MX240 and MX480
Ethernet Services Router
Fan Tray Installation Instructions

13 February 2008
Part Number: 530-022145-01
Revision 1

This document describes how to remove and replace the fan tray on a Juniper Networks MX240 and MX480 Ethernet Services Router. The fan tray and the air filter make up the cooling system.

Contents

■ 1

Cooling System

The cooling system consists of the following components:

- Fan tray
- Air filter

The cooling system components work together to keep all router components within the acceptable temperature range (see Figure 1 on page 2, Figure 2 on page 2, Figure 3 on page 3, Figure 4 on page 3, Figure 5 on page 4, and Figure 6 on page 4). The router has one fan tray and one air filter that install vertically in the rear of the router. The fan tray contains three fans on an MX240 router and six fans on an MX480 router.

The air intake to cool the chassis is located on the side of the chassis next to the air filter. Air is pulled through the chassis toward the fan tray, where it is exhausted out the side of the system. The air intake to cool the power supplies is located in the front of the router above the craft interface. The exhaust for the power supplies is located on the rear bulkhead power supplies.

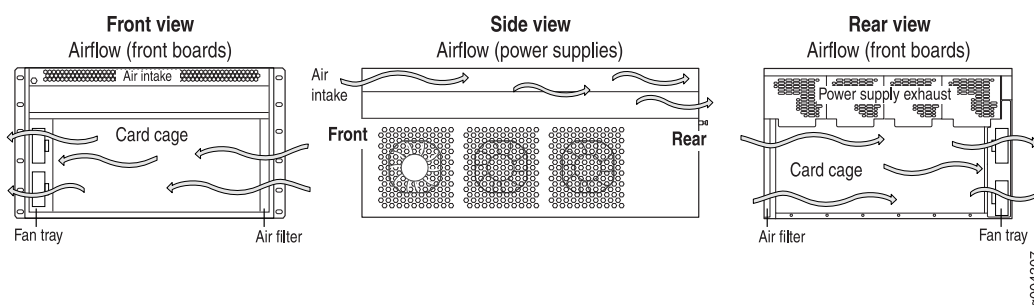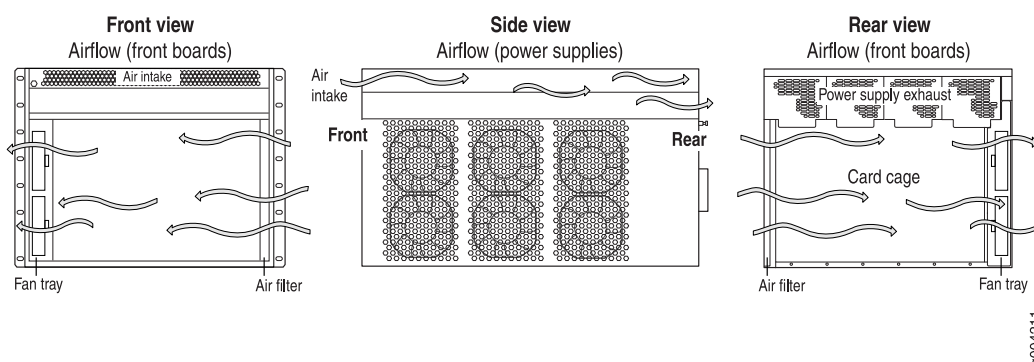**Figure 1: Airflow Through the MX240 Chassis**

Figure 2: Airflow Through the MX480 Chassis

The host subsystem monitors the temperature of the router components. When the router is operating normally, the fans function at lower than full speed. If a fan fails or the ambient temperature rises above a threshold, the speed of the remaining fans is automatically adjusted to keep the temperature within the acceptable range. If the ambient maximum temperature specification is exceeded and the system cannot

be adequately cooled, the Routing Engine shuts down the system by disabling output power from each power supply.
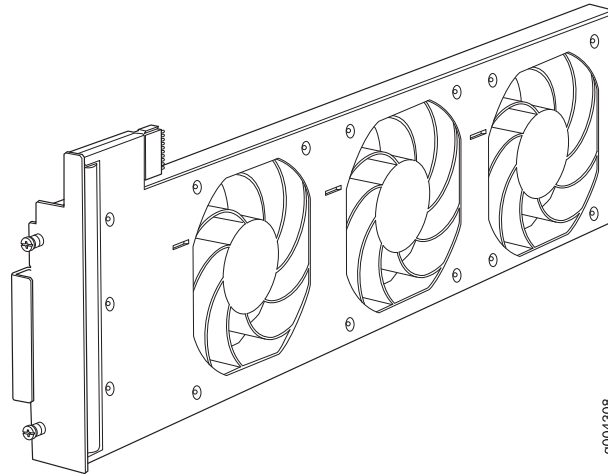
Figure 3: Fan Tray in an MX240 Router

