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Starting in Junos OS Release 14.1, the power management feature for PTX5000 routers ensures that at any time, the chassis power requirements do not exceed the available chassis power. The PTX5000 has two PDUs to meet the power requirements of the chassis. Each PDU is capable of providing power to the chassis on its own. In case the power requirement exceeds the individual capacity of a PDU, the required power is provided by both the PDUs and the No redundant power supply alarm is triggered. If the system cannot provide power for all the installed FPCs or PICs, the system brings down FPCs or PICs that in can no longer provide power for and the Insufficient Power - FRU(s) went offline alarm is raised.

The power management feature provides the following functionality:

- Power management ensures that high-priority FPCs continue to receive power when the system does not have sufficient power to keep all the FPCs online.
- Power management ensures that if a power supply fails, the router can continue to operate normally by keeping high-priority FPCs online and taking low-priority FPCs offline.
- If power supply failure requires power management to power down some components, power management does so by gracefully powering down lower-priority FPCs.

Power management manages power to router components by employing a power budget policy. In its power budget policy, power management:

- Budgets power for each installed router component that requires power. The amount that power management budgets for each component is the maximum power that component might consume under worst-case operating conditions. For example, for the fan tray, power management budgets the amount of power required to run the fans at their maximum speed setting, even if the current fan speed is much lower.
- Manages the router for $N+1$ power redundancy, which ensures uninterrupted system operation if one power supply fails.
- Provides power to host subsystem components, such as the Routing Engines, before it provides power to the FPCs.

- Manages the priority of individual FPCs. By assigning different priorities to the FPCs, you can determine which FPCs are more likely to receive power in the event of insufficient power.

Power Priority of FPCs

The power priority of FPCs determines:

- The order in which FPCs are allocated power.
- How power is reallocated if there is a change in power availability or demand in an operating router.

This section covers:

How an FPC's Power Priority Is Determined

Using the CLI, you can assign an explicit power priority to an FPC slot. The power priority is determined by the slot number, with the lowest-numbered slots receiving power first. Thus, if you do not explicitly assign priorities to slots, power priority is determined by slot number, with slot 0 having the highest priority. See *Configuring Power-On Sequence to Redistribute the Available Power*.

FPC Priority and FPC Power Allocation

When a PTX5000 is powered on, power management allocates power to components according to its power budget policy. After power management has allocated power to the host subsystem components, it allocates the remaining available power to the FPCs. It powers on the FPCs in the configured order of priority until all FPCs are powered on or the available power provided by both the PDUs is exhausted. Thus if available power is exhausted before all FPCs receive power, higher-priority FPCs are powered on while lower-priority FPCs remain powered off.

FPCs that have been taken offline are not allocated power.

NOTE: Because power management does not allocate power to an FPC that has been taken offline, that FPC is brought online only when you commit a configuration. You must explicitly use the `request chassis fpc slot slot-number online` command to bring an FPC online that was taken offline previously.

If an FPC with a high priority in the priority sequence also has high-power requirement, and if the system does not have the required power available, then the lower priority FPCs with lower power requirements are also not powered on. This is to maintain consistency and also avoid powering off of the lower priority FPC when extra power is available. For example, if an FPC that requires 450 W has a

higher priority than an FPC that requires 330 W, then the FPC with the lower power requirement (330 W) is also not powered on if the system does not have the required power to power the FPC that requires 450 W.

FPC Priority and Changes in the Power Budget

In an operating router, power management dynamically reallocates power in response to changes in power availability or demand or changes in FPC priority. Power management uses the configured priority on FPC slots to determine how to reallocate power in response to the following events:

- When a new power supply is brought online, FPCs that were powered off because of insufficient power are powered on in the order of priority.
- When a user changes the assigned power priority of one or more FPCs when power is insufficient to meet the power budget, power management reruns the current power budget policy and powers FPCs on or off based on their priority. As a result, FPCs receive power strictly by the order of priority and previously operating FPCs might no longer receive power.
- When an FPC is installed, Junos OS does not automatically power on and bring the FPC online. This FPC stays in the offline state until the user brings it online through the CLI or by pushing the online button, and only if the available chassis power is more than the budgeted power for this FPC, the FPC becomes operational.

