JUNIPER NETWORKS

WX Application Acceleration Platforms

WX Administration Guide

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WX Administration Guide

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Juniper Networks hardware and software products are Year 2000 compliant. The Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

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About This Guide

This preface describes how to use this guide and request technical support:

Objectives

This guide describes how to use the Web interface of the Juniper WAN Acceleration Operating System (JWOS) to configure, monitor, and manage the Juniper Networks WX application acceleration platforms.

To manage WX devices through the JWOS command-line interface (CLI), see the *JWOS Command Reference Guide*.

Audience

This guide is intended for administrators responsible for configuring and managing WX devices. It is assumed that readers of this guide are familiar with their network architecture and devices and can perform basic network configuration procedures.

Document Conventions

Table 1 on page xvi defines notice icons used in this guide, Table 2 on page xvi defines text conventions used throughout the book, and Table 3 on page xvi defines the GUI conventions.

Table 1: Notice icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates that you may risk losing data or damaging your hardware.
	Warning	Alerts you to the risk of personal injury.

Table 2: Text Conventions

Convention	Description
Plain sans serif type	Filenames and directory names.
Italics	• Terms defined in text. • Variable elements for which you supply values. • Book titles.
+ (plus sign)	Key names linked with a plus sign indicate that you must press two or more keys simultaneously.

Table 3: GUI Conventions

Convention	Description
> (chevron)	Navigation paths through the UI.
Bold type	User interface elements that you select in a procedure, such as tabs, buttons, and menu options.
Italics	Variables for which you supply values.

List of Technical Publications

The following additional WX documents are available at http://www.juniper.net/techpubs:

- *JWOS Command Reference Guide*—Explains how to use the CLI interface to configure the WX application acceleration platforms.
- *WX Client User's Guide*—Explains how to use the WX client software to provide application acceleration between a Windows 2000 or Windows XP workstation and remote WX devices running JWOS 6.0 or later.

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 post-sales technical support, you can access our tools and resources online or open a case with JTAC.

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- 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 Management tool: http://www.juniper.net/cm/

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

Opening a Case with JTAC

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

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

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

PART 1

WX Device Management

CHAPTER 1

Introduction

This chapter provides an overview of the WAN application acceleration platforms, including a description of the new features in this release.

About the WAN Application Acceleration Platforms

The WX application acceleration platforms are LAN-based network devices that are installed on each side of a WAN circuit to enhance throughput. The WX devices use the following technologies to compress and accelerate WAN traffic:

- **Network Sequence Caching (NSC)**—A disk-based compression algorithm used to identify and retain long patterns of repeated traffic. NSC is most effective where large files are often sent over the WAN.
- **TCP acceleration**—While compression effectively increases available bandwidth, TCP acceleration improves TCP application performance where the use of available bandwidth is constrained by network latency, such as on low- speed remote-access connections.
- **CIFS acceleration**—An application-level acceleration method that accelerates Microsoft Common Internet File System (CIFS) traffic.

You can monitor and manage WX devices through a secure Web interface or a command line interface (CLI). You can also monitor device performance through an SNMP-based management system. For the specifications of each type of WX device, see "WX Device Specifications" on page 89.

WX Features and Benefits

WX devices enable networks to achieve maximum capacity over wide area network (WAN) links. The primary features and benefits include:

- **Substantial throughput gain**—Greatly improves WAN capacity, accelerates TCP applications in high-latency environments, and reduces the load on other network devices.
- **Immediate impact**—Gains are realized immediately when WX client solution is used.
- **Transparent**—Operates transparently to existing network equipment, topologies, and WAN interfaces (such as Frame Relay, MPLS, and ATM). No network or application modifications are required.
- **Application independent**—Works on any TCP-based application (such as email, database, Web, ERP, and so on). Uses open standard protocols.
- **QoS interoperable**—Preserves QoS priority levels within your network.
- **Fail-safe nonstop operation**—Traffic is passed through on any hardware or software disruption, including power loss.
- **Easily managed**—Provides administrative access through an intuitive Web user interface (SSL) and a CLI using SSH.
- **VPN and firewall friendly**—Installs on the LAN side of encryption devices to work seamlessly with virtual private networks (VPNs) and firewalls.
- **Secure**—Provides confidentiality and message integrity for WAN traffic.

What's New in JWOS Version 6.0

The Juniper WAN Acceleration Operating System (JWOS) 6.0 includes the following new features:

- **WX client support**—JWOS 6.0 provides application acceleration between a WXC590, WXC2600, or WXC3400, typically installed in a data center, and remote Windows devices running the WX client software. Now mobile users and users in small remote offices can get the performance benefits of data compression and acceleration without requiring a dedicated WX device (see "Managing WX Clients" on page 63).
- **Auto-discovery**—WX clients automatically discover the WX devices in the data center. Each WX client dynamically forms an *adjacency* with a remote WX device to accelerate the traffic between them.
- **Simplified configuration**—All application services, such as compression, acceleration, and monitoring, are configured on the WX device. The WX clients derive their configuration from the WX device, and do not require a separate configuration. (see "Enabling WX Client Image Downloads" on page 66).
- **Management interface**—WX devices that have a management port can now be managed exclusively through your management network (see "Configuring the WX Management Interface" on page 29).
- **Compatibility with previous releases**— Any WXC590, WXC2600, or WXC3400 that has WXOS 5.6.5 or later can be upgraded to JWOS 6.0. Due to architectural changes,

traffic can be accelerated only between WX clients and WX devices running JWOS 6.0. WX clients cannot form adjacencies with WX devices running WXOS.

- **Terminology changes**. The following WXOS terms have been changed or no longer apply to JWOS:

WXOS Term	JWOS Term
Tunnel	Adjacency
Application Flow Acceleration	Protocol acceleration
Fast Connection Setup Forward Error Correction Registration server Topology settings Compression subnets Prime time	N/A

Sample Topologies for WX Devices

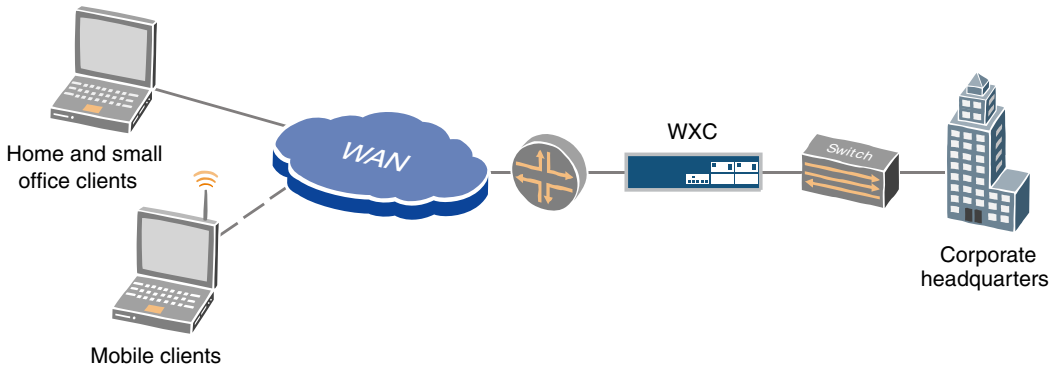
The following topics provide sample deployment topologies for WX devices:

- WX Inline Deployment on page 5
- WX Off-Path Deployment on page 6
- WX and Virtual Private Network (VPN) Topology on page 6

WX Inline Deployment

When the WX client software is installed on Windows XP and Windows 2000 clients, WAN traffic can be accelerated from the clients to a remote WX device installed on the other side of the WAN. WX devices are typically deployed in the data path between a LAN switch and an edge router (see Figure 1 on page 6).

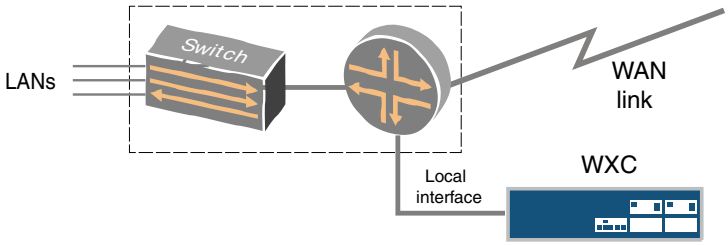
Figure 1: Typical Inline Deployment



WX Off-Path Deployment

WX devices are usually deployed in the physical data path between a LAN switch and a WAN edge router, with no changes to Layer 3 routing. When interrupting the data path is not practical, such as in collapsed backbone environments where the switch and the router are the same physical device, you can deploy the device off path (see Figure 2 on page 6). In this case, the Local interface is connected to the switch or the router, and the Remote interface is not used (we recommend connecting the Local interface directly to the router).

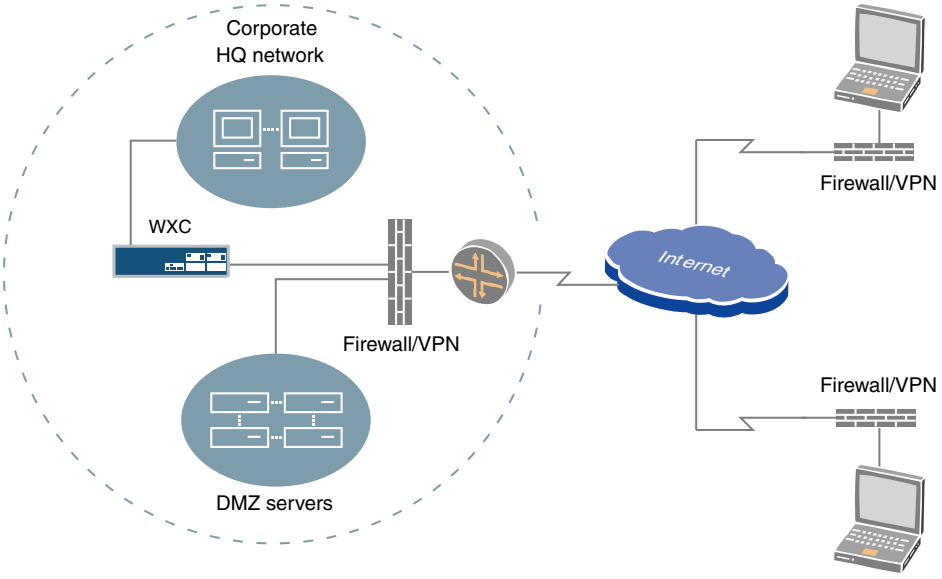
Figure 2: Off-Path Deployment



WX and Virtual Private Network (VPN) Topology

WX devices operate transparently relative to existing network equipment, including firewalls and VPN devices (see Figure 3 on page 7).

Figure 3: VPN Configuration



By compressing data before it enters the VPN tunnel, the WX devices and clients reduce the workload for the VPN devices. The same bandwidth multiplication effect is achieved for VPN encapsulated traffic as for unencapsulated traffic.

NOTE: The WX software does not support Network Address Translation (NAT). If NAT is enabled on the local firewall, all traffic is passed through without any processing.

CHAPTER 2

Installing WX Devices

This chapter describes how to install and set up the WXC devices that support JWOS 6.0. It covers the following topics:

WX Installation Overview

The following topics provide an overview of the WX installation process:

WX Preinstallation Tasks

Before you begin, complete the following preinstallation tasks:

- Ensure that sufficient power is available. Power supply circuits should be protected by a 15A or 20A circuit breaker.
- Ensure there is ample space and lighting. You need enough space to connect one or two CAT-5 UTP Ethernet data cables and one or two power cords to the back of the chassis, and proper lighting to see the LEDs on the data ports.
- Provide a minimum of six inches of clearance in the front and back of the chassis. For a WXC590, provide three inches of clearance on both sides of the chassis to allow cooling air to be drawn through the side panels. Do not install one device directly behind another where warm or hot air may be recirculated. There are no ventilation requirements above or below the device.

- Ensure that paper materials or heavy equipment are not stacked on top of a device.
- For rack-mount installations, reserve sufficient space for the device form factor, as follows:
  - 1 U — WXC2600
  - 2 U — WXC590 and WXC3400
- Identify a 10/100 or 10/100/1000 Ethernet LAN port where you can connect the WX device (all devices support 1000 Mbps). This port is typically on an aggregation switch or other LAN device connected directly to the WAN router.
- Log in to the router that will be on the WAN side of the WX device and note the interface speed and duplex mode.
- Verify that all firewalls between WX endpoints do not use NAT and allow traffic on the following ports:
  - TCP/UDP ports 3577 and 3578
  - UDP port 3579 (required for communication with WX clients)

  If the WX is installed in the DMZ, and you plan to use FTP to upgrade the WX software,, open an FTP port in the firewall between the DMZ and the intranet.
- Reserve an IP address for the WX device and identify the default gateway. The default gateway is the next hop on the WAN side of the device.

CAUTION: Special packaging material is provided to protect the WXC systems during shipping. Retain the packing material in case the unit needs to be shipped again for any reason. Shipping the unit without the original packaging material will void the warranty.

WARNING: WX devices have no user-serviceable parts. Opening the device voids the warranty. As a safety caution, note that opening the chassis exposes a lithium battery. If you attempt to remove or replace the lithium cell, do not use a conductive instrument, as a short-circuit may cause the cell to explode. A replacement cell must be of the same type (CR2032). Dispose of a spent cell promptly—do not recharge, disassemble, or incinerate. Keep cells away from children.
For additional general safety recommendations and warnings about avoiding situations that could cause injury to people or devices, see the *Security Products Safety Guide*.

Field-Replaceable Components

The fans, disk drives, and power supplies can be replaced on the WXC590, WXC2600, and WXC3400. Do not remove a disk drive while the power is on. Doing so will disable drive. If a drive is removed while the system is running, reboot the device to reactivate the drive.

After replacing a failed drive, enter the following CLI command to activate the drive:

```
config set disk activate
```

For more information about replacing the disk drives, see *WXC590 Field-Replaceable Units Removal and Installation* and *WXC2600 and WXC3400 Field-Replaceable Units Removal and Installation*.

WX Interface Speeds and Modes

Interface speed and duplex settings should be the same across all devices: the switch, the WX Local and Remote interfaces, and the router. This ensures connectivity through the device in the event of a power loss or a condition that causes a hardware bypass.

WX Installation Procedure

A WX installation consists of the following steps for each type of device:

1. Install the hardware and apply power.
2. Configure network settings (such as IP address).
3. Run Quick Setup to define required configuration settings.
4. Perform post-installation tasks for optional configuration settings.

Inline and Off-Path WX Installations

WX devices are usually installed in the data path (inline) between a LAN switch (or other aggregation device) and the WAN edge router. If interrupting the data path is not practical, such as in collapsed backbone environments, you can deploy the device off path.

The installation instructions describe how to install a WX device in the data path. To install a device off path, note the following:

- Do not disconnect any cables. Simply connect the Local interface of the device to the switch or the router. We recommend connecting directly to the router. The Local interface should be set to full-duplex (half-duplex may cause excessive collisions).
- Do not connect the Remote interface to the router. The Remote interface is not used, so you can apply power to the device without first verifying connectivity between the LAN and the router.
- After you run Quick Setup, configure packet interception to route traffic to the off-path device (see “Configuring WX Packet Interception” on page 35).

Installing the WXC590

The following topics describe the installation process for the WXC590:

Installing the WXC590 Hardware

To install the WXC590 in your network:

1. Set up the chassis.

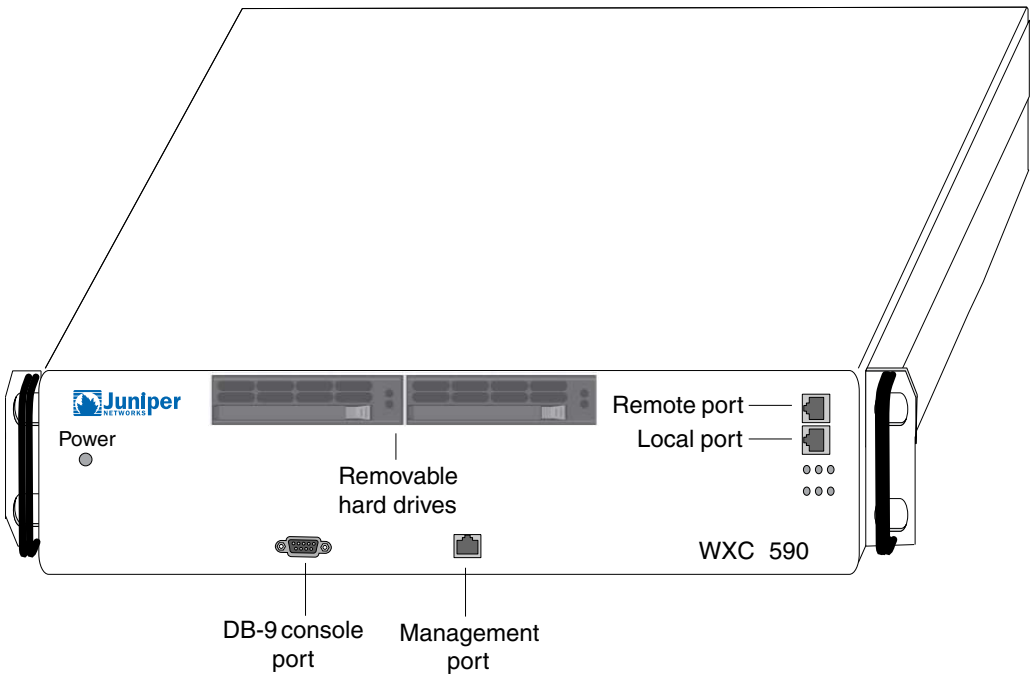
- To install the device in a 19-inch rack, install the supplied brackets (front panel forward) to the sides of the device with the countersunk screws provided. Next, install the chassis in your network rack.
- To install the WXC590 on a desktop, place the chassis upside down on a smooth, flat surface, and install the supplied rubber feet on the bottom of the chassis. Place the chassis on a desktop or on top of another device so that all four rubber feet are secure on the flat surface.

NOTE: Do not connect power to the device until Step 4.

2. Connect the network cables and verify connectivity.

   The standard WXC590 has two 10/100/1000 auto-sensing Ethernet interfaces (see Figure 4 on page 12).

Figure 4: WXC590 Front Panel



To connect the network cables to the WXC590:

a. Locate the cable that connects the switch (or other aggregating device) to the router.

b. Disconnect this cable from the router port and connect it to the Local port on the WXC590.

c. Connect a cross-over cable (not provided) from the router port to the Remote port on the WXC590.

d. Optionally, connect a straight-through cable from the MGT port on the WXC590 to your management network.

3. Use one of the following methods to verify connectivity across the WXC590 when the power is off. This step ensures that the correct cables are used and that traffic will pass through the WXC590 in the event of a power loss.
   - Ping a host on the remote side of the WXC590 from a host on the local side of the WXC590.
   - Observe the link status LEDs (if available) on the interfaces of the adjacent network devices (switch and router).
4. Connect the supplied power cords to the dual power supplies on the back of the chassis, and then connect the power cords to the local power source.

   The WXC590 maximum power usage is 300 W or 1025 BTU/hour.

WARNING: The appliance is designed to work with IT power systems. Because the appliance has more than one power supply connection, all connections must be removed completely to remove power from the unit.

Now that the device is installed and powered on, configure the network settings as described in "Configuring the WXC590 Network Settings" on page 13.

Configuring the WXC590 Network Settings

To configure the network settings for the WXC590, connect an ANSI-compatible terminal to the serial console port, and use a terminal emulation program (such as HyperTerminal) to enter the CLI commands described here.

NOTE: The serial console port is of type RS-232 (AT-compatible) with a male DB-9 connector. You should use a female/female DB-9 crossover cable (such as a null-modem cable) when connecting directly to a PC serial port. The pin-outs for the console port are shown in "DB9 Console Port Pin-Outs" on page 92.

1. Connect an ANSI-compatible terminal to the serial console port on the front of the WXC590 (see Figure 4 on page 12).
2. Verify the serial port settings are as follows:
   - Baud rate: 9600 bps
   - Data bits: 8
   - Parity: none
   - Stop bits: 1
   - Flow control: none
3. Start the terminal emulation program, and choose to connect through the serial port. To configure the device manually, press Enter.
4. Type **admin** for the username and **juniper** for the password.

5. Press Enter and enter the following network information at the prompts:
   a. Type an IP address for the device, and then press Enter.
   b. Type the subnet mask for the network, and then press Enter.
   c. Type the default gateway address for the device, and then press Enter.

      The default gateway is typically the next hop on the Remote side of the WXC590.

   d. Press Enter to confirm the network settings.
6. By default, the Local and Remote interfaces are set to auto-negotiate the speed and duplex mode. However, to avoid problems when the switch or router speed and duplex mode are set manually, we strongly recommend that you manually configure the Local and Remote interface settings.

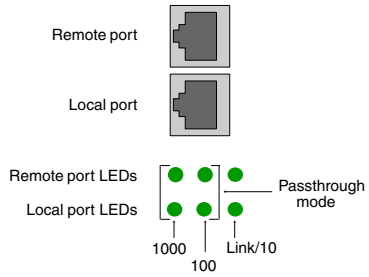
   To manually configure the interface settings:
   a. At the prompt to configure the interface settings, type **y** and press Enter.
   b. Enter a number (0 to 5) for the speed and mode of the Local interface.

      0 - 10-full
      1 - 10-half
      2 - 100-full
      3 - 100-half
      4 - 1000-full
      5 - auto

      Press Enter to confirm the setting, and then repeat for the Remote interface.
7. Continue with the Quick Setup or press Enter at each prompt, and later run Quick Setup from the Web interface. Note that the last prompt is to save the configuration as **startup.cfg**, which is used when you reboot the device.
8. Check the LEDs below the Ethernet ports (see Figure 5 on page 15). Note the following:
   - The link LEDs indicate the port is connected properly.
   - The 100 and 1000 LEDs indicate the interface speed in Mbps. If the 100 and 1000 LEDs are off, the port is running at 10 Mbps.
   - If all four 100 and 1000 LEDs are on, the device is in passthrough mode. This occurs during a restart or system failure (the default).

     In high-availability environments, you can disable hardware passthrough using the **config set system no-bypass-capability** command (see the *JWOS Command Reference Guide*). This will block traffic through the WX during a restart or system failure so that the traffic can be routed to an alternate device.

