNING: stored on this machine. It will attempt to preserve dumps
WARNING: and log files, but this can not be guaranteed. This is the
WARNING: pre-installation stage and all the software is loaded when
WARNING: you reboot the system.
```

```
Saving the config files ...
NOTICE: uncommitted changes have been saved in
/var/db/config/juniper.conf.pre-install
Installing the bootstrap installer ...
```

```
WARNING: A REBOOT IS REQUIRED TO LOAD THIS SOFTWARE CORRECTLY. Use
the
WARNING: 'request system reboot' command when software installation
is
WARNING: complete. To abort the installation, do not reboot your
system,
WARNING: instead use the 'request system software delete jinstall'
WARNING: command as soon as this operation completes.
```

```
Saving package file in /var/sw/pkg/jinstall-9.6B2.7-domestic-signed.tgz
...
```

```
Saving state for rollback ...
```

```
user@host-scc-re1>
```

For more information on the `request system software add` command, see the *JUNOS System Basics and Services Command Reference*.

## **Loading the New JUNOS Software Version on the Backup Routing Engines of the Routing Matrix with a TX Matrix Router**

After you have added the new software version to the backup Routing Engines (**re1**), reboot the routing matrix with a TX Matrix router to load the new software and verify the version of the software. To reboot the routing matrix, reboot the TX Matrix router which forces all T640 routers to reboot and loads the new software on all backup Routing Engines (**re1**) in the routing matrix.

1. Reboot the TX Matrix router to start the new software using the `request system reboot` command:

```
user@host-scc-re1> request system reboot
Reboot the system ? [yes,no] (no) yes

rebooting lcc0-re1
Rebooting lcc2-re1
Shutdown NOW!
Reboot consistency check bypassed - jinstall 9.6B2.7 will complete
installation upon reboot
[pid 23517]

user@host-scc-re1>

*** FINAL System shutdown message from user@host-scc-re1> ***

System going down IMMEDIATELY

rlogin: connection closed
user@host-scc-re0>
```



**NOTE:** You must reboot to load the new installation of the JUNOS Software onto the backup Routing Engine (**re1**) of the TX Matrix router and to propagate the new image on all backup Routing Engines (**re1**) of the T640 routers in the routing matrix.

To abort the installation, do not reboot your system; instead, finish the installation and then issue the `request system software delete jinstall` command. This is your last chance to stop the installation.

---

All the software is loaded on all the backup Routing Engines when you reboot the system. Installation can take about 10 minutes. The backup Routing Engines (**re1**) then reboot from the boot device on which the software was just installed. When the reboot is complete, the TX Matrix router backup Routing Engine (**re1**) displays the login prompt.

While the software is being upgraded, the Routing Engine (**re1**) on which you are performing the installation is not routing traffic.

2. Log in to the TX Matrix router backup Routing Engine (**re1**) and issue the **show version** command to verify the version of the software installed:

```
user@host-scc-re1>> show version
```

```
scc-re1:
```

```
-----
Hostname: z8-1
Model: TX Matrix
JUNOS Base OS boot [9.6B2.7]
JUNOS Base OS Software Suite [9.6B2.7]
JUNOS Kernel Software Suite [9.6B2.7]
JUNOS Crypto Software Suite [9.6B2.7]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B2.7]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B2.7]
JUNOS Online Documentation [9.6B2.7]
JUNOS Voice Services Container package [9.6B2.7]
JUNOS Border Gateway Function package [9.6B2.7]
JUNOS Services AACL Container package [9.6B2.7]
JUNOS Services LL-PDF Container package [9.6B2.7]
JUNOS Services Stateful Firewall [9.6B2.7]
JUNOS AppId Services [9.6B2.7]
JUNOS IDP Services [9.6B2.7]
JUNOS Routing Software Suite [9.6B2.7]
```

```
lcc0-re1:
```

```
-----
Hostname: z8-lcc0-re1
Model: t640
JUNOS Base OS boot [9.6B2.7]
JUNOS Base OS Software Suite [9.6B2.7]
JUNOS Kernel Software Suite [9.6B2.7]
JUNOS Crypto Software Suite [9.6B2.7]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B2.7]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B2.7]
JUNOS Online Documentation [9.6B2.7]
JUNOS Voice Services Container package [9.6B2.7]
JUNOS Border Gateway Function package [9.6B2.7]
JUNOS Services AACL Container package [9.6B2.7]
JUNOS Services LL-PDF Container package [9.6B2.7]
JUNOS Services Stateful Firewall [9.6B2.7]
JUNOS AppId Services [9.6B2.7]
JUNOS IDP Services [9.6B2.7]
JUNOS Routing Software Suite [9.6B2.7]
```

```
lcc2-re1:
```

```
-----
Hostname: z8-lcc2-re1
Model: t640
JUNOS Base OS boot [9.6B2.7]
JUNOS Base OS Software Suite [9.6B2.7]
JUNOS Kernel Software Suite [9.6B2.7]
```



```

JUNOS Crypto Software Suite [9.6B2.7]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B2.7]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B2.7]
JUNOS Online Documentation [9.6B2.7]
JUNOS Voice Services Container package [9.6B2.7]
JUNOS Border Gateway Function package [9.6B2.7]
JUNOS Services AACL Container package [9.6B2.7]
JUNOS Services LL-PDF Container package [9.6B2.7]
JUNOS Services Stateful Firewall [9.6B2.7]
JUNOS AppId Services [9.6B2.7]
JUNOS IDP Services [9.6B2.7]
JUNOS Routing Software Suite [9.6B2.7]

```

## ***Installing Software on the Master Routing Engines of a Routing Matrix with a TX Matrix Router***

Before you install the new software on the master Routing Engines (re0) of the routing matrix with a TX Matrix router, you need to switch mastership over to the backup Routing Engines (re1) to minimize the disruption to network operation.

To change mastership and install the new software version on the new backup Routing Engine (re0), perform the following steps:

1. On the TX Matrix router, log in to the original master Routing Engine (re0) console port.

For more information on logging in to the Routing Engine through the console port, see the administration guide for your particular router.

2. Transfer mastership to the backup Routing Engine (re1) for all routers in the routing matrix using the `request chassis routing-engine master switch all-chassis` command:

```

user@host-scc-re0> request chassis routing-engine master switch all-chassis

warning: Traffic will be interrupted while the PFE is re-initialized
Toggle mastership between routing engines ? [yes,no] (no) yes

1cc0-re0:
-----
warning: Traffic will be interrupted while the PFE is re-initialized
Resolving mastership...
Complete. The other routing engine becomes the master.

1cc2-re0:
-----
warning: Traffic will be interrupted while the PFE is re-initialized
Resolving mastership...
Complete. The other routing engine becomes the master.

scc-re0:
-----
warning: Traffic will be interrupted while the PFE is re-initialized
Resolving mastership...
Complete. The other routing engine becomes the master.

```

3. Verify that the backup Routing Engine (slot 1) is now the master Routing Engine on all routers in the routing matrix using the `show chassis routing-engine` command:

```

user@host-scc-re0> show chassis routing-engine
scc-re0:
-----
Routing Engine status:
  Slot 0:
    Current state      Backup
    Election priority  Master (default)
    [...Output Truncated...]
Routing Engine status:
  Slot 1:
    Current state      Master
    Election priority  Backup (default)
    [...Output Truncated...]

lcc0-re0:
-----
Routing Engine status:
  Slot 0:
    Current state      Backup
    Election priority  Master (default)
    [...Output Truncated...]
                                0.02      0.07      0.11
Routing Engine status:
  Slot 1:
    Current state      Master
    Election priority  Backup (default)
    [...Output Truncated...]

lcc2-re0:
-----
Routing Engine status:
  Slot 0:
    Current state      Backup
    Election priority  Master (default)
    [...Output Truncated...]
Routing Engine status:
  Slot 1:
    Current state      Master
    Election priority  Backup (default)
    [...Output Truncated...]

```

4. Install the new software package using the `request system software add` command:

```

user@host-scc-re0> request system software add
/var/tmp/jinstall-9.6B2.7-domestic-signed.tgz
Pushing bundle to lcc0-re0
Pushing bundle to lcc2-re0
[...Output Truncated...]

```

5. Reboot the Routing Engine (re0) using the `request system reboot` command:

```

user@host-scc-re0> request system reboot
Reboot the system ? [yes,no] (no) yes

```

```

Rebooting lcc0-re0
Rebooting lcc2-re0
Shutdown NOW!
Reboot consistency check bypassed - jinstall 9.6B2.7 will complete
installation upon reboot
[pid 9071]

user@host-scc-re0>

*** FINAL System shutdown message from user@host-scc-re0> ***

System going down IMMEDIATELY

Connection closed by foreign host.

```



**NOTE:** You must reboot to load the new installation of the JUNOS Software onto the original master Routing Engine (re0) of the TX Matrix router and to propagate the new image on all original master Routing Engines (re0) of the T640 routers in the routing matrix.

To abort the installation, do not reboot your system; instead, finish the installation and then issue the `request system software delete jinstall` command. This is your last chance to stop the installation.

The software is loaded when you reboot the system. Installation can take about 10 minutes. The routers then reboot from the boot device on which the software was just installed. When the reboot is complete, the TX Matrix Routing Engine (re0) displays the login prompt.

While the software is being upgraded, the Routing Engine (re0) on which you are performing the installation does not route traffic.

6. Log in and issue the `show version` command to verify the version of the software installed:

```

user@host-scc-re0> show version
scc-re0:
-----
Hostname: z8
Model: TX Matrix
JUNOS Base OS boot [9.6B2.7]
JUNOS Base OS Software Suite [9.6B2.7]
JUNOS Kernel Software Suite [9.6B2.7]
JUNOS Crypto Software Suite [9.6B2.7]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B2.7]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B2.7]
JUNOS Online Documentation [9.6B2.7]
JUNOS Voice Services Container package [9.6B2.7]
JUNOS Border Gateway Function package [9.6B2.7]
JUNOS Services AACL Container package [9.6B2.7]
JUNOS Services LL-PDF Container package [9.6B2.7]
JUNOS Services Stateful Firewall [9.6B2.7]
JUNOS AppId Services [9.6B2.7]

```

```
JUNOS IDP Services [9.6B2.7]
JUNOS Routing Software Suite [9.6B2.7]
```

```
lcc0-re0:
```

```
-----
Hostname: z8-lcc0-re0
Model: t640
JUNOS Base OS boot [9.6B2.7]
JUNOS Base OS Software Suite [9.6B2.7]
JUNOS Kernel Software Suite [9.6B2.7]
JUNOS Crypto Software Suite [9.6B2.7]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B2.7]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B2.7]
JUNOS Online Documentation [9.6B2.7]
JUNOS Voice Services Container package [9.6B2.7]
JUNOS Border Gateway Function package [9.6B2.7]
JUNOS Services AACL Container package [9.6B2.7]
JUNOS Services LL-PDF Container package [9.6B2.7]
JUNOS Services Stateful Firewall [9.6B2.7]
JUNOS AppId Services [9.6B2.7]
JUNOS IDP Services [9.6B2.7]
JUNOS Routing Software Suite [9.6B2.7]
```