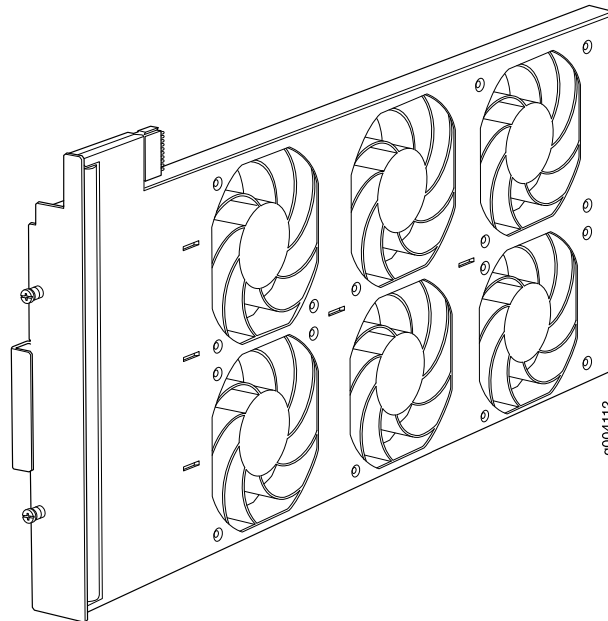**Figure 4: Fan Tray in an MX480 Router**

Figure 5: Air Filter on an MX240 Router
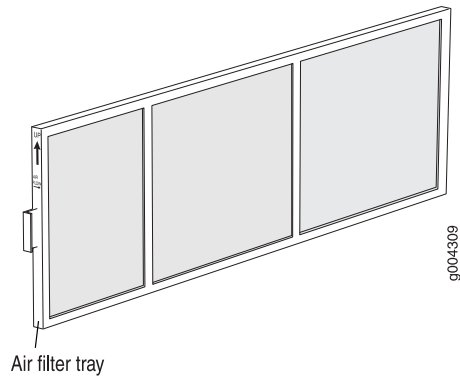
Air filter tray

Figure 6: Air Filter on an MX480 Router

Air filter tray
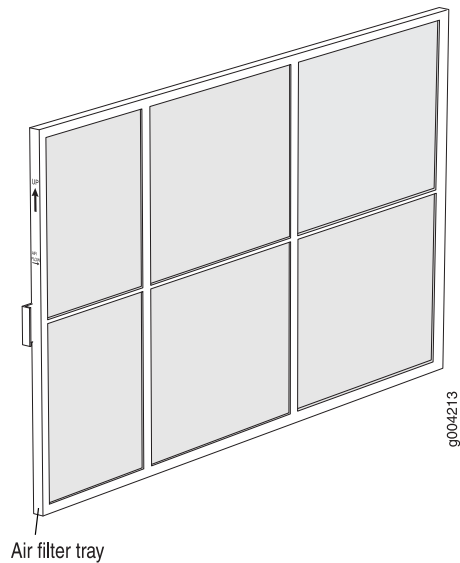
Replacing the Fan Tray

The router has one fan tray that installs vertically in the rear of the chassis. The fan tray contains three fans on an MX240 router and six fans on an MX480 router. The fan tray is hot-removable and hot-insertable.

The fan tray is located in the rear of the chassis on the right side. The fan tray weighs about 6.8 lb (3.08 kg).

☞ **NOTE:** To prevent overheating, install the replacement fan tray immediately after removing the existing fan tray.

To replace the fan tray, use the following procedures:

■ Removing the Fan Tray on page 5

■ Installing the Fan Tray on page 6

Removing the Fan Tray

To remove the fan tray (see Figure 7 on page 5 and Figure 8 on page 6):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage" on page 9.

2. Loosen the captive screws on the fan tray faceplate.

3. Grasp the fan tray handle and pull it out approximately 1 to 3 inches.

⚡ **WARNING:** To avoid injury, keep tools and your fingers away from the fans as you slide the fan tray out of the chassis. The fans might still be spinning.