Figure 5: Checking the Link and Speed LEDs on the WXC590



NOTE: The LEDs on the hard drives do not light up during operation.

The installation is complete. You can now run Quick Setup as described in "Running Quick Setup through the Web Interface" on page 21.

Installing the WXC2600

The following topics describe the installation process for the WXC2600:

- Installing the WXC2600 Hardware on page 15
- Configuring the WXC2600 Network Settings on page 16

Installing the WXC2600 Hardware

To install the WXC2600 in your network:

1. Set up the chassis.
   - To install the device in a 19-inch rack, install the supplied brackets (front panel forward) to the sides of the device with the countersunk screws provided. Next, install the chassis in your network rack.
   - To install the device on a desktop, place the chassis on a desktop or on top of another device.

NOTE: Do not connect power to the device until Step 4.

2. Connect the network cables to the device.

   The WXC2600 has two 10/100/1000 Ethernet interfaces on the front panel labeled Local and Remote (see Figure 6 on page 16), plus a management port (MGT). A high-availability port and USB port are provided for future use (not supported in JWOS 6.0).

   To connect the network cables:

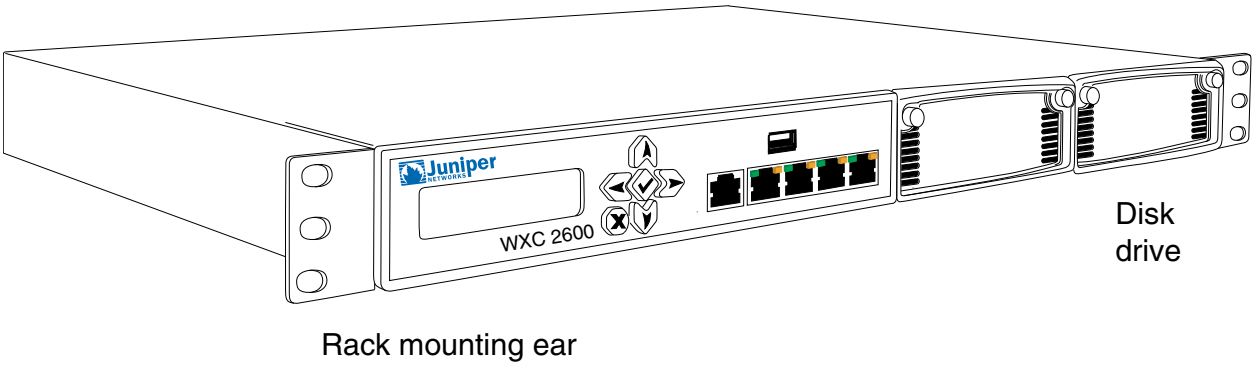
a. Locate the cable that connects the switch (or other aggregating device) to the router.

b. Disconnect this cable from the router and connect it to the Local port on the WXC2600.

c. Connect the crossover cable from the router port to the Remote port on the WXC2600.

d. Optionally, connect a straight-through cable from the MGT port on the WXC2600 to your management network.

Figure 6: WXC2600 Front Panel



3. Use one of the following methods to verify connectivity across the WXC2600 when the power is off. This step ensures that the correct cables are used and that traffic will pass through the device in the event of a power loss.

   - Ping a host on the remote side of the device from a host on the local side of the device.
   - Observe the link status LEDs (if available) on the interfaces of the adjacent network devices (switch and router).

4. Connect the power supply to the back of the chassis, and then connect the power cord to the local power source.

NOTE: The maximum power usage is 300 W or 1025 BTU/hour.

Now that the device is installed and powered on, continue to the next section to configure network settings for the device.

Configuring the WXC2600 Network Settings

To configure the network settings, follow these steps using the front-panel keypad and LCD:

1. Press the Enter button (center button).
2. Press Enter at the **Select Setup Network** prompt in the LCD.

3. Use the front-panel keypad to assign an IP address, subnet mask, and default gateway as follows:
   - Use the Up And Down Arrow buttons to display a number (between 0-9). Use the Left And Right Arrow buttons to move to the previous or next character.
   - Press Enter after each of the three settings. Press the X button to discard all changes and start over.
   - After you enter the gateway address, use the Left Arrow to select **Save & Reboot** and press Enter.

NOTE: The default gateway is typically the next hop on the Remote side of the device.

4. After the device reboots, specify the speed and mode of each interface. By default, the Local and Remote interfaces are set to auto-negotiate. However, to avoid problems when the switch or router speed and duplex mode are set manually, we **strongly recommend** that you manually configure the Local and Remote interface settings.

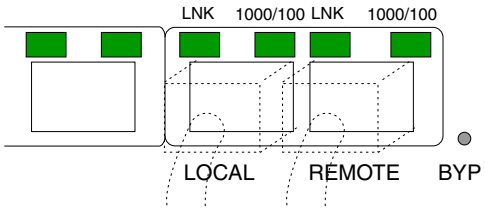
   To configure the interfaces from the front panel:

   a. Press Enter to display the **Setup Network_** prompt in the LCD.
   b. Use the Down Arrow to show the Local If Settings menu option, and press Enter.
   c. Use the Left Arrow to select **y**, and press Enter.
   d. Use the Down Arrow to show the desired speed and duplex setting, and press Enter. The options are 10/Half, 10/Full, 100/Half, 100/Full, 1000/Full, Auto-Negotiate.
   e. Use the Left Arrow to select **Commit&Save**, and press Enter. Repeat this process for the Remote interface.

NOTE: After installation, you can change the interface settings from the Web interface or CLI.

5. Check the LEDs above the Local and Remote ports (see Figure 7 on page 18). Note the following:
   - The LNK LEDs indicate the device is properly connected.
   - The 1000/100 LEDs indicate the interface speed: yellow for 1000 Mbps, green for 100 Mbps, or off for 10 Mbps.

Figure 7: Checking the LEDs



6. Check the other LEDs on the front panel.

Front Panel LED	Description
POWER	Indicates that power is on.
BYP	Indicates whether traffic is being processed, passed through, or blocked: • **Green**. Traffic is being processed (normal operation). • **Orange**. All traffic is passing through without any processing (hardware passthrough). This occurs during a restart or system failure when the bypass capability is enabled (the default). • **Off**. All traffic through the device is blocked. This occurs during a restart or system failure when the bypass capability (hardware passthrough) is disabled. In high-availability environments, you can disable hardware passthrough using the **config set system no-bypass-capability** command (see the *JWOS Command Reference Guide*). This will block the traffic through the WX during a restart or system failure so that the traffic can be routed to an alternate device.

The installation is complete. You can now run Quick Setup, as described in “Running Quick Setup through the Web Interface” on page 21.

Installing the WXC3400

The following topics describe the installation process for the WXC3400:

Installing the WXC3400 Hardware

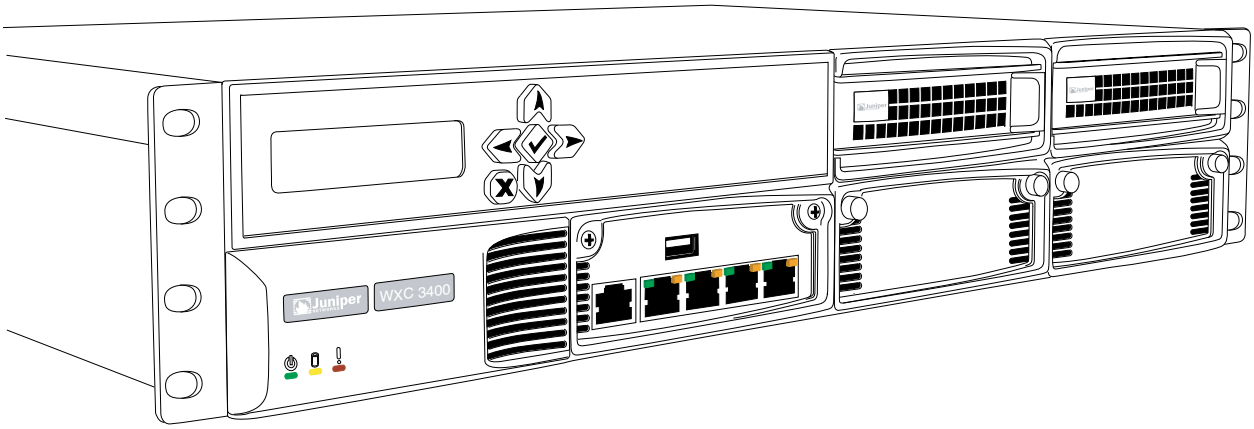
To install the WXC3400 in your network:

1. Set up the chassis.
   - To install the device in a 19-inch rack, install the supplied brackets (front panel forward) to the sides of the device with the countersunk screws provided. Next, install the chassis in your network rack.
   - To install the device on a desktop, place the chassis on a desktop or on top of another device.
2. Connect the network cables to the device.

NOTE: Do not connect power to the device until Step 4.

The WXC3400 has two 10/100/1000 Ethernet interfaces on the front panel labeled Remote and Local (see Figure 8 on page 19), plus a management port (MGT). A high-availability port and USB port are provided for future use (not supported in JWOS 6.0).

Figure 8: WXC3400 Front Panel



Rack mounting ear

To connect the network cables:

a. Locate the cable that connects the switch (or other aggregating device) to the router.

b. Disconnect this cable from the router and connect it to the Local port on the WXC3400.

c. Connect the crossover cable from the router port to the Remote port on the WXC3400.

d. Optionally, connect a straight-through cable from the MGT port on the WXC3400 to your management network.

3. Use one of the following methods to verify connectivity across the WXC3400 when the power is off. This step ensures that the correct cables are used and that traffic will pass through the device in the event of a power loss.

   - Ping a host on the remote side of the device from a host on the local side of the device.
   - Observe the link status LEDs (if available) on the interfaces of the adjacent network devices (switch and router).

   Connect the power cables to the two power supplies on the back of the chassis (a second power supply is optional), and then connect the cables to the local power source.

If you have two power supplies, and one of them fails, the other one can provide full power indefinitely, and the failed power supply can be removed and replaced while the device is running.

The WXC3400 maximum power usage is 400 W or 1370 BTU/hour.

WARNING: The appliance is designed to work with IT power systems. Because the appliance has more than one power supply connection, all connections must be removed completely to remove power from the unit.

Now that the device is installed and powered on, see "Configuring the WXC3400 Network Settings" on page 20 to configure the network settings.

Configuring the WXC3400 Network Settings

To configure the network settings, follow these steps using the front-panel keypad and LCD:

1. Press the Enter button (center button).
2. Press Enter at the **Select Setup Network_** prompt in the LCD.
3. Use the front-panel keypad to assign an IP address, subnet mask, and default gateway as follows:
   - Use the Up And Down Arrow buttons to display a number (between 0-9). Use the Left And Right Arrow buttons to move to the previous or next character.
   - Press Enter after each of the three settings. Press the X button to discard all changes and start over.
   - After you enter the gateway address, use the Left Arrow to select **Save & Reboot** and press Enter.

NOTE: The default gateway is typically the next hop on the Remote side of the device.

4. After the device reboots, specify the speed and mode of each interface. By default, the Local and Remote interfaces are set to auto-negotiate. However, to avoid problems when the switch or router speed and duplex mode are set manually, we **strongly recommend** that you manually configure the Local and Remote interface settings.

   To configure the interfaces from the front panel:

   a. Press Enter to display the **Setup Network** prompt in the LCD.

   b. Use the Down Arrow to show the Local If Settings menu option, and press Enter.

   c. Use the Left Arrow to select **y**, and press Enter.

d. Use the Down Arrow to show the desired speed and duplex setting, and press Enter. The options are 10/Half, 10/Full, 100/Half, 100/Full, 1000/Full, Auto-Negotiate.

e. Use the Left Arrow to select **Commit&Save**, and press Enter. Repeat this process for the Remote interface.

NOTE: After installation, you can change the interface settings from the Web interface or CLI.

5. Check the LEDs above the Ethernet ports (see Figure 7 on page 18). Note the following:

   - The LNK LEDs indicate the device is properly connected.
   - The 1000/100 LEDs indicate the interface speed: yellow for 1000 Mbps, green for 100 Mbps, or off for 10 Mbps.
   - Check the other LEDs on the front panel.

Front Panel LED	Description
POWER	Indicates that power is on.
DISK	Indicates disk drive activity.
FAULT	Indicates a system failure.
BYP	Indicates whether traffic is being processed, passed through, or blocked: • **Green**. Traffic is being processed (normal operation). • **Orange**. All traffic is passing through without any processing (hardware passthrough). This occurs during a restart or system failure when the bybass cabability is enabled (the default). • **Off**. All traffic through the device is blocked. This occurs during a restart or system failure when the bybass cabability (hardware passthrough) is disabled. In high-availability environments, you can disable hardware passthrough using the **config set system no-bypass-capability** CLI command (see the *JWOS Command Reference Guide*). This will block traffic through the WX during a restart or system failure so that the traffic can be routed to an alternate device.

The installation is complete. You can now run Quick Setup, as described in “Running Quick Setup through the Web Interface” on page 21.

Running Quick Setup through the Web Interface

After starting a device and configuring network settings, you are ready to run the Quick Setup program. The first time you log in to the Web interface, the Quick Setup program starts automatically and guides you through the required configuration steps. All settings made during Quick Setup can be changed later.

You can log in to the JWOS Web interface from any workstation in your network. Data is securely transmitted through HTTPS. The JWOS Web interface has the following requirements:

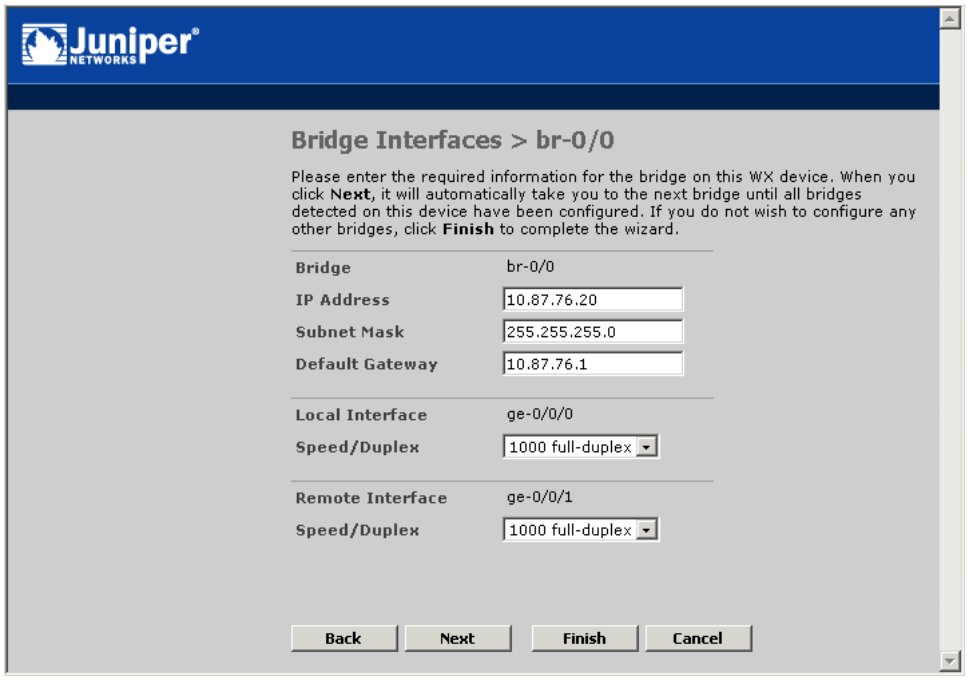
- Microsoft Internet Explorer browser version 6 or 7.0, or Firefox 3.0.
- Monitor display settings of 1024 x 768 or higher.

To run Quick Setup from the Web interface:

1. Verify that the browser accepts cookies (required to log in) and that the server is always checked for the latest configuration information:
   a. Select **Tools>Internet Options**.
   b. Click **Settings** under Temporary Internet files, select **Every visit to the page**, and click **OK**.
   c. Click the **Privacy** tab and verify that the setting is medium high or lower.
   d. Click the **Security** tab, click **Default Level**, and verify that the setting is medium or lower.
2. Enter the following URL in the browser:

   https://*IP address of the WX device*
3. If the Security Alert dialog box appears, click **Yes** to proceed.
4. In the Login page, type **admin** for the username and **juniper** for the password, and click **Login**.
5. Click **Next** to open the Bridge Interfaces page.

Figure 9: Configure the Bridge Interfaces



6. If necessary, change the IP address, subnet mask, or default gateway address that were entered for the **br-0/0** bridge interface during the initial setup. You can also change the speed and mode of the Local and Remote interfaces.
7. Click **Finish**.

The initial configuration is complete. See “Post-Installation Tasks” on page 23 for a list of key configuration tasks.

Post-Installation Tasks

After you run Quick Setup, you can continue configuring the device through the Web interface or through the CLI.

- To use the Web interface, see “Configuring WX Setup Policies” on page 25.
- To use CLI, see the *JWOS Command Reference Guide*.

Be sure to review the following key configuration tasks.

- Set the device time manually, or specify an NTP server, as described in “Configuring WX Time Settings” on page 30.
- Change the default password for the **admin** account, as described in “Defining WX Local Users” on page 32.
- Review the application definitions provided and add any new ones needed for your network, as described in “Configuring WX Application Definitions” on page 43.

- Configure traffic acceleration for the appropriate applications, as described in “Configuring WX Acceleration Policies” on page 37.
- Review the settings for WX clients, as described in “Managing WX Clients” on page 63.

CHAPTER 3

Configuring WX Setup Policies

This chapter describes how to use the Web interface to perform the basic WX setup procedures. To configure a WX using the CLI, see the *JWOS Command Reference Guide*.

Using the WX Web Interface

The WX Web interface lets you log in to a device from anywhere in your network and securely access management and performance information.

The WX Web interface supports the Microsoft Internet Explorer browser, version 6 or 7.0, or Firefox 3.0. Browser privacy settings must be configured to accept cookies. The WX Web interface is designed to be viewed at 1024 x 768 pixels. To ensure secure transmission of configuration and management data, the Web interface uses the Secure Sockets Layer protocol (SSL/HTTPS).

Logging In

To log in to a WX device through the Web interface:

1. Using a supported Web browser, enter the IP address of a WX device:

   https://*IP address of a device*

2. If a Security Alert dialog box appears, click **Yes** to proceed.
3. In the Enter Network Password dialog box, type your username and password.

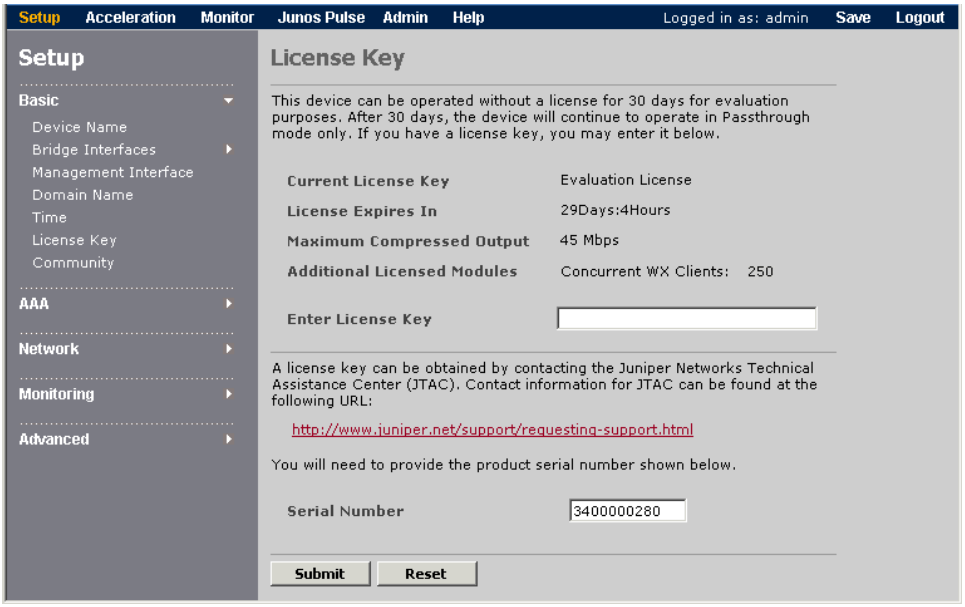
   When a new device is accessed for the first time, use **admin** and **juniper** for the username and password, and then run Quick Setup (see "Running Quick Setup through the Web Interface" on page 21).

To log out of the JWOS Web interface, click **Logout** in the taskbar of any page. Users are logged out automatically if their sessions are inactive for the session timeout time (default is 30 minutes).

Understanding the JWOS Web Interface

The JWOS Web interface contains a taskbar of administrative functions, a left-hand navigation pane, and a data pane for configuring and viewing policies and performance data.

Figure 10: JWOS Web Interface



Select **Help > About** to view hardware and software information for the device, such as the IP address, the software and hardware versions, and the license key. Select **Help > Site Map** to view a list of the options available under each taskbar selection, and select **Help > Online Documentation** to open the website for all WX documentation.

Assigning Names to WX Devices and Other Objects

Use only letters (A–Z, a–z), numbers (0–9), dashes (-), underscores (_) and periods (.) when assigning names to devices, applications, and other objects.

Configuring Basic WX Setup Policies

The following topics describe the basic configuration procedures:

- Obtaining a Permanent WX License on page 30
- Configuring the WX Community on page 31

Configuring the WX Device Name

The Device Name page lets you change the device name displayed in the Web interface banner and CLI prompts, as well as specify the device's physical location and contact information for the device administrator.

To configure the device name and contact information:

1. Select **Setup > Basic > Device Name**.
2. Specify the following information:

Device Name	Enter the device name (up to 30 characters) displayed in the banner of the Web interface and in CLI prompts (default is the IP address). Use only letters, numbers, dashes, underscores, and periods. A device name change is propagated to the other devices in the community.
Device Location	Enter a description of the device's physical location.
Contact Information	Enter the contact information (up to 64 characters) for the device administrator.

