

# **Operating Juniper Networks Routers in the Enterprise**

---

8.a

***Detailed Lab Guide***



1194 North Mathilda Avenue  
Sunnyvale, CA 94089  
USA  
408-745-2000  
[www.juniper.net](http://www.juniper.net)

Course Number: EDU-JUN-OJRE

Juniper Networks, the Juniper Networks logo, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. JUNOS and JUNOSe are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks are the property of their respective owners.

*Operating Juniper Networks Routers in the Enterprise Detailed Lab Guide, Revision 8.a*

Copyright © 2007, Juniper Networks, Inc.

All rights reserved. Printed in USA.

Revision History:

Revision 8.a—March 2007

The information in this document is current as of the date listed above.

The information in this document has been carefully verified and is believed to be accurate for software Release 8.1R2. Juniper Networks assumes no responsibilities for any inaccuracies that may appear in this document. In no event will Juniper Networks be liable for direct, indirect, special, exemplary, incidental or consequential damages resulting from any defect or omission in this document, even if advised of the possibility of such damages.

Juniper Networks reserves the right to change, modify, transfer or otherwise revise this publication without notice.

#### YEAR 2000 NOTICE

Juniper Networks hardware and software products do not suffer from Year 2000 problems and hence are Year 2000 compliant. The JUNOS software has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

#### SOFTWARE LICENSE

The terms and conditions for using this software are described in the software license contained in the acknowledgment to your purchase order or, to the extent applicable, to any reseller agreement or end-user purchase agreement executed between you and Juniper Networks. By using this software, you indicate that you understand and agree to be bound by those terms and conditions.

Generally speaking, the software license restricts the manner in which you are permitted to use the software and may contain prohibitions against certain uses. The software license may state conditions under which the license is automatically terminated. You should consult the license for further details.

# Contents

---

<b>Lab 1:</b>	<b>J-series User Interface Options (Detailed)</b> .....	<b>1-1</b>
	Part 1: Log In to J-Web .....	1-2
	Part 2: Explore J-Web Monitoring Capabilities .....	1-3
	Part 3: Explore J-Web Configuration and Diagnostic Capabilities .....	1-10
	Part 4: Log In Using the CLI .....	1-21
	Part 5: Experiment with the CLI's Operational and Configuration Modes .....	1-21
<b>Lab 2:</b>	<b>Initial System Configuration (Detailed)</b> .....	<b>2-1</b>
	Part 1: Invoke Autoinstallation and Confirm Results .....	2-2
	Part 2: Load a Factory-Default Configuration .....	2-9
	Part 3: Perform Initial Configuration Using J-Web .....	2-12
	Part 4: Perform Initial Configuration Using the CLI (Optional) .....	2-22
<b>Lab 3:</b>	<b>Operational Monitoring and Maintenance (Detailed)</b> .....	<b>3-1</b>
	Part 1: Reload and Commit the Previous J-Web Configuration .....	3-2
	Part 2: Monitor System and Chassis Operation Using J-Web .....	3-3
	Part 3: Monitor Interface Operation Using J-Web .....	3-9
	Part 4: License Management, File System Maintenance, and Software Upgrades: J-Web ....	3-15
	Part 5: Monitor System and Chassis Operation Using the CLI (Optional) .....	3-27
	Part 6: Monitor Interface Operation Using the CLI (Optional) .....	3-28
	Part 7: License Management, Snapshots, and Software Upgrades: CLI (Optional) .....	3-32
<b>Lab 4:</b>	<b>RIP and OSPF Routing (Detailed)</b> .....	<b>4-1</b>
	Part 1: Reload and Commit Previous J-Web Configuration .....	4-2
	Part 2: Configure and Monitor RIP .....	4-3
	Part 3: Monitor RIP Using the CLI .....	4-9
	Part 4: Configure and Monitor Single-Area OSPF: J-Web .....	4-14
	Part 5: Configure and Monitor Multiarea OSPF Using the CLI (Optional) .....	4-22
<b>Lab 5:</b>	<b>Static and BGP Routing (Detailed)</b> .....	<b>5-1</b>
	Part 1: Reload and Commit the Previous J-Web Configuration .....	5-2
	Part 2: Configure and Monitor Static Routing .....	5-8
	Part 3: Configure and Monitor BGP Routing .....	5-12
<b>Lab 6:</b>	<b>J-series Services (Detailed)</b> .....	<b>6-1</b>
	Part 1: Reload and Commit the Previous J-Web Configuration .....	6-2
	Part 2: Configure Stateful Firewall and NAT .....	6-7
	Part 3: Monitor NAT/Stateful Firewall .....	6-10
	Part 4: Modify Stateful Firewall Configuration .....	6-19
<b>Appendix A: Lab Diagrams</b> .....		<b>A-1</b>