4. Press the latch located on the inside of the fan tray to release it from the chassis.

5. Place one hand under the fan tray to support it and pull the fan tray completely out of the chassis.

Figure 7: Removing the Fan Tray from an MX240 Router

Captive screws
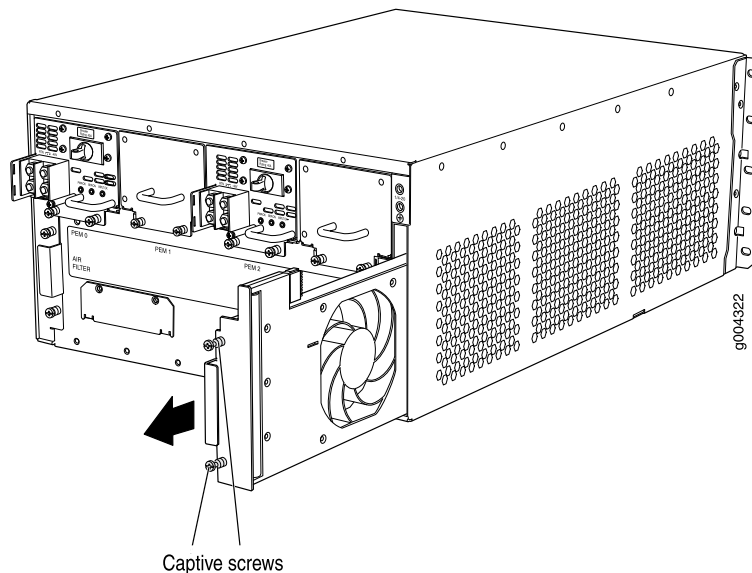
Figure 8: Removing the Fan Tray from an MX480 Router

Captive screws
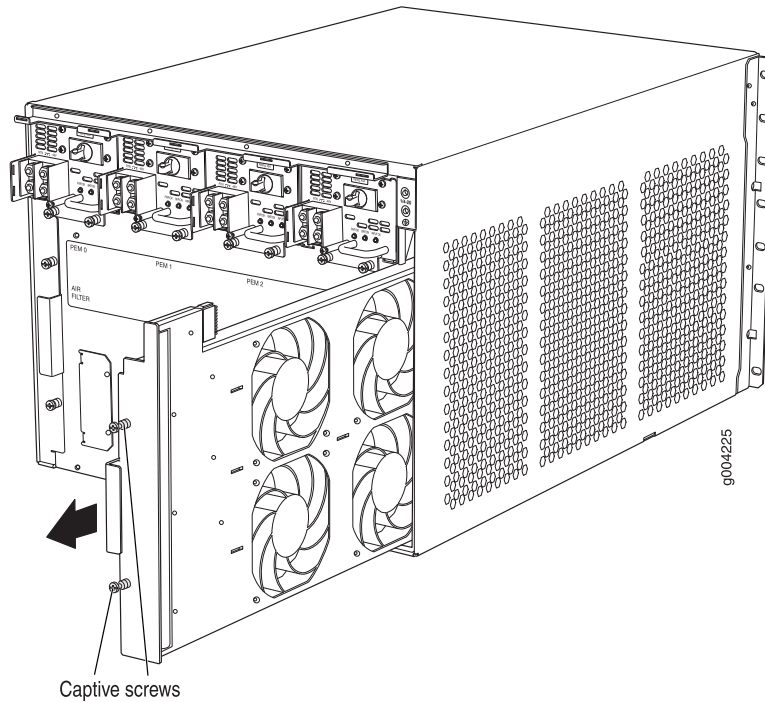
Installing the Fan Tray

To install the fan tray (see Figure 9 on page 7 and Figure 10 on page 7):

1. Attach an electrostatic discharge (ESD) grounding strap to your bare wrist and connect the strap to one of the ESD points on the chassis. For more information about ESD, see "Preventing Electrostatic Discharge Damage" on page 9.

2. Grasp the fan tray handle and insert it straight into the chassis. Note the correct orientation by the this side up label on the top surface of the fan tray.

3. Tighten the captive screws on the fan tray faceplate to secure it in the chassis.

Figure 9: Installing the Fan Tray in an MX240 Router

Tighten captive screws.
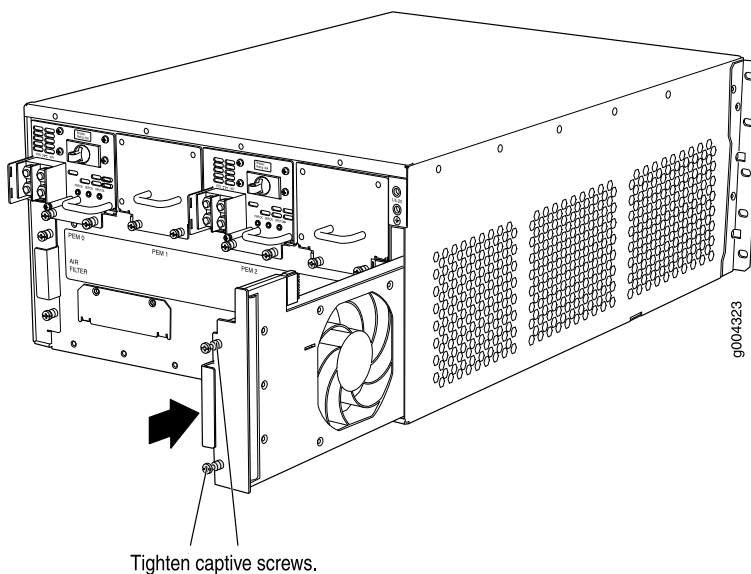
Figure 10: Installing the Fan Tray in an MX480 Router