```
lcc2-re0:
```

```
-----
Hostname: z8-lcc2-re0
Model: t640
JUNOS Base OS boot [9.6B2.7]
JUNOS Base OS Software Suite [9.6B2.7]
JUNOS Kernel Software Suite [9.6B2.7]
JUNOS Crypto Software Suite [9.6B2.7]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B2.7]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B2.7]
JUNOS Online Documentation [9.6B2.7]
JUNOS Voice Services Container package [9.6B2.7]
JUNOS Border Gateway Function package [9.6B2.7]
JUNOS Services AACL Container package [9.6B2.7]
JUNOS Services LL-PDF Container package [9.6B2.7]
JUNOS Services Stateful Firewall [9.6B2.7]
JUNOS AppId Services [9.6B2.7]
JUNOS IDP Services [9.6B2.7]
JUNOS Routing Software Suite [9.6B2.7]
```

7. (Optional to avoid another traffic disruption) Transfer routing control back to the original master Routing Engine (re0) using the `request chassis routing-engine master switch all-chassis` command:

```
user@host-scc-re0> request chassis routing-engine master switch all-chassis
```

```
warning: Traffic will be interrupted while the PFE is re-initialized
Toggle mastership between routing engines ? [yes,no] (no) yes
```

```
lcc0-re0:
```

```
-----
warning: Traffic will be interrupted while the PFE is re-initialized
Resolving mastership...
Complete. The local routing engine becomes the master.
```

```
lcc2-re0:
```

```
-----
warning: Traffic will be interrupted while the PFE is re-initialized
Resolving mastership...
Complete. The local routing engine becomes the master.
```

```
scc-re0:
```

```
-----
warning: Traffic will be interrupted while the PFE is re-initialized
Resolving mastership...
Complete. The local routing engine becomes the master.
```

8. Verify that the master Routing Engine (slot 0) is indeed the master Routing Engine using the `show chassis routing-engine` command:

```
user@host-scc-re0> show chassis routing-engine
scc-re0:
```

```
-----
Routing Engine status:
```

```
Slot 0:
  Current state      Master
  Election priority  Master (default)
  [...Output Truncated...]
```

```
Routing Engine status:
```

```
Slot 1:
  Current state      Backup
  Election priority  Backup (default)
  [...Output Truncated...]
```

```
1cc0-re0:
```

```
-----
Routing Engine status:
```

```
Slot 0:
  Current state      Master
  Election priority  Master (default)
  [...Output Truncated...]
```

```
Routing Engine status:
```

```
Slot 1:
  Current state      Backup
  Election priority  Backup (default)
  [...Output Truncated...]
```

```
1cc2-re0:
```

```
-----
Routing Engine status:
```

```
Slot 0:
  Current state      Master
  Election priority  Master (default)
  [...Output Truncated...]
```

```
Routing Engine status:
```

```
Slot 1:
  Current state      Backup
  Election priority  Backup (default)
  [...Output Truncated...]
```

## Finalizing the Installation for a Routing Engine with a TX Matrix Router

After the software is installed on all Routing Engines, you return the routing matrix with a TX Matrix router back to its original configuration and back up the new installation.

1. Restore the configuration that existed before you deleted it at the start of this procedure using the `configure` and `rollback` commands:

```
user@host-scc-re0> configure
Entering configuration mode

[edit]
user@host-scc-re0# rollback 1
load complete
```

2. Save the configuration change on all Routing Engines using the `commit synchronize and-quit` command:

```
[edit]
user@host-scc-re0# commit synchronize and-quit
scc-re0:
configuration check succeeds
lcc0-re1:
commit complete
lcc0-re0:
commit complete
lcc2-re1:
commit complete
lcc2-re0:
commit complete
scc-re1:
commit complete
scc-re0:
commit complete

user@host-scc-re0>
```

3. After you have installed the new software and are satisfied that it is successfully running, issue the following commands to back up the new software on both the master (re0) and the backup (re1) Routing Engines:

```
user@host-scc-re0> request system snapshot
user@host-scc-re0> request chassis routing-engine master switch all-chassis
user@host-scc-re1> request system snapshot
```

The sample output below shows examples of all the commands above.

```
{master}
user@host-scc-re0> request system snapshot
scc-re0:
-----
Verifying compatibility of destination media partitions...
Running newfs (220MB) on hard-disk media / partition (ad1s1a)...
Running newfs (24MB) on hard-disk media /config partition (ad1s1e)...
```

```
Copying '/dev/ad0s1a' to '/dev/ad1s1a' .. (this may take a few minutes)
Copying '/dev/ad0s1e' to '/dev/ad1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

```
1cc0-re0:
```

```
-----
Verifying compatibility of destination media partitions...
Running newfs (220MB) on hard-disk media / partition (ad1s1a)...
Running newfs (24MB) on hard-disk media /config partition (ad1s1e)...
Copying '/dev/ad0s1a' to '/dev/ad1s1a' .. (this may take a few minutes)
Copying '/dev/ad0s1e' to '/dev/ad1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

```
1cc2-re0:
```

```
-----
Verifying compatibility of destination media partitions...
Running newfs (220MB) on hard-disk media / partition (ad1s1a)...
Running newfs (24MB) on hard-disk media /config partition (ad1s1e)...
Copying '/dev/ad0s1a' to '/dev/ad1s1a' .. (this may take a few minutes)
Copying '/dev/ad0s1e' to '/dev/ad1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

```
{master}
```

```
user@host-scc-re0> request chassis routing-engine master switch all-chassis
```

```
Toggle mastership between routing engines ? [yes,no] (no) yes
```

```
1cc0-re0:
```

```
-----
Resolving mastership...
Complete. The other routing engine becomes the master.
```

```
1cc2-re0:
```

```
-----
Resolving mastership...
Complete. The other routing engine becomes the master.
```

```
scc-re0:
```

```
-----
Resolving mastership...
Complete. The other routing engine becomes the master.
```

```
{master}
```

```
user@host-scc-re1> request system snapshot
```

```
scc-re1:
```

```
-----
Verifying compatibility of destination media partitions...
Running newfs (220MB) on hard-disk media / partition (ad1s1a)...
Running newfs (24MB) on hard-disk media /config partition (ad1s1e)...
Copying '/dev/ad0s1a' to '/dev/ad1s1a' .. (this may take a few minutes)
Copying '/dev/ad0s1e' to '/dev/ad1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

```
1cc0-re1:
```

```
-----
Verifying compatibility of destination media partitions...
Running newfs (223MB) on hard-disk media / partition (ad2s1a)...
Running newfs (24MB) on hard-disk media /config partition (ad2s1e)...
Copying '/dev/ad0s1a' to '/dev/ad2s1a' .. (this may take a few minutes)
```

```
Copying '/dev/ad0s1e' to '/dev/ad2s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

```
lcc2-rel:
```

```
-----
Verifying compatibility of destination media partitions...
Running newfs (220MB) on hard-disk media / partition (ad1s1a)...
Running newfs (24MB) on hard-disk media /config partition (ad1s1e)...
Copying '/dev/ad0s1a' to '/dev/ad1s1a' .. (this may take a few minutes)
Copying '/dev/ad0s1e' to '/dev/ad1s1e' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

The root file system is backed up to `/altroot`, and `/config` is backed up to `/altconfig`. The root and `/config` file systems are on the router's CompactFlash card, and the `/altroot` and `/altconfig` file systems are on the router's hard disk.



**NOTE:** After you issue the `request system snapshot` command, you cannot return to the previous version of the software because the running copy and backup copy of the software are identical.

## Managing System Processes in the Routing Matrix with a TX Matrix Router

Some system processes in a routing matrix with a TX Matrix router run on the TX Matrix router and some run on the T640 routers. For example, the routing protocol process (`rpd`) runs exclusively on the TX Matrix router. To restart the routing protocol process for the entire routing matrix, issue the `restart routing` command on the TX Matrix router.

```
user@router> restart routing ?
Possible completions:
<[Enter]>      Execute this command
gracefully    Gracefully restart the process
immediately    Immediately restart (SIGKILL) the process
logical-system Name of logical system
soft          Soft reset (SIGHUP) the process
|            Pipe through a command
```

Other processes run on both the TX Matrix router and the T640 routers. To restart the chassis process that manages PICs, FPCs, and other hardware components, issue the `restart chassis-control` command on the TX Matrix router and select the `all`, `all-lcc`, or `lcc lcc-number` option.

```
user@router> restart chassis-control ?
Possible completions:
<[Enter]>      Execute this command
all           Restart software process on all chassis
all-lcc       Restart software process on all LCC chassis
gracefully    Gracefully restart the process
immediately    Immediately restart (SIGKILL) the process
lcc           Restart software process on specific chassis (0..3)
```



```

soft                Soft reset (SIGHUP) the process
|                  Pipe through a command

```

To restart the Simple Network Management Protocol (SNMP) process, issue the **restart snmp** command on the TX Matrix router and select the **all**, **all-lcc**, or **lcc lcc-number** option.

```

user@router> restart snmp ?
Possible completions:
<[Enter]>          Execute this command
all                Restart software process on all chassis
all-lcc            Restart software process on all LCC chassis
gracefully         Gracefully restart the process
immediately        Immediately restart (SIGKILL) the process
lcc                Restart software process on specific chassis (0..3)
soft              Soft reset (SIGHUP) the process
|                  Pipe through a command

```

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Rebooting and Halting Routing Matrix with a TX Matrix Router Components

You can control which component in a routing matrix with a TX Matrix router is rebooted or halted. If you reboot or halt the TX Matrix router, by default you also reboot or halt the master Routing Engines on all T640 routers. To reboot a specific component, issue the **request system reboot** command with the **all-lcc**, **lcc**, or **scc** option.

```

user@router> request system reboot ?
Possible completions:
<[Enter]>          Execute this command
all-lcc            Reboot all LCC chassis
at                 Time at which to perform the operation
in                 Number of minutes to delay before operation
lcc                Reboot LCC (0..3)
media              Boot media for next boot
message            Message to display to all users
scc                Reboot SCC chassis
|                  Pipe through a command
user@router> request system reboot
Reboot the system ? [yes,no] (no) yes
Rebooting lcc0-re0
Rebooting lcc1-re0

```

Similarly, to halt a specific component in a routing matrix, issue the **request system halt** command with the **all-lcc**, **lcc**, or **scc** option.



**CAUTION:** Before entering this command, you must have access to the TX Matrix router console port and the console ports of all of the LCCs in order to bring up the TX Matrix Routing Engines.

```
user@router> request system halt ?
Possible completions:
<[Enter]>          Execute this command
all-lcc            Halt all LCC chassis
at                Time at which to perform the operation
both-routing-engines  Halt both Routing Engines
in                Number of minutes to delay before operation
lcc               Halt LCC (0..3)
media             Boot media for next boot
message           Message to display to all users
scc               Halt SCC
|                Pipe through a command
```

Issuing the `request system halt both-routing-engines` command on a TX Matrix router halts both Routing Engines in the TX Matrix router and both Routing Engines in all T640 routers in the routing matrix. To reboot a Routing Engine that has been halted, you must connect through the console. For more information about system commands, see the *JUNOS System Basics and Services Command Reference*.

- 
- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

---

## Enabling and Disabling Specific Routing Matrix with a TX Matrix Router Hardware Components

---

You can temporarily disable certain hardware components (such as FPCs, PICs, and SIBs) that belong to the TX Matrix router and T640 routers in the routing matrix. To do so, issue the appropriate `request chassis` command and include the `lcc` or `scc` option as needed.



**NOTE:** If you issue a chassis-related command that references FPCs, we recommend that you use the FPC hardware slot number (0 through 7) of the specific T640 router and specify its corresponding LCC number.