Not For Reproduction

## Course Overview

---

This three-day course is an introductory-level, instructor-led course that focuses on installation, configuration, and operational analysis of Juniper Networks routers in the enterprise environment. OJRE introduces Juniper Networks enterprise routing platforms including both M-series and J-series models. It then focuses on router configuration using both the J-Web graphical user interface (GUI) and the JUNOS software command-line interface (CLI). Real-world configuration and operational monitoring case studies are provided for general router configuration and for RIP, static, and OSPF routing. The class also provides an overview of common services such as IPSec VPNs and stateful firewall/NAT.

The course combines both lecture and labs, with significant time allocated for hands-on experience with J-series platforms and JUNOS Internet software. The OJRE class is an excellent way to prepare students for attending other offerings in the Juniper Networks training curriculum.

### Objectives

After successfully completing this course, you should be able to install, configure, and operate J-series platforms.

### Intended Audience

The primary audiences for this course are end users of J-series platforms, which include the following:

- Network engineers;
- Support personnel;
- Reseller support; and
- Others responsible for implementing Juniper enterprise routing products.

### Course Level

OJRE is an introductory-level course.

### Prerequisites

The OJRE prerequisite is a basic understanding of the TCP/IP protocols.

While not required, familiarity with the command-line interface of a routing platform or UNIX system is helpful.

## Course Agenda

---

### Day 1

- Lab 1: J-series User Interface Options (Detailed)
- Lab 2: Initial System Configuration (Detailed)

### Day 2

- Lab 3: Operational Monitoring and Maintenance (Detailed)
- Lab 4: RIP and OSPF Routing (Detailed)
- Lab 5: Static and BGP Routing (Detailed)

### Day 3

- Lab 6: J-series Services (Detailed)

Not For Reproduction

## Document Conventions

---

### CLI and GUI Text

Frequently throughout this course, we refer to text that appears in a command-line interface (CLI) or a graphical user interface (GUI). To make the language of these documents easier to read, we distinguish GUI and CLI text from chapter text according to the following table.

Style	Description	Usage Example
Franklin Gothic	Normal text.	Most of what you read in the Lab Guide and Student Guide.
Courier New	Console text: <ul style="list-style-type: none"><li>• Screen captures</li><li>• Noncommand-related syntax</li></ul>	<code>commit complete</code> <code>Exiting configuration mode</code>
Century Gothic	GUI text elements: <ul style="list-style-type: none"><li>• Menu names</li><li>• Text field entry</li></ul>	Select File > Open, and then click Configuration.conf in the Filename text box.

### Input Text Versus Output Text

You will also frequently see cases where you must enter input text yourself. Often this will be shown in the context of where you must enter it. We use bold style to distinguish text that is input versus text that is simply displayed.

Style	Description	Usage Example
Normal CLI	No distinguishing variant.	Physical interface:fxp0 , Enabled
Normal GUI		View configuration history by clicking Configuration > History.
<b>CLI Input</b> <b>GUI Input</b>	Text that you must enter.	lab@San_Jose> <b>show route</b> Select File > Save, and enter <b>config.ini</b> in the Filename field.

## Defined and Undefined Syntax Variables

Finally, this course distinguishes between regular text and syntax variables, and it also distinguishes between syntax variables where the value is already assigned (defined variables) and syntax variables where you must assign the value (undefined variables). Note that these styles can be combined with the input style as well.

