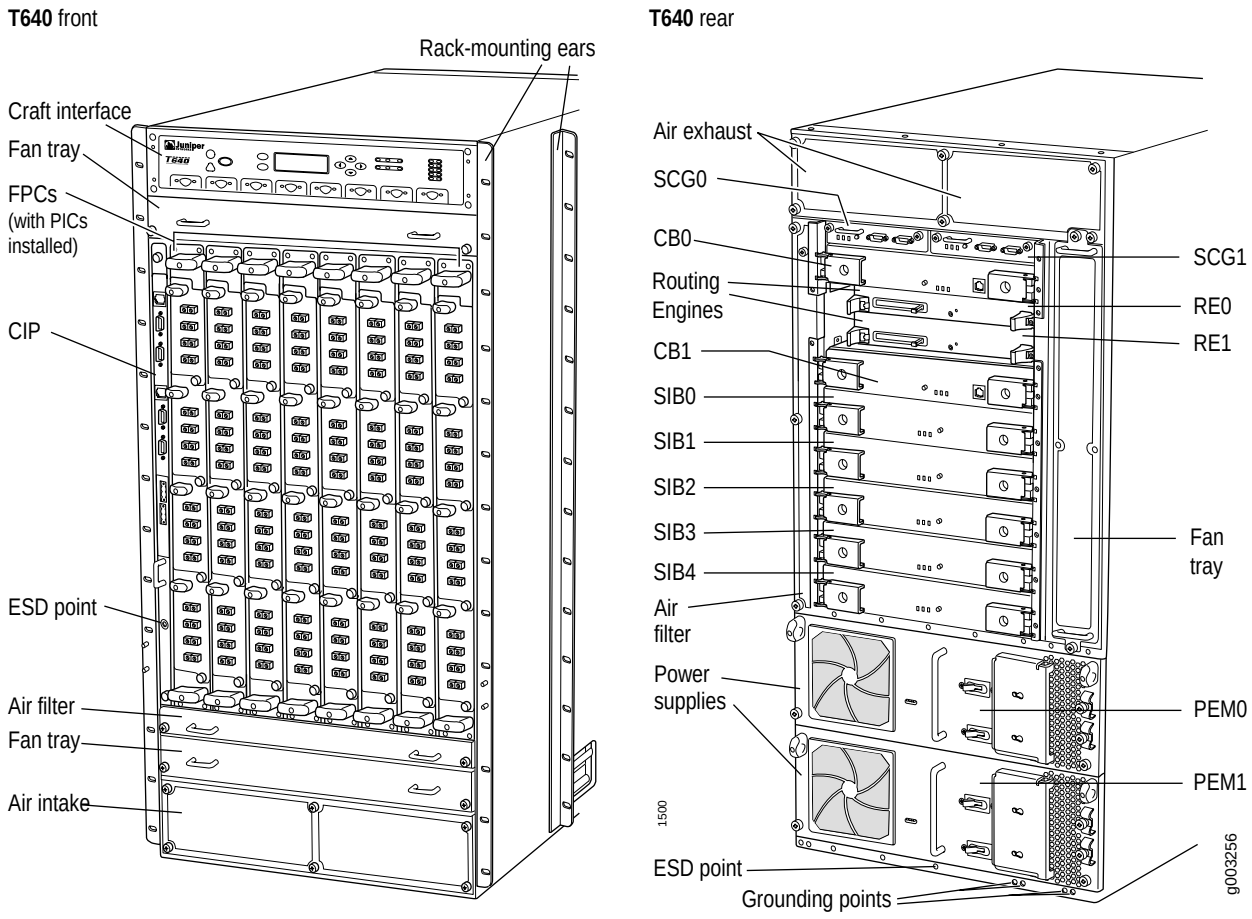
Chapter 10

T640 Internet Routing Node Overview

The T640 Internet routing node provides 40G capable platform, delivering 640 Gigabits per second (Gbps) of capacity and up to 770 million packets per second (Mpps) of throughput and supports 32 10-Gbps (OC192c/STM64 and 10-Gigabit Ethernet) ports, as well as OC48c/STM16. Gigabit Ethernet, SONET/SDH, and other high-speed interfaces for large core networks and network applications, such as those supported by Internet service providers (ISPs). It provides a cost-effective migration path to an Multiprotocol Label Switching (MPLS) infrastructure. The T640 routing node supports the JUNOS software which provides router configuration and monitoring. (See Figure 10 on page 40.)

Figure 10: T640 Routing Node



In a standalone configuration, the T640 routing node's maximum aggregate throughput is 320 Gbps, full duplex.

The T640 routing node supports two types of Flexible PIC Concentrators (FPCs):

FPC2—Rated at 10 Gbps full duplex; supports PICs that are also used in the M160 router.

FPC3—Rated at 40 Gbps full duplex; supports higher-speed PICs.