3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring the WX Bridge Interfaces

A bridge interface connects a pair of Local and Remote ports on the WX. When either port receives traffic that is not processed by the WX, such as broadcast or passthrough traffic, the traffic is sent out the other port. The two ports, called a *port-pair*, share the IP address of the bridge interface.

Interface names are assigned automatically, as follows:

Table 4: WX Interface Names

Interface	Name	Description
Bridge	br-slot/pair	Every WX device has a bridge interface named br-0/0.
Local	fe-slot/pair/0 or ge-slot/pair/0	The **fe** or **ge** indicates the interface speed (Fast Ethernet or Gigabit Ethernet). The slot and pair numbers are the same as the associated bridge interface. The **/0** indicates the Local interface.
Remote	fe-slot/pair/1 or ge-slot/pair/1	Same as the Local interface name, except the **/1** indicates the Remote interface.

From the Web interface, you can:

- View the status, Media Access Control (MAC) address, and speed and mode for the Local and Remote interfaces on each bridge interface.
- Change the IP address, subnet mask, and default gateway of a bridge interface.
- Enable link failure propagation so that when a failure is detected on one interface, the other interface is turned off for 15 seconds.
- Add static routes to a bridge interface.

To configure the bridge interfaces:

1. Select **Setup > Basic > Bridge Interfaces**, and then select the name of the bridge interface to be configured.
2. To change the interface settings, specify the following information and click **Submit**:

IP address	Enter the IP address of the bridge interface. If you change the IP address or subnet mask, you must reboot the device (see "Rebooting the WX Device" on page 77).
Subnet mask	Specify the network portion of the IP address. For example, **255.255.255.0** indicates that the first 24 bits of the IP address are used for the network portion of the address.
Default gateway	Enter the IP address of the default router, which must be on the same subnet as the bridge IP address.
Speed/Duplex	Select the speed and mode for the Local or Remote interface (such as **1000 full-duplex**). By default, the Local and Remote interfaces are set to negotiate the speed and mode automatically. Note that a passive test runs periodically and displays a message above the taskbar if a speed or mode mismatch is detected. The passive test can detect a mismatch only when data is sent and received at the same time.
Link Failure	In high-availability environments, you can enable the following options so that when a failure is detected on one interface, the other interface is turned off for 15 seconds. This allows the switch or router to detect the failure, and ensures that the routing mechanisms work as expected. • **Propagate to Remote**—If the switch fails, the Remote interface is disabled so that the router detects the loss of connectivity with the switch. • **Propagate to Local**—If the router fails, the Local interface is disabled so that the switch detects a loss of connectivity with the router. You can also disable the hardware passthrough feature so that the router detects the loss of traffic if the WX device fails (see the **config set system bypass-capability** command in the *JWOS Command Reference Guide*).

3. To add static routes to the bridge interface:
   a. Select the **Local Routes** tab on the Bridge Interfaces page.
   b. Enter the IP address, subnet mask, and the IP address of the gateway for a subnet.

c. Click **Submit** to add the route to the list of local routes. Note that ICMP redirect routes take precedence over static routes.

d. Click **DELETE** next to any route that you want to remove.

4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring the WX Management Interface

On devices that have a management port, you can connect the port to your management network, and then configure an IP address, subnet mask, and default gateway for the port. The name of the management interface is **fxp0**.

To configure the management interface:

1. Select **Setup > Basic > Management Interface**.
2. Select the **Enable management interface** check box, and specify the following information:

IP Address	Enter the IP address of the management interface. If you change the IP address or subnet mask, you must reboot the device (see "Rebooting the WX Device" on page 77).
Subnet Mask	Specify the network portion of the IP address. For example, **255.255.255.0** indicates that the first 24 bits of the IP address are used for the network portion of the address.
Default Gateway	Enter the IP address of the default router, which must be on the same subnet as the interface IP address.
Speed	Select **Auto** to allow the interface speed and mode to be negotiated. To set the interface speed and mode manually, select **Manual**, and then select a speed and mode setting from the list (such as **1000 full-duplex**).

3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring the WX Domain Name

You can specify the device's local DNS domain name and up to three DNS servers for use in resolving IP addresses on the Flow Diagnostics page (see "Viewing WX Flow Diagnostics" on page 81).

To configure the domain name:

1. Select **Setup > Basic > Domain Name**.
2. Specify the following information:

Domain Name	Enter the local DNS domain name (up to 256 characters). The domain name must include at least one period, but not as the first or last character. When an IP address in the local domain is resolved by one of the specified DNS servers, the local domain name is prepended to the host name shown on the Flow Diagnostics page. If the domain is blank, only the host names are shown for resolved IP addresses in the local domain. Resolved addresses outside the local domain include the domain name returned by the DNS server.
DNS Servers	Enter the IP addresses of up to three DNS servers (one per line).

3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring WX Time Settings

If your network uses the Network Time Protocol (NTP), you can specify a primary and secondary NTP server to maintain the current device time. You can also set the time manually. Entries in the system log files include the current time to assist with device administration.

To configure the time settings:

1. Select **Setup > Basic > Time**.
2. Select the time format (**AM/PM** or **24 Hour**).
3. Do one of the following:
   - If you have an NTP server in your network, select **Use NTP Server** and enter the IP address of the NTP server in the Primary box. A secondary NTP server is optional.
   - If you do not have an NTP server, select **Enter Local Time** and enter the current time and date.
4. Select a time zone, GMT offset, or geographical location from the Time Zone list.
5. Click **Submit** to activate the changes, or click **Reset** to discard them.
6. Click **Save** in the taskbar to retain your changes when the device is restarted.

Obtaining a Permanent WX License

Each device requires a permanent license key for operation. The license key determines the licensed modules and throughput for the device, and properly registers the product. Initially, each device has a full-speed, 30-day license with access to all features. When the temporary license expires, the device is limited to the base speed.

To obtain a permanent license key, you need:

- Device serial number displayed in the License Key page (also displayed in the About box and on the back of the device).
- If you purchased license upgrades, you will need the Authorization Code Certificate that was emailed to you in PDF format. If you operate the device at its base speed, only the serial number is needed to generate a permanent license.
- User ID and password to access the License Key server at:

  http://www.juniper.net/generate_license

  If you lose the license key, you can use the License Key server to retrieve your current license key.

If you have any problems with the licensing process, open a case with the Juniper Case Manager at **http://www.juniper.net/cm**. To call from the United States, Canada, or Mexico, dial +1-888-314-JTAC. To call from other locations, check the list of local support centers at **http://www.juniper.net/support/requesting-support.html** or dial +1-408-745-9500.

To install a permanent license key:

1. Select **Setup > Basic > License Key**.

   The License Key page displays the status of the current license, including the licensed modules and the compressed output for the device.

2. Enter your registered license key in the Enter License Key box. If you do not have a registered license key, you can obtain one as follows:

   a. Go to **http://www.juniper.net/generate_license**, register to create an account, and then log in.

   b. Select **WAN Acceleration Products** from the menu, and click **Go**.

   c. Enter your device serial number and authorization code and click **Generate**. If you enter only the serial number, the device is licensed for the base speed.

   d. Copy the displayed license key into the Enter License Key box in the WX Web interface.

3. Click **Submit** to activate the changes, or click **Reset** to discard them.

Configuring the WX Community

Two WX endpoints can form an adjacency and accelerate the traffic between them only if they belong to the same community. Initially, all WX endpoints are in the **default** community. In large deployments you may want to group WX devices into separate communities to control which devices can form adjacencies.

By default, Windows-based WX clients are in the same community as the WX device from which the client software is downloaded (see “Defining the Default WX Client Configuration” on page 68).

To configure the community:

1. Select **Setup > Basic > Community**.
2. Enter the community name (up to 64 characters). If the Community box is left blank, the device remains in the default community. Note that changing the community name disables all adjacencies with devices in the old community.
3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring AAA for JWOS

The following topics describe how to configure the JWOS security features:

- Defining WX Local Users on page 32
- Securing WX Front Panel Access on page 33

Defining WX Local Users

You can define up to 25 WX users for local authentication. The user class assigned to each account determines the user's access privileges. The predefined **admin** account has full access, and a default password of **juniper**. To ensure secure access to the device, you should change the passwords periodically.

To define local user accounts:

1. Select **Setup > AAA > Local Users**.

   From the Local Users page, you can:

   - Add a new user account, as described in Step 2.
   - Change a user account. Click the username, make any needed changes, and click **Submit**.
   - Delete user accounts. Select the check box next to the accounts you want to delete, and click **Submit**.

2. Click **New User** to add a new account, and specify the following information:

User Name	Enter the account name (up to 32 characters).
User Class	Select a user class to determine the user's privileges: • **Superuser**. Full read-write privileges, including management of user accounts. • **Operator**. Read-write configuration privileges, but no packet capture or user management privileges. • **Read Only Plus**. Read-only privileges and packet capture capability. • **Read Only**. Read-only privileges.
Idle Timeout	Enter the number of minutes before an idle user is logged out (the default is 30).
Password	Enter the password twice (from 4 to 64 characters).

3. Click **Submit** to activate the changes.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Securing WX Front Panel Access

On WX devices that have a keypad on the front panel, you can lock the keypad to prevent anyone from rebooting the device or making configuration changes through the front panel keypad.

To lock the front panel keypad:

1. Select **Setup > AAA > Front Panel Access**.
2. Select **Locked** to lock the front panel keypad.
3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring the WX ARP Table

The Address Resolution Protocol (ARP) is used to:

- Determine whether the gateway for a route is on the Local or Remote interface.
- Discover the hardware (MAC) addresses of devices that are directly addressable on the Local and Remote interfaces.

For devices that do not respond to ARP requests, you can add static ARP entries that map their IP addresses to their MAC addresses. You can also clear the dynamic ARP entries if you suspect some entries are out of date.

To configure the ARP table:

1. Select **Setup > Network > ARP**.
2. Click **Flush** to delete all dynamic ARP entries. This forces new ARP requests to be issued as needed.
3. Click **DELETE** next to any static ARP entry that you want to remove.
4. Click **Add** to add one or more static ARP entries. For each entry, enter the IP address and its associated MAC address, and select the Local or Remote interface. You can add up to five entries at one time. The format of the MAC address is: **xx:xx:xx:xx:xx:xx**.

   Click **Submit** to activate the new entries, or click **Cancel** to discard them.
5. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring WX System Monitoring

The following topics describe how to configure the WX monitoring features:

Configuring WX Support for SNMP

The following support is provided for SNMP:

- SNMP version 2
- Enterprise Management Information Base (MIB)
- MIB II, Interface Group public objects

NOTE: SNMPv2-compatible utilities are needed to query the 64-bit counters in the Enterprise MIB.

The Enterprise MIB can be used to view performance statistics from a network management system (NMS). In addition, the SNMP traps can be sent to the NMS and other network devices. For a description of the SNMP traps, see “WX SNMP Traps and Syslog Messages” on page 95.

To configure support for SNMP:

1. Select **Setup > Monitoring > SNMP**.
2. Select the **SNMP Enabled** check box to enable support for SNMP, and then enter the read and write community strings used by the NMS to access SNMP data on the device. The default community strings are **public** and **private**.
3. Select the **Trap Enabled** check box to generate SNMP traps (version 2 traps only). To add trap destinations (up to 10), enter the IP address and community string (up to 30 characters), and click **Add**. To delete a trap destination, click **Delete** next to the destination.
4. Select the **Authentication Trap Enabled** check box to generate traps for incorrect logins and unauthorized user access attempts.
5. Click **Submit** to activate the changes, or click **Reset** to discard them.
6. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring WX for Syslog Reporting

Syslog messages can be sent to up to five syslog servers. A syslog server allows you to centrally log and analyze configuration events and system error messages such as interface status, security alerts, and environmental conditions. For a description of the syslog messages, see “WX SNMP Traps and Syslog Messages” on page 95.

To enable syslog reporting:

1. Select **Setup > Monitoring > Syslog Server**.
2. Enter the IP addresses of up to five syslog servers (one per line).
3. Select a facility from the Facility list to send the syslog messages to a specific facility (**local1** through **local7**). The default is **local0**.
4. Select the lowest severity level of the messages sent to the syslog servers. Select **Any** to include all severity levels, including debug messages.
   - **Emergency**—Critical error messages about system failures.
   - **Alert**—Critical error messages needing immediate action.
   - **Critical**—Critical error messages needing prompt action.
   - **Error**—Noncritical error messages, such as license expired.
   - **Warning**—Informational messages about minor events that are not errors.
   - **Notice**—Informational messages about normal, but significant events.
   - **Info**—Informational messages, such as reload requests.
5. Click **Submit** to activate the changes, or click **Reset** to discard them. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring WX Packet Interception

WX devices are usually deployed in the data path between a LAN switch and a WAN edge router. When interrupting the data path is not practical, you can deploy WX devices off path, where the Local interface is connected to the switch or router, and the Remote interface is not used (we recommend connecting the Local interface directly to the router).

After a WX device is installed off path, you must configure packet interception to redirect the appropriate traffic to the WX for acceleration. The following topics describe how to configure packet interception on a WX device and on the local router.

- Configuring Packet Interception for Off-Path WX Devices on page 35
- Configuring External Policy-Based Router Commands on page 36

Configuring Packet Interception for Off-Path WX Devices

To configure packet interception for an off-path device:

1. Select **Setup > Advanced > Packet Interception**.
2. Select **Use external policy-based router commands**. For an example of how to configure the router to route traffic to the off-path device, see “Configuring External Policy-Based Router Commands” on page 36.

CAUTION: Enabling packet interception disables the Remote interface for all bridge interfaces. If the device is installed in the data path, all data transmission through the device will stop.

3. Click **Submit** to activate the changes.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring External Policy-Based Router Commands

The following commands provide examples of how to configure policy-based routing on Cisco routers and Layer 3 switches.

If the off-path WX device is connected to a dedicated port on a router, the routing policy must be applied to the inbound interface from the LAN switch AND to the router's outbound WAN interface.

In the following example, incoming packets from the LAN interface (FastEthernet 0/0) that match access-list 120 are routed to the WX device at IP address 192.168.10.10. Return traffic from the WAN interface (FastEthernet 0/2) that match access-list 120 are also forwarded to the WX device. The access list shown here redirects all packets, but it can be as specific as necessary.

```
interface FastEthernet 0/0
ip address 192.168.9.1 255.255.255.0
ip policy route-map Juniper
interface FastEthernet 0/2
ip address 192.168.11.1 255.255.255.0
ip policy route-map Juniper
access-list 120 permit ip any any
route-map Juniper permit 50
match ip address 120
set ip next-hop 192.168.10.10
```

If the off-path device is connected to a dedicated VLAN on a Layer 3 switch, the commands are almost the same. For example:

```
interface Vlan200
ip address 192.168.9.1 255.255.255.0
ip policy route-map Juniper
interface Vlan400
ip address 192.168.11.1 255.255.255.0
ip policy route-map Juniper
```

NOTE: Use the **set ip next-hop** command to redirect packets to the IP address of the bridge interface on the WX device. Do not use the **set interface** command to redirect traffic to the interface where the WX device is connected.

CHAPTER 4

Configuring WX Acceleration Policies

This chapter describes how to configure traffic acceleration.

Understanding WAN Acceleration

The following topics describe each type of WAN acceleration:

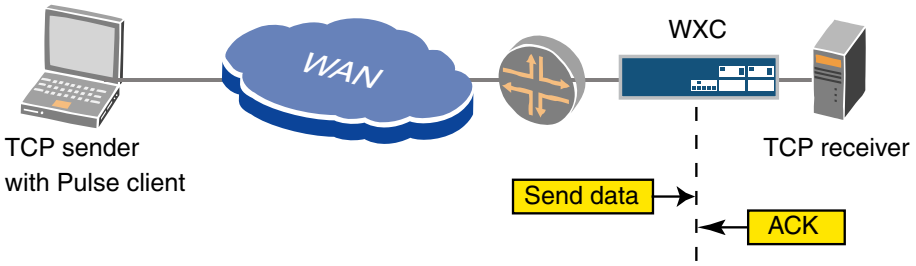
Overview of TCP Acceleration

In WAN environments, TCP may restrict the transmission of data because long wait times for acknowledgments (ACKs) are interpreted as signs of network congestion. On the WX, TCP acceleration solves this problem by terminating each TCP session locally. The result is three independent TCP sessions—between the TCP source and the sending WX endpoint, between the two WX endpoints, and between the receiving WX endpoint and the destination.

NOTE: TCP acceleration is required to use Network Sequence Caching (NSC) or Microsoft CIFS acceleration.

Because each WX endpoint acknowledges all transmissions locally, more data can be put “in flight” at once. Each WX endpoint returns ACKs to the sender at a rate governed by the speed of the link.

Figure 11: TCP Acceleration



TCP acceleration is most effective for applications that do large data transfers. In general, TCP acceleration improves performance if the maximum window size (the effective bandwidth multiplied by the latency) exceeds the TCP window size. The typical TCP window size is 64 KB for Windows 2000 and later, and 16 KB for Windows 98.

For example, on a T1 link (1.5 Mbps) where the latency is 200 ms, and a 50 percent data compression doubles the effective bandwidth, the maximum window size is:

(3,088,000 bps * 0.200 seconds)/8 = 77,200 bytes

In this case, TCP acceleration will improve performance if the host's TCP window size is 64 KB or less.

NOTE: As with high bandwidth and latency, high compression rates also increase the maximum window size, which increases the benefit of TCP acceleration.

Microsoft CIFS Acceleration Overview

If TCP acceleration is enabled, you can enable acceleration for Microsoft CIFS traffic. Microsoft CIFS transfers files by sending one block of data at a time, and then waiting for an acknowledgment before sending the next block. The serial transmission of small data blocks is a major contributor to slow performance over the WAN.

When CIFS acceleration is enabled, the WX endpoint locally acknowledges each block of traffic sent during bulk read/write operations. This allows many data blocks to be in flight at the same time, which speeds up the data transfer. Acceleration benefits begin at relatively low latencies (about 20-ms round-trip time).

CIFS acceleration is supported between the following clients and servers:

- Windows Desktop 2000 and Windows XP Desktop clients

- Windows Server 2000, Windows Server 2003, Windows Vista and Samba servers version 3.0 and later

When Server Message Block (SMB) signing is enabled, additional processing is required to accelerate the traffic flow. By default, traffic flows between Vista and non-Vista devices are downgraded from SMB2 to SMB, and then accelerated (see "Configuring SMB Signing for CIFS Acceleration" on page 46).

You can accelerate all CIFS traffic, or you can create application definitions that let you accelerate traffic to specific servers. CIFS acceleration must be enabled on both WX endpoints.

Configuring WX Application Policies

For each defined application, you can enable or disable compression and acceleration services, as well as monitoring for reports. The application policies are applied to the traffic sent to all adjacent WX endpoints, provided the appropriate services are enabled for each endpoint (see "Configuring WX Client Policies" on page 67).

To add or change an application definition, see "Managing WX Application Definitions" on page 40.

NOTE: Acceleration and compression services must be enabled on both the sending and receiving WX endpoints.

To configure application policies:

1. Select **Acceleration > Policies > Applications**.
2. Select the check box at the top of the list for each service that you want to enable, and then select the check boxes for the appropriate applications. To select or clear a service for all applications, select the **Select All/Clear** check box below the list.

Service	Description
TCP Acceleration	Indicates whether the application's traffic is accelerated using TCP acceleration (see "Overview of TCP Acceleration" on page 37). TCP acceleration is intended for applications that transfer large amounts of data (such as FTP and CIFS) over high-latency links (such as satellite connections) and long-haul high-bandwidth links (such as E3 and T3). TCP acceleration is required for Network Sequence Caching (NSC) and CIFS acceleration.
NSC	Indicates whether Network Sequence Caching is used for data compression. You can select only applications that are enabled for TCP acceleration. NSC uses disk storage to identify long patterns of repeated traffic (including entire files) and is most effective for applications that do large data transfers. To conserve system processing capacity, disable compression for applications whose traffic is encrypted or already compressed.

Service	Description
CIFS Acceleration	Indicates whether CIFS traffic is accelerated. You can select only CIFS applications that are enabled for TCP acceleration. To accelerate transactions that use SMB signing, see “Configuring SMB Signing for CIFS Acceleration” on page 46.
Monitor	Indicates whether compression and acceleration statistics for the application are included on reports. You can monitor up to 100 applications. For more information about monitoring statistics, see “Viewing WX Monitoring Reports” on page 49. Application definitions are provided for applications with well-known port numbers. All other applications are grouped together as the **Undefined-Application**, which is monitored by default. To define additional applications, see “Configuring WX Application Definitions” on page 43.

3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Managing WX Application Definitions

The following topics describe how to manage application policies:

About WX Application Definitions

Application definitions allow WX devices to identify the traffic of up to 256 applications. Definitions are provided for applications with well-known port numbers, and all other applications are grouped together as the **Undefined-Application**. For each additional application you define, you can:

- Enable or disable compression, acceleration, and monitoring for reports.
- View compression and acceleration statistics for monitored applications (see “Viewing WX Monitoring Reports” on page 49).

NOTE: Only TCP traffic can be compressed and accelerated. Non-TCP traffic can just be monitored.

Each application definition can have up to 10 rules, and each rule can specify a protocol, source and destination port numbers (or range of port numbers), source and destination IP addresses or subnets, and a ToS/DSCP value.

A packet matches an application definition if a match occurs on any of its rules. All the values defined in the same rule must be true for a match to occur on that rule. A packet

is classified under the first application for which a rule match is found. Packets are compared against the definitions according to the order number (definitions with the lowest order numbers are checked first). The comparison stops on the first match, so if two definitions are similar, the more specific definition must have a lower order number.

Table 5 on page 41 lists the default application definitions. Each definition has rules to match any traffic that has the specified port number(s) as the source or destination. The UDP definition acts as a default (no port numbers defined).