Style	Description	Usage Example
<i>CLI Variable</i>	Text where variable value is already assigned.	policy <i>my-peers</i>
<i>GUI Variable</i>		Click on <i>my-peers</i> in the dialog.
<u>CLI Undefined</u>	Text where the variable's value is the user's discretion and text where the variable's value as shown in the lab guide might differ from the value the use must input.	Type <b>set policy <u>policy-name</u></b> <b>ping 10.0.1.1</b> Select File > Save, and enter <u>filename</u> in the Filename field.
<u>GUI Undefined</u>		



## Additional Information

---

### Education Services Offerings

You can obtain information on the latest Education Services offerings, course dates, and class locations from the World Wide Web by pointing your Web browser to:  
<http://www.juniper.net/training/education/>.

### About This Publication

The *Operating Juniper Networks Routers in the Enterprise* Detailed Lab Guide was developed and tested using software version 8.1R2. Previous and later versions of software may behave differently so you should always consult the documentation and release notes for the version of code you are running before reporting errors.

This document is written and maintained by the Juniper Networks Education Services development team. Please send questions and suggestions for improvement to [training@juniper.net](mailto:training@juniper.net).

### Technical Publications

You can print technical manuals and release notes directly from the Internet in a variety of formats:

- Go to <http://www.juniper.net/techpubs/>.
- Locate the specific software or hardware release and title you need, and choose the format in which you want to view or print the document.

Documentation sets and CDs are available through your local Juniper Networks sales office or account representative.

### Juniper Networks Support

For technical support, contact Juniper Networks at <http://www.juniper.net/customers/support/>, or at 1-888-314-JTAC (within the United States) or 408-745-2121 (from outside the United States).

Not For Reproduction

---

## J-series User Interface Options (Detailed)

---

### Overview

---

This lab introduces you to the J-Web graphical user interface (GUI) and the JUNOS software command-line interface (CLI). In this lab, you will be introduced to various J-Web and CLI operational-mode and configuration-mode features and capabilities.

The lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- J-Web:
  - Log in to J-web;
  - Explore J-Web monitoring options; and
  - Explore J-Web configuration and diagnose options.
- CLI:
  - Log in to the CLI; and
  - Explore the JUNOS software CLI using both operational and configuration modes.

## Key Commands

---

Key operational-mode CLI commands used in this lab include the following:

```
?  
configure  
help reference  
show chassis  
show configuration  
show interfaces  
show route  
show system
```

## Part 1: Log In to J-Web

---

### Note

Depending on the specifics of your class, you might be accessing a router that is remote from your physical location. The instructor will inform you as to the nature of your access and will provide you with the details needed to access your router.

### Step 1.1

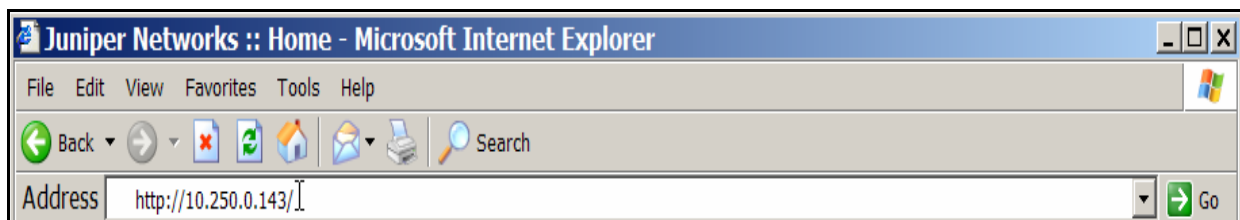
Make sure that you know to which station you are assigned. Check with your instructor if you are unsure. Consult the lab diagram handout to determine your station's out-of-band (OoB) management address. In some classrooms, you might also be able to access the routers by domain name.

Question: What is the management address assigned to your station?

Answer: The answer will vary; in this example the user is assigned to the *London* station, which uses an IP address of 10.250.0.143.