Tighten captive screws.
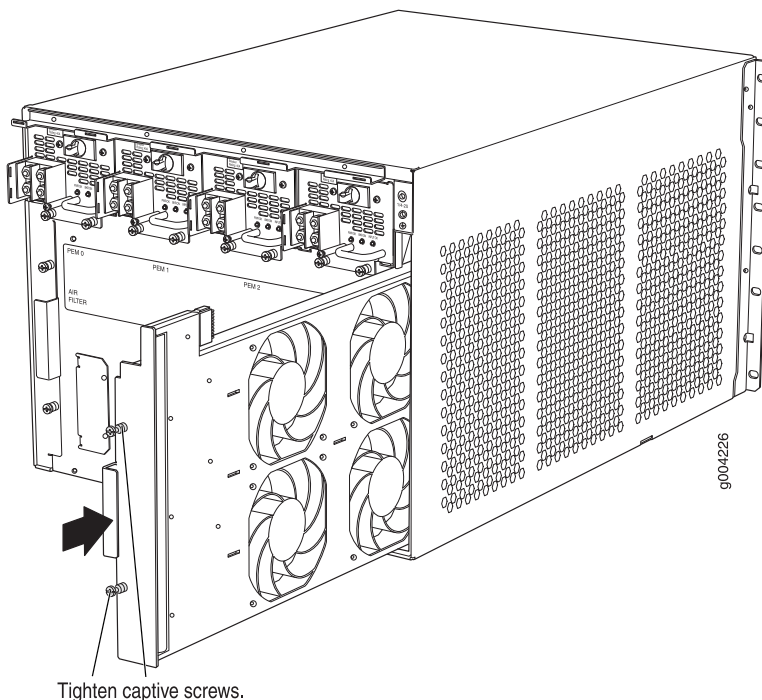
Electrostatic Discharge Point

Figure 11 on page 8 and Figure 12 on page 8 show the location of the ESD point on the rear of the chassis. The illustration shows a DC-powered router, but the location is the same in AC-powered routers.

Figure 11: Rear View of a Fully Configured DC-Powered MX240 Router

DC Power supplies

Protective earthing

Power supply exhaust

PEM 0

PEM 1

AIR FILTER

PEM 2

PEM 3

FAN TRAY

ESD

g004351

Air filter

ESD point   Fan tray   Air exhaust
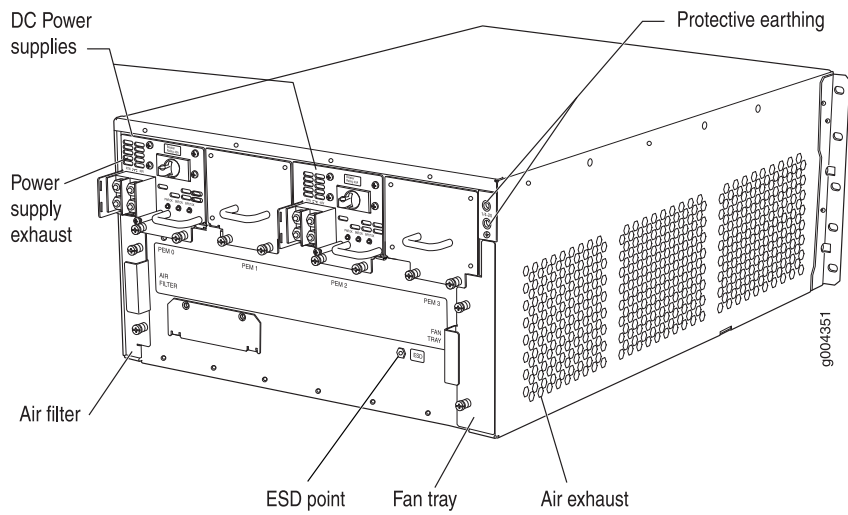
Figure 12: Rear View of a Fully Configured DC-Powered MX480 Router