Power Zones

In a PTX5000 equipped with high capacity PDUs and PSMs, there is one common zone that provides power to all FRUs and all FPCs. A high-capacity PDU can support up to eight PSMs and it does not support power zoning, unlike a normal-capacity PDU. All available PDU power is considered as a part of single zone. All PSMs provide power to the common zone. The PSM LEDs on the craft interface are interpreted as described in [PTX5000 Craft Interface LEDs](#). After the PDU upgrade from the normal-capacity PDUs to High-Capacity PDUs, the power management converges all power zones into a single common zone. All FRU power is distributed based on the power available in the common zone.

NOTE: Presence of both normal-capacity PDUs and high-capacity PDUs is referred to as mixed-mode of operation and is supported only during the PDU upgrade.

To cater for the increase in the PIC power consumption, the power manager is enhanced to account for the PIC power separately from the FPC. The priority sequence for the PICs follows the priority sequence for the FPCs. That is, PICs installed in high-priority FPCs are given preference over PICs installed in low-priority FPCs. All PICs on an FPC have the same priority.

NOTE: You cannot mix existing PDUs with the High Capacity DC PDU.

Power Supply Redundancy

By default, power management in PTX5000 routers is configured to manage the power supplies for $N+N$ redundancy, by which power supplies are held in reserve for backup if the other power supplies are removed or fail.

When power is insufficient to meet the budgeted power requirements, power management raises alarms as follows:

- With power supply redundancy, when one PSM fails, it does not cause FPCs to go offline. Only the No redundant power supply alarm is raised. However, with no redundancy, FPCs can go offline depending on the total chassis power available at that time. When an FPC or PIC goes offline due to insufficient power, which is indicated by No power in the output of the **show chassis fpc** command, then the Insufficient Power - FRU(s) went offline alarm is raised. The alarm gets cleared when there is sufficient power to bring up all the FPCs and PICs. The Insufficient Power - FRU(s) went offline alarm is raised when PSMs fail, when PSMs are powered off manually, or any time there is insufficient power for the system to power all the FPCs or PICs in the system.
- When power fails or when a PSM is removed, power management:
 - Calculates the total chassis power available from the remaining PSMs for the FPCs.
 - Powers off the FPCs based on the priority depending on the power budget for the FPCs and the FRUs and their configured power-on sequence.

NOTE: In the scenario where the available power is more than the budgeted power required by the FPC but less than its maximum power, the FPC is taken offline and then brought online, but one or more PICs in that FPC are not online.

- When a new PSM is inserted, power management:
 - Checks the power-on sequence of the FPCs and the PICs and brings any offline PICs online when power is available.
 - Powers on the FPCs based on the FPC's budgeted power and its power-on sequence depending on its priority.

- Maintains the power for high-priority FPCs and their PICs by taking the low-priority FPCs offline when all the FPCs are brought online, depending on the available power.

Power management clears all alarms when sufficient power is available to meet normal operating and reserved power requirements.

Configuring and Disabling Power Saving Mode

To configure and to disable power saving mode:

1. At the [edit chassis] hierarchy level, configure the set interfaces interface-range powersaving commands indicating the ports or member-range. You can also configure power saving mode for unused ports. For example:

```
[edit chassis]
user@host# set interfaces interface-range powersaving member-range et-0/0/24 to et-0/0/47
user@host# set interfaces interface-range powersaving member-range et-0/0/51 to et-0/0/53
user@host# set interfaces interface-range powersaving unused
```

2. Reboot the system.
3. To disable power saving mode, At the [edit chassis] hierarchy level, remove the set interfaces interface-range powersaving commands indicating the ports or member-range. For example:

```
[edit chassis]
user@host# set interfaces interface-range powersaving member-range et-0/0/24 to et-0/0/47
user@host# set interfaces interface-range powersaving member-range et-0/0/51 to et-0/0/53
user@host# set interfaces interface-range powersaving unused
```

4. Reboot the system.

NOTE:

- If PTP(Precision Time Protocol) is enabled on the last port in **member-range**, the interface range **unused** option cannot be configured. The sample configuration varies for each platform.
- It is recommended to configure power saving mode on Core1 ports.

RELATED DOCUMENTATION

| *interfaces (QFX Series, ACX Series)*

Release History Table

| Release | Description |
|---------|---|
| 14.1 | Starting in Junos OS Release 14.1, the power management feature for PTX5000 routers ensures that at any time, the chassis power requirements do not exceed the available chassis power. |

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