Table 5: Default Application Definitions

Application	Order	Port Numbers
AOL	37	5190-5193
ClearCase	24	371
CVS	34	2401
DNS	15	53
Exchange	20	135 **NOTE:** Port 135 is the startup port; other ports are learned dynamically. This definition applies only to Exchange traffic for Windows clients, not Web clients.
Filenet	41	32768-32774
FTP	1	20-21 Note: Nondefault FTP ports are learned dynamically.
Groupwise	30	1677
Hostname Resolution	21	42
HTTP	4	80, 8080
HTTPS	12	443
ICA (Citrix)	19	1494
ICMP	22	Protocol 1 (no ports specified)
Kerberos	17	88
LDAP	16	389
Lotus Notes	7	1352
Mail	3	25,110,143

Table 5: Default Application Definitions *(continued)*

Application	Order	Port Numbers
Microsoft SQL Monitor	43	1434
Microsoft SQL Server	6	1433
MS Streaming	31	1755
MS Terminal Services	18	3389
NetApp SnapMirror	40	10566
NetBios	5	137, 138
NFS	33	2049
Novell NCP	28	524
Oracle	11	1525
Oracle SQL*Net	46	1529 TCP
Oracle SQL*Net v1	45	1525 TCP
Oracle SQL*Net v2	44	1521 TCP
PCAnywhere	38	5631-5632
Printer	27	515
RADIUS	32	1812, 1813
RTSP	29	554
SAP	36	3200, 3300-3388, 3390-3399, 3600-3699
Shell	25	514 TCP
SNMP	19	161-162
SNTP	14	123
SSH	13	22
Sybase	10	1498
Symantec Anti-Virus	35	2967
Syslog	26	514 UDP

Table 5: Default Application Definitions *(continued)*

Application	Order	Port Numbers
TACACS	23	49
Telnet	2	23
Traceroute	42	33434-33534 UDP
UniSQL	47	1978
UniSQL Java	48	1979 TCP
XWindows	39	6000-6063

Configuring WX Application Definitions

For each defined application, the Applications Definitions page lists the application's name, type, and source and destination ports.

To add or change application definitions:

1. Click **Acceleration > Applications > Definitions**.

   From the Application Definitions page, you can:

   - Add a new application definition, as described in Step 2.
   - Change an application definition. Click the application name, make any needed changes, and click **Submit**.
   - Change a definition's order number. Type a new value in the Order box, and click **Submit** to renumber the definitions. The new value cannot exceed the highest value in the current range. The definitions are compared against the traffic in ascending order.
   - Delete application definitions. Select the check box next to the applications you want to delete, and click **Submit**.

2. To add a new application definition:

a. Click **New Application** and specify the following information:

Application Name	Enter a name for the application (up to 63 characters). Use only letters, numbers, dashes, underscores, and periods.
Application Type	Select one of the following application types: • **Default**. No special processing. • **FTP**. Apply to the FTP application to allow FTP ports to be learned dynamically. Applies only to active FTP.
Services	Select or clear the check box next to each service to be enabled or disabled for the application. The services can also be configured on the Application Policies page (see "Configuring WX Application Policies" on page 39).
Specify up to 10 rules composed of one or more of the following values. A match occurs if any of the rules are true. All values defined in the same rule must be true for a match to occur on that rule. You can have a total of 512 rules for all applications.	
Source Address	Enter a source IP address or subnet. The general format is: **address/subnetmask** A blank or an asterisk (*) with no subnet mask indicates any source IP address.
Source Port	Enter a source port number, a series of comma-separated port numbers, or a range of port numbers separated by a hyphen (-). A blank indicates any port. For a list of common application ports, see: **http://www.iana.org/assignments/port-numbers**
Destination Address	Enter a destination IP address or subnet (same format as the source address). A blank or asterisk (*) indicates any destination IP address. Typically, source and destination addresses are specified in separate rules so that a match occurs on either one. A rule that specifies source and destination addresses will match only the traffic between those addresses.
Destination Port	Enter one or more destination port numbers (same format as the source port). A blank indicates any port. Typically, source and destination ports are specified in separate rules so that a match occurs on either one. A rule that specifies source and destination ports will match only the traffic between those ports.
Protocol	Select an application protocol or select **Any** to indicate that a match can occur on any TCP or non-TCP packet (the default). Also, if you do not specify any port numbers you can type in a protocol number (0 to 134). **NOTE:** Only TCP traffic can be compressed and accelerated. Non-TCP traffic can just be monitored. If the protocol is **Any**, all selected services are applied to the TCP traffic, but the monitoring statistics will include the matching non-TCP traffic (if any).

b. Click **Advanced** next to a rule to include a type of service (ToS) value, and then specify the following:

ToS bits

Select the check box, and then select one of the following:

IP Precedence. Select an IP precedence value (0 through 7).

DSCP. Select a DSCP value (0 through 63) or name.

Table 6 on page 45 lists the DSCP names and the equivalent DSCP and IP precedence values for the class selector (CSx) names. The assured forwarding (AFx) and expedited forwarding (EF) names are defined by RFCs 2597 and 3246.

c. Click **Continue** to return to the Application Definition page.

d. Click **Submit** to activate the definition, or click **Cancel** to discard it. To erase an entire rule, including the advanced settings, click **CLEAR** next to the rule.

3. Click **Save** in the taskbar to retain your changes when the device is restarted.

Table 6: ToS and DSCP Values

Name	DSCP	IP Precedence
Default	0	0
CS1	8	1
CS2	16	2
CS3	24	3
CS4	32	4
CS5	40	5
CS6	48	6
CS7	56	7
AF11	10	–
AF12	12	–
AF13	14	–
AF21	18	–
AF22	20	–
AF23	22	–
AF31	26	–

Table 6: ToS and DSCP Values *(continued)*

Name	DSCP	IP Precedence
AF32	28	–
AF33	30	–
AF41	34	–
AF42	36	–
AF43	38	–
EF	46	–

Testing New WX Application Definitions

When you add a new definition, it is assigned the next highest order number (the lowest precedence), and enabled automatically for compression, TCP acceleration, and monitoring for reports. If the new application is encrypted or already compressed, you should disable compression. To view or change the policies for the new application, see “Configuring WX Application Policies” on page 39.

If you do not see any traffic for the application (see “Viewing WX Monitoring Reports” on page 49), check the accuracy of the definition, and verify that the traffic is not being counted against an application with a more general definition and a higher precedence (lower order number).

Configuring SMB Signing for CIFS Acceleration

By default, CIFS transactions are not accelerated when Server Message Block (SMB) signing is used. For servers that have SMB signing enabled, but not required, the WX can simply disable SMB signing. If a server requires SMB signing, you can configure the WX to log in to the server to obtain the key needed to create an SMB signature.

To disable the SMB signing requirement on Windows 2000 or Windows 2003 domain controllers, see the Microsoft website:

http://support.microsoft.com/kb/887429

To configure SMB signing for CIFS acceleration:

1. Select **Acceleration > Protocol Acceleration > CIFS Acceleration**.
2. Select the following options:
   - **Disable SMB signing when not required by the server**. Allows CIFS transactions to be accelerated for servers that have SMB signing enabled, but not required.
   - **Apply SMB signing across the WAN when required by the server**. Allows CIFS transactions to be accelerated for servers that require SMB signing. The SMB signature is based on a key derived from the login password. To allow the WX to

log in to a server and create a signature, specify a valid username, password, and Windows domain (optional) that matches an account on the appropriate Windows servers. The domain is needed if the WX must log in to a Windows domain controller.

Note the following:

- A Windows domain user needs the minimal rights.
- SMB signing occurs between the client-side WX endpoint and the server, not between the WX and the client.
- Traffic flows between Vista and non-Vista devices are downgraded from SMB2 to SMB to allow acceleration (to disable this feature, see the **config set acceleration** CLI command in the *JWOS Command Reference Guide*).

3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

CHAPTER 5

Viewing WX Monitoring Reports

This chapter describes how to view statistics for data compression, bandwidth utilization, application acceleration, and overall traffic statistics.

Viewing and Printing Reports

Use the following methods to view and print reports:

- To view a report for a specific remote endpoint, click the magnifier icon next to the Enter Endpoint list, and select the appropriate endpoint. To page through the list of endpoints, click the page numbers and arrow icons above the list.
- To view the numerical value associated with a point on a chart, move the cursor over the point on the chart.
- To print a report, select **Print** in the upper-right corner of the report.

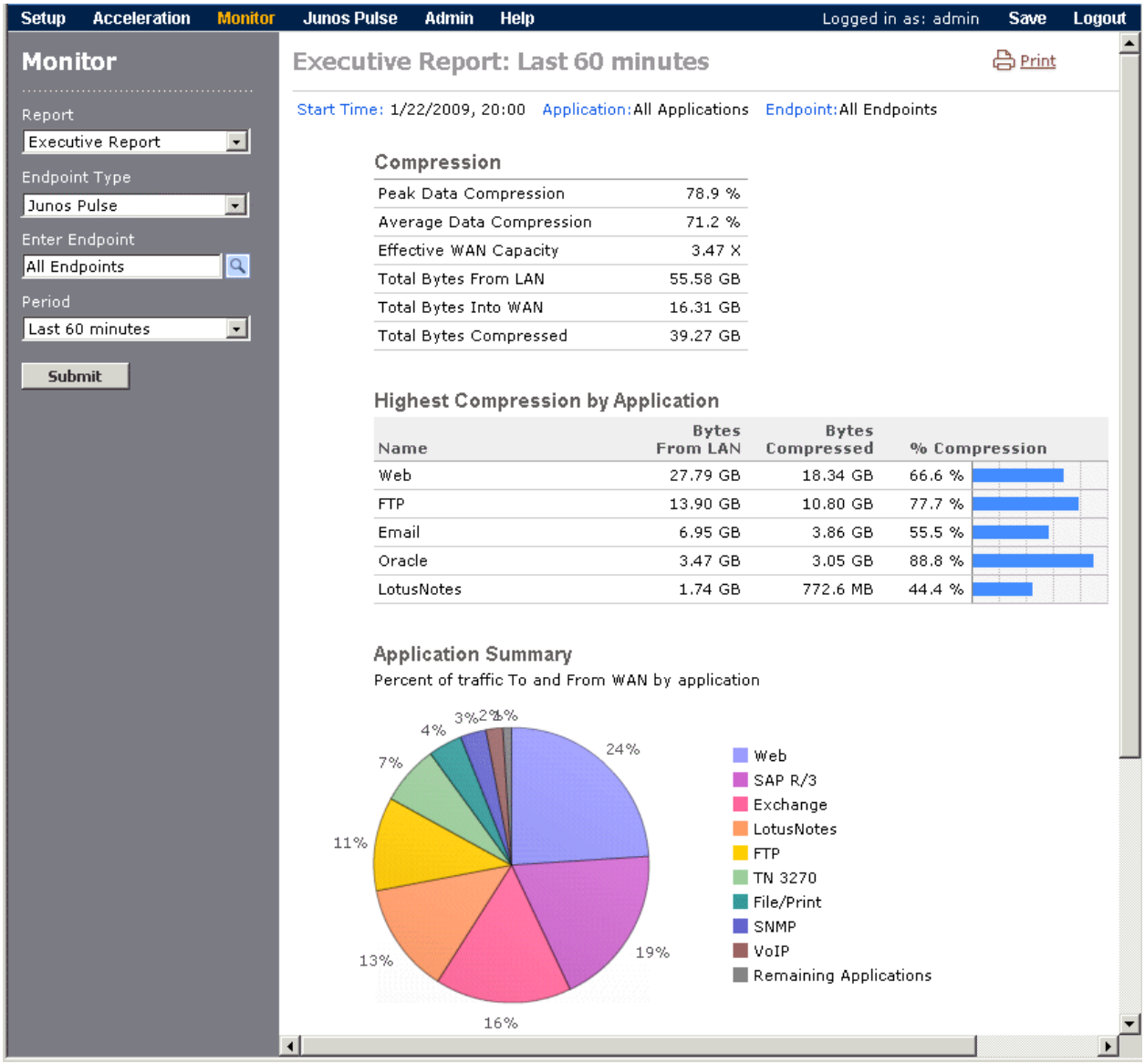
Executive Report

The Executive report summarizes the compression results and traffic volume by application for one or all remote WX clients.

To view the Executive report:

1. Click **Monitor** in the taskbar, and select **Executive Report** from the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a specific device from the Enter Endpoint list to view statistics only for traffic sent to the selected endpoint. The default is **All Endpoints**.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.

Figure 12: Executive Report



3. Review the following information:

   - The Compression table shows the following:

     - **Peak Compression**. Highest percentage of data compression for the selected time period. Based on five-second intervals for hourly reports, one-minute-intervals for daily reports, and one-hour intervals for weekly and monthly reports.

     - **Average Data Compression**. Average percentage of data compression for the selected time period.

  - **Effective WAN Capacity**. Factor increase in WAN capacity resulting from the total data compression. For example, this value is 2.00 if total data compression is 50%.
  - **Total Bytes From LAN**. Number of bytes received from the LAN.
  - **Total Bytes To WAN**. Number of bytes sent to the WAN.
  - **Total Bytes Compressed**. Number of bytes of traffic compressed.
- The Highest Compression by Application table has the following columns:
  - **Name**. Names of the top ten monitored applications with the highest compression percentage.
  - **Bytes from LAN**. Number of bytes into the device from the LAN for each application.
  - **Bytes Compressed**. Number of bytes compressed for each application.
  - **% Compression**. Percentage of data compression achieved for each application.
- The Application Summary pie chart shows up to nine monitored applications with the highest percentage of the total traffic sent to and from the WAN. The Remaining Applications category, when shown, indicates the traffic for all other applications (both defined and undefined).
- The Traffic Volume by Application graph shows the traffic volume over the selected time period for the top monitored applications.

WAN Statistics

The following topics describe the WAN statistics displayed in the JWOS Web interface:

- WAN Throughput Report on page 51
- WAN Application Summary Report on page 53

WAN Throughput Report

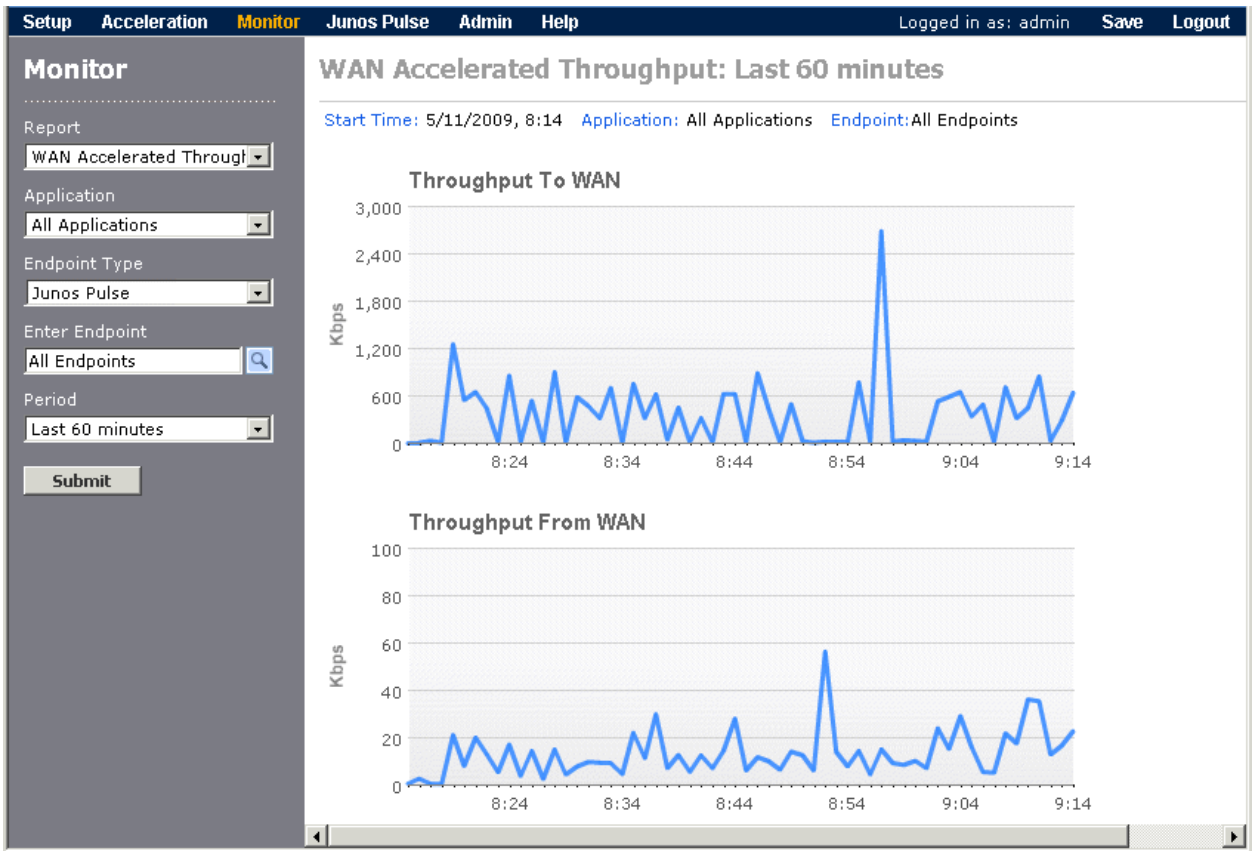
The WAN Throughput report shows separate graphs of the throughput to and from the WAN for all remote endpoints, or for a specific endpoint. These statistics help you gauge the speed of all traffic to and from the WAN.

To view the WAN Throughput report:

1. Click **Monitor** in the taskbar, and select **WAN Throughput** in the Report list.
2. Optionally, change the following report parameters, and click **Submit**.

- Select a monitored application from the Application list. The default is **All Applications**. To specify the monitored applications, see “Configuring WX Application Policies” on page 39.
- Select the device type from the Endpoint Type list to view statistics for traffic sent to WX devices, WX clients, or both. The default is **All Endpoint Types**.
- Select a specific device from the Enter Endpoint list to view statistics only for traffic sent to the selected endpoint. The default is **All Endpoints**.
- Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.

Figure 13: WAN Throughput Report



3. Review the following information:
   - The Throughput to WAN graph shows the average throughput of data sent to the WAN.
   - The Throughput From WAN graph shows the average throughput of data received from the WAN.

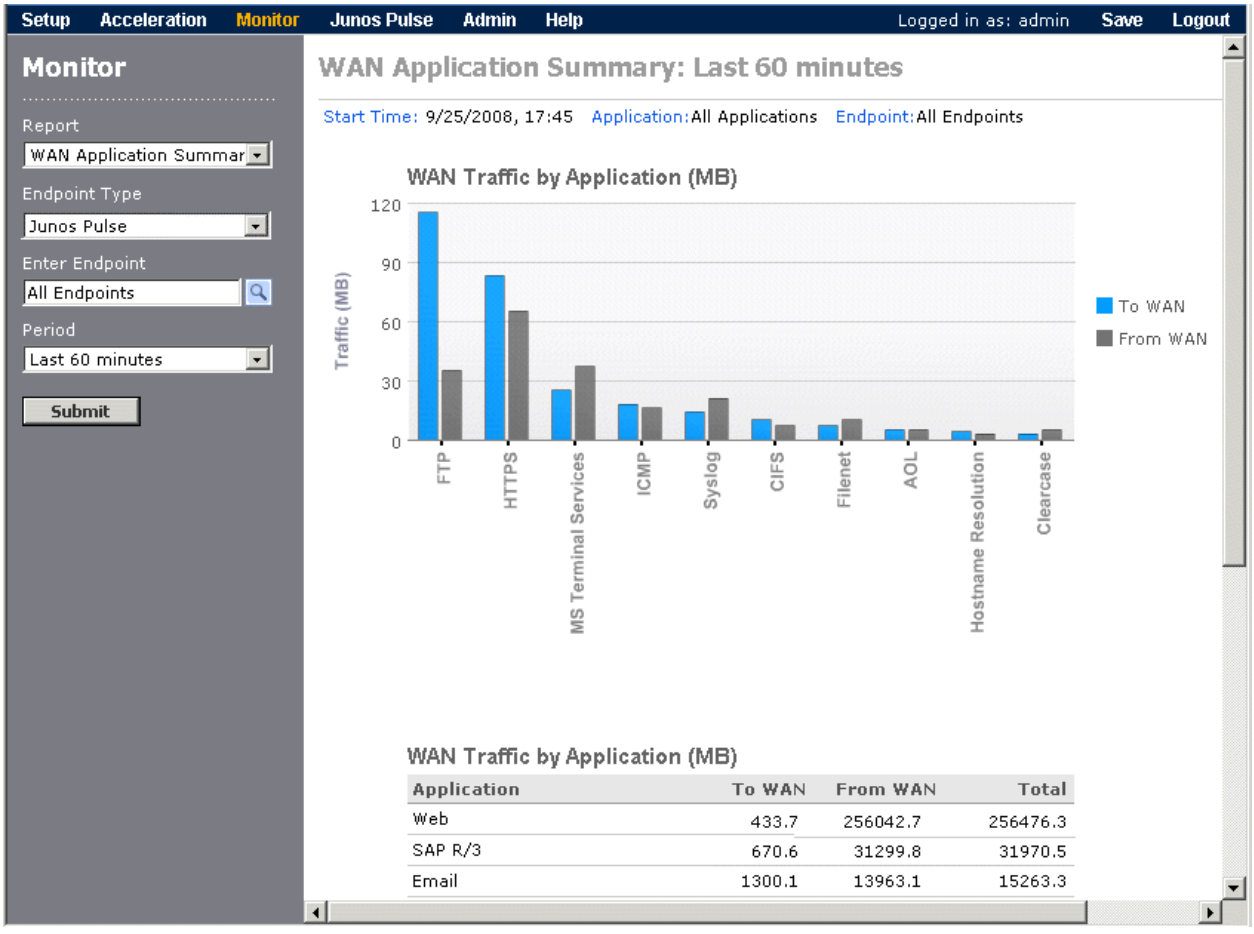
WAN Application Summary Report

The WAN Application Summary shows the application traffic to and from the WAN for all remote endpoints, or for a specific endpoint. The traffic to and from the WAN is shown for up to 100 monitored applications. To specify the monitored applications, see “Enabling WX Client Image Downloads” on page 66.

To view the WAN Application Summary:

1. Click **Monitor** in the taskbar, and select **WAN Application Summary** in the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a specific device from the Enter Endpoint list to view statistics only for traffic sent to the selected endpoint. The default is **All Endpoints**.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.