AC Power supplies

Protective earthing

Power supply exhaust

PEM 0

PEM 1

AIR FILTER

PEM 2

PEM 3

FAN TRAY

ESD

g004201

Air filter

Air exhaust

ESD point   Fan tray

8 ■ Electrostatic Discharge Point
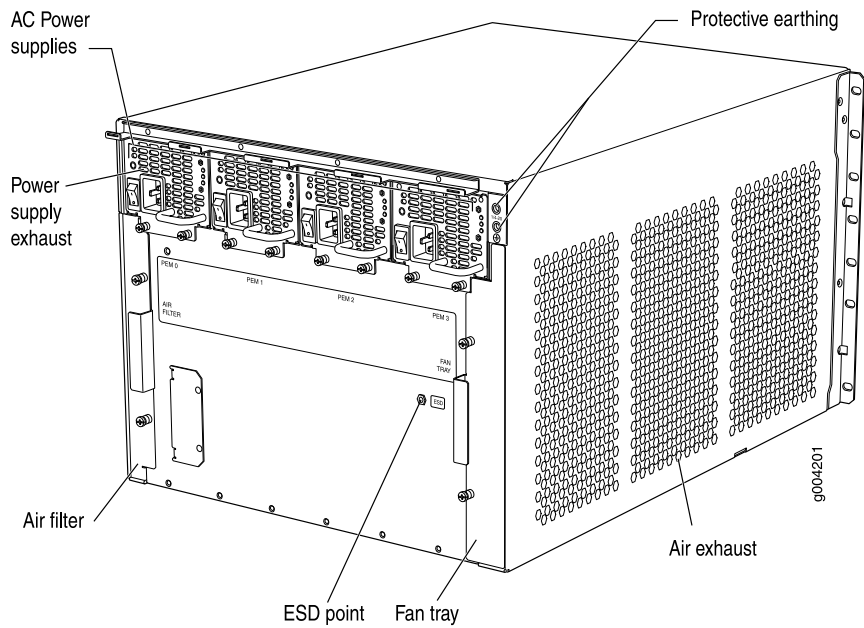
Preventing Electrostatic Discharge Damage

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

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

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

■ When handling any component that is removed from the chassis, make sure the equipment end of your ESD strap is attached to one of the ESD points on the chassis, which are shown in Figure 11 on page 8 and Figure 12 on page 8.

■ Avoid contact between the component and your clothing. ESD voltages emitted from clothing can still damage components.

■ When removing or installing a component, always place it component-side up on an antistatic surface, in an antistatic card rack, or in an electrostatic bag (see Figure 13 on page 9). If you are returning a component, place it in an electrostatic bag before packing it.

Figure 13: Placing a Component into an Electrostatic Bag
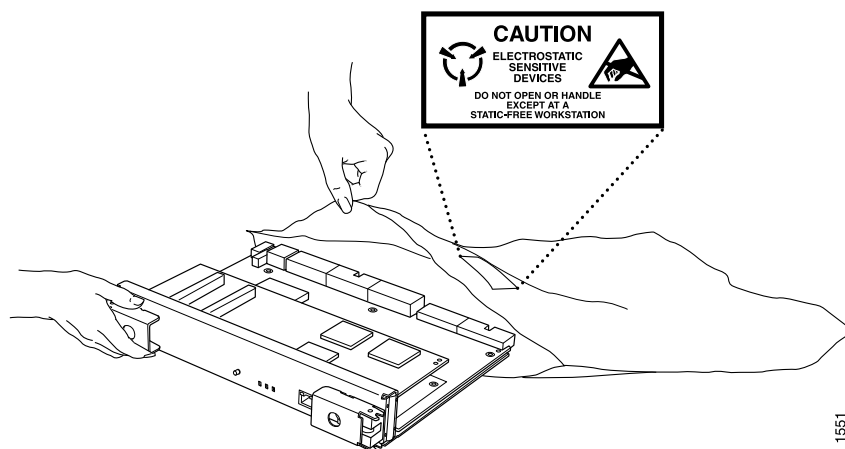
List of Technical Publications

Table 1 on page 10 lists the software and hardware guides and release notes for Juniper Networks J-series, M-series, MX-series, and T-series routing platforms and describes the contents of each document. Table 2 on page 14 lists the books included in the *Network Operations Guide* series. Table 3 on page 14 lists the manuals and

release notes supporting JUNOS software with enhanced services. All documents are available at http://www.juniper.net/techpubs/.

Table 4 on page 15 lists additional books on Juniper Networks solutions that you can order through your bookstore. A complete list of such books is available at http://www.juniper.net/books.

Table 1: Technical Documentation for Supported Routing Platforms

Book	Description
JUNOS Software for Supported Routing Platforms	
Access Privilege	Explains how to configure access privileges in user classes by using permission flags and regular expressions. Lists the permission flags along with their associated command-line interface (CLI) operational mode commands and configuration statements.
Class of Service	Provides an overview of the class-of-service (CoS) functions of the JUNOS software and describes how to configure CoS features, including configuring multiple forwarding classes for transmitting packets, defining which packets are placed into each output queue, scheduling the transmission service level for each queue, and managing congestion through the random early detection (RED) algorithm.
CLI User Guide	Describes how to use the JUNOS command-line interface (CLI) to configure, monitor, and manage Juniper Networks routing platforms. This material was formerly covered in the *JUNOS System Basics Configuration Guide*.
Feature Guide	Provides a detailed explanation and configuration examples for several of the most complex features in the JUNOS software.
High Availability	Provides an overview of hardware and software resources that ensure a high level of continuous routing platform operation and describes how to configure high availability (HA) features such as nonstop active routing (NSR) and graceful Routing Engine switchover (GRES).
MPLS Applications	Provides an overview of traffic engineering concepts and describes how to configure traffic engineering protocols.
Multicast Protocols	Provides an overview of multicast concepts and describes how to configure multicast routing protocols.
Multiplay Solutions	Describes how you can deploy IPTV and voice over IP (VoIP) services in your network.
MX-series Solutions Guide	Describes common configuration scenarios for the Layer 2 features supported on the MX-series routers, including basic bridged VLANs with normalized VLAN tags, aggregated Ethernet links, bridge domains, Multiple Spanning Tree Protocol (MSTP), and integrated routing and bridging (IRB).
Network Interfaces	Provides an overview of the network interface functions of the JUNOS software and describes how to configure the network interfaces on the routing platform.