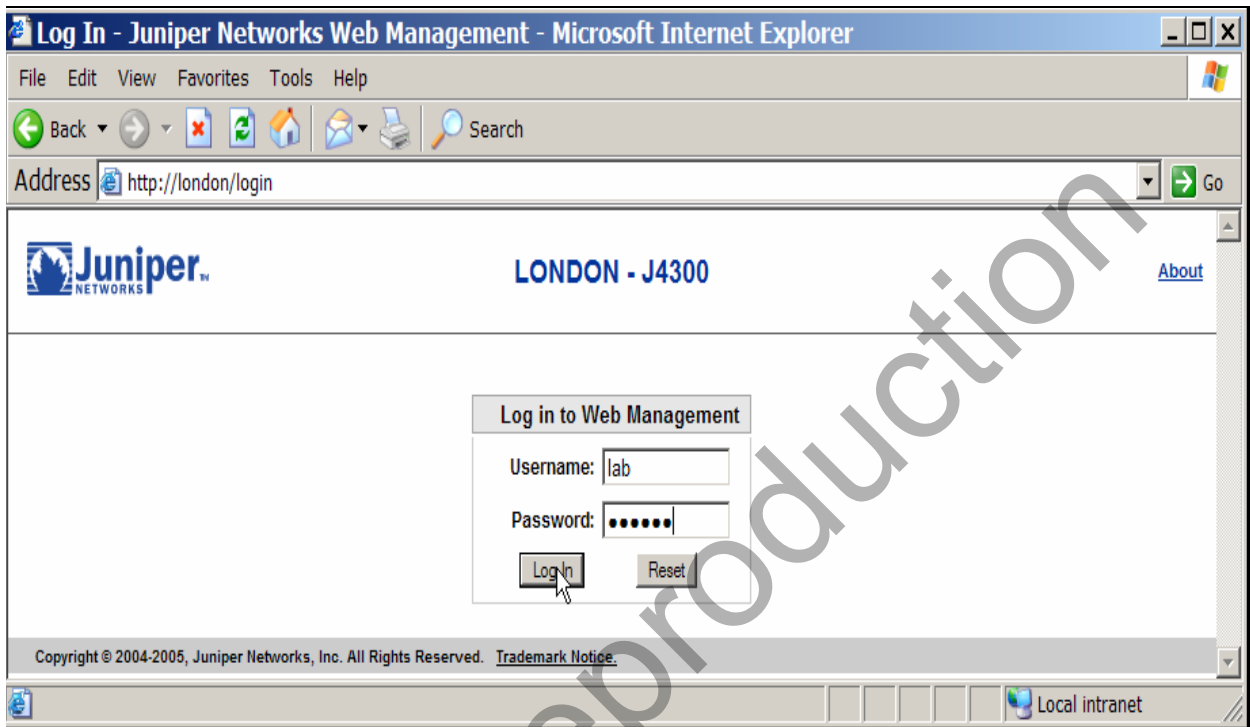
### Step 1.2

Launch the Web browser on your PC and point it to the address identified in the previous lab step. This example is taken from the *London* station:



### Step 1.3

Log in as user *lab* with the password supplied by your instructor. Note that this is a superuser login granting all permissions. Please be careful, and have fun!



#### Note

Notify your instructor if you experience any difficulties establishing a J-Web session to your station.

## Part 2: Explore J-Web Monitoring Capabilities

### Step 2.1

Use the information found in to your browser to answer the following questions.

Question: What J-Web page is loaded after a successful login?

---

---

Answer: You should be placed at the Monitor > System page when a complete configuration is present.