The T640 routing node can operate with any combination of FPC2s and FPC3s installed. Each FPC contains one or two Packet Forwarding Engines. The Packet Forwarding Engine consists of Layer 2/Layer 3 Packet Processing application-specific integrated circuits (ASICs), Switch Interface ASICs, T-series Internet Processor ASICs, and a memory subsystem (MMB) which includes the Queuing and Memory Interface ASICs. The Packet Forwarding Engine receives incoming packets from the PICs installed on the FPC and forwards them through the switch planes to the appropriate destination port. Each FPC contains data memory, which is managed by the Queuing and Memory Interface ASICs. Each FPC3 has two Packet Forwarding Engines, and each FPC2 has one Packet Forwarding Engine.

Physical Interface Cards (PICs) provide the physical connection to various network media types, receiving incoming packets from the network and transmitting outgoing packets to the network. PICs for the T640 routing node currently support the following network media types: Gigabit Ethernet, SONET/SDH OC12c/STM4, OC48c/STM16, OC192c/STM64, and Tunnel Services. You can install up to four PICs into the slots in each FPC. For more information on PICs used in the routing node, see the *T640 Internet R outing Node PIC Guide* .

The Switch Interface Boards (SIBs) provide the switching function to the destination FPC. The SIBs create the switch fabric for the routing node, providing up to a total of 640 million Mpps of forwarding. Five SIBs are installed in the routing node.

The host subsystem provides the routing and system management functions of the routing node. The host subsystem consists of the Routing Engine and the Control Board. The Routing Engine maintains the routing tables used by the routing node and controls the routing protocols that run on the routing node.

Each Control Board works with an adjacent Routing Engine to provide control and monitoring functions for the routing node. These include determining Routing Engine mastership; controlling power, reset, and SONET clocking for the other routing node components; monitoring and controlling fan speed; and monitoring system status using I^2C controllers.

ASICs are a definitive part of the router design; these ASICs enable the router to achieve data rates that match current fiber-optic capacity.

T640 Routing Node Major Hardware Components

Table 12 lists the major T640 routing node components and characteristics.

Table 12: T640 Routing Node Major Hardware Components

Component	Quantity	Function	Redundant	Field-Replaceable	Offline Button
Connector Interface Panel (CIP)	1	Provides ports for external management and alarm relay devices	—	Hot-pluggable	—
Control Board	1–2	Monitors and controls router components	Yes	Hot-pluggable	Yes
Cooling system	2 front fan trays, 1 rear fan tray	Cools router components	Yes	hot-removable, hot insertable	—
Craft interface	1	Displays status and provides an interface for controlling router functions	—	Hot-removable. hot-insertable	—
FPC	1–8	Connect PICs to other router components, contains Packet Forwarding Engines	—	Hot-removable, hot-insertable	Yes
PIC	1–4 per FPC	Provides an interface to various network media	—	Hot-removable, hot-insertable	Yes
Power supply (DC only)	2	Distributes needed voltages to router components	Yes	Hot-removable, hot-insertable	—
Routing Engine	1–2	Provides routing functions and routing tables	Yes	Hot-removable, hot-insertable	Yes

Component	Quantity	Function	Redundant	Field-Replaceable	Offline Button
SONET Clock Generator (SCG)	1 - 2	Provides Stratum 3 SONET/SDH clockings	Yes	Hot-pluggable	Yes
SIB	5	Provides switch fabric	4 active, 1 standby	Hot-removable, hot-insertable	Yes

Field-replaceable units (FRUs) are router components that can be replaced at the customer site. Replacing FRUs requires minimal router downtime. There are three types of FRUs:

Hot-removable and hot-insertable—You can remove and replace the component without powering down the router or interrupting the routing functions.

Hot-pluggable—You can remove the component without powering down the router, but routing functions are interrupted until the replacement is installed.

Requires router shutdown—You must power down the router before removing the component.

Monitoring T640 Routing Node Components

See the following chapters for information about monitoring and troubleshooting the T640 routing node components:

“Monitoring the Router Chassis” on page 107

“Monitoring the Routing Engine” on page 125

“Monitoring Redundant Routing Engines” on page 491

“Monitoring FPCs” on page 163

“Monitoring PICs” on page 183

“Monitoring the Craft Interface” on page 197

“Monitoring Power Supplies” on page 217

“Monitoring Redundant Power Supplies” on page 507

“Monitoring the Cooling System” on page 251

“Monitoring Redundant Cooling System Components” on page 523

“Maintaining the Cable Management System, Cables, and Connectors” on page 275

“Monitoring the Host Subsystem” on page 289

“Host Redundancy Overview” on page 463

“Monitoring the Control Board” on page 301

“Monitoring Redundant Control Boards” on page 559

“Monitoring the SCGs” on page 315

“Monitoring Redundant SCGs” on page 551

“Monitoring the SIBs” on page 325

“Monitoring Redundant SIBs” on page 543

“Monitoring the CIP” on page 381