Table 1: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
Network Management	Provides an overview of network management concepts and describes how to configure various network management features, such as SNMP and accounting options.
Policy Framework	Provides an overview of policy concepts and describes how to configure routing policy, firewall filters, and forwarding options.
Routing Protocols	Provides an overview of routing concepts and describes how to configure routing, routing instances, and unicast routing protocols.
Secure Configuration Guide for Common Criteria and JUNOS-FIPS	Provides an overview of secure Common Criteria and JUNOS-FIPS protocols for the JUNOS software and describes how to install and configure secure Common Criteria and JUNOS-FIPS on a routing platform.
Services Interfaces	Provides an overview of the services interfaces functions of the JUNOS software and describes how to configure the services interfaces on the router.
Software Installation and Upgrade Guide	Describes the JUNOS software components and packaging and explains how to initially configure, reinstall, and upgrade the JUNOS system software. This material was formerly covered in the *JUNOS System Basics Configuration Guide*.
System Basics	Describes Juniper Networks routing platforms and explains how to configure basic system parameters, supported protocols and software processes, authentication, and a variety of utilities for managing your router on the network.
VPNs	Provides an overview and describes how to configure Layer 2 and Layer 3 virtual private networks (VPNs), virtual private LAN service (VPLS), and Layer 2 circuits. Provides configuration examples.
JUNOS References	
Hierarchy and RFC Reference	Describes the JUNOS configuration mode commands. Provides a hierarchy reference that displays each level of a configuration hierarchy, and includes all possible configuration statements that can be used at that level. This material was formerly covered in the *JUNOS System Basics Configuration Guide*.
Interfaces Command Reference	Describes the JUNOS software operational mode commands you use to monitor and troubleshoot interfaces.
Routing Protocols and Policies Command Reference	Describes the JUNOS software operational mode commands you use to monitor and troubleshoot routing policies and protocols, including firewall filters.
System Basics and Services Command Reference	Describes the JUNOS software operational mode commands you use to monitor and troubleshoot system basics, including commands for real-time monitoring and route (or path) tracing, system software management, and chassis management. Also describes commands for monitoring and troubleshooting services such as class of service (CoS), IP Security (IPSec), stateful firewalls, flow collection, and flow monitoring.

Table 1: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
System Log Messages Reference	Describes how to access and interpret system log messages generated by JUNOS software modules and provides a reference page for each message.
J-Web User Guide	
J-Web Interface User Guide	Describes how to use the J-Web graphical user interface (GUI) to configure, monitor, and manage Juniper Networks routing platforms.
JUNOS API and Scripting Documentation	
JUNOScript API Guide	Describes how to use the JUNOScript application programming interface (API) to monitor and configure Juniper Networks routing platforms.
JUNOS XML API Configuration Reference	Provides reference pages for the configuration tag elements in the JUNOS XML API.
JUNOS XML API Operational Reference	Provides reference pages for the operational tag elements in the JUNOS XML API.
NETCONF API Guide	Describes how to use the NETCONF API to monitor and configure Juniper Networks routing platforms.
JUNOS Configuration and Diagnostic Automation Guide	Describes how to use the commit script and self-diagnosis features of the JUNOS software. This guide explains how to enforce custom configuration rules defined in scripts, how to use commit script macros to provide simplified aliases for frequently used configuration statements, and how to configure diagnostic event policies.
Hardware Documentation	
Hardware Guide	Describes how to install, maintain, and troubleshoot routing platforms and components. Each platform has its own hardware guide.
PIC Guide	Describes the routing platform's Physical Interface Cards (PICs). Each platform has its own PIC guide.
DPC Guide	Describes the Dense Port Concentrators (DPCs) for all MX-series routers.
JUNOScope Documentation	
JUNOScope Software User Guide	Describes the JUNOScope software graphical user interface (GUI), how to install and administer the software, and how to use the software to manage routing platform configuration files and monitor routing platform operations.
Advanced Insight Solutions (AIS) Documentation	
Advanced Insight Solutions Guide	Describes the Advanced Insight Manager (AIM) application, which provides a gateway between JUNOS devices and Juniper Support Systems (JSS) for case management and intelligence updates. Explains how to run AI scripts on Juniper Networks devices.