Figure 14: WAN Application Summary



3. Review the following information:

- The bar chart shows the nine monitored applications that have the most traffic sent to and from the WAN.
- The application table shows the traffic in megabytes sent to and from the WAN for each monitored application. The applications are sorted in descending order by total traffic.

Compression Statistics

The following topics describe the compression statistics displayed in the JWOS Web interface:

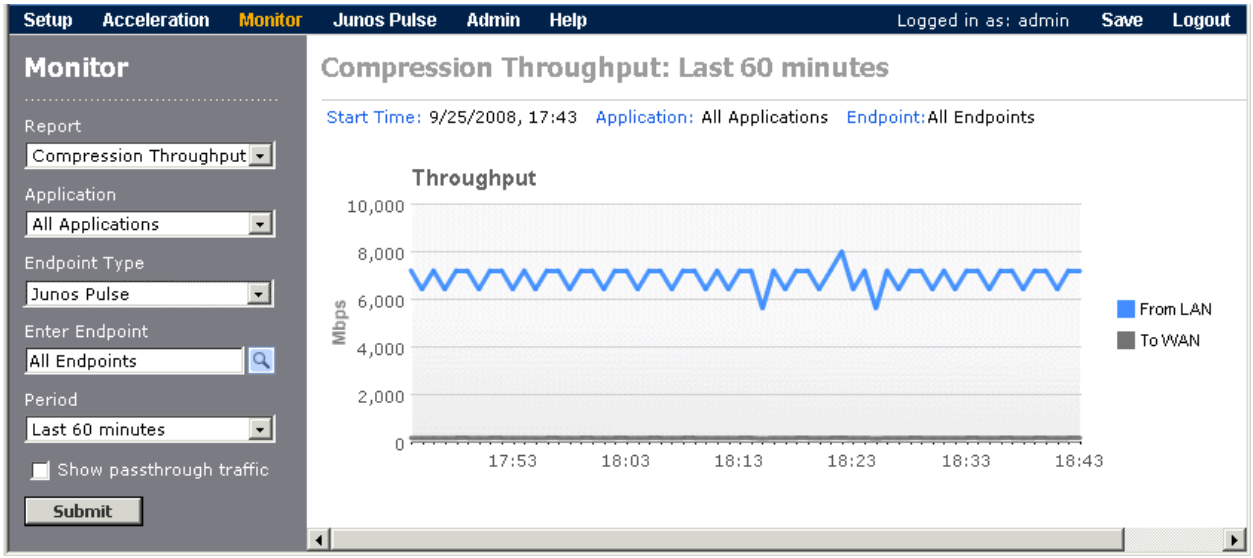
Compression Throughput Report

The Compression Throughput report compares the throughput of the traffic into the compression engine from the LAN with the throughput of the compressed traffic sent to the WAN.

To view the Compression Throughput report:

1. Click **Monitor** in the taskbar, and select **Compression Throughput** from the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a monitored application from the Application list. The default is **All Applications**. To specify the monitored applications, see “Configuring WX Application Policies” on page 39.
   - Select a specific device from the Enter Endpoint list to view statistics only for traffic sent to the selected endpoint. The default is **All Endpoints**.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.
   - Select the **Show passthrough traffic** check box to display the total traffic sent to the WAN without any processing.

Figure 15: Compression Throughput Report



3. Review the following information on the Throughput graph:
   - **From LAN**. Average data throughput into the compression engine.
   - **To WAN**. Average data throughput out of the compression engine.

Compression Report

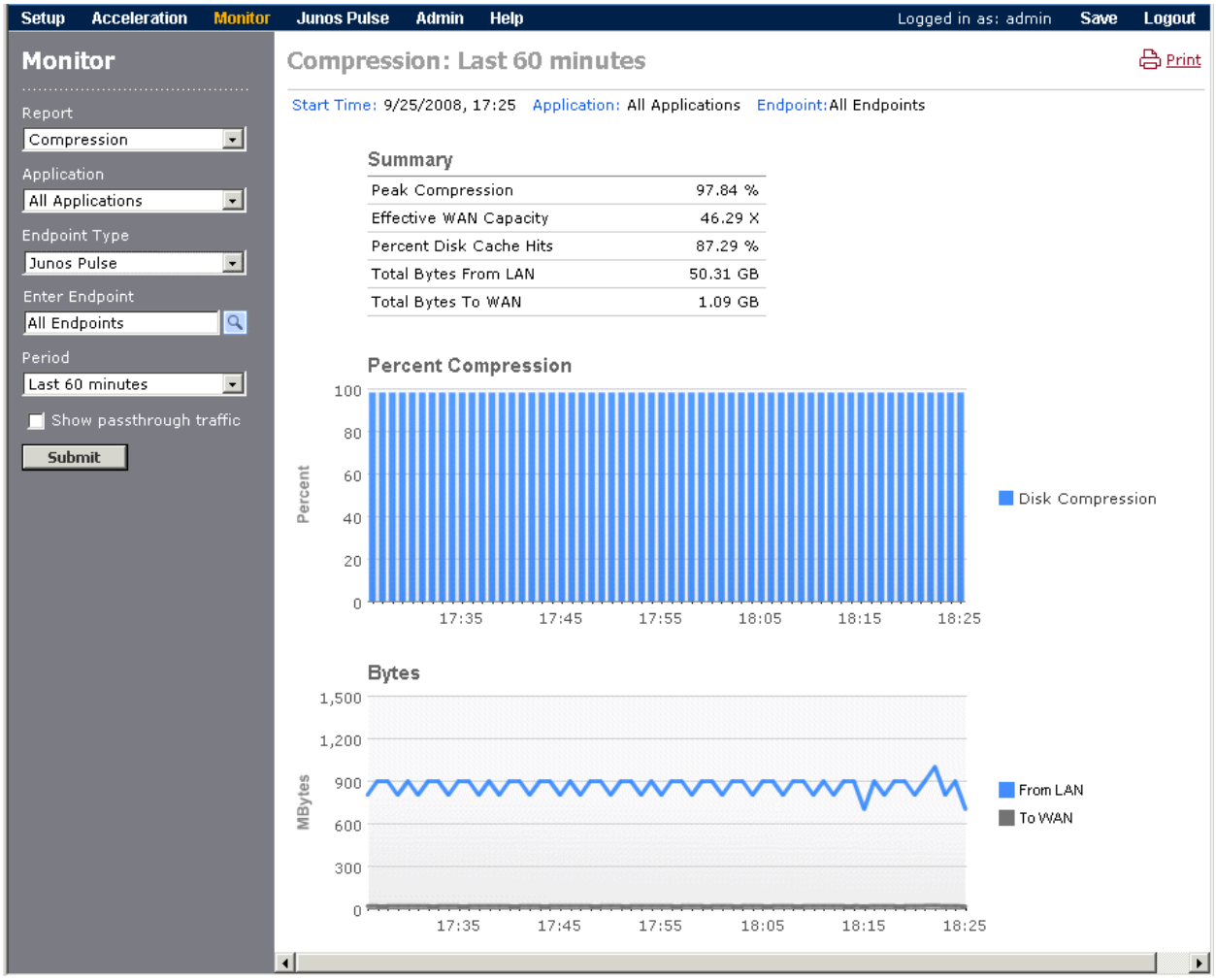
The Compression report includes a summary table, a graph of the compression percentage, and a graph of the number of bytes received from the LAN and sent to the WAN for the selected time period. Note that the compression percentage is not an average, but is based on the total number of bytes compressed, as follows:

Compression % = [(Bytes from LAN - Bytes to WAN)/Bytes from LAN] x 100

To view the Compression report:

1. Click **Monitor** in the taskbar, and select **Compression** from the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a monitored application from the Application list. The default is **All Applications**. To specify the monitored applications, see “Configuring WX Application Policies” on page 39.
   - Select a specific device from the Enter Endpoint list to view statistics only for traffic sent to the selected endpoint. The default is **All Endpoints**.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.
   - Select the **Show passthrough traffic** check box to include the traffic sent to the WAN without any processing.

Figure 16: Compression Report



3. Review the following information:

   - The Summary table shows the following if **All Endpoints** is selected from the Enter Endpoint list.
     - **Peak Compression**. Highest percentage of data compression for the selected time period. Based on five-second intervals for hourly reports, one-minute-intervals for daily reports, and one-hour intervals for weekly and monthly reports.
     - **Effective WAN Capacity**. Factor increase in WAN capacity resulting from the total data compression. For example, this value is 2.00 if total data compression is 50%.
     - **Percent Disk Cache Hits**. Percentage of lookups in the compression dictionary that were successful.
     - **Total Bytes From LAN**. Number of bytes received from the LAN.

  - **Total Bytes To WAN**. Number of bytes sent to the WAN.
  - **Total Bytes Passed Through**. Number of bytes sent to the WAN that are passed through without any processing. This value is shown only if the **Show passthrough traffic** check box is selected.
- The Percent Compression graph shows how the percentage of data compression varied over the selected time period.
- The Bytes graph shows the number of megabytes received from the LAN and sent to the WAN for the selected time period.

Compression by Endpoint Report

The Compression by Endpoint report shows the percentage of data compression achieved for the traffic sent to each remote WX endpoint, and the number of bytes that the local WX received from the LAN and sent to the WAN for each remote endpoint. You can view the report for one or all applications.

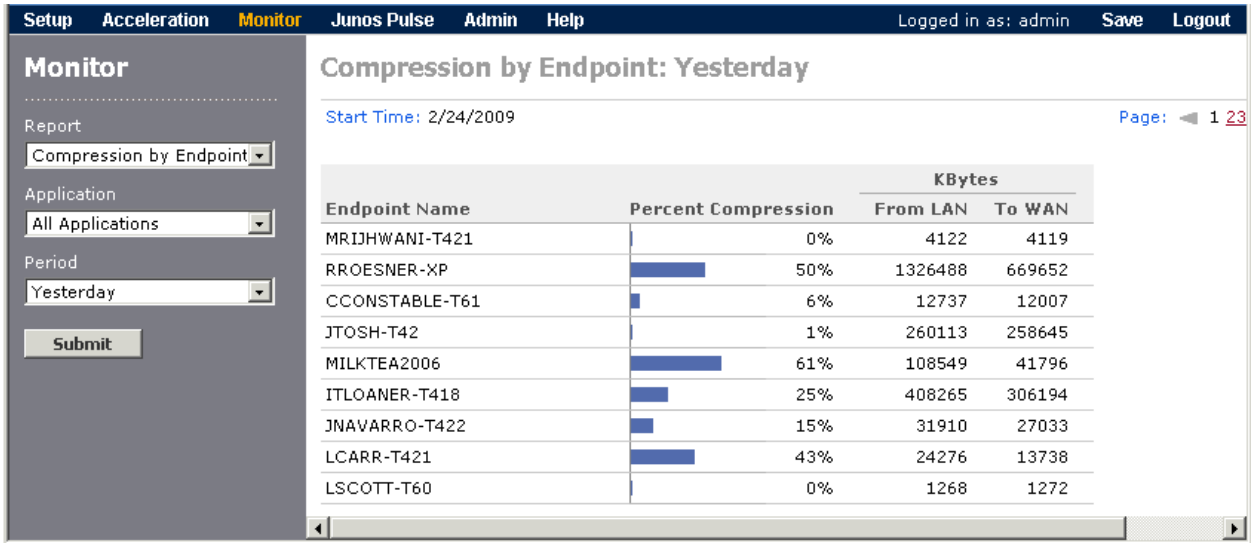
You can also select an endpoint name to view the compression by application for the selected endpoint. To view application statistics for all endpoints, see the "Compression Application Summary Report" on page 58.

Note that historical data is maintained for at least two months, so endpoints may be listed that have no data for the selected time period.

To view the Compression by Endpoint report:

1. Click **Monitor** in the taskbar, and select **Compression by Endpoint** from the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a monitored application from the Application list. The default is **All Applications**. Select **Others** to view statistics for applications that are undefined or unmonitored. To specify the monitored applications, see "Configuring WX Application Policies" on page 39.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.

Figure 17: Compression by Endpoint Report



3. Locate a specific endpoint by clicking the page numbers at the top of the page.
4. Review the following information for each endpoint:
   - **Percent Compression**. Percentage of data compression for the selected time period.
   - **KBytes From LAN**. Number of kilobytes received from the LAN.
   - **KBytes To WAN**. Number of kilobytes sent to the WAN.

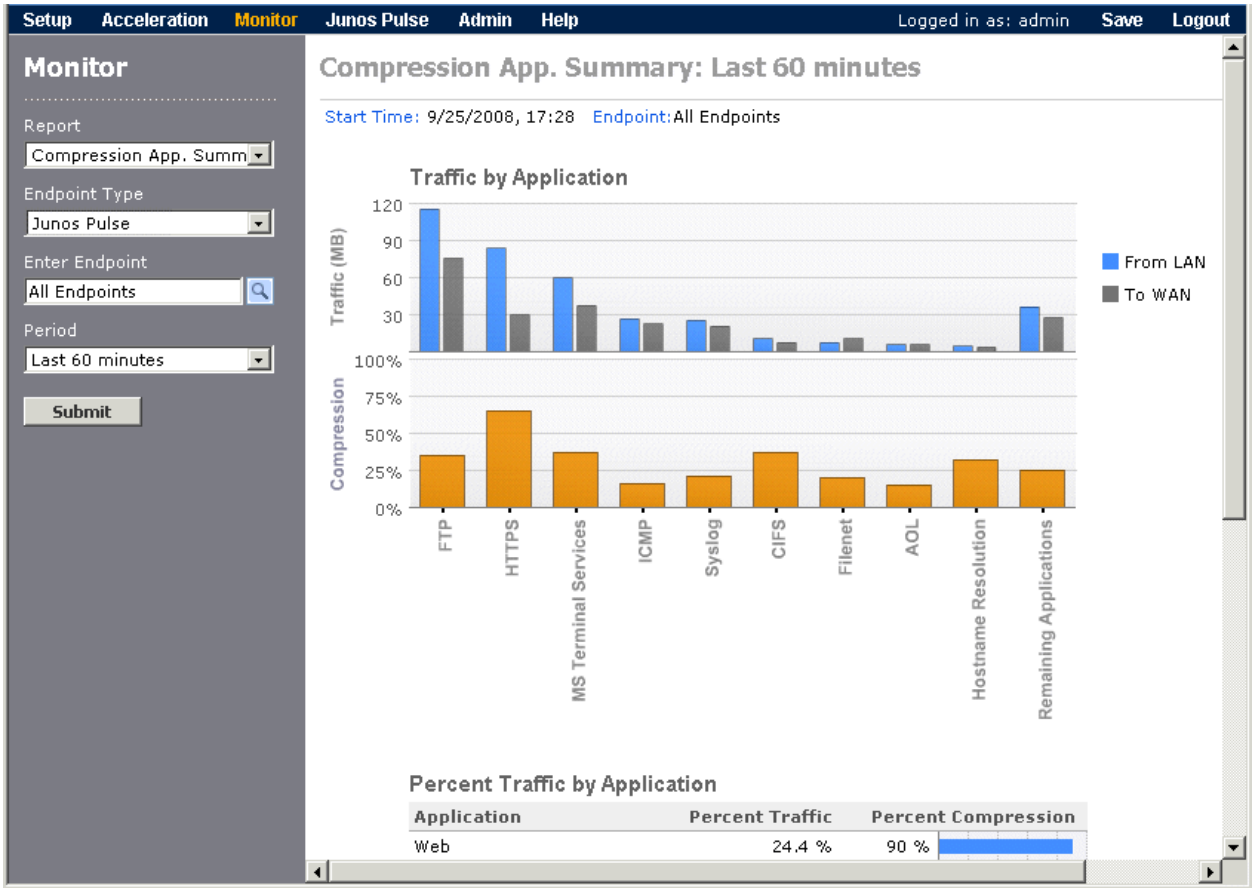
Compression Application Summary Report

The Compression Application Summary report shows a bar chart of the nine monitored applications that have the highest percentage of the traffic into the WX device. A table is also included that shows the traffic statistics and percentage of data compression for each monitored application (up to 100). To specify the monitored applications, see “Configuring WX Application Policies” on page 39.

To view the Compression Application Summary:

1. Click **Monitor** in the taskbar, and select **Compression App. Summary** from the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a specific device from the Enter Endpoint list to view statistics only for traffic sent to the selected endpoint. The default is **All Endpoints**.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.

Figure 18: Compression Application Summary



3. Review the following information on the Application Summary.

   - The bar charts show the nine monitored applications with the highest percentage of the total traffic received from the LAN for the selected endpoint(s). The first chart also shows the traffic sent to the WAN, which is affected by the compression percentage shown in the second chart.
   - The application table has the following columns.
     - **Application**. Names of the monitored applications, sorted in descending order by the application's percentage of the total traffic.
     - **Percent Traffic**. Percentage of the total traffic received from the LAN for each application.
     - **Percent Compression**. Percentage of data compression achieved for each application. A dash is shown for applications that have no traffic or cannot be compressed (such as encrypted applications). Data compression should be disabled for applications that consistently show little or no compression (see "Configuring WX Application Policies" on page 39).

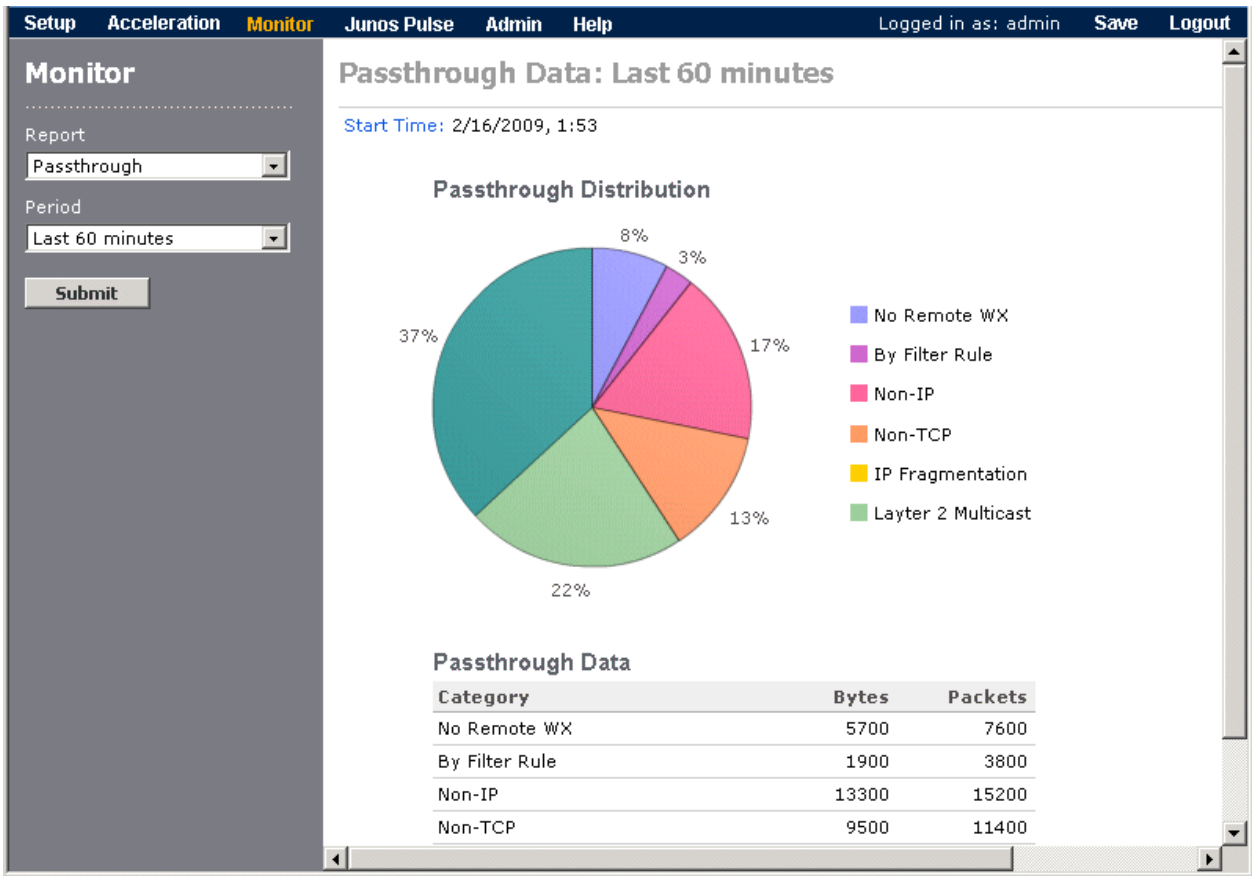
Passthrough Report

Traffic that falls into one of several categories is passed through the WX device without any processing. The Passthrough report shows a pie chart of the percentage of passthrough traffic in each category. A table is also included that shows the number of bytes and packets in each category.

To view the Passthrough report:

1. Click **Monitor** in the taskbar, and select **Passthrough** from the Report list.
2. Select a time period from the Period list, and click **Submit**.

Figure 19: Passthrough Report



The following table describes the passthrough categories.

Category	Description
No Remote WX	No WX endpoints available, or TCP acceleration is disabled for one or more endpoints.
By Filter Rule	TCP acceleration is disabled for specific applications (see “Configuring WX Application Policies” on page 39).

Category	Description
Non-IP	Non-IP traffic is not accelerated.
Non-TCP	Non-TCP traffic is not accelerated.
IP Fragmentation	Fragmented IP packets are not accelerated.
Layer 2 Multicast	Layer 2 multicast traffic, such as for ARP, is not compressed because the intended destination is unknown.