```
user@router> request chassis ?
Possible completions:
cb          Change Control Board status
fpc         Change Flexible PIC Concentrator status
fpm         Change craft interface status
```

<b>lcc</b>	Change LCC status
<b>pic</b>	Change Physical Interface Card status
<b>routing-engine</b>	Change Routing Engine status
<b>scg</b>	Change SONET Clock Generator status
<b>sib</b>	Change Switch Interface Board status
<b>smb</b>	Change Switch Processor Mezzanine Board status

```
user@router> request chassis fpc ?
```

Possible completions:

<b>lcc</b>	Slot number of LCC that houses FPC (0..3)
<b>offline</b>	Take FPC offline
<b>online</b>	Bring FPC online
<b>restart</b>	Restart FPC
<b>slot</b>	FPC slot number (0..31)

```
user@router> request chassis pic ?
```

Possible completions:

<b>fpc-slot</b>	Slot number of FPC that houses PIC (0..31)
<b>lcc</b>	Slot number of LCC that houses FPC (0..3)
<b>offline</b>	Take PIC offline
<b>online</b>	Bring PIC online
<b>pic-slot</b>	PIC slot number (0..3)

```
user@router> request chassis sib ?
```

Possible completions:

<b>lcc</b>	Change Switch Interface Board status (0..3)
<b>offline</b>	Take SIB offline
<b>online</b>	Bring SIB online
<b>scc</b>	Change Switch Interface Board status
<b>slot</b>	SIB slot number (0..4)
<b>start-receiver</b>	Start SIB optical receiver (0..3)
<b>stop-receiver</b>	Stop SIB optical receiver (0..3)

The routing matrix extends the concept of taking specific hardware components offline or online to include an entire T640 router in a routing matrix. To enable or disable a T640 router in a routing matrix, issue the **request chassis lcc slot lcc-number (offline | online)** command.

```
user@router> request chassis lcc ?
```

Possible completions:

<b>offline</b>	Take LCC offline
<b>online</b>	Bring LCC online
<b>slot</b>	LCC Slot (0..3)

Although you can enter the routing matrix-based slot number when you issue the **request chassis fpc** command, output from **show chassis** commands always references the FPC hardware slot number (0 through 7) of the specific T640 router and its corresponding LCC number. As a result, we recommend that you include the FPC hardware slot number when you issue **request chassis** or **show chassis** commands, as shown in the following example:

First, issue the **request chassis fpc** command with the routing matrix-based FPC slot number of 19:

```
user@router> request chassis fpc offline slot 19
```

lcc2-re0:

Offline initiated, use "show chassis fpc" to verify

However, when you issue the **show chassis fpc** command to check the result, the output displays the change using node-centric terminology: FPC slot number 3 on T640 router LCC2 (the equivalent of routing matrix slot 19).

user@router> **show chassis fpc**

lcc0-re0:

Slot	State	Temp (C)	CPU Utilization (%)	Memory (MB)	Utilization (%)
			Total Interrupt	DRAM (MB) Heap	Buffer
0	Empty				
1	Online	31	2 0	256 7	44
2	Online	28	1 0	256 7	44
3	Online	31	2 0	256 14	44
4	Empty				
5	Empty				
6	Empty				
7	Empty				

lcc2-re0:

Slot	State	Temp (C)	CPU Utilization (%)	Memory (MB)	Utilization (%)
			Total Interrupt	DRAM (MB) Heap	Buffer
0	Online	31	2 0	256 14	44
1	Online	30	2 0	256 7	44
2	Empty				
3	Offline	--- Offlined by cli command ---			
4	Empty				
5	Empty				
6	Empty				
7	Empty				

To bring the same FPC back online, use the slot number and LCC number from the previous command output:

user@router> **request chassis fpc online lcc 2 slot 3**

lcc2-re0:

Online initiated, use "show chassis fpc" to verify

Once you bring the FPC back online, reissue the **show chassis fpc** command to see that the FPC slot and LCC number you used in the last command now matches the command output:

user@router> **show chassis fpc**

lcc0-re0:

Slot	State	Temp (C)	CPU Utilization (%)	Memory (MB)	Utilization (%)
			Total Interrupt	DRAM (MB) Heap	Buffer
0	Empty				
1	Online	31	1 0	256 7	44
2	Online	28	1 0	256 7	44
3	Online	31	3 0	256 14	44
4	Empty				

```

5 Empty
6 Empty
7 Empty

```

**lcc2-re0:**

Slot	State	Temp	CPU Utilization (%)		Memory	Utilization (%)	
		(C)	Total	Interrupt	DRAM (MB)	Heap	Buffer
0	Online	31	3	0	256	14	44
1	Online	30	1	0	256	7	44
2	Empty						
3	<b>Present</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
4	Empty						
5	Empty						
6	Empty						
7	Empty						

For more information about converting FPC hardware slot numbers on a T640 router to routing matrix FPC slot numbers, see “Routing Matrix with a TX Matrix Router FPC Numbering” on page 5.

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Managing Files on Routing Engines in a Routing Matrix with a TX Matrix Router

You can manage files on all Routing Engines in a routing matrix with a TX Matrix router. For example, you can copy a file from the master Routing Engine in the TX Matrix router to the master Routing Engine on a T640 router.

```

user@router> file list lcc0-re0:
/var/home/user/lcc0-re0: No such file or directory

```

```

user@router> file list
/var/home/user/:
.ssh/
fred.txt

```

```

user@host> file copy fred.txt lcc0-re0:fred.txt

```

```

user@host> file list lcc0-re0:
lcc0-re0:

```

```

-----
/var/home/user/:
.ssh/
fred.txt

```

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Miscellaneous Commands for a Routing Matrix with a TX Matrix Router

There are a variety of other useful commands you can use when maintaining a routing matrix with a TX Matrix router.

- To display the location of routing matrix components and convert FPCs from T640 router local numbering to routing matrix global numbering, issue the **show chassis location fpc** command on the TX Matrix router:

```
user@router> show chassis location fpc
```

Global FPC	LCC	Local FPC
1	0	1
2	0	2
3	0	3
16	2	0
17	2	1
19	2	3

- To check the status of the SIB connection between the TX Matrix router and T640 routers, issue the **show chassis fabric topology** command on the TX Matrix router. All values for each available T640 router (LCC) should be in the **UP** state. In the following excerpt of output for this command, a routing matrix that contains only LCCs 0 and 2 shows only these two T640 routers as being **UP**:

```
LCC0_SIB-L0_F0,03->SIB-S0_F0,00 UP
LCC1_SIB-L0_F0,03->SIB-S0_F0,01 RESET
LCC2_SIB-L0_F0,03->SIB-S0_F0,02 UP
LCC3_SIB-L0_F0,03->SIB-S0_F0,03 RESET
```

- To verify that the Ethernet links between the TX Matrix router and the T640 router control boards are operational, issue the **show chassis ethernet-switch** command on the TX Matrix router:

```
user@router> show chassis ethernet-switch
```

```
scc-re0:
```

```
-----
Link is good on FE port 4 connected to device: LCC0
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 6 connected to device: LCC2
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 8 connected to device: SPMB
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on GE port 13 connected to device: Other RE
  Speed is 1000Mb
  Duplex is full
  Autonegotiate is Enabled
```

```
1cc0-re0:
```

```
-----
Link is good on FE port 1 connected to device: FPC1
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 2 connected to device: FPC2
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 3 connected to device: FPC3
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 8 connected to device: SPMB
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 10 connected to device: SCC
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on GE port 13 connected to device: Other RE
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
```

```
1cc2-re0:
```

```
-----
Link is good on FE port 0 connected to device: FPC0
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 1 connected to device: FPC1
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 3 connected to device: FPC3
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 8 connected to device: SPMB
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on FE port 10 connected to device: SCC
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
Link is good on GE port 13 connected to device: Other RE
  Speed is 100Mb
  Duplex is full
  Autonegotiate is Enabled
```

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46





## Chapter 3

# Routing Matrix with a TX Matrix Router Configuration Examples

- Merging Examples on page 45
- Example: Routing Matrix with a TX Matrix Router Configuration on page 46
- For More Information on page 66

## Merging Examples

---

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your router.

For example, copy the following configuration to a file and name the file `ex-script.conf`. Copy the `ex-script.conf` file to the `/var/tmp` directory on your router.

```
system {
  scripts {
    commit {
      file ex-script.xsl;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your router configuration by issuing the `load merge` configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your router.

For example, copy the following snippet to a file and name the file `ex-script-snippet.conf`. Copy the `ex-script-snippet.conf` file to the `/var/tmp` directory on your router.

```
commit {
  file ex-script-snippet.xsl; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:

```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your router configuration by issuing the `load merge relative` configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

**Related Topics** For more information about the `load` command, see the *JUNOS CLI User Guide*.

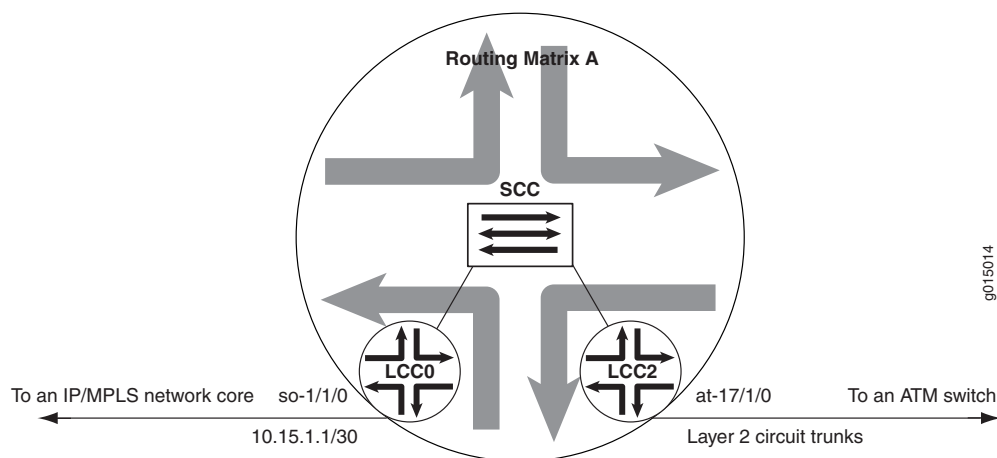
## Example: Routing Matrix with a TX Matrix Router Configuration

---

- Routing Matrix with a TX Matrix Router Topology on page 46
- TX Matrix Router—SCC on page 47
- Verifying Your Work on the Routing Matrix with a TX Matrix Router on page 53

### ***Routing Matrix with a TX Matrix Router Topology***

Figure 2 on page 47 shows Routing Matrix A, a basic routing matrix consisting of a TX Matrix router and two T640 routers. The TX Matrix router is named **SCC** and the nodes are named **LCC0** and **LCC2**. The routing matrix with a TX Matrix router is acting as a provider edge (PE) router in a Layer 2 circuit network. SONET interface `so-1/1/0` in node **LCC0** connects to an IP/MPLS core network, and Asynchronous Transfer Mode 2 (ATM2) intelligent queuing (IQ) interface `at-17/1/0` in node **LCC2** runs Layer 2 circuit trunk mode to connect to an ATM switch. (For more information about Layer 2 see the *JUNOS VPNs Configuration Guide*.)