Table 1: Technical Documentation for Supported Routing Platforms *(continued)*

Book	Description
J-series Routing Platform Documentation	
Getting Started Guide	Provides an overview, basic instructions, and specifications for J-series routing platforms. The guide explains how to prepare your site for installation, unpack and install the router and its components, install licenses, and establish basic connectivity. Use the *Getting Started Guide* for your router model.
Basic LAN and WAN Access Configuration Guide	Explains how to configure the interfaces on J-series Services Routers for basic IP routing with standard routing protocols, ISDN backup, and digital subscriber line (DSL) connections.
Advanced WAN Access Configuration Guide	Explains how to configure J-series Services Routers in virtual private networks (VPNs) and multicast networks, configure data link switching (DLSw) services, and apply routing techniques such as policies, stateless and stateful firewall filters, IP Security (IPSec) tunnels, and class-of-service (CoS) classification for safer, more efficient routing.
Administration Guide	Shows how to manage users and operations, monitor network performance, upgrade software, and diagnose common problems on J-series Services Routers.
Release Notes	
JUNOS Release Notes	Summarize new features and known problems for a particular software release, provide corrections and updates to published JUNOS, JUNOScript, and NETCONF manuals, provide information that might have been omitted from the manuals, and describe upgrade and downgrade procedures.
Hardware Release Notes	Describe the available documentation for the routing platform and summarize known problems with the hardware and accompanying software. Each platform has its own release notes.
JUNOScope Release Notes	Contain corrections and updates to the published JUNOScope manual, provide information that might have been omitted from the manual, and describe upgrade and downgrade procedures.
AIS Release Notes	Summarize AIS new features and guidelines, identify known and resolved problems, provide information that might have been omitted from the manuals, and provide initial setup, upgrade, and downgrade procedures.
AIS AI Script Release Notes	Summarize AI Scripts new features, identify known and resolved problems, provide information that might have been omitted from the manuals, and provide instructions for automatic and manual installation, including deleting and rolling back.
J-series Services Router Release Notes	Briefly describe Services Router features, identify known hardware problems, and provide upgrade and downgrade instructions.

Table 2: JUNOS Software Network Operations Guides

Book	Description
Baseline	Describes the most basic tasks for running a network using Juniper Networks products. Tasks include upgrading and reinstalling JUNOS software, gathering basic system management information, verifying your network topology, and searching log messages.
Interfaces	Describes tasks for monitoring interfaces. Tasks include using loopback testing and locating alarms.
MPLS	Describes tasks for configuring, monitoring, and troubleshooting an example MPLS network. Tasks include verifying the correct configuration of the MPLS and RSVP protocols, displaying the status and statistics of MPLS running on all routing platforms in the network, and using the layered MPLS troubleshooting model to investigate problems with an MPLS network.
MPLS Log Reference	Describes MPLS status and error messages that appear in the output of the **show mpls lsp extensive** command. The guide also describes how and when to configure Constrained Shortest Path First (CSPF) and RSVP trace options, and how to examine a CSPF or RSVP failure in a sample network.
MPLS Fast Reroute	Describes operational information helpful in monitoring and troubleshooting an MPLS network configured with fast reroute (FRR) and load balancing.
Hardware	Describes tasks for monitoring M-series and T-series routing platforms.

To configure and operate a J-series Services Router running JUNOS software with enhanced services, you must also use the configuration statements and operational mode commands documented in JUNOS configuration guides and command references. To configure and operate a WX Integrated Services Module, you must also use WX documentation.

Table 3: JUNOS Software with Enhanced Services Documentation

Book	Description
JUNOS Software with Enhanced Services Design and Implementation Guide	Provides guidelines and examples for designing and implementing IP Security (IPSec) virtual private networks (VPNs), firewalls, and routing on J-series routers running JUNOS software with enhanced services.
JUNOS Software with Enhanced Services J-series Services Router Quick Start	Explains how to quickly set up a J-series router. This document contains router declarations of conformity.
JUNOS Software with Enhanced Services J-series Services Router Getting Started Guide	Provides an overview, basic instructions, and specifications for J-series Services Routers. This guide explains how to prepare a site, unpack and install the router, replace router hardware, and establish basic router connectivity. This guide contains hardware descriptions and specifications.