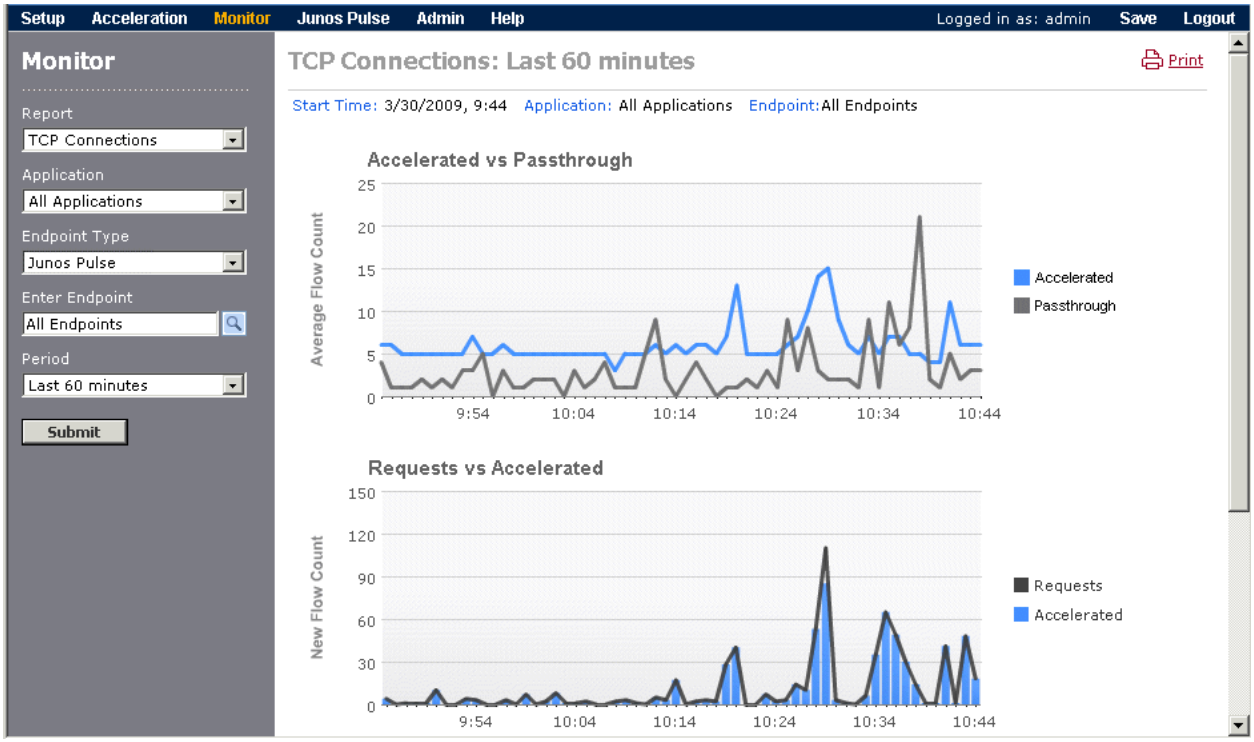
TCP Connections Report

The TCP Connections report compares the average number of accelerated TCP connections with the average number that are passed through, and the number of connections accelerated versus the number of acceleration requests.

To view the TCP Connections report:

1. Click **Monitor** in the taskbar, and select **TCP Connections** in the Report list.
2. Optionally, change the following report parameters, and click **Submit**.
   - Select a monitored application from the Application list. The default is **All Applications**. To specify the monitored applications, see “Configuring WX Application Policies” on page 39.
   - Select a specific device from the Enter Endpoint list to view connections only for the selected endpoint. The default is **All Endpoints**.
   - Select a time period from the Period list. You can select the current or previous hour, day, or week. The default is **Last 60 minutes**.

Figure 20: TCP Connections Report



3. Review the following graphs:

   - **Accelerated vs Passthrough**. Compares the average number of traffic flows receiving TCP acceleration with the total number of traffic flows being passed through without any processing. The passthrough traffic flows are shown only if the report is displayed for all endpoints. For hourly reports, the average number of traffic flows for each minute is based on 10-second intervals.
   - **Requests vs Accelerated**. Compares the number of traffic flows that requested TCP acceleration with the number of traffic flows that were accelerated.

CHAPTER 6

Managing WX Clients

This chapter describes how to install and manage the WX clients.

Installing the WX Client

Mobile and remote Windows users can obtain the benefits of WAN acceleration by installing the WX client software from a WX device. The following sections describe the WX client hardware and software requirements, and how to install and uninstall the WX client on a Windows 2000 or Windows XP system:

NOTE: The WX client supports only the 32-bit editions of Windows 2000 SP4 or later and Windows XP SP2 or later (the 64-bit editions are not supported). The WX client must be installed on each Windows client, not on a single Windows system that serves as a gateway for other clients.

WX Client Hardware and Software Requirements

The WX client has the following hardware requirements:

- CPU Pentium M class or higher, 1.5 GHz minimum
- 2 GB or more of free disk space
- 1 GB or more of RAM

The following table lists the Windows operating systems, Internet browsers, and other key hardware and software versions that are supported by the WX client. The qualified

versions have been tested extensively; the compatible versions have received less testing, but are fully supported. Note that only 32-bit versions of Windows are supported.

Qualified	Compatible
Windows Operating Systems	
• Windows XP Professional SP2, 32 bit • Windows 2000 Professional SP4, 32 bit **NOTE:** The WX client supports the German, French, Japanese, Simplified Chinese, Spanish, Russian and Korean versions of Windows. However, the WX client interface is available in English only.	• Windows XP Home Edition SP2, 32 bit • Windows XP Professional SP3, 32 bit • Windows XP Media Center Edition • Windows XP Media Center Edition 2004 • Windows XP Media Center Edition 2005
Client Internet Browsers	
• Internet Explorer 6.0 • Internet Explorer 7.0 • Firefox 3.0	• Internet Explorer 8.0 • Firefox 3.0.1
Java Run-Time Environment	
• Java 2 Runtime Environment Standard Edition 1.4.2	• Later versions of the JRE
VPN Clients	
• Juniper Secure Access 6500, 4500, 2500 and 700 version 6.4.0.1.406 with Network Connect version 6.4 • Juniper Secure Access 6500, 4500, 2500 and 700 version 6.3 with Network Connect version 6.3 • Juniper SSG 550 version 6.0.0r4.0 with NS Remote version 8.0.0, and later versions of the SSG 550 and NS Remote • Juniper IC 6000 version 3.0R1 build 12709 and SSG 550 version 6.0.0r4.0 with OAC version 5.00.12709.0 (where the IC 6000 is the Infranet Controller and the SSG 550 is the Infranet Enforcer) • Later versions of IC 6500, 6000,4500, and 4000, SSG 550, and OAC	• Cisco VPN 3000 Concentrator version 4.1.7 D with IPSec VPN version 4.6.04.0043 • Cisco ASA Series with later versions of IPSec VPN, SSL VPN, or Easy VPN • Nortel Contivity server 1010 version V04_80.124 with client version V06_01.109, and later versions of the Nortel Contivity server and client
System Management Server	
• Microsoft SMS 2003 SP2	• Microsoft SMS 2003 SP3

Downloading the WX Client from a WX Device

The WX client software can be downloaded to a Windows 2000 or Windows XP workstation from any WX device running JWOS that has a client license. When the license is present, a **WX Clients** selection is shown in the taskbar of the WX Web interface.

Before users can download the client software, you must:

- Verify that WX client downloads are enabled (see "Enabling WX Client Image Downloads" on page 66).
- Specify the client configuration on the WX device (see "Defining the Default WX Client Configuration" on page 68).

To download the client software from a WX device:

1. On a workstation running a 32-bit edition of Windows 2000 or Windows XP, enter the following URL in a supported Web browser:

   https://*WX IP address/client*

2. Enter the username and password, if needed, and click **Login**.
3. Select **Install Now**, and, if necessary, click **Install** in the Security Warning dialog box. Note the following:

   - If the Windows Firewall is enabled, click **Unblock** when prompted to allow the WX client to accept external connections.
   - If you are prompted to stop the Network Connect client, click **OK** and restart the Network Connect client after the WX client is installed.

   When installation is complete, the WX client starts automatically, and the WX icon is shown in the system tray in the lower-right corner of the Windows desktop. Traffic acceleration starts automatically when remote WX devices are discovered. No additional configuration is necessary.
4. In the lower left corner of the WAN Acceleration Client window, click the arrow icon and select **Help > Help Topics** to open the *WX Client User's Guide*.

Downloading the WX Client from a Secure Access Gateway

The WX client software can be downloaded and installed automatically when users access a Juniper Networks Secure Access (SA) gateway. To use this option, the WX client software must first be exported from a WX device and uploaded to the Secure Access gateway (see "Distributing the WX Client" on page 70)

NOTE: Users must have Windows admin privileges to install the WX client from the SA gateway.

To download the client software from a Secure Access Gateway:

1. On a workstation running a 32-bit edition of Windows 2000 or Windows XP, enter the URL of the SA gateway in a supported Web browser. For example:

   https://wx-sa.juniper.net

   The Loading Components page is displayed. The Host Checker window opens to download the WX client installer, followed by the WX Client window to download and install the client. Note the following:

   - If the Windows Firewall is enabled, click **Unblock** when prompted to allow the WX client to accept external connections.
   - If you are prompted to stop the Network Connect client, click **OK** and restart the Network Connect client after the WX client is installed.
   - If you are prompted about improper installation of the Host Checker or WX client, click **Try Again** to complete the installation.

   When installation is complete, the WX client may start automatically. To start the WX client manually, double-click the WX icon on the Windows desktop. The WX icon is added to the system tray, and traffic acceleration starts automatically when remote WX devices are discovered. No additional configuration is necessary.

2. In the lower left corner of the WAN Acceleration Client window, click the arrow icon and select **Help > Help Topics** to open the *WX Client User's Guide*.

Uninstalling the WX Client

To uninstall the WX client software, select **Start > All Programs > Juniper Networks > WX Client > Uninstall** or run the following program (if necessary, change C: to the drive where Windows is installed):

C:\Program Files\Juniper Networks\WX Client\uninstall.exe

Managing WX Client Software, Configurations, and Policies

The following topics describe how to manage WX clients:

Enabling WX Client Image Downloads

Windows users can download and install the client software only from a WX device that has client downloads enabled. Optionally, you can require users to log in before they can download the client software.

To enable client image downloads:

1. Select **WX Clients > Setup > Client Image Download**.
2. Verify that the displayed version of the WX client image is correct. If a later version is available, it must be uploaded to the WX device (see "Uploading the WX Client Image" on page 69).
3. Select **Allow WX Client image download** to allow users to download the client software.
4. Select **Require user authentication** to require users to log in, and specify the required username and password.
5. Click **Submit** to activate the changes.
6. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring WX Client Adjacencies

By default, the WX can form adjacencies with any Windows client that is running a supported version of the WX client software. If needed, you can disable and enable client adjacencies at any time. For example, to conserve system resources, you can restrict client adjacencies to specific WX devices. After an adjacency is manually disabled (or disrupted for any reason), it takes about 30 seconds to reestablish the adjacency.

To configure adjacencies with WX clients:

1. Select **WX Clients > Setup > Client Adjacency**.
2. Select **Allow adjacency with WX Clients** to enable the WX to form adjacencies with WX clients. Note that if you clear the check box, all current adjacencies are disabled, and all client traffic flows are reset.
3. Click **Submit** to activate the changes.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Configuring WX Client Policies

Compression (NSC) and acceleration services can be configured for each client that is currently adjacent (connected) or that has been adjacent at any time since the last time the WX was restarted. When an adjacency is established, the local application policies are applied to the traffic sent to that client, provided the same services are also enabled on the client.

To define the default configuration for a client, see "Defining the Default WX Client Configuration" on page 68.

To configure the WX client policies:

1. Select **WX Clients > WX Client Policies**.
2. Enable a service for one or more clients by selecting the check box for the service next to the appropriate clients. To select or clear a service for all clients, select the **Select All/Clear** check box below the list.

3. Click **Submit** to activate the changes, or click **Reset** to discard them.
4. Click **Save** in the taskbar to retain your changes when the device is restarted.

Viewing the Status of WX Client Policies

The WX Client Status page shows the status of each service between the local WX device and each of the remote WX clients. The list of clients includes the adjacent (connected) clients and all clients that are waiting for a connection or have been adjacent at any time since the last time the WX was restarted. Inactive adjacencies are disconnected after 15 minutes.

To view the status of WX clients:

1. Select **WX Clients > WX Client Status**.
2. Review the status icons of each service:

Icon	Description
	The WX client is adjacent (connected).
	The WX client is disconnected, waiting for a connection, or in the process of connecting or disconnecting.
	The service is operating normally.
	The service is not enabled on the local WX device. To enable the service, see “Configuring WX Client Policies” on page 67.
	A problem exists, or the service is enabled on the local device, but disabled on the client.

Defining the Default WX Client Configuration

When users download the WX client software, a default client configuration is included. You must generate a default client configuration from the current WX configuration file (**startup.cfg**) or load a customized configuration file from a local disk, FTP server, or TFTP server.

If you generate the client configuration from the WX device, you should regenerate the client configuration whenever the application policies on the WX device are changed. To view the current client configuration, see “Viewing the WX Client Configuration” on page 69.

1. Select **WX Clients > Admin > Load Client Configuration**.

   The default client configuration and its last update time are indicated at the top of the page. If a client configuration is not defined, **Not Available** is displayed.

2. Select one of the following:

Generate configuration file	Generates a client configuration based on the current WX configuration saved in the **startup.cfg** file.
Local disk	Specify the path and filename on a machine in your network or click **Browse** and select the configuration file.
TFTP server	Enter a TFTP server's IP address and the path and filename on the server, such as **/juniper/client_config.cfg**.
FTP server	Enter an FTP server's IP address and the path and filename on the server, such as **/juniper/client_config.cfg**. If the FTP server does not accept anonymous user access, enter a username and password for an account that has read/write privileges on the server.

3. Click **Load** to update the client configuration.

Viewing the WX Client Configuration

The default configuration that is downloaded to WX clients can be viewed through the Web interface. Note that when you generate the client configuration from the WX device, the client configuration contains a subset of the CLI commands from the WX configuration.

To view the client configuration:

1. Click **WX Clients > Admin > Display Client Configuration.**
2. View the client configuration. For more information about the CLI commands in the configuration, see the *JWOS Command Reference Guide*.

Uploading the WX Client Image

When a new version of the WX client software becomes available, it must be uploaded to the WX before it can be downloaded by users or exported for distribution. You can load a new client image from a local disk or an FTP or TFTP server.

To upload a new WX client image:

1. Select **WX Clients > Admin > Load WX Client Image**.
2. Verify that you want to replace the version of the WX client displayed at the top of the page.
3. Select one of the following:

Local disk	Specify the path and filename on a machine in your network or click **Browse** and select the client software image file.
TFTP server	Enter a TFTP server's IP address and the path and filename on the server.

FTP server	Enter an FTP server's IP address and the path and filename on the server. If the FTP server does not accept anonymous user access, enter a username and password for an account that has read/write privileges on the server.

4. Click **Load** to update the WX client image.

Distributing the WX Client

In addition to allowing users to download the WX client software from a WX device, you can also distribute the client using either of the following methods:

- **Juniper Networks Secure Access (SA) gateway**—The WX client can be downloaded and installed automatically when users access the SA gateway. A WX client software package compatible with the SA Host Checker must be exported from a WX device, and then uploaded to the Secure Access gateway.
- **Microsoft System Management Server (SMS)**—The WX client can be distributed through SMS by exporting the client configuration for inclusion in the Windows installer file.

To export the WX client software or configuration:

1. Load or generate a WX client configuration (see "Defining the Default WX Client Configuration" on page 68).
2. Select **WX Clients > Admin > Export Client Software**.
3. To export a software package to be installed on a Secure Access gateway:
   a. Select **Create Host Checker package for use with SA** and select one of the following options:
      - **Install and invoke without remediation**—The Host Checker installs and starts the WX client. If the WX client fails or is stopped manually, it is not restarted automatically.
      - **Install only**—The Host Checker installs the WX client, and the user must start the WX client manually.

   b. Click **Export**, click **OK**, and then save the **.zip** file to a local folder or file share.

   c. Upload the exported software package to the SA gateway (see "Uploading the WX Client to a Secure Access Gateway" on page 71).
4. To export a client configuration file for use with SMS:
   a. Select **Download Configuration for MSI package**.

   b. Click **Export**, and then save the **Config_All.ini** file to a local folder or file share.

   c. Configure the Windows installer file (see "Configuring the Windows Installer File for the WX Client" on page 71).

Uploading the WX Client to a Secure Access Gateway

To upload the exported WX client software to a Secure Access gateway (for more information about the SA gateway, see the *Secure Access Administration Guide*):

1. Log in as an administrator to the admin console of the SA gateway and select **Authentication > Endpoint Security > Host Checker**.
2. Verify that the **Perform check every X minutes** and **Client-side process, login inactivity timeout** are set to 10 minutes or more, and that the timeout interval is not greater than the check interval. .
3. Select **New 3rd Party Policy**, specify a policy name, and select the exported WX client software package as the Policies File.
4. Select the **Remediate**, check box and click **Save Changes**.
5. Select **Users > User Realms > *Select Realm* > Authentication Policy > Host Checker.**. Select both the **Evaluate Policies** and **Require and Enforce** check boxes for the displayed WX client policy.
6. Click **Save Changes** to save the Host Checker policy.

Configuring the Windows Installer File for the WX Client

To use SMS to distribute the WX client software, you must replace the default client configuration in the Windows installer file with the client configuration that you exported from the WXC (see “Distributing the WX Client” on page 70).

To configure the Windows installer file:

1. Download the Windows installer version of the WX client software (a .msi file) to a computer that has InstallShield 2008. You can download the software from **http://www.juniper.net/customers/support**.
2. Open the downloaded file with InstallShield and select the **Installation Designer** tab.
3. Select **Organization > Components** in the left pane, and open the first components folder in the middle pane.
4. Select the **Files** subfolder in the middle pane, right-click on the **Config_All.ini** file displayed in the right pane, and select **Delete**.
5. Right-click on the **Files** subfolder, and select **Add**.
6. Locate the **Config_All.ini** file that you exported from the WXC, and click **Open**.
7. Select **In a new CAB file** file, select the **Stream the new CAB file into the Windows Installer package** check box, and click **OK**.
8. Click **Save** to save your changes.

CHAPTER 7

Maintaining WX Devices

This chapter describes how to maintain WX devices through the Web interface.

Maintaining Configurations and Software

The following topics describe how to maintain the WX configuration and software:

Saving the WX Configuration

When you change a device's configuration, you must save the configuration file to flash memory to retain the settings the next time the device is restarted. You can also save the configuration file to another location for backup, such as an FTP or TFTP server. If a problem occurs where you must restore the factory default settings, you can load a saved configuration file to restore your network settings.

NOTE: A configuration file contains device-specific information, such as IP network addresses. Therefore, do not load the configuration file from one WX device to another.

1. Click **Admin > Maintenance > Save Configuration**.

2. Select one of the following:

Flash memory	Save the current configuration to the **startup.cfg** file in flash memory or click **Save to the filename** and enter another name. The name can be up to eight characters, with no file extension (such as **myconfig**). Click **Save** to save the configuration. Note that **startup.cfg** is loaded each time you reboot the device. Always save the standard configuration to **startup.cfg**. Saving to a backup location is also recommended.
Local disk drive	Save the current configuration to the disk of a local machine in your network. Select this option, click **Save**, and specify the filename and location.
TFTP server	Save the current configuration to a TFTP server in your network. Enter the server's IP address and a path and filename on the server, such as **/juniper/config_save.cfg**., and click **Save**.
FTP server	Save the current configuration to an FTP server in your network. Enter the server's IP address and a path and filename on the server, such as **/juniper/config_save.cfg**. If the FTP server does not accept anonymous user access, enter a username and password for an account that has read/write privileges on the server. Click **Save**.

Viewing the WX Configuration

The current candidate configuration on the device can be viewed through the Web interface. The candidate and running configurations are the same unless a CLI user enters uncommitted changes to the candidate configuration. All uncommitted changes are applied to the running configuration when a **commit** command is entered or you click **Submit** in the Web interface.

The running configuration may be different from the configuration saved in flash memory. To save the running configuration, see "Saving the WX Configuration" on page 73.

To view the running configuration:

1. Click **Admin > Maintenance > Display Configuration**.
2. View the running configuration. Some configuration options can be set only through the CLI (see the *JWOS Command Reference Guide*).

Loading a WX Configuration File

You can change a device's configuration by loading a configuration file that was previously saved to flash memory, a local disk, or an FTP or TFTP server.

NOTE: A configuration file contains device-specific information, such as IP network addresses. Do not load the configuration file from one WX device to another. Loading an improper configuration file can have adverse effects on the device and on the other WX endpoints in the community.

To load a configuration file:

1. Click **Admin > Maintenance > Load Configuration**.
2. Select the source for the configuration file (including location and filename), and then click **Load**.

Flash memory	Load the default configuration (startup.cfg) from flash memory or click **Load from the file** and select another configuration that is saved in flash memory.
Local disk	Specify the path and filename on a machine in your network or click **Browse** and select the configuration file.
TFTP server	Enter a TFTP server's IP address and a path and filename on the server, such as **/juniper/config_save.cfg**.
FTP server	Enter an FTP server's IP address and a path and filename on the server, such as **/juniper/config_save.cfg**. If the FTP server does not accept anonymous user access, enter a username and password for an account that has read/write privileges on the server.

3. Click **Save** in the taskbar to retain the configuration when the device is restarted. This step is unnecessary if you load **startup.cfg** from flash memory.

   If the new configuration file changes the device's IP address, you MUST save the configuration to **startup.cfg** in flash memory, and then reboot the device (see "Rebooting the WX Device" on page 77).

Loading a WX Software Package

To upgrade the JWOS operating system on a WX device, you can load a new boot image from a local disk or an FTP or TFTP server. You can then reboot the device to activate the new software. Loading a boot image does not affect the configuration settings stored in the **startup.cfg** file. All configuration information is preserved.

NOTE: Always save the current configuration file before upgrading to a new release so that you can reload the configuration if you must restore the previous release (see "Saving the WX Configuration" on page 73).

To load a software package:

1. Click **Admin > Maintenance > Load Software Package.**
2. Select one of the following:

Local disk	Specify the path and filename on a machine in your network or click **Browse** and select the software image file.
TFTP server	Enter a TFTP server's IP address and the path and filename on the server.

FTP server	Enter an FTP server's IP address and the path and filename on the server. If the FTP server does not accept anonymous user access, enter a username and password for an account that has read/write privileges on the server.