**Figure 2: Routing Matrix with a TX Matrix Router Topology Diagram**

Some key considerations for this configuration are as follows:

- Treat the routing matrix like a single router and execute all configuration and operational commands on the TX Matrix router **SCC**.
- Create configuration groups for each Routing Engine in the routing matrix by using groups **re0**, **re1**, **lcc0-re0**, **lcc2-re0**, **lcc0-re1**, and **lcc2-re1**. In the groups, configure hostnames, default routes, and management interfaces.
- To configure interfaces, use the routing matrix FPC numbering convention of slots 0 through 31.
- To enable ATM2 IQ trunk mode and other chassis-based commands, include the **lcc lcc-number** statement at the **[edit chassis]** hierarchy level and use the hardware FPC slot numbers 0 through 7 of node **LCC2**.
- Configure most other processes as usual, such as routing, class of service (CoS), and firewalls.

### **TX Matrix Router—SCC**

```
[edit]
groups { # You can create special configuration groups in a routing matrix.
  re0 { # This group corresponds to the master Routing Engine.
    system { # on the TX Matrix router.
      host-name scc;
      backup-router 192.168.17.254;
    }
    interfaces {
      fxp0 {
        unit 0 {
          family inet {
            address 192.168.77.158/21;
          }
        }
      }
    }
  }
}
```

```

re1 { # This group corresponds to the backup Routing Engine
  system { # on the TX Matrix router.
    host-name scc1;
    backup-router 192.168.17.254;
  }
  interfaces {
    fxp0 {
      unit 0 {
        family inet {
          address 192.168.77.168/21;
        }
      }
    }
  }
}

lcc0-re0 { # This group corresponds to the master Routing Engine
  system { # on the T640 router LCC0.
    host-name lcc0;
    backup-router 192.168.17.254 destination [10.0.0.0/8 192.168.0.0/16];
  }
  interfaces {
    fxp0 {
      unit 0 {
        family inet {
          address 192.168.77.157/21;
        }
      }
    }
  }
}

lcc2-re0 { # This group corresponds to the master Routing Engine
  system { # on the T640 router LCC2.
    host-name lcc2;
    backup-router 192.168.17.254 destination [10.0.0.0/8 192.168.0.0/16];
  }
  interfaces {
    fxp0 {
      unit 0 {
        family inet {
          address 192.168.77.159/21;
        }
      }
    }
  }
}

lcc0-re1 { # This group corresponds to the backup Routing Engine
  system { # on the T640 router LCC0.
    host-name lcc0-1;
    backup-router 192.168.17.254 destination [10.0.0.0/8 192.168.0.0/16];
  }
  interfaces {
    fxp0 {
      unit 0 {
        family inet {
          address 192.168.77.169/21;
        }
      }
    }
  }
}

```

```

    }
  }
}
lcc2-re1 { # This group corresponds to the backup Routing Engine
  system { # on the T640 routing node LCC2.
    host-name lcc2-1;
    backup-router 192.168.17.254 destination [10.0.0.0/8 192.168.0.0/16];
  }
  interfaces {
    fxp0 {
      unit 0 {
        family inet {
          address 192.168.77.192/21;
        }
      }
    }
  }
}
}
apply-groups [ re0 re1 lcc0-re1 lcc2-re1 lcc0-re0 lcc2-re0 ];
system {
  syslog {
    file messages {
      any any;
    }
  }
}
chassis { # You must apply chassis commands to a specific T640 router.
  lcc 2 { # Specify the T640 router and the FPC hardware slot of the node.
    fpc 1 { # This FPC is equivalent to slot 17 in the routing matrix.
      pic 1 {
        atm-l2circuit-mode {
          trunk nni;
        }
      }
    }
  }
}
}
interfaces {
  so-1/1/0 { # This is a SONET interface at FPC 1, PIC 1, port 0
    mtu 9192; # on the T640 router LCC0.
    unit 0 {
      family inet {
        address 10.15.1.1/30 {
          destination 10.15.1.2;
        }
      }
      family iso;
      family mpls {
        filter {
          input filter_1;
        }
      }
    }
  }
}
}

```

```

at-17/1/0 { # This is an ATM2 IQ interface at FPC 1, PIC 1, port 0
encapsulation atm-ccc-cell-relay; # on the T640 router LCC2.
atm-options {
pic-type atm2;
scheduler-maps { # CoS on an ATM2 IQ PIC works the same in a routing matrix.
cos1 { # as it does in a standalone T640 router.
forwarding-class ubr {
priority low;
transmit-weight percent 25;
}
forwarding-class nrtvbr {
priority low;
transmit-weight percent 25;
}
forwarding-class rtvbr {
priority low;
transmit-weight percent 25;
}
forwarding-class cbr {
priority high;
transmit-weight percent 25;
}
}
cos2 {
forwarding-class ubr {
priority low;
transmit-weight percent 10;
}
forwarding-class nrtvbr {
priority low;
transmit-weight percent 20;
}
forwarding-class rtvbr {
priority low;
transmit-weight percent 30;
}
forwarding-class cbr {
priority high;
transmit-weight percent 40;
}
}
cos3 {
forwarding-class ubr {
priority low;
transmit-weight percent 40;
}
forwarding-class nrtvbr {
priority low;
transmit-weight percent 30;
}
forwarding-class rtvbr {
priority low;
transmit-weight percent 20;
}
forwarding-class cbr {
priority high;

```

```

        transmit-weight percent 10;
    }
}
}
unit 0 {
    trunk-id 0;
    trunk-bandwidth 10m;
    cell-bundle-size 2;
}
unit 1 {
    trunk-id 1;
    trunk-bandwidth 10m;
    cell-bundle-size 1;
    atm-scheduler-map cos1;
}
unit 2 {
    trunk-id 2;
    trunk-bandwidth 10m;
    cell-bundle-size 2;
    atm-scheduler-map cos2;
}
unit 3 {
    trunk-id 3;
    trunk-bandwidth 10m;
    cell-bundle-size 3;
    atm-scheduler-map cos3;
}
}
lo0 {
    unit 0 {
        family inet {
            address 127.0.0.1/32;
            address 10.255.77.158/32 {
                primary;
            }
        }
        family iso {
            address 47.0005.80ff.f800.0000.0108.0001.0102.5507.0158.00;
        }
        family inet6 {
            address 2001:db8::10:255:77:158/32 {
                primary;
            }
        }
    }
}
}
protocols { # You can configure protocols in the routing matrix as usual.
    mpls {
        interface so-1/1/0.0;
    }
    isis {
        interface so-1/1/0.0;
        interface lo0.0;
    }
}

```

```

ldp {
  interface so-1/1/0.0;
  interface lo0.0;
}
l2circuit {
  neighbor 10.255.71.97 {
    interface at-17/1/0.0 {
      virtual-circuit-id 100;
    }
    interface at-17/1/0.1 {
      virtual-circuit-id 101;
    }
    interface at-17/1/0.2 {
      virtual-circuit-id 102;
    }
    interface at-17/1/0.3 {
      virtual-circuit-id 103;
    }
  }
}
}

class-of-service { # You can configure CoS in the routing matrix as usual.
  forwarding-classes {
    queue 0 ubr;
    queue 1 nrtvbr;
    queue 2 rtvbr;
    queue 3 cbr;
  }
  traceoptions {
    flag all;
  }
}

firewall { # You can configure firewalls in the routing matrix as usual.
  family mpls {
    filter filter_1 {
      term plp0 {
        from {
          exp [ 0 2 4 6 ];
        }
        then {
          count LOW;
          loss-priority low;
        }
      }
    }
    term plp1 {
      from {
        exp [ 1 3 5 7 ];
      }
      then {
        count HIGH;
        loss-priority high;
      }
    }
  }
}
}

```



## Verifying Your Work on the Routing Matrix with a TX Matrix Router

To verify proper operation of the routing matrix with a TX Matrix router, use the following commands on the TX Matrix router:

- `show chassis alarms < lcc lcc-number | scc >`
- `show chassis craft-interface < lcc lcc-number | scc >`
- `show chassis ethernet-switch < lcc lcc-number | scc >`
- `show chassis hardware < lcc lcc-number | scc >`
- `show chassis fpc < lcc lcc-number >`
- `show chassis lccs`
- `show chassis location < fpc | interface | lcc lcc-number | scc >`
- `show chassis routing-engine < lcc lcc-number | scc >`
- `show chassis sibs < lcc lcc-number | scc >`
- `show interfaces terse`
- `show route summary`
- `show system uptime < all-lcc | lcc lcc-number | scc >`
- `show version < all-lcc | lcc lcc-number | scc >`

In general, when you issue standard operational commands on a TX Matrix router, you receive output from the primary Routing Engines of all components in the routing matrix. To limit the output of information for a specific T640 router within the routing matrix, include the `lcc lcc-number` option. To display information for the TX Matrix router only, include the `scc` option. To display information for all T640 routers within the routing matrix (selected commands only), include the `all-lcc` option. Any exceptions to this general rule are mentioned next to the appropriate commands.

The following sections show the output of select operational commands used with the configuration example:

- Displaying the Software Version on A Routing Matrix with a TX Matrix Router on page 53
- Displaying Interfaces on page 56
- Displaying Routes on page 57
- Displaying Alarms and System Uptime on page 57
- Displaying Chassis Hardware and Status for a Routing Matrix with a TX Matrix Router on page 60

### Displaying the Software Version on A Routing Matrix with a TX Matrix Router

The `show version` command provides an excellent example of how you can select output for various components of the routing matrix with a TX Matrix router. If the

TX Matrix router (SCC) or a T640 router (LCC) is not specified in the command, then the command displays output for all components.

```
user@router> show version ?
Possible completions:
  <[Enter]>      Execute this command
  all-lcc        Show software version on all LCC chassis
  brief         Display brief output
  detail        Display detailed output
  lcc           Show software version on specific LCC (0..3)
  scc           Show software version on the SCC
  |             Pipe through a command
```

To display the software version for all routing matrix components, issue the **show version** command on the TX Matrix router:

```
user@router> show version
scc-re0:
-----
Hostname: scc
Model: TX Matrix
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
lcc0-re0:
-----
Hostname: lcc0
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
lcc2-re0:
-----
Hostname: lcc2
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
```

To display the software version for the TX Matrix router only, include the **scc** option:

```

user@router> show version scc
Hostname: scc
Model: TX Matrix
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]

```

To display the software version for a specific T640 router, include the `lcc` option:

```

user@router> show version lcc 0
lcc0-re0:
-----
Hostname: lcc0
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]

```

To display the output for all T640 routers, include the `all-lcc` option:

```

user@router> show version all-lcc
lcc0-re0:
-----
Hostname: lcc0
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]
lcc2-re0:
-----
Hostname: lcc2
Model: t640
JUNOS Base OS boot [7.0-20040630.0]
JUNOS Base OS Software Suite [7.0-20040629.0]
JUNOS Kernel Software Suite [7.0-20040630.0]
JUNOS Packet Forwarding Engine Support (T-Series) [7.0-20040630.0]
JUNOS Routing Software Suite [7.0-20040630.0]
JUNOS Online Documentation [7.0-20040630.0]
JUNOS Crypto Software Suite [7.0-20040630.0]
JUNOS Support Tools Package [7.0-20040630.0]