Table 3: JUNOS Software with Enhanced Services Documentation *(continued)*

Book	Description
JUNOS Software with Enhanced Services Migration Guide	Provides instructions for migrating an SSG device running ScreenOS software or a J-series router running the JUNOS software to JUNOS software with enhanced services.
JUNOS Software with Enhanced Services Interfaces and Routing Configuration Guide	Explains how to configure J-series router interfaces for basic IP routing with standard routing protocols, ISDN service, firewall filters (access control lists), and class-of-service (CoS) traffic classification.
JUNOS Software with Enhanced Services Security Configuration Guide	Explains how to configure and manage security services such as stateful firewall policies, IPSec VPNs, firewall screens, Network Address translation (NAT) and Router interface modes, Public Key Cryptography, and Application Layer Gateways (ALGs).
JUNOS Software with Enhanced Services Administration Guide	Shows how to monitor the router and routing operations, firewall and security services, system alarms and events, and network performance. This guide also shows how to administer user authentication and access, upgrade software, and diagnose common problems.
JUNOS Software with Enhanced Services CLI Reference	Provides the complete JUNOS software with enhanced services configuration hierarchy and describes the configuration statements and operational mode commands not documented in the standard JUNOS manuals.
WXC Integrated Services Module Installation and Configuration Guide	Explains how to install and initially configure a WXC Integrated Services Module in a J-series router for application acceleration.
JUNOS Software with Enhanced Services Release Notes	Summarize new features and known problems for a particular release of JUNOS software with enhanced services on J-series routers, including J-Web interface features and problems. The release notes also contain corrections and updates to the manuals and software upgrade and downgrade instructions for JUNOS software with enhanced services.

Table 4: Additional Books Available Through http://www.juniper.net/books

Book	Description
Interdomain Multicast Routing	Provides background and in-depth analysis of multicast routing using Protocol Independent Multicast sparse mode (PIM SM) and Multicast Source Discovery Protocol (MSDP); details any-source and source-specific multicast delivery models; explores multiprotocol BGP (MBGP) and multicast IS-IS; explains Internet Gateway Management Protocol (IGMP) versions 1, 2, and 3; lists packet formats for IGMP, PIM, and MSDP; and provides a complete glossary of multicast terms.
JUNOS Cookbook	Provides detailed examples of common JUNOS software configuration tasks, such as basic router configuration and file management, security and access control, logging, routing policy, firewalls, routing protocols, MPLS, and VPNs.

Table 4: Additional Books Available Through http://www.juniper.net/books *(continued)*

Book	Description
MPLS-Enabled Applications	Provides an overview of Multiprotocol Label Switching (MPLS) applications (such as Layer 3 virtual private networks [VPNs], Layer 2 VPNs, virtual private LAN service [VPLS], and pseudowires), explains how to apply MPLS, examines the scaling requirements of equipment at different points in the network, and covers the following topics: point-to-multipoint label switched paths (LSPs), DiffServ-aware traffic engineering, class of service, interdomain traffic engineering, path computation, route target filtering, multicast support for Layer 3 VPNs, and management and troubleshooting of MPLS networks.
OSPF and IS-IS: Choosing an IGP for Large-Scale Networks	Explores the full range of characteristics and capabilities for the two major link-state routing protocols: Open Shortest Path First (OSPF) and IS-IS. Explains architecture, packet types, and addressing; demonstrates how to improve scalability; shows how to design large-scale networks for maximum security and reliability; details protocol extensions for MPLS-based traffic engineering, IPv6, and multitopology routing; and covers troubleshooting for OSPF and IS-IS networks.
Routing Policy and Protocols for Multivendor IP Networks	Provides a brief history of the Internet, explains IP addressing and routing (Routing Information Protocol [RIP], OSPF, IS-IS, and Border Gateway Protocol [BGP]), explores ISP peering and routing policies, and displays configurations for both Juniper Networks and other vendors' routers.
The Complete IS-IS Protocol	Provides the insight and practical solutions necessary to understand the IS-IS protocol and how it works by using a multivendor, real-world approach.

Requesting Technical Support

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

■ JTAC policies—For a complete understanding of our JTAC procedures and policies, review the JTAC User Guide located at http://www.juniper.net/customers/support/downloads/710059.pdf.

■ Product warranties—For product warranty information, visit http://www.juniper.net/support/warranty/.

■ JTAC Hours of Operation —The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

Self-Help Online Tools and Resources

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

- Find CSC offerings: http://www.juniper.net/customers/support/

- Search for known bugs: http://www2.juniper.net/kb/

- Find product documentation: http://www.juniper.net/techpubs/

- Find solutions and answer questions using our Knowledge Base: http://kb.juniper.net/

- Download the latest versions of software and review release notes: http://www.juniper.net/customers/csc/software/

- Search technical bulletins for relevant hardware and software notifications: https://www.juniper.net/alerts/

- Join and participate in the Juniper Networks Community Forum: http://www.juniper.net/company/communities/

- Open a case online in the CSC Case Manager: http://www.juniper.net/cm/

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

Opening a Case with JTAC

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

- Use the Case Manager tool in the CSC at http://www.juniper.net/cm/ .

- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

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

Revision History

13 February 2008—530-022145-01 Revision 1. Added the MX240 Router

12 September 2007—530-020797-01 Revision 1.

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