3. Select the following options, as appropriate:

Make this the selected software package for the next reboot	Activates the new software the next time you reboot the WX device (see "Rebooting the WX Device" on page 77).
Allow downgrade to version 5.6 or higher	Allows you to downgrade from JWOS 6.0 to WXOS 5.6.5 or later. Note that you cannot downgrade from JWOS 6.0 or later to a version prior to WXOS 5.6.5.

4. Click **Load** to update the WX software.

Clearing Application Monitoring Statistics

At any time you can reset all the application monitoring statistics to zero. This may be useful during testing.

To clear the application monitoring statistics:

1. Click **Admin > Maintenance > Clear Monitor Stats**.
2. Click **Clear** to clear the application monitoring statistics.

Restoring the WX Factory Default Configuration

You can erase all device configuration information, including compression statistics and network address information, by restoring the factory default configuration. This is useful during testing or when you want to move the device to another location.

NOTE: Restoring the factory default configuration removes all data, configuration information and log files. It also disrupts the adjacencies with this device. Before you restore the factory default configuration, we strongly recommend that you back up the configuration file to another location (see "Saving the WX Configuration" on page 73).

To set the device to the factory default configuration:

1. Click **Admin > Maintenance > Set to Factory Default**.
2. Select the following options, as appropriate:

Preserve IP Address	Preserves the network settings of the bridge interfaces. If you clear this check box, the device will be powered off, and you must have physical access to the device to apply power and do the initial configuration.

Wipe Disk	Erases the disks so the data cannot be restored. Enter the number of passes used to wipe the disks (up to 20). Each pass may take several hours, depending on the amount of data on the disk. We recommend five passes for maximum security. To stop the process, reboot the device. During each pass, a different value is written to each byte on the disks. The first pass uses random numbers, the second pass writes a repeated pattern, the third pass uses zeros, the fourth pass writes another repeated pattern, while the fifth pass repeats the sequence with random numbers, shifted by one byte.

3. Click **Set to Factory Default**. If you elected to wipe the disks, the current pass number and the percent completion of the pass are displayed. After the disks are wiped, the factory defaults are loaded.
4. If you cleared the **Preserve IP Address** check box, the device will be powered off. To restart the device:
   a. Wait until the LCD on the front panel displays the following:

      Factory Default. Power System Off

   b. Unplug the power cable from the back of the device, plug the cable back in, and then specify the IP address, subnet mask, and default gateway for the device (see “Installing WX Devices” on page 9).

Rebooting the WX Device

If you load a new boot image of the JWOS software on a device, you must reboot the device to activate the new software. During a reboot, the selected boot image and the device configuration file (**startup.cfg**) are loaded from flash memory into main memory.

To reboot the WX device:

1. Click **Admin > Maintenance > Reboot**.
2. Verify that the correct version of the JWOS software is shown. To reboot the device using a different version, select the version from the list and click **Submit**.
3. Select one of the following:

Reboot	Performs a standard restart of the device.
Clean Reboot	Restarts the device and clears the compression dictionary used by Network Sequence Caching.

Using Maintenance Tools

The following topics describe how to use the maintenance tools through the Web interface:

- Using the WX Ping Utility on page 78
- Using the WX Traceroute Utility on page 78

Using the WX Ping Utility

You can use the ping utility to verify connectivity with remote WX devices, or other network devices.

To use the ping utility:

1. Click **Admin > Tools > Ping**.
2. Enter the IP address of a network device.
3. Optionally, enter the size of each ping packet (8 to 4068 bytes), and the number of packets to be sent (1 to 50).
4. Click **Submit** to ping the device. The results are shown in the Web interface, including the round-trip time of each packet (in milliseconds).

   For example:

   ```
   PING 10.87.77.20 (10.87.77.20): 32 data bytes
   40 bytes from 10.87.77.20: icmp_seq=0 ttl=63 time=0.435 ms
   40 bytes from 10.87.77.20: icmp_seq=1 ttl=63 time=0.251 ms
   40 bytes from 10.87.77.20: icmp_seq=2 ttl=63 time=0.272 ms


   --- 10.87.77.20 ping statistics ---
   3 packets transmitted, 3 packets received, 0% packet loss
   round-trip min/avg/max/stddev = 0.251/0.319/0.435/0.082 ms
   ```

Using the WX Traceroute Utility

You can use the traceroute utility to determine the number of router hops in the network path between the WX device and another remote network device. This tool can help you determine the point in your network that may be causing a connection failure.

To use the traceroute utility:

1. Click **Admin > Tools > Traceroute**.
2. Enter the IP address of the destination device, and the maximum number of router hops (1 to 30).
3. Click **Submit**. The results are displayed in the Web interface, including the IP address of each device in the path, and the round-trip time (in milliseconds) of each of the three packets sent to identify each hop. For example:

   ```
   1 192.168.53.130 2 ms 0 ms 0 ms
     2 192.168.53.70 2 ms 2 ms 4 ms
     3 192.168.53.1 0 ms 2 ms 2 ms
   ```

4 192.168.52.15 2 ms 2 ms 2 ms
5 192.168.0.127 2 ms 2 ms 2 ms

Using the WX Packet Capture Utility

The packet capture utility lets you capture raw network data from a Local or Remote interface on the WX device. The packet capture information can then be exported to a file and analyzed by a protocol analyzer program or other hardware. The packet capture's file format is either **libpcap** or **snoop**. Note that the packet capture criteria can be populated from the Flow Diagnostics page (see "Viewing WX Flow Diagnostics" on page 81).

To use the packet capture utility:

1. Click **Admin > Tools > Packet Capture**.
2. Specify the following information:

Interface	Select a Local or Remote interface where you want to capture packets. The name format is **fe-** or **ge-** *slot/pair* **/0** for Local interfaces and **fe-** or **ge-** *slot/pair* **/1** for Remote interfaces.
Size	Enter the number of bytes to be captured (minimum is 4096). Execution stops when the specified number of bytes are captured.
Maximum Packets	Limit the capture to a maximum number of packets by selecting the second option and entering the number of packets.
Snap Length	Enter the maximum number of bytes captured for each packet (1 to 65535). The default is 1514. Select **All** to capture the entire packet.
Filter	Optionally, select **On** to limit the packet capture to any combination of the following: • Enter a source and/or destination IP address and port number • Select **TCP** or **UDP** from the IP Protocol list, or select **Enter** and enter a protocol number (0 to 255) • Select one or more TCP flags (applied only to TCP traffic) To populate the filter settings from a current traffic flow, see "Viewing WX Flow Diagnostics" on page 81.
Storage Format	Select the format of the captured data (**libpcap** or **snoop**). The default filename is **pkgdump.dmp**.
Delete After	Enter the number of hours that the packet capture file is retained (1 to 168).

3. Click **Start** to start the packet capture. The status is displayed on the left side of the page. Click **Stop** at any time to stop the capture.
4. Click **Save** to save the packet capture, and specify a filename and location.
5. Click **Delete** to manually delete the packet capture file. You cannot run another packet capture until the previous one is deleted.

Viewing and Saving WX System Logs

The system log files can be displayed in the Web interface or downloaded to a local machine for use by third-party applications. If your network has dedicated syslog servers, you can configure the WX device to send log messages to up to five syslog servers, as described in “Configuring WX for Syslog Reporting” on page 34.

To view or download system log files:

1. Click **Admin > Tools > Display System Log** to view the system log file. The current system log is displayed in the Web interface. The most recent entries are displayed last.
2. Click **Save System Log** in the navigation pane to download a system log file for a specific time period.

   The **wxoutput** file contains the most recent data. Each time **wxoutput** reaches 1 MB in size, it is saved as **wxoutput1**, and the existing log files are renumbered up to **wxoutput10** (older log files are discarded). The First entry time column shows the oldest entry in each log file.
3. Click the name of the log file you want to save, click **Save**, and specify a filename and location.

Viewing and Saving the WX Access Control Log

The access control log shows the username, date, and time of each user who accessed the WX in the past five days. The access method is shown as SSH (CLI access), HTTPS (Web access), or CONSOLE (direct access). The workstation IP address is included for SSH and HTTPS.

NOTE: The access log has six files. Viewing or saving the access log concatenates the data from all the files.

To view or download an access control log file:

1. Click **Admin > Tools > Display Access Control Log** to display the access control log. The most recent entries are displayed last.
2. Click **Save Access Control Log** in the navigation pane to download the access control log. Click the name of the log file you want to save, click **Save**, and specify a filename and location.

Exporting WX Performance Data

You can export the performance data for all time periods to a file in comma-separated variable (CSV) format. The CSV file can then be imported into a spreadsheet program (such as Microsoft Excel) or other data evaluation program. The performance data is similar to the data displayed in the Monitor page of the Web interface (see “Viewing WX Monitoring Reports” on page 49).

To export performance data to CSV format:

1. Click **Admin > Tools > Export Data**.
2. Select **All (ZIP format)** to export the data for all time periods as a **.zip** file. If you cannot open a **.zip** file (some browser versions cannot), select **All (CSV format)**.

   See "Performance Statistics Export" on page 99 for a description of the CSV data file.
3. Click **Submit**, and then click **Save** and specify a filename and location.

Creating a WX Diagnostic File

If you experience problems with a WX device, you can generate a diagnostic file to send to Technical Support. The diagnostic file contains current configuration, filter settings, system information, and the most recent log files. After you generate and save the diagnostic file, email it to support@juniper.net.

To create and send a diagnostic file to Technical Support:

1. Click **Admin > Tools > Diagnostic File**.
2. Click **Submit** to generate the diagnostic file, and then click **Save** and specify a filename and location.
3. Email the diagnostic file as an attachment to support@juniper.net. A support representative will contact you.

Viewing WX Flow Diagnostics

You can view diagnostic details for up to 50 of the most recently started active traffic flows. You can also initiate a packet capture for a specific flow, and download the top 50 flows to a file in CSV format (for a description of the exported diagnostics, see "Flow Diagnostics Export" on page 103).

NOTE: A flow constitutes data sent and/or received from a single source IP address and port number, to a single destination IP address and port number over the same protocol.

To view the flow diagnostics:

1. Click **Admin > Tools > Flow Diagnostics**.
2. Click **Download** to export the diagnostics for the 50 most recent traffic flows to a file in CSV format, and then click **Save** and specify a filename and location.
3. Click **Go** to view the top 50 most recent traffic flows.

4. Specify any of the following information to view specific traffic flows, and click **Go**.

Source Subnet	Enter a subnet to view just the traffic flows from that subnet. The format is: ***IP address/subnet mask*** The subnet mask indicates the number of bits used for the network portion of the address (such as 10.10.20.0/24).
Source Port	Enter the source port number of the flows you want to view. An asterisk indicates any port. For a list of common application ports, see: **http://www.iana.org/assignments/port-numbers**
Destination Subnet	Enter a subnet to view just the traffic flows sent to that subnet. The format is: ***IP address/subnet mask*** The subnet mask indicates the number of bits used for the network portion of the address (such as 10.10.20.0/24).
Destination Port	Enter the destination port number of the flows you want to view. An asterisk indicates any port.
Application	Select an application to view just the traffic flows for the selected application (the default is **All**).
Protocol	Select an application protocol or select **Any** to indicate TCP or UDP. You can also type in a protocol number (0 to 134).
Show reg. port names	Click the check box to view the registered names for all ports. Clear the check box to view the names only for port numbers up to 1024.
Show domain names	Click the check box to view the domain names for each IP address. To specify the DNS servers to be queried, see “Configuring the WX Domain Name” on page 29. The IP address is displayed if its domain name cannot be resolved (the DNS queries may take a few seconds).

5. Click the arrow icon next to a flow to open the Packet Capture page with the filtering criteria for the traffic flow.
6. Click the magnifier icon next to a flow to view a summary of the diagnostic details for the traffic flow. The summary details are grouped into the following sections:
   - General Flow
   - TCP Acceleration
   - Application Acceleration
   - CIFS
   - Network Sequence Caching

7. Click the **Auto Refresh** check box to update the summary every five seconds.
8. Click **Show details** next to a section name to view more details related to the section. Refer to "Flow Diagnostics Export" on page 103 for a description of the flow details provided.

Troubleshooting WX Passthrough Mode

The following sections describe how to correct a condition where all traffic is passed through the WX device without any processing:

Detecting WX Passthrough Mode

During normal operation, some traffic (such as non-TCP traffic) is passed through the WX device without any processing. However, some hardware and software errors can cause a WX device to enter passthrough mode where all traffic is passed through.

To determine whether the WX is in passthrough mode:

1. Try to log in to the WX web interface by entering the IP address of the bridge interface in the browser. You can also use the IP address of the management interface, if configured.

   https://*IP address*

2. If you can log in, and one of the messages in Table 7 on page 83 is displayed in the banner, see "Using the WX Web Interface to Recover from Passthrough Mode" on page 84. If the login fails, see "Using the WX Console to Recover from Passthrough Mode" on page 84.

Table 7: Passthrough Error Messages

Error Message	Description
HW-Passthru: Mgmtd	The management process is down. In this case you cannot log in to the web interface, so this message is displayed only on the WX console.
HW-Passthru: Netd	The network manager is down.
HW-Passthru: IfMgrd	The interface manager is down.
HW-Passthru: DiskMgrd	The disk drive manager is down.
SW-Passthru: SvcP	The services processor is down.

Table 7: Passthrough Error Messages *(continued)*

Error Message	Description
SW-Passthru: MonAgtProcess	The monitoring agent is down. In this case, monitoring reports and some SNMP data will not be available while the device is in passthrough mode.
SW-Passthru: WxTimer	The WX timer process is down.
SW-Passthru: br-0/0 is down	The bridge interface is down. This can occur if the interface is disabled manually, configured incorrectly, or missing any required static routes.

Using the WX Web Interface to Recover from Passthrough Mode

1. If the message displayed is **SW-Passthru: br-0/0 is down**, do the following:

   a. Select **Setup > Bridge Interfaces > br-0/0** and verify that the IP address, subnet mask, and default gateway address are correct. Make any necessary changes, and click **Submit**.

   b. If the status of the Local or Remote interface is down, verify the physical connections to the network. Note that in off-path deployments, only the Local interface is connected.

   c. Select **Local Routes** and verify that the appropriate static routes are defined. Add any necessary static routes, and click **Submit**.

   If the problem persists, contact Technical Support.

2. For all other passthrough messages, use the following procedure to collect the diagnostic information for Technical Support.

   a. Select **Admin > Tools > Diagnostic file**, click **Download**, and save the file.

   b. If you cannot download the diagnostic file, select **Admin > Tools > Display System Log** and copy the displayed log entries to a file. Also, select **Admin > Display Configuration** and copy the device configuration to a file.

3. After you collect the diagnostic information, try rebooting the device:

   a. Select **Admin > Reboot**, select the alternate JWOS software image (if you have one), click **Submit**, and then click **Reboot**.

   b. If the problem persists, check whether a JWOS upgrade is available, and upgrade the device to the new version.

   c. If the above steps fail, try rebooting from the JWOS Safe OS as described in “Using the WX Console to Recover from Passthrough Mode” on page 84.

Using the WX Console to Recover from Passthrough Mode

For more information about the CLI commands used in the following procedure, see the *JWOS Command Reference Guide*.

1. Log in as the **admin** user on a terminal connected to the WX console port. If the device is in passthrough mode, one of the messages in Table 7 on page 83 is displayed. If the login fails, contact Technical Support.
2. Execute the following commands and collect the output for Technical Support:
   - **show system**
   - **show interfaces br-0/0 extensive**
   - **show log**
   - **show boot**
   - **show disks**
   - **show flow-stats**
3. After you collect the diagnostic information, try rebooting the device. If you have an alternate JWOS software image, specify the alternate partition (**A** or **B**):

   config set boot *partition*
   request system reboot
4. If the problem persists, check whether a JWOS upgrade is available, and upgrade the device to the new version:
   a. Before loading the JWOS upgrade, reboot the device using the JWOS Safe OS:

      config set boot safe
      request system reboot

   b. When the **(none)safe>** prompt is displayed, load the JWOS upgrade and reboot:

      request system install *path*
      request system reboot

PART 2

WX Specifications

APPENDIX A

WX Device Specifications

This appendix lists the technical specifications for the WX devices, and the pin-outs for the DB9 console port.

General Specifications for All WXC Platforms

Table 8 on page 89 describes the specifications that apply to all WX platforms.

Table 8: General Specifications for All WXC Platforms

Product Features	Description
Traffic services	Compression, acceleration, application identification and monitoring
Protocols supported	Any IP-based traffic (such as TCP, UDP, GRE, ICMP, and L2TP)
Applications supported	All TCP-based applications, such as Microsoft Office applications, Oracle E-Business Suite, Sharepoint, Microsoft Exchange, Citrix, SAP, and web-based applications
Network Integration	
Installation	In-line between an aggregation switch and edge router, or off the WAN router using policy-based routing
Transparency	Transparent bridge mode operation, configurable DSCP, and IP port transparency
Topology support	Point to point, hub and spoke, full mesh
Adjacency creation	Automatic or manual
Fault tolerant non-stop operation	10/100/1000 Base-T auto switch-to-wire on any power, hardware, or software failure condition
High availability	Automatically fail-to-wire

Table 8: General Specifications for All WXC Platforms *(continued)*

Product Features	Description
Quality of Service (QoS)	
Honor, preserve and/or set ToS/DSCP	Retain settings on received traffic and set ToS/DSCP values for WX control traffic
Application identification	Automatic, based on source/destination IP address/port, ToS/DSCP, IP protocol; follows port hopping applications (FTP, Exchange)
Traffic Acceleration	TCP acceleration, Microsoft CIFS acceleration
Device Management	
SNMP, syslog	SNMPv2c, MIB II, WX Enterprise MIB, and local syslog
Secure remote access	SSHv1, SSHv2, and HTTPS (SSL)
Reports	Device-level reports available through Web interface
Authentication, Authorization, and Accounting	Local user account database
Network upgradeable	Via FTP, HTTP and TFTP; dual software images and configurations
Monitoring	
Compression statistics	Per device, per application, and per destination; both real-time and historical
WAN Performance statistics	Network latency, loss, and availability for SLA monitoring and enforcement
Acceleration	TCP session time and throughput; both real-time and historical
Data export	CSV format
Application reporting	Detail by IP addresses, and/or port numbers, and/or IP protocol, and/or DSCP/ToS value, with greater detail by URL element or application type
Event monitoring	Generate automatic alerts (SNMP traps, console) for system events
Operating Environment	
Temperature	41º to 104º F (5º to 40º C)
Relative humidity	10% to 85%, noncondensing at 95º F (35º C)
Maximum altitude	10,000 ft (3048 m)
Nonoperating Environment	

Table 8: General Specifications for All WXC Platforms *(continued)*

Product Features	Description
Temperature	-40º to 158º F (-40º to 70º C)
Relative humidity	10% to 85%, noncondensing at 95º F (35º C)
Maximum altitude	40,000 ft (12,192 m)
Regulations	
Emissions	FCC Class A, EN 55022 Class A, EN 55024 Immunity, EN 61000-3-2, VCCI Class A
Safety	CAN/CSA-C22.2 No. 60950-1-03 - UL 60950-1 and EN 60950-1
Acoustic noise	Maximum noise level is less than 70 dB Maschinenlärminformations-Verordnung - 3. GPSGV, der höchste Schalldruckpegel beträgt 70 dB(A) oder weniger gemäss EN ISO 7779

WXC Family Specifications

Table 9 on page 91 describes the specifications for the disk-based WXC platforms supported by JWOS 6.0.

Table 9: WXC Family Specifications

	WXC590	WXC2600	WXC3400
Performance			
Total compression throughput speed	Up to 10 Mbps	128 Kbps to 8 Mbps	2 Mbps to 45 Mbps
Adjacencies supported (all features enabled)	100	100	250
Concurrent accelerated traffic flows	500	500	1000
Disk capacity	500 GB (two redundant, replaceable 250 GB drives)	250 GB (replaceable)	1 TB (two redundant, replaceable 500 GB drives)
Application definitions	Up to 256	Up to 256	Up to 256
Connections			

Table 9: WXC Family Specifications *(continued)*

	WXC590	WXC2600	WXC3400
Network interfaces	Two copper fail-to-wire 10/100/1000 Ethernet ports	• Two copper fail-to-wire 10/100/1000 Ethernet ports • Console port • High availability port • Management port • USB port • Slot for pluggable bypass interface module (PBIM)	• Two copper fail-to-wire 10/100/1000 Ethernet ports • Console port • High availability port • Management port • USB port • Two PBIM slots
Power			
Power	Dual 100 to 240 VAC, 50 to 60 Hz, 300 W max or 1025 BTU/hr. Designed to work with IT power systems.	100 to 240 VAC, 50 to 60 Hz, 300 W max or 1025 BTU/hr	Dual 100 to 240 VAC, 50 to 60 Hz, 400 W max or 1370 BTU/hr. DC option available. Designed to work with IT power systems.
Dimensions and Weight			
(W x H x D)	17.1 x 3.4 x 16.7 in (43.4 x 8.7 x 42.4 cm) 2 U	17.5 x 1.8 x 14.5 in (44.5 x 4.6 x 36.8 cm) 1 U	17.5 x 3.4 x 18 in (44.5 x 8.6 x 45.7 cm) 2 U
Weight	25 lbs (11.3 kg)	17 lbs (7.7 kg)	30 lbs (13.6 kg)

DB9 Console Port Pin-Outs

Table 10 on page 92 and Table 11 on page 93 list the pin-outs for a null-modem cable used to connect the DB9 console port to a DB9 or DB25 terminal port. Applies to all WX devices.

Table 10: DB9 to DB9 Cable

Console Port	DB9	DB9	Terminal Port
Receive Data	2	3	Transmit Data
Transmit Data	3	2	Receive Data
Data Terminal Ready	4	6+1	Data Set Ready + Carrier Detect
System Ground	5	5	System Ground

Table 10: DB9 to DB9 Cable *(continued)*

Console Port	DB9	DB9	Terminal Port
Data Set Ready + Carrier Detect	6+1	4	Data Terminal Ready
Request to Send	7	8	Clear to Send
Clear to Send	8	7	Request to Send

Table 11: DB9 to DB25 Cable

Console Port	DB9	DB25	Terminal Port
Receive Data	2	2	Transmit Data
Transmit Data	3	3	Receive Data
Data Terminal Ready	4	6+8	Data Set Ready + Carrier Detect
System Ground	5	7	System Ground
Data Set Ready + Carrier Detect	6+1	20	Data Terminal Ready
Request to Send	7	5	Clear to Send
Clear to Send	8	4	Request to Send

APPENDIX B

WX SNMP Traps and Syslog Messages

This appendix describes the SNMP traps and syslog messages for the system events generated by WX devices.