```

## Displaying Interfaces

Although individual FPCs are installed in each of the T640 routers, the routing matrix is designed to collect interface information centrally at the TX Matrix router. To display available interfaces in the routing matrix, issue a **show interfaces** command on the TX Matrix router:

```
user@router> show interfaces terse
```

Interface	Admin	Link	Proto	Local	Remote
so-1/0/0	up	up			
so-1/1/0	up	up			
so-1/1/0.0	up	up	inet	10.15.1.1	--> 10.15.1.2
			iso		
			mpls		
so-1/3/0	up	down			
at-2/1/0	up	up			
ge-2/2/0	up	up			
so-3/3/0	up	up			
so-3/3/1	up	up			
so-3/3/2	up	down			
so-3/3/3	up	down			
so-16/0/0	up	down			
so-16/0/1	up	down			
so-16/0/2	up	down			
so-16/0/3	up	up			
ge-16/1/0	up	down			
so-17/0/0	up	down			
at-17/1/0	up	up			
at-17/1/0.0	up	up	ccc		
at-17/1/0.1	up	up	ccc		
at-17/1/0.2	up	up	ccc		
at-17/1/0.3	up	up	ccc		
at-17/1/1	up	up			
ge-17/2/0	up	up			
ge-17/2/1	up	up			
so-17/3/0	up	down			
so-19/0/0	up	down			
so-19/1/0	up	down			
so-19/2/0	up	down			
so-19/3/0	up	down			
bcm0	up	up			
bcm0.0	up	up	tnp	4	
dsc	up	up			
em0	up	up			
em0.0	up	up	tnp	4	
fxp0	up	up			
fxp0.0	up	up	inet	192.168.77.158/21	
gre	up	up			
ipip	up	up			
lo0	up	up			
lo0.0	up	up	inet	10.255.70.158	--> 0/0
				127.0.0.1	--> 0/0
			iso		
47.0005.80ff.f800.0000.0108.0001.0102.5507.0158.00			inet6	2001:db8::10:255:70:158	
				fe80::280:42ff:fe13:269d	
lo0.16385	up	up	inet		
			inet6	fe80::280:42ff:fe13:269d	

```

lsi                up    up
mtun               up    up
pimd               up    up
pime               up    up
tap                up    up

```

## Displaying Routes

When you need to verify route information for a routing matrix, you must issue operational commands on the TX Matrix router. To display available routes for the routing matrix, issue a **show route** command:

```

user@router> show route summary
Router ID: 10.255.77.158
inet.0: 13 destinations, 14 routes (12 active, 0 holddown, 1 hidden)
      Direct:    4 routes,    3 active
      Local:     2 routes,    2 active
      Static:    6 routes,    6 active
      IS-IS:     2 routes,    1 active
inet.3: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
      LDP:       1 routes,    1 active
iso.0: 1 destinations, 1 routes (1 active, 0 holddown, 0 hidden)
      Direct:    1 routes,    1 active
mpls.0: 7 destinations, 7 routes (7 active, 0 holddown, 0 hidden)
      MPLS:      3 routes,    3 active
      LDP:       2 routes,    2 active
      L2CKT:     2 routes,    2 active
inet6.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
      Direct:    2 routes,    2 active
__juniper_private1__inet6.0: 1 destinations, 1 routes (1 active, 0 holddown, 0
hidden)
      Direct:    1 routes,    1 active
l2circuit.0: 5 destinations, 5 routes (5 active, 0 holddown, 0 hidden)
      LDP:       1 routes,    1 active
      L2CKT:     4 routes,    4 active

```

## Displaying Alarms and System Uptime

To display alarms for all routing matrix components, issue the **show chassis alarms** command:

```

user@router> show chassis alarms
scc-re0:
-----
2 alarms currently active
Alarm time          Class  Description
2004-09-27 08:50:57 PDT  Major  LCC 2 Major Errors
2004-09-27 08:50:42 PDT  Minor  LCC 0 Minor Errors
lcc0-re0:
-----
1 alarms currently active
Alarm time          Class  Description
2004-09-27 08:50:42 PDT  Minor  PEM 1 Absent
lcc2-re0:
-----
1 alarms currently active

```

Alarm time	Class	Description
2004-09-27 08:50:57 PDT	Major	PEM 1 Not OK

To display the craft interface display for all routing matrix components, issue the `show chassis craft-interface` command:

```
user@router> show chassis craft-interface
scc-re0:
```

```
-----
FPM Display contents:
```

```
+-----+
|scc      |
|2 Alarms active |
|R: LCC 2 Major Error|
|Y: LCC 0 Minor Error|
+-----+
```

```
Front Panel System LEDs:
Routing Engine    0    1
```

```
-----
OK                *    *
Fail              .    .
Master            *    .
```

```
Front Panel Alarm Indicators:
```

```
-----
Red LED          *
Yellow LED       *
Major relay      *
Minor relay      *
```

```
CB LEDs:
  CB    0    1
```

```
-----
Amber .    .
Green *    *
Blue  *    .
```

```
SIB LEDs:
  SIB   0    1    2    3    4
```

```
-----
Fail .    .    .    .    .
OK   *    *    *    *    *
Active .    *    *    *    *
```

```
lcc0-re0:
```

```
-----
FPM Display contents:
```

```
+-----+
|lcc0      |
|1 Alarm active |
|Y: PEM 1 Absent |
|            |
+-----+
```

```
Front Panel System LEDs:
Routing Engine    0    1
```

```
-----
OK                *    *
Fail              .    .
Master            *    .
```

```
Front Panel Alarm Indicators:
```

```
-----
Red LED          .
Yellow LED       *
Major relay      .
```

```

Minor relay *
Front Panel FPC LEDs:
FPC    0  1  2  3  4  5  6  7
-----
Red     .  .  .  .  .  .  .  .
Green   .  *  *  *  .  .  .  .
CB LEDs:
  CB    0  1
-----
Amber   .  .
Green   *  *
Blue    *  .
SCG LEDs:
  SCG   0  1
-----
Amber   .  .
Green   *  *
Blue    *  .
SIB LEDs:
  SIB   0  1  2  3  4
-----
Red     .  .  .  .  .
Green   *  *  *  *  *
lcc2-re0:
-----
FPM Display contents:
+-----+
|lcc2      |
|1 Alarm active|
|R: PEM 1 Not OK|
|          |
+-----+

Front Panel System LEDs:
Routing Engine    0  1
-----
OK                *  *
Fail              .  .
Master            *  .
Front Panel Alarm Indicators:
-----
Red LED           *
Yellow LED        .
Major relay       *
Minor relay       .
Front Panel FPC LEDs:
FPC    0  1  2  3  4  5  6  7
-----
Red     .  .  .  .  .  .  .  .
Green   *  *  .  *  .  .  .  .
CB LEDs:
  CB    0  1
-----
Amber   .  .
Green   *  *
Blue    *  .
SCG LEDs:
  SCG   0  1
-----
Amber   .  .
Green   *  .

```

```

Blue   *   .
SIB LEDs:
      SIB  0   1   2   3   4
-----
Red     .   .   .   .   .
Green  *   *   *   *   *

```

To display the amount of time the routing matrix components have been in operation, issue the **show system uptime** command on the TX Matrix router:

```

user@router> show system uptime
scc-re0:
-----
Current time: 2004-09-27 09:44:55 PDT
System booted: 2004-09-27 08:49:31 PDT (00:55:24 ago)
Protocols started: 2004-09-27 08:50:27 PDT (00:54:28 ago)
Last configured: 2004-09-27 09:16:08 PDT (00:28:47 ago) by regress
9:44AM PDT up 55 mins, 1 user, load averages: 0.00, 0.05, 0.06
lcc0-re0:
-----
Current time: 2004-09-27 09:44:55 PDT
System booted: 2004-09-27 08:49:24 PDT (00:55:31 ago)
Last configured: 2004-09-27 09:16:06 PDT (00:28:49 ago) by regress
9:44AM PDT up 56 mins, 0 users, load averages: 0.00, 0.02, 0.00
lcc2-re0:
-----
Current time: 2004-09-27 09:44:55 PDT
System booted: 2004-09-27 08:49:26 PDT (00:55:29 ago)
Last configured: 2004-09-27 09:16:06 PDT (00:28:49 ago) by regress
9:44AM PDT up 55 mins, 0 users, load averages: 0.02, 0.01, 0.00

```

## Displaying Chassis Hardware and Status for a Routing Matrix with a TX Matrix Router

To display the hardware inventory for a routing matrix with a TX Matrix router, you can select output for the TX Matrix router only, a specific T640 router, or all components. If a specific component (lcc or scc) is not specified as an option in the command, the default output displays information for the entire routing matrix.

```

user@router> show chassis hardware ?
Possible completions:
  <[Enter]>      Execute this command
  detail        Include RAM and disk information in output
  extensive     Display ID EEPROM information
  frus          Display assembly IDs and extra PIC information
  lcc           Display chassis-specific information (0..3)
  scc           Display chassis-specific information
  |            Pipe through a command

```

To display all hardware components in a routing matrix, issue the **show chassis hardware** command on the TX Matrix router:

```

user@router> show chassis hardware
scc-re0:
-----
Hardware inventory:

```



Item	Version	Part number	Serial number	Description
Chassis				TX Matrix
Midplane	REV 04	710-004396	RB0013	SCC Midplane
FPM GBUS				
FPM Display	REV 04	710-004619	HS5953	SCC FPM
CIP 0	REV 01	710-010218	HS5726	SCC CIP
CIP 1	REV 01	710-010218	HV9163	SCC CIP
PEM 0	Rev 11	740-002595	pm18529	Power Entry Module
Routing Engine 0	REV 02	740-008883	212058900121	RE-4.0
Routing Engine 1	REV 03	740-008883	211123900258	RE-4.0
CB 0	REV 01	710-011709	HS5911	Control Board (CB-TX)
CB 1	REV 01	710-011709	HZ2163	Control Board (CB-TX)
SPMB 0	REV 09	710-003229	HT4129	T-series Switch CPU
SPMB 1	REV 09	710-003229	HT4174	T-series Switch CPU
SIB 0	REV 01	710-011223	HS0663	SIB-S8-F16 1/2
B Board	REV 05	710-011225	HW1210	SIB-S8-F16 1/2 (B)
SIB 1	REV 01	710-005839	HW1160	SIB-S8-F16
B Board	REV 01	710-005840	HW1213	SIB-S8-F16 (B)
SIB 2	REV 05	710-011223	HW1146	SIB-S8-F16 1/2
B Board	REV 05	710-011225	JB8148	SIB-S8-F16 1/2 (B)
SIB 3	REV 05	710-011223	HW1218	SIB-S8-F16 1/2
B Board	REV 05	710-011225	HW1214	SIB-S8-F16 1/2 (B)
SIB 4	REV 05	710-011223	HW1162	SIB-S8-F16 1/2
B Board	REV 05	710-011225	HW1182	SIB-S8-F16 1/2 (B)
1cc0-re0:				

-----  
Hardware inventory:

Item	Version	Part number	Serial number	Description
Chassis			65409	T640
Midplane	REV 03	710-005608	RA1395	T640 Backplane
FPM GBUS	REV 09	710-002901	RA2649	T640 FPM Board
FPM Display	REV 05	710-002897	RA2608	FPM Display
CIP	REV 06	710-002895	HS0753	T-series CIP
PEM 0	Rev 01	740-002595	MF16629	Power Entry Module
SCG 0	REV 11	710-003423	HS4313	T640 Sonet Clock Gen.
SCG 1	REV 11	710-003423	HR9161	T640 Sonet Clock Gen.
Routing Engine 0	REV 03	740-008883	211123900199	RE-4.0
Routing Engine 1	REV 03	740-008883	211123900248	RE-4.0
CB 0	REV 02	710-007655	HS5909	Control Board (CB-T)
CB 1	REV 02	710-007655	HS5910	Control Board (CB-T)
FPC 1	REV 07	710-007527	HR0716	FPC Type 2
CPU	REV 15	710-001726	HS6048	FPC CPU
PIC 0	REV 07	750-001900	AR3722	1x OC-48 SONET, SMSR
PIC 1	REV 05	750-001900	AD3644	1x OC-48 SONET, SMSR
PIC 3	REV 06	750-001900	HD7603	1x OC-48 SONET, SMSR
MMB 1	REV 03	710-005555	HT5273	MMB-288mbit
PPB 0	REV 04	710-003758	HR4249	PPB Type 2
PPB 1	REV 04	710-003758	HR4257	PPB Type 2
FPC 2	REV 01	710-010233	HM4189	E-FPC Type 1
CPU	REV 01	710-010169	HS9936	FPC CPU-Enhanced
PIC 1	REV 03	750-005719	HL8326	1x OC-12 ATM-II IQ, MM
PIC 2	REV 01	750-003141	AD9051	1x G/E, 1000 BASE-SX
MMB 1	REV 01	710-008923	HR0848	MMB 3M 288-bit
FPC 3	REV 01	710-010154	HR0863	E-FPC Type 3
CPU	REV 01	710-010169	HN3422	FPC CPU-Enhanced
PIC 3	REV 01	750-009553	HP3576	4x OC-48 SONET
SFP 0	REV 01	740-009030	P11H5N1	SFP-LR
SFP 1	REV 01	740-009029	35D464P00060	SFP-IR
SFP 3	REV 01	740-009030	P11H5LM	SFP-LR
MMB 0	REV 01	710-010171	HR0821	MMB-288mbit
MMB 1	REV 01	710-010171	HR0818	MMB-288mbit

SPMB 0	REV 09	710-003229	HT4177	T-series Switch CPU
SPMB 1	REV 09	710-003229	HT4176	T-series Switch CPU
SIB 0	REV 07	710-005781	HR5939	SIB-L8-F16
B Board	REV 06	710-005782	HR5944	SIB-L8-F16 (B)
SIB 1	REV 02	710-005781	HZ2146	SIB-L8-F16
B Board	REV 03	710-005782	HY4160	SIB-L8-F16 (B)
SIB 2	REV 07	710-005781	HR5925	SIB-L8-F16
B Board	REV 03	710-005782	HY4161	SIB-L8-F16 (B)
SIB 3	REV 07	710-005781	HR5918	SIB-L8-F16
B Board	REV 06	710-005782	HR5972	SIB-L8-F16 (B)
SIB 4	REV 07	710-005781	HR5935	SIB-L8-F16
B Board	REV 06	710-005782	HR5969	SIB-L8-F16 (B)

1cc2-re0:

-----  
Hardware inventory:

Item	Version	Part number	Serial number	Description
Chassis			55609	T640
Midplane	REV 03	710-005608	RA1444	T640 Backplane
FPM GBUS	REV 09	710-002901	RA3309	T640 FPM Board
FPM Display	REV 05	710-002897	RA3273	FPM Display
CIP	REV 06	710-002895	HS0735	T-series CIP
PEM 0	Rev 11	740-002595	PM18568	Power Entry Module
PEM 1	Rev 11	740-002595	PM18572	Power Entry Module
SCG 0	REV 11	710-003423	HS9991	T640 Sonet Clock Gen.
Routing Engine 0	REV 03	740-008883	211123900183	RE-4.0
Routing Engine 1	REV 02	740-008883	212058900178	RE-4.0
CB 0	REV 02	710-007655	HS5913	Control Board (CB-T)
CB 1	REV 02	710-007655	HS5944	Control Board (CB-T)
FPC 0	REV 05	710-001721	HD5965	FPC Type 3
CPU	REV 09	710-001726	AY4909	FPC CPU
PIC 0	REV 04	750-009553	HV3648	4x OC-48 SONET
SFP 0	REV 01	740-009029	P11JXWP	SFP-IR
SFP 1	REV 01	740-008169	36D525P00154	UNKNOWN
SFP 2	REV 01	740-009028	2353110	SFP-SR
SFP 3	REV 01	740-008169	36D525P00159	UNKNOWN
PIC 1	REV 02	750-009567	HX2875	1x 10GE(LAN),XENPAK
SFP 0	REV 01	740-009898	USC202YW25	XENPAK-LR
MMB 0	REV 03	710-004047	HE3427	MMB-288mbit
MMB 1	REV 03	710-004047	HD5812	MMB-288mbit
ICBM	REV 04	710-003384	HB1884	FPC ICBM
PPB 0	REV 02	710-002845	HC0964	PPB Type 3
PPB 1	REV 02	710-002845	HC0987	PPB Type 3
FPC 1	REV 02	710-002385	HC0618	FPC Type 2
CPU	REV 06	710-001726	HA4724	FPC CPU
PIC 0	REV 02	750-009066	HL9900	1x OC-48 SONET SFP
SFP 0		NON-JNPR	P11QS8W	SFP-LR
PIC 1	REV 02	750-007219	AZ1339	2x OC-12 ATM-II IQ, MM
PIC 2	REV 02	750-002510	AP7476	2x G/E, 1000 BASE-SX
PIC 3	REV 05	750-001900	AD5738	1x OC-48 SONET, SMSR
MMB 1	REV 03	710-004047	HD5829	MMB-288mbit
ICBM	REV 04	710-003384	HC0386	FPC ICBM
PPB 0	REV 02	710-003758	HC0904	PPB Type 2
PPB 1	REV 02	710-003758	HC0898	PPB Type 2
FPC 3	REV 07	710-007529	HR3311	FPC Type 3
CPU	REV 15	710-001726	HR2788	FPC CPU
PIC 0	REV 10	750-004535	HT0545	1x OC-192 SM SR2
PIC 1	REV 12	750-004535	HX2065	1x OC-192 SM SR2
PIC 2	REV 01	750-004535	HC0241	1x OC-192 SM SR1
PIC 3	REV 01	750-004535	HF6583	1x OC-192 SM SR1
MMB 0	REV 03	710-005555	HR5642	MMB-288mbit
MMB 1	REV 03	710-005555	HR5586	MMB-288mbit

PPB 0	REV 04	710-002845	HT6719	PPB Type 3
PPB 1	REV 04	710-002845	HM0206	PPB Type 3
SPMB 0	REV 09	710-003229	HR8685	T-series Switch CPU
SPMB 1	REV 09	710-003229	HR3730	T-series Switch CPU
SIB 0	REV 07	710-005781	HR5937	SIB-L8-F16
B Board	REV 06	710-005782	HZ5288	SIB-L8-F16 (B)
SIB 1	REV 07	710-005781	HZ5279	SIB-L8-F16
B Board	REV 06	710-005782	HR5951	SIB-L8-F16 (B)
SIB 2	REV 07	710-005781	HZ5276	SIB-L8-F16
B Board	REV 06	710-005782	HR5950	SIB-L8-F16 (B)
SIB 3	REV 07	710-005781	HR5915	SIB-L8-F16
B Board	REV 06	710-005782	HZ5285	SIB-L8-F16 (B)
SIB 4	REV 07	710-005781	HR5934	SIB-L8-F16
B Board	REV 06	710-005782	HR5952	SIB-L8-F16 (B)

You can also display individual hardware components in the TX Matrix router, a specific T640 router, or the entire routing matrix. To display all the SIBs in the entire routing matrix, issue the **show chassis sibs** command on the TX Matrix router.

```
user@router> show chassis sibs
```

```
scc-re0:
```

```
-----
Slot  State          Uptime
0      Spare
1      Online          53 minutes, 38 seconds
2      Online          53 minutes, 36 seconds
3      Online          53 minutes, 33 seconds
4      Online          53 minutes, 30 seconds
```

```
lcc0-re0:
```

```
-----
Slot  State          Uptime
0      Spare
1      Online          53 minutes, 18 seconds
2      Online          53 minutes, 17 seconds
3      Online          53 minutes, 16 seconds
4      Online          53 minutes, 15 seconds
```

```
lcc2-re0:
```

```
-----
Slot  State          Uptime
0      Spare
1      Online          53 minutes, 18 seconds
2      Online          53 minutes, 17 seconds
3      Online          53 minutes, 16 seconds
4      Online          53 minutes, 15 seconds
```

To display information about all master Routing Engines in the routing matrix, issue the **show chassis routing-engine** command on the TX Matrix router:

```
user@router> show chassis routing-engine
```

```
scc-re0:
```

```
-----
Routing Engine status:
```

```
Slot 0:
```

```
Current state          Master
Election priority      Master (default)
Temperature            34 degrees C / 93 degrees F
```

```

CPU temperature          35 degrees C / 95 degrees F
DRAM                    2048 MB
Memory utilization       12 percent
CPU utilization:
  User                   0 percent
  Background             0 percent
  Kernel                 5 percent
  Interrupt              0 percent
  Idle                   95 percent
Model                   RE-4.0
Serial ID                212058900121
Start time               2004-09-27 08:49:31 PDT
Uptime                   1 hour, 4 seconds
Load averages:          1 minute   5 minute   15 minute
                        0.06        0.04        0.05

```

Routing Engine status:

Slot 1:

```

Current state           Backup
Election priority       Backup (default)
Temperature             33 degrees C / 91 degrees F
CPU temperature         34 degrees C / 93 degrees F
DRAM                    2048 MB
Memory utilization      10 percent
CPU utilization:
  User                   0 percent
  Background             0 percent
  Kernel                 0 percent
  Interrupt              1 percent
  Idle                   99 percent
Model                   RE-4.0
Serial ID                211123900258
Start time               2004-09-26 13:09:13 PDT
Uptime                   20 hours, 40 minutes, 4 seconds

```

1cc0-re0:

-----

Routing Engine status:

Slot 0:

```

Current state           Master
Election priority       Master (default)
Temperature             37 degrees C / 98 degrees F
CPU temperature         38 degrees C / 100 degrees F
DRAM                    2048 MB
Memory utilization      11 percent
CPU utilization:
  User                   0 percent
  Background             0 percent
  Kernel                 3 percent
  Interrupt              1 percent
  Idle                   97 percent
Model                   RE-4.0
Serial ID                211123900199
Start time               2004-09-27 08:49:24 PDT
Uptime                   1 hour, 11 seconds
Load averages:          1 minute   5 minute   15 minute
                        0.02        0.02        0.00

```

Routing Engine status:

Slot 1:

```

Current state           Backup
Election priority       Backup (default)
Temperature             35 degrees C / 95 degrees F
CPU temperature         35 degrees C / 95 degrees F

```

```

DRAM                                2048 MB
Memory utilization                    10 percent
CPU utilization:
  User                               0 percent
  Background                         0 percent
  Kernel                            0 percent
  Interrupt                          0 percent
  Idle                              99 percent
Model                                RE-4.0
Serial ID                            211123900248
Start time                          2004-09-26 13:09:07 PDT
Uptime                              20 hours, 40 minutes, 12 seconds
lcc2-re0:

```

-----

Routing Engine status:

```

Slot 0:
  Current state                      Master
  Election priority                  Master (default)
  Temperature                        33 degrees C / 91 degrees F
  CPU temperature                    35 degrees C / 95 degrees F
  DRAM                              2048 MB
  Memory utilization                  11 percent
  CPU utilization:
    User                            0 percent
    Background                      0 percent
    Kernel                          4 percent
    Interrupt                       0 percent
    Idle                            96 percent
  Model                              RE-4.0
  Serial ID                          211123900183
  Start time                        2004-09-27 08:49:26 PDT
  Uptime                            1 hour, 9 seconds
  Load averages:                    1 minute   5 minute  15 minute
                                      0.15        0.05      0.01

```

Routing Engine status:

```

Slot 1:
  Current state                      Backup
  Election priority                  Backup (default)
  Temperature                        32 degrees C / 89 degrees F
  CPU temperature                    34 degrees C / 93 degrees F
  DRAM                              2048 MB
  Memory utilization                  10 percent
  CPU utilization:
    User                            0 percent
    Background                      0 percent
    Kernel                          0 percent
    Interrupt                       1 percent
    Idle                            99 percent
  Model                              RE-4.0
  Serial ID                          212058900178
  Start time                        2004-09-26 13:09:10 PDT
  Uptime                            20 hours, 40 minutes, 8 seconds

```

To display information about FPCs in a routing matrix, issue the **show chassis fpc** command. Because there are no FPCs in a TX Matrix router, there is no **scc** option available for this command.

```

user@router> show chassis fpc
lcc0-re0:

```

Slot	State	Temp (C)	CPU Total	Utilization (%) Interrupt	Memory DRAM (MB)	Utilization (%) Heap	Buffer
0	Empty						
1	Online	31	1	0	256	7	44
2	Online	28	1	0	256	7	44
3	Online	31	3	0	256	14	44
4	Empty						
5	Empty						
6	Empty						
7	Empty						

lcc2-re0:

---

Slot	State	Temp (C)	CPU Total	Utilization (%) Interrupt	Memory DRAM (MB)	Utilization (%) Heap	Buffer
0	Online	31	3	0	256	14	44
1	Online	30	2	0	256	7	44
2	Empty						
3	Online	31	3	0	256	14	44
4	Empty						
5	Empty						
6	Empty						
7	Empty						

You can also check to see if the TX Matrix router and T640 routers are communicating correctly within the routing matrix. To verify that the T640 routers have proper connectivity to the routing matrix, issue the **show chassis lccs** command. In this example, there are two T640 routers in the routing matrix.

```
user@router> show chassis lccs
Slot  State      Uptime
0     Online      52 minutes, 5 seconds
1     Empty
2     Online      52 minutes, 6 seconds
3     Empty
```

- Related Topics**
- Routing Matrix with a TX Matrix Router Solutions Page
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Roadmap to Configuring a Routing Matrix with a TX Matrix Router on page 10
  - System Requirements for the Routing Matrix with a TX Matrix Router on page 6

## For More Information

For additional information about the routing matrix, see the following:

- *TX Matrix Router Hardware Guide*
- *JUNOS Network Interfaces Configuration Guide*
- *JUNOS CLI User Guide*

## Chapter 4

# Troubleshooting

- Space or DRAM Error During Software Upgrade of a Routing Matrix with a TX Matrix Router on page 67
- Software Upgrade Fails Due to Misaligned Software Versions on A Routing Matrix with a TX Matrix Router on page 72

### Space or DRAM Error During Software Upgrade of a Routing Matrix with a TX Matrix Router



**NOTE:** Throughout this document, we use the term TX Matrix router to refer to the switch-card chassis (SCC) and T640 router to refer to the line-card chassis (LCC).

A routing matrix with a TX Matrix router (scc) and T640 routers (lcc) must have sufficient disk space and DRAM on all Routing Engines for an upgrade of the JUNOS Software to install successfully. If there is insufficient disk space or DRAM, you might receive a warning indicating that the /var file system is low on free disk space similar to the following:

```
WARNING: The /var filesystem is low on free disk space.
WARNING: This package requires 1075136k free, but there
WARNING: is only 666502k available.
```

To determine the amount of free disk space on the Routing Engine, use the CLI `show system storage` command. To determine the amount of DRAM available on the Routing Engine, use the CLI `show chassis routing-engine` command.

Below is sample output showing the two commands.

```
{backup}
user@host-rel> show system storage
scc-rel:
-----
Filesystem      Size    Used    Avail  Capacity  Mounted on
/dev/ad0s1a     217M   176M     24M     88%      /
devfs           1.0K    1.0K      0B    100%    /dev
devfs           1.0K    1.0K      0B    100%    /dev/
/dev/md0         31M     31M      0B    100%    /packages/mnt/jbase
/dev/md1        199M    199M      0B    100%
/packages/mnt/jkernel-9.5R2.1
/dev/md3         4.9M    4.9M      0B    100%
/packages/mnt/jdocs-9.5R2.1
```

/dev/md4	55M	55M	0B	100%	
/packages/mnt/jroute-9.5R2.1					
/dev/md5	14M	14M	0B	100%	
/packages/mnt/jcrypto-9.5R2.1					
/dev/md7	2.0G	40K	1.8G	0%	/tmp
/dev/md8	2.0G	11M	1.8G	1%	/mfs
/dev/ad0s1e	24M	1.5M	21M	7%	/config
procfs	4.0K	4.0K	0B	100%	/proc
/dev/ad1s1f	25G	2.4G	21G	10%	/var
/dev/ad1s1e	24M	1.5M	22M	6%	/tmp/.snp3061/mnt

lcc0-re1:

Filesystem	Size	Used	Avail	Capacity	Mounted on
/dev/ad0s1a	220M	186M	16M	92%	/
devfs	1.0K	1.0K	0B	100%	/dev
devfs	1.0K	1.0K	0B	100%	/dev/
/dev/md0	33M	33M	0B	100%	/packages/mnt/jbase
/dev/md1	216M	216M	0B	100%	
/packages/mnt/jkernel-9.6B1.8					
/dev/md2	66M	66M	0B	100%	
/packages/mnt/jpfe-T-9.6B1.8					
/dev/md3	4.1M	4.1M	0B	100%	
/packages/mnt/jdocs-9.6B1.8					
/dev/md4	57M	57M	0B	100%	
/packages/mnt/jroute-9.6B1.8					
/dev/md5	15M	15M	0B	100%	
/packages/mnt/jcrypto-9.6B1.8					
/dev/md6	34M	34M	0B	100%	
/packages/mnt/jpfe-common-9.6B1.8					
/dev/md7	2.0G	10.0K	1.8G	0%	/tmp
/dev/md8	2.0G	532K	1.8G	0%	/mfs
/dev/ad0s1e	24M	44K	22M	0%	/config
procfs	4.0K	4.0K	0B	100%	/proc
/dev/ad2s1f	34G	21G	11G	66%	/var

lcc2-re1:

Filesystem	Size	Used	Avail	Capacity	Mounted on
/dev/ad0s1a	217M	178M	21M	89%	/
devfs	1.0K	1.0K	0B	100%	/dev
devfs	1.0K	1.0K	0B	100%	/dev/
/dev/md0	33M	33M	0B	100%	/packages/mnt/jbase
/dev/md1	216M	216M	0B	100%	
/packages/mnt/jkernel-9.6B1.8					
/dev/md2	66M	66M	0B	100%	
/packages/mnt/jpfe-T-9.6B1.8					
/dev/md3	4.1M	4.1M	0B	100%	
/packages/mnt/jdocs-9.6B1.8					
/dev/md4	57M	57M	0B	100%	
/packages/mnt/jroute-9.6B1.8					
/dev/md5	15M	15M	0B	100%	
/packages/mnt/jcrypto-9.6B1.8					
/dev/md6	34M	34M	0B	100%	
/packages/mnt/jpfe-common-9.6B1.8					
/dev/md7	2.0G	8.0K	1.8G	0%	/tmp
/dev/md8	2.0G	538K	1.8G	0%	/mfs
/dev/ad0s1e	24M	46K	22M	0%	/config
procfs	4.0K	4.0K	0B	100%	/proc
/dev/ad1s1f	25G	1.3G	22G	5%	/var



```
{master}
user@host-re0> show chassis routing-engine
scc-re0:
-----
Routing Engine status:
Slot 0:
  Current state           Master
  Election priority       Master (default)
  Temperature             41 degrees C / 105 degrees F
  CPU temperature         43 degrees C / 109 degrees F
  DRAM                   2048 MB
  Memory utilization      21 percent
  CPU utilization:
    User                  0 percent
    Background            0 percent
    Kernel                4 percent
    Interrupt             0 percent
    Idle                  96 percent
  Model                   RE-4.0
  Serial ID               P11123909610
  Start time              2009-06-16 13:21:12 PDT
  Uptime                  21 hours, 19 minutes, 44 seconds
  Last reboot reason      Router rebooted after a normal shutdown.
  Load averages:         1 minute   5 minute  15 minute
                        0.03       0.06     0.07

Routing Engine status:
Slot 1:
  Current state           Backup
  Election priority       Backup (default)
  Temperature             39 degrees C / 102 degrees F
  CPU temperature         38 degrees C / 100 degrees F
  DRAM                   2048 MB
  Memory utilization      20 percent
  CPU utilization:
    User                  0 percent
    Background            0 percent
    Kernel                0 percent
    Interrupt             0 percent
    Idle                  100 percent
  Model                   RE-4.0
  Serial ID               211123900273
  Start time              2009-06-15 13:38:48 PDT
  Uptime                  1 day, 21 hours, 2 minutes, 5 seconds
  Last reboot reason      Router rebooted after a normal shutdown.

lcc0-re0:
-----
Routing Engine status:
Slot 0:
  Current state           Master
  Election priority       Master (default)
  Temperature             46 degrees C / 114 degrees F
  CPU temperature         50 degrees C / 122 degrees F
  DRAM                   2048 MB
  Memory utilization      18 percent
  CPU utilization:
    User                  0 percent
    Background            0 percent
    Kernel                2 percent
    Interrupt             0 percent
```

```

Idle 98 percent
Model RE-4.0
Serial ID P11123908065
Start time 2009-06-16 13:20:59 PDT
Uptime 21 hours, 19 minutes, 56 seconds
Last reboot reason Router rebooted after a normal shutdown.
Load averages: 1 minute 5 minute 15 minute
                0.05      0.03      0.00

Routing Engine status:
Slot 1:
Current state Backup
Election priority Backup (default)
Temperature 50 degrees C / 122 degrees F
CPU temperature 55 degrees C / 131 degrees F
DRAM 3584 MB
Memory utilization 11 percent
CPU utilization:
  User 0 percent
  Background 0 percent
  Kernel 0 percent
  Interrupt 0 percent
  Idle 100 percent
Model RE-A-2000
Serial ID 1000673710
Start time 2009-06-15 13:34:44 PDT
Uptime 1 day, 21 hours, 6 minutes, 8 seconds
Last reboot reason Router rebooted after a normal shutdown.