System Events and SNMP Traps

Table 12 on page 95 describes each system event, and provides the SNMP trap name and its associated object ID (OID).

Table 12: System Events and SNMP Traps

Metric Name	Severity	Message	SNMP Trap/OID	Syslog ID
Client Limit Exceeded	Error	**Client Limit Exceeded** Indicates the licensed concurrent connections for WX clients has been exceeded. Contact Juniper Networks to obtain a new license with a higher number of concurrent connections.	jnxWxCommonEventClientLimitExceeded 1.3.6.1.4.1.2636.3.41.1.1.3.0.6	204
Cold Start	Notice	**WX Device is initialized** Indicates the device was restarted.	Cold Start 1.3.6.1.6.3.1.1.5.1	302
Fail Safe Mode Active	Critical	**Put the system in SW bypass** Indicates the device was restarted in safe mode. The device is powered on, but all traffic is passed through without any processing.	jnxWxGrpEventInFailSafeMode 1.3.6.1.4.1.2636.3.41.1.1.3.0.7	301
Interface Duplex Mismatch	Error	**Interface duplex mismatch** Indicates a possible duplex mismatch exists between the Local or Remote interface and the device attached to that interface. The interface is identified in SNMP by jnxWxCommonEventDescr.	jnxWxGrpEventInterfaceDuplexMismatch 1.3.6.1.4.1.2636.3.41.1.1.3.0.10	403

Table 12: System Events and SNMP Traps *(continued)*

Metric Name	Severity	Message	SNMP Trap/OID	Syslog ID
Interface Speed Mode Mismatch	Error	**Speed-duplex mismatch between local and remote interface** Indicates a speed or duplex mismatch between the Local and Remote interface on the WX device.	jnxWxGrpEventInterfaceSpeedMismatch 1.3.6.1.4.1.2636.3.41.1.1.3.0.8	401
Interface Speed Mode Ok	Notice	**Speed matches between local and remote interface** Indicates a previously detected mismatch between the Local and Remote interface is now resolved.	jnxWxGrpEventInterfaceSpeedOk 1.3.6.1.4.1.2636.3.41.1.1.3.0.9	402
LAN Link Down	Information	**Lan Link down** Indicates the Local interface link has failed. Verify that the link state change was not due to a network error.	LAN Link Down 1.3.6.1.6.3.1.1.5.4	502
LAN Link Up	Notice	**Lan Link up** The Local interface link has been established.	LAN Link Up 1.3.6.1.6.3.1.1.5.3	501
License Expired	Error	**Evaluation License expired** Indicates the temporary license has expired. Contact Juniper Networks for a permanent license.	jnxWxGrpEventLicenseExpired 1.3.6.1.4.1.2636.3.41.1.1.3.0.5	203
License Will Expire	Information	**License will expire soon** Indicates the temporary license will expire soon. Contact Juniper Networks to obtain a permanent license.	jnxWxGrpEventLicenseWillExpire 1.3.6.1.4.1.2636.3.41.1.1.3.0.3	201
Login Failure	Error	**Login failed: access=*method* user=*name*** Indicates an attempt to log in has failed. The access method is **Web**, **SSH**, or **Console**.	jnxWxGrpEventLoginFailure 1.3.6.1.4.1.2636.3.41.1.1.3.0.11	601
Management Config Save Failure	Error	**Management Config save failure** Indicates an attempt to save the configuration has failed.	None	702
Management Startup Config Saved	Notice	**Management startup config saved** Indicates the startup configuration was saved successfully.	None	701

Table 12: System Events and SNMP Traps *(continued)*

Metric Name	Severity	Message	SNMP Trap/OID	Syslog ID
Power Supply Failure	Error	**Power supply failure** Indicates one or more sources of power to the system has failed. A redundant power supply has presumably taken over.	jnxWxGrpEventPowerSupplyFailure 1.3.6.1.4.1.2636.3.41.1.1.3.0.1	101
Power Supply Ok	Notice	**Power supply Ok** Indicates one or more previously failed sources of power is now working normally. The system returned to normal without being restarted.	jnxWxGrpEventPowerSupplyOk 1.3.6.1.4.1.2636.3.41.1.1.3.0.2	102
Security Login Success	Notice	**Login ok: access=*method* user=*name*** Indicates a user logged in successfully. The access method is **Web**, **SSH**, or **Console**.	None	602
WAN Link Down	Information	**WAN Link down** Indicates the Remote interface link has failed. Verify that the link state change was not due to a network error.	WAN Link Down 1.3.6.1.6.3.1.1.5.4	504
WAN Link Up	Notice	**WAN Link up** Indicates the Remote interface link has been established.	WAN Link Up 1.3.6.1.6.3.1.1.5.3	503

WX Syslog Message Format

The WX syslog message format is based on the syslog-19 standard. For more information about syslog-19, go to **http://tools.ietf.org/html/draft-ietf-syslog-protocol-19**. Each message consists of a header, structured data enclosed in brackets, and the text of the message. The header contains the date, time, and IP address of the WX device that sent the message, followed by "1 - - Juniper-WX", a WX module name, and the event ID from Table 12 on page 95. In the following example, the module name is **authentication**:

```
Feb 13 17:34:48 10.88.16.34 1 - - Juniper-WX authentication 0601
[wx-event@juniper.net eventtime="1234730471" metric="Login Failure" sev="error"
type="sys" devid="164584745349120"] Login failed: access=Web user=admin
```

Note that the structured data starts with **wx-event@juniper.net**, followed by the event time, and the metric name and severity level from Table 12 on page 95. All messages are for events of type **sys**. The **devid=** value is used only by WX CMS.

APPENDIX C

WX Exported Data

This appendix describes the traffic data that can be exported by a WX device.

Performance Statistics Export

The following topics describe the performance data that can be exported in CSV format (see “Exporting WX Performance Data” on page 80).

General Device Information

Table 13 on page 99 describes the exported general device information.

Table 13: General Device Information

Parameter	Description
Device IP	IP address of the WX device.
Software version	Version of JWOS software that was running when the statistics were exported.
Serial number	Serial number of the WX device that exported the statistics.
License speed	Licensed speed of the WX device.
Operation mode	Indicates whether the device is active (Inline).
Monitored applications	Names of the applications being monitored for reports.

Data Section Information

Table 14 on page 100 describes the data section information that precedes the set of statistic tables for each exported time range.

Table 14: Data Section Information

Parameter	Description
time data section	Indicates one of the following time ranges for the statistics tables that follow: • This hour • Last hour • Today • Yesterday • This week • Last week
device local time=	Local date and time of the export.
gmt_time=	Date and time of the export in Greenwich Mean Time (GMT).

System Session Statistics

Table 15 on page 100 describes the exported system session statistics.

Table 15: System Session Statistics

Parameter	Description
startTime	Start time for statistics generation in GMT (number of minutes since January 1, 1970).
ptAppDefMatchBytes	Number of bytes passed through due to application policy.
ptAppDefMatchPkts	Number of packets passed through due to application policy.
ptNoRemoteWxBytes	Number of bytes passed through due to no remote WX.
ptNoRemoteWxPkts	Number of packets passed through due to no remote WX.
ptNonTcpProtoBytes	Number of non-TCP bytes passed through.
ptNonTcpProtoPkts	Number of non-TCP packets passed through.
ptNonIpBytes	Number of non-IP bytes passed through (such as IPX).
ptNonIpPkts	Number of non-IP packets passed through.
ptFragIpBytes	Number of bytes of IP fragments passed through.
ptFragIpPkts	Number of packets of IP fragments passed through.

Table 15: System Session Statistics *(continued)*

Parameter	Description
ptVlanBytes	Number of bytes of VLAN traffic passed through.
ptVlanPkts	Number of packets of VLAN traffic passed through.
ptMcastBytes	Number of Layer 2 Multicast bytes passed through.
ptMcastPkts	Number of Layer 2 Multicast packets passed through.
compFailAppDefDisableBytes	Number of bytes not compressed due to application policy.
compFailAppDefDisablePkts	Number of packets not compressed due to application policy.
compFailTcpAcclToRemoteBytes	Number of bytes not compressed because TCP acceleration to remote is disabled.
compFailTcpAcclToRemotePkts	Number of packets not compressed because TCP acceleration to remote is disabled.
compFailResCrunchBytes	Number of bytes not compressed due to device buffer overflow.
compFailAlgoLimitBytes	Number of bytes not compressed due to device buffer overflow algorithmic limitation.
compTcpAccFailedBytes	Number of bytes not compressed because local TCP acceleration is disabled.
compTcpAccFailedPkts	Number of packets not compressed because local TCP acceleration is disabled.
cifsFailAppDefBytes	Number of CIFS bytes not accelerated due to application policy.
cifsFailAppDefPkts	Number of CIFS packets not accelerated due to application policy.
cifsFailTcpAcclToRemoteBytes	Number of CIFS bytes not accelerated because TCP acceleration to remote is disabled.
cifsFailTcpAcclToRemotePkts	Number of CIFS packets not accelerated because TCP acceleration to remote is disabled.
cifsFailTcpAcclFailedBytes	Number of CIFS bytes not accelerated because TCP acceleration to remote failed.
cifsFailTcpAcclFailedPkts	Number of CIFS packets not accelerated because TCP acceleration to remote failed.

Compression Statistics

Table 16 on page 101 describes the exported compression statistics for each session.

Table 16: Compression Session Statistics

Parameter	Description
startTime	Start time for statistics generation.
appName	Name of the application.

Table 16: Compression Session Statistics *(continued)*

Parameter	Description
hostName	Name of the remote WX endpoint.
remoteWXId	Internal ID of the remote WX endpoint.
remoteWX Mac Address	Hardware address of the remote WX endpoint.
bytesIn	Number of bytes into the compression engine.
bytesOut	Number of compressed bytes sent to the remote WX endpoint.
cachesHit	Number of lookups in the compression dictionary that were successful.
cachesMiss	Number of lookups in the compression dictionary that were unsuccessful.

WAN Performance Statistics

Table 17 on page 102 describes the exported WAN performance statistics.

Table 17: WAN Performance StatisticsTable 17:

Parameter	Description
startTime	Start time for statistics generation.
appName	Name of the application.
hostName	Name of the remote WX endpoint.
remoteWXId	Internal ID of the remote WX endpoint.
remoteWX Mac Address	Hardware address of the remote WX endpoint.
bytesToWan	Number of bytes sent to the WAN for the remote WX endpoint and application.
bytesFromWan	Number of bytes received from the WAN for the remote WX endpoint and application.
proxyBytesToWan	Number of bytes sent to the WAN using TCP acceleration.

TCP Flow Statistics

Table 17 on page 102 describes the exported TCP traffic flow statistics.

Table 18: TCP Flow Statistics

Parameter	Description
startTime	Start time for statistics generation.

Table 18: TCP Flow Statistics *(continued)*

Parameter	Description
appName	Name of the application.
hostName	Name of the remote WX endpoint.
remoteWXId	Internal ID of the remote WX endpoint.
remoteWX Mac Address	Hardware address of the remote WX endpoint.
ptFlowCountAvg	Average number of flows that are passed through without being proxied (no TCP acceleration).
proxyFlowCountAvg	Average number of flows that are currently being proxied.
ptFlowCountDiff	Number of flows that were passed through in the last 10 seconds.
proxyRequestCountDiff	Number of proxy flow requests received in the last 10 seconds.
proxyFlowCountDiff	Number of flows proxied in the last 10 seconds.
failedToProxyCountDiff	Number of flows that could not be proxied for any reason in the last 10 seconds.

Flow Diagnostics Export

Table 19 on page 103 describes the flow diagnostics data exported to the **flowdiag.csv** file.

Table 19: Flow Diagnostics

Parameter	Description
SrcIp	IP address of the flow source.
SrcPort	Source port number.
DstIp	IP address of the flow destination.
DstPort	Destination port number.
Application	Traffic flow application name.
Proto	Traffic flow protocol (TCP, UDP, or protocol number).
Start Time	Date and time the flow started.
Last Active	Date and time of the last flow activity.
General Flow	

Table 19: Flow Diagnostics *(continued)*

Parameter	Description
Proxy Mode On Box	TCP acceleration mode (Opaque).
Proxy Mode Mismatch	TCP acceleration mode configured differently on remote WX (TRUE or FALSE).
Configured CIFS	CIFS acceleration is enabled locally (TRUE or FALSE).
Configured NSC	NSC compression is enabled locally (TRUE or FALSE).
Actual MAPI	Exchange acceleration is applied (FALSE).
Actual CIFS	CIFS acceleration is applied (TRUE or FALSE).
Actual NSC	NSC compression is applied (TRUE or FALSE).
Should Be Proxied	TCP acceleration should be applied based on local and remote configuration (TRUE or FALSE).
Proxied	TCP acceleration is applied (TRUE or FALSE).
Total Packets Sent	Number of packets sent for proxied flows.
Total Packets Rcvd	Number of packets received for proxied flows.
Total Bytes Received from WAN	Number of bytes received from the WAN for proxied flows.
Total Bytes Sent to WAN	Number of bytes sent to the WAN for proxied flows.
Packets Diff Sent to LAN	Difference between total packets sent to LAN and number of packets sent for proxied flows.
Packets Diff Received from LAN	Difference between total packets received from LAN and number of packets received for proxied flows.
Packets Diff Sent to WAN	Difference between total packets sent to WAN and number of packets sent for proxied flows.
Packets Diff Received from WAN	Difference between total packets received from WAN and number of packets received for proxied flows.
Total Pass Through Packets	Number of packets for all flows that are passed through.
Total Pass Through Bytes	Number of bytes for all flows that are passed through.
Flow Start Time	Date and time the flow started.
Last Time Packet Sent	Date and time of last packet sent for a proxied flow.
Last Time Packet Received	Date and time of last packet received for or proxied flow.
TCP Acceleration	

Table 19: Flow Diagnostics *(continued)*

Parameter	Description
Number of Reads At PSI Layer	Number of read operations for peer socket information (PSI).
Number of Writes At PSI Layer	Number of write operations of peer socket information.
Generic PSI Layer State	State of peer socket.
PSI Socket Eagain Counter	Number of timeouts that occurred while waiting to receive data.
Last PSI Socket Error Number	Last PSI socket error.
Socket fd	Socket file descriptor (negative value indicates an error).
Initial sequence number	First sequence number in the traffic flow.
Initial syn-ack number	Sequence number of the SYN-ACK packet.
Number of SYNs seen	Number of SYN packets seen.
Number of SYN-ACKs seen	Number of SYN-ACK packets seen.
Options In SYN	Options specified in the SYN packet.
Options Supported	Options supported by the local WX device.
SACK supported	Options supported in the SYN-ACK packet.
Write window size	Size of the TCP write window, in bytes.
Read window size	Size of the TCP read window, in bytes.
TCP bytes recvd	Number of bytes received.
TCP bytes sent	Number of bytes sent.
TCP connection state	Status of TCP connection.
FIN received	The FIN packet was received (TRUE or FALSE).
Which side received FIN	The WX device that received the FIN packet (local or remote).
Has bidirectional FIN received	The FIN packet was received by both local and remote devices (TRUE or FALSE).
Was RST received	The RST packet was received (TRUE or FALSE).

Table 19: Flow Diagnostics *(continued)*

Parameter	Description
Last socket error	Last socket error.
Last RTT	Last round-trip time, in milliseconds.
Best RTT	Lowest round-trip time measured.
Largest send window	Largest TCP send window, in bytes.
LAN packets transmitted	Number of packets sent to the LAN.
LAN duplicates acks received	Number of duplicate acknowledgements received from the LAN.
WAN packets transmitted	Number of packets sent to the WAN.
WAN duplicates acks received	Number of duplicate acknowledgements received from the WAN.
Application Acceleration	
Protocol accelerated	Name of the accelerated application (CIFS)
AAP sync version	The version of protocol acceleration.
Flow initialized	The flow has been initialized (TRUE or FALSE).
Hard quits	Number of flows ended by the application.
Soft quits	Number of flows where the application disabled acceleration.
Unknown quits	Number of flows where an unknown agent disabled acceleration.
Bytes to server	Number of bytes sent to the application server.
Bytes from server	Number of bytes received from the application server.
PDUs to server	Number of protocol data units (PDUs) sent to the application server.
PDUs from server	Number of PDUs received from the application server.
Bytes to client	Number of bytes sent to the client.
Bytes from client	Number of bytes received from the client.
PDUs to client	Number of PDUs sent to the client.
PDUs from client	Number of PDUs received from the client.

Table 19: Flow Diagnostics *(continued)*

Parameter	Description
AAP state	The flow is being accelerated now (TRUE or FALSE).
Present AAP PDU size	Number of bytes per PDU.
CIFS	
Accl Reads	Number of accelerated read requests.
Total Reads	Total number of read requests.
Accl Writes	Number of accelerated write requests.
Total Writes	Total number of write requests.
Total Trans2 Count	Total number of Trans2 packets.
Free Disk Space Positive	Number of times the WX determined that the server had enough disk space to satisfy a write request or a Trans2/SetEndOfFile request. These requests are accelerated.
Free Disk Space Negative	Number of times the server did not have enough disk space to satisfy a write request or a Trans2/SetEndOfFile request. These requests are not accelerated.
Free Disk Space Stale	Number of times write or Trans2/SetEndOfFile requests were not accelerated because the server's disk space information on the WX was out of date.
Free Disk Space Unavailable	Number of times write or Trans2/SetEndOfFile requests were not accelerated because the server's disk space information was unavailable.
Prefetch Reuse OK	When a file is closed, the read prefetch data for the file is kept for potential reuse. This counter is the number of times the prefetch data was found to be eligible for reuse.
Prefetch Reuse Not OK	Number of times the prefetch data was not eligible for reuse.
Whole File Prefetches	Number of times an entire file was prefetched for read acceleration.
Whole File Prefetch Alloc Failed	A file prefetch failed (TRUE or FALSE).
MID Table Full	The table of Multiplex IDs used to track CIFS requests became full at least once (TRUE or FALSE).
Write Update Error (Prefetch Buffer)	Indicates whether an update error occurred when an accelerated write overlaps with a read prefetch, and the write data is used to update the read prefetch data (TRUE or FALSE).
Close Accl Failure	Indicates whether an accelerated Close failed on the server (TRUE or FALSE).
Write Through on File Open	Indicates whether a file open operation writes the file directly to disk, rather than to a cache in memory (TRUE or FALSE).

Table 19: Flow Diagnostics *(continued)*

Parameter	Description
Write Through On Write	Indicates whether file open operations were written directly to disk, rather than cached in memory (TRUE or FALSE). These write operations are not accelerated.
Send Buffer Alloc Failed	Indicates whether the allocation of a send buffer failed (TRUE or FALSE).
Network Sequence Caching	
Bytes to WAN	Number of compressed bytes sent to the WAN.
Bytes from WAN	Number of compressed bytes received from the WAN.
Bytes to LAN	Number of uncompressed bytes sent to the LAN.
Bytes from LAN	Number of uncompressed bytes received from the LAN.
Number of cache hits to WAN	Number of successful lookups in the compression dictionary for traffic sent to the WAN.
Number of cache hits from WAN	Number of successful lookups in the compression dictionary for traffic received from the WAN.
Number of cache misses to WAN	Number of unsuccessful lookups in the compression dictionary for traffic sent to the WAN.
Number of cache misses from WAN	Number of unsuccessful lookups in the compression dictionary for traffic received from the WAN.

APPENDIX D

WX Certifications

Table 20 on page 109 lists the certifications for the supported WX devices.

Table 20: Certifications for WX Devices

Description	WXC590	WXC2600 WXC3400
Safety Standards		
CSA 60950-1 (2003)	X	X
UL 60950-1 (2003)	X	X
EN 60950-1 (2001)	X	X
IEC 60950-1 (2001)		X
EN 60825-1 +A1+A2 (1994)		X
EN 60825-2 (2000)		X
Conformity for EMC and EMI		
EN 300 386 V1.3.3 (2005)		X
FCC Part 15 Class A	X	X
EN 55022 Class A	X	X
VCCI Class A (2007)		X
Immunity		
EN 55024 +A1+A2	X	X
EN 61000-3-2	X	X
EN 61000-3-3 +A1+A2+A3	X	X

Table 20: Certifications for WX Devices *(continued)*

Description	WXC590	WXC2600 WXC3400
EN-61000-4-2 +A1 +A2		X
EN-61000-4-3 +A1 +A2		X
EN-61000-4-4 (2004)		X
EN-61000-4-5 (2006)		X
EN-61000-4-6 (2007)		X
EN-61000-4-11 (2004)		X
Gost	X	

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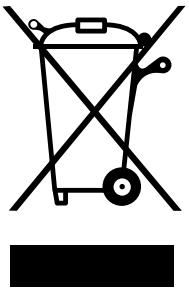
These directives and other similar regulations from countries outside the European Union regulate electronic waste management and the reduction or elimination of specific hazardous materials in electronic products. The WEEE Directive requires electrical and electronics manufacturers to provide mechanisms for the recycling and reuse of their products. The RoHS Directive restricts the use of certain substances that are commonly found in electronic products today. Restricted substances include heavy metals, including lead, and polybrominated materials. The RoHS Directive, with some exemptions, applies to all electrical and electronic equipment.

In accordance with Article 11(2) of Directive 2002/96/EC (WEEE), products put on the market after 13 August 2005 are marked with the following symbol or include it in their documentation: a crossed-out wheeled waste bin with a bar beneath.



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http://www.juniper.net/environmental, and indicate the type of Juniper Networks equipment that you wish to dispose of and the country where it is currently located, or contact your Juniper Networks account representative.

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APPENDIX E

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