```

```
lcc2-re0:
```

```
-----
Routing Engine status:
```

```

Slot 0:
Current state Master
Election priority Master (default)
Temperature 41 degrees C / 105 degrees F
CPU temperature 42 degrees C / 107 degrees F
DRAM 2048 MB
Memory utilization 18 percent
CPU utilization:
  User 0 percent
  Background 0 percent
  Kernel 2 percent
  Interrupt 0 percent
  Idle 98 percent
Model RE-4.0
Serial ID P11123908326
Start time 2009-06-16 13:21:10 PDT
Uptime 21 hours, 19 minutes, 44 seconds
Last reboot reason Router rebooted after a normal shutdown.
Load averages: 1 minute 5 minute 15 minute
                0.00      0.00      0.00

```

```
Routing Engine status:
```

```

Slot 1:
Current state Backup
Election priority Backup (default)
Temperature 41 degrees C / 105 degrees F
CPU temperature 42 degrees C / 107 degrees F
DRAM 2048 MB
Memory utilization 18 percent
CPU utilization:
  User 0 percent

```

```
Background          0 percent
Kernel              0 percent
Interrupt            0 percent
Idle                 100 percent
Model                RE-4.0
Serial ID            212058900119
Start time           2009-06-15 13:37:41 PDT
Uptime               1 day, 21 hours, 3 minutes, 8 seconds
```

**Solution** If you find that you need to free up some space, issue the `request system storage cleanup` command and delete everything that appears in the output. then try the upgrade again.

```
{master}
user@host-re0> request system storage cleanup
```

List of files to delete:

```
Size Date      Name
2B Jun 16 12:46 /var/crash/bounds
80.4M Jun 15 14:56 /var/crash/cores/kernel.0.090615.1455
80.4M Jun 15 15:46 /var/crash/cores/kernel.1.090615.1546
80.4M Jun 15 15:58 /var/crash/cores/kernel.2.090615.1558
80.4M Jun 16 12:47 /var/crash/cores/kernel.3.090616.1246
30.6M Jun 15 15:05 /var/crash/cores/vmcore.0.090615.1455.tgz
33.5M Jun 15 16:33 /var/crash/cores/vmcore.1.090615.1546.tgz
35.9M Jun 15 17:52 /var/crash/cores/vmcore.2.090615.1558.tgz
48.0M Jun 16 13:47 /var/crash/cores/vmcore.3.090616.1246.tgz
504B Jun 15 14:55 /var/crash/info.0
504B Jun 15 15:46 /var/crash/info.1
505B Jun 15 15:58 /var/crash/info.2
505B Jun 16 12:46 /var/crash/info.3
716B Jun 15 13:43 /var/log/install.0.gz
1669B Jun 13 18:05 /var/log/install.1.gz
[...Output Truncated...]
201.6K Jun 11 02:27 /var/tmp/jnx-routeservice-9.6I20090611_0926_root.tgz
59.7K Jun 10 09:07 /var/tmp/jnx_ifinfo_sanity.pl.base_test_cfg_66245
59.9K Jun 10 15:19 /var/tmp/jnx_ifinfo_sanity.pl.base_test_cfg_74023
59.7K Jun 11 02:57 /var/tmp/jnx_ifinfo_sanity.pl.base_test_cfg_83419
181.0M Jul 23 2008 /var/tmp/mchassis-install.tgz
59.7K Jun 10 09:07 /var/tmp/orig_z8_cfg_66245
59.9K Jun 10 15:19 /var/tmp/orig_z8_cfg_74023
59.7K Jun 11 02:57 /var/tmp/orig_z8_cfg_83419
Delete these files ? [yes,no] (no) yes
```



**NOTE:** For some DRAM issues, remove any superfluous files from the `/root` and `/tmp` directories.

- Related Topics**
- Upgrading the Software for a Routing Matrix with a TX Matrix Router on page 17
  - Software Upgrade Fails Due to Misaligned Software Versions on A Routing Matrix with a TX Matrix Router on page 72
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## Software Upgrade Fails Due to Misaligned Software Versions on A Routing Matrix with a TX Matrix Router



**NOTE:** Throughout this document, we use the term TX Matrix router to refer to the switch-card chassis (SCC) and T640 router to refer to the line-card chassis (LCC).

A routing matrix with a TX Matrix router (scc) and T640 routers (lcc) must have all master and backup Routing Engines running the same version of software. This is necessary for the routing matrix to operate and for the JUNOS Software to install successfully. If the software versions on the Routing Engines are not aligned, the software upgrade will return an error.

The output below from the master (scc-re0) Routing Engine shows the JUNOS Software version on a routing matrix with a TX Matrix router and two T640 routers. The backup Routing Engine (scc-re1) has JUNOS Release 9.5R2.1 installed, while all the other Routing Engines have JUNOS Release 9.6B1.8 installed.

```
[edit]
user@host-reo# run show version invoke-on all-routing-engines
scc-re0:
```

```
-----
Hostname: z8
Model: TX Matrix
JUNOS Base OS boot [9.6B1.8]
JUNOS Base OS Software Suite [9.6B1.8]
JUNOS Kernel Software Suite [9.6B1.8]
JUNOS Crypto Software Suite [9.6B1.8]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B1.8]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B1.8]
JUNOS Online Documentation [9.6B1.8]
JUNOS Voice Services Container package [9.6B1.8]
JUNOS Border Gateway Function package [9.6B1.8]
JUNOS Services AACL Container package [9.6B1.8]
JUNOS Services LL-PDF Container package [9.6B1.8]
JUNOS Services Stateful Firewall [9.6B1.8]
JUNOS AppId Services [9.6B1.8]
JUNOS IDP Services [9.6B1.8]
JUNOS Routing Software Suite [9.6B1.8]
```

```
scc-re1:
```

```
-----
Hostname: z8-1
Model: TX Matrix
JUNOS Base OS boot [9.5R2.1]
JUNOS Base OS Software Suite [9.5R2.1]
JUNOS Kernel Software Suite [9.5R2.1]
JUNOS Crypto Software Suite [9.5R2.1]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.5R2.1]
JUNOS Packet Forwarding Engine Support (T-Series) [9.5R2.1]
JUNOS Online Documentation [9.5R2.1]
JUNOS Voice Services Container package [9.5R2.1]
JUNOS Services AACL Container package [9.5R2.1]
JUNOS Services LL-PDF Container package [9.5R2.1]
JUNOS Services Stateful Firewall [9.5R2.1]
```

```
JUNOS AppId Services [9.5R2.1]
JUNOS IDP Services [9.5R2.1]
JUNOS Routing Software Suite [9.5R2.1]
JUNOS Installation Software [9.6B1.8]
```

```
lcc0-re0:
```

```
-----
Hostname: z8-lcc0-re0
Model: t640
JUNOS Base OS boot [9.6B1.8]
JUNOS Base OS Software Suite [9.6B1.8]
JUNOS Kernel Software Suite [9.6B1.8]
JUNOS Crypto Software Suite [9.6B1.8]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B1.8]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B1.8]
JUNOS Online Documentation [9.6B1.8]
JUNOS Voice Services Container package [9.6B1.8]
JUNOS Border Gateway Function package [9.6B1.8]
JUNOS Services AACL Container package [9.6B1.8]
JUNOS Services LL-PDF Container package [9.6B1.8]
JUNOS Services Stateful Firewall [9.6B1.8]
JUNOS AppId Services [9.6B1.8]
JUNOS IDP Services [9.6B1.8]
JUNOS Routing Software Suite [9.6B1.8]
```

```
lcc0-re1:
```

```
-----
Hostname: z8-lcc0-re1
Model: t640
JUNOS Base OS boot [9.6B1.8]
JUNOS Base OS Software Suite [9.6B1.8]
JUNOS Kernel Software Suite [9.6B1.8]
JUNOS Crypto Software Suite [9.6B1.8]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B1.8]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B1.8]
JUNOS Online Documentation [9.6B1.8]
JUNOS Voice Services Container package [9.6B1.8]
JUNOS Border Gateway Function package [9.6B1.8]
JUNOS Services AACL Container package [9.6B1.8]
JUNOS Services LL-PDF Container package [9.6B1.8]
JUNOS Services Stateful Firewall [9.6B1.8]
JUNOS AppId Services [9.6B1.8]
JUNOS IDP Services [9.6B1.8]
JUNOS Routing Software Suite [9.6B1.8]
JUNOS Installation Software [9.6B1.8]
```

```
lcc2-re0:
```

```
-----
Hostname: z8-lcc2-re0
Model: t640
JUNOS Base OS boot [9.6B1.8]
JUNOS Base OS Software Suite [9.6B1.8]
JUNOS Kernel Software Suite [9.6B1.8]
JUNOS Crypto Software Suite [9.6B1.8]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B1.8]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B1.8]
JUNOS Online Documentation [9.6B1.8]
JUNOS Voice Services Container package [9.6B1.8]
JUNOS Border Gateway Function package [9.6B1.8]
JUNOS Services AACL Container package [9.6B1.8]
JUNOS Services LL-PDF Container package [9.6B1.8]
```

```

JUNOS Services Stateful Firewall [9.6B1.8]
JUNOS AppId Services [9.6B1.8]
JUNOS IDP Services [9.6B1.8]
JUNOS Routing Software Suite [9.6B1.8]

lcc2-re1:
-----
Hostname: z8-lcc2-re1
Model: t640
JUNOS Base OS boot [9.6B1.8]
JUNOS Base OS Software Suite [9.6B1.8]
JUNOS Kernel Software Suite [9.6B1.8]
JUNOS Crypto Software Suite [9.6B1.8]
JUNOS Packet Forwarding Engine Support (M/T Common) [9.6B1.8]
JUNOS Packet Forwarding Engine Support (T-Series) [9.6B1.8]
JUNOS Online Documentation [9.6B1.8]
JUNOS Voice Services Container package [9.6B1.8]
JUNOS Border Gateway Function package [9.6B1.8]
JUNOS Services ACL Container package [9.6B1.8]
JUNOS Services LL-PDF Container package [9.6B1.8]
JUNOS Services Stateful Firewall [9.6B1.8]
JUNOS AppId Services [9.6B1.8]
JUNOS IDP Services [9.6B1.8]
JUNOS Routing Software Suite [9.6B1.8]

```

**Solution** Different versions of the JUNOS Software can have incompatible message formats especially if you turn on GRES. Because the steps in the upgrade process include changing mastership, running the same version of software is recommended. For information about upgrading a routing matrix with a TX Matrix router (scc) and T640 (lcc) routers, see “Upgrading the Software for a Routing Matrix with a TX Matrix Router” on page 17.

Log directly into the Routing Engine with the different JUNOS version and issue the CLI `request system software add` command with the appropriate JUNOS version. For example:

```

user@host-re1> request system software add
/var/tmp/jinstall-9.6B1.8-domestic-signed.tgz

```

When all the Routing Engines are running the same version of the JUNOS Software, try the upgrade again.

To log in to other Routing Engines, issue the `request routing-engine login` command in the appropriate format for your situation. Below are some examples of the version of the command you might use:

```

user@host-re1> request routing-engine login other-routing-engine
user@host-re1> request routing-engine login lcc 2 re1

```

- Related Topics**
- Upgrading the Software for a Routing Matrix with a TX Matrix Router on page 17
  - Space or DRAM Error During Software Upgrade of a Routing Matrix with a TX Matrix Router on page 67
  - Overview of the Routing Matrix with a TX Matrix Router on page 3
  - Example: Routing Matrix with a TX Matrix Router Configuration on page 46

## **Part 2**

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