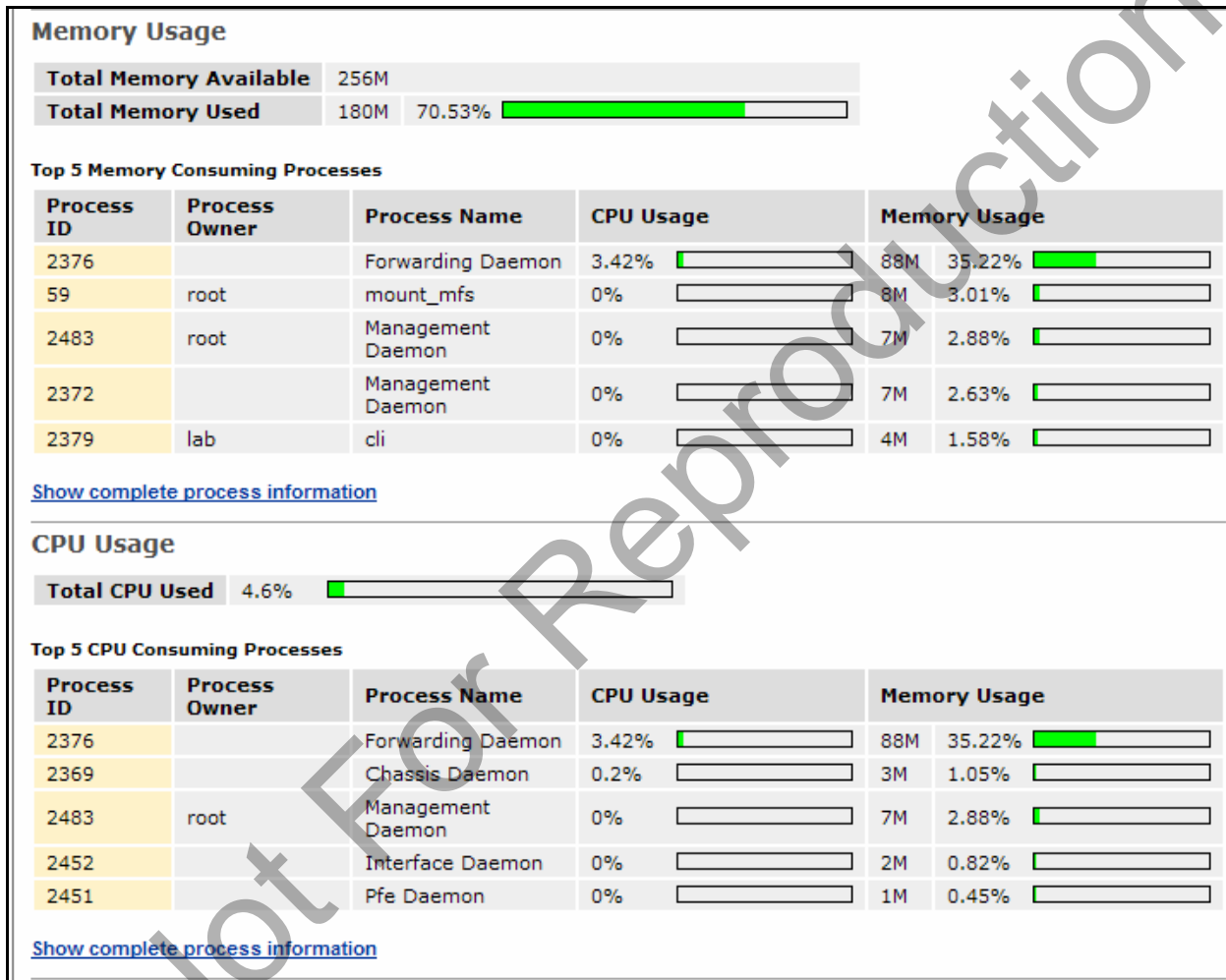
Question: What is the current memory and CPU usage on your assigned station?

---



---

Answer: The answer can vary. The capture taken from the *London* station shows memory and CPU utilization of 70.53% and 4.6% respectively:



## Step 2.2

Click the Chassis link to monitor chassis-related parameters.

Question: Are any alarms currently active?

---

Answer: No alarms should be present at this time.

Question: What is the RE temperature, and is this considered normal?

Answer: The capture taken from *London* indicates that the RE temperature is considered to be normal at 28 degrees Celsius:

The screenshot shows the Juniper J-Web interface with the 'Monitor' tab selected. The left sidebar contains a navigation menu with options: System, Chassis (selected), Interfaces, Routing, Service Sets, Firewall, IPSec, NAT, and RPM. The main content area is titled 'Chassis' and includes an 'Alarm Summary' section stating 'Currently, no alarms are active.' Below this is the 'Environment Information' section, which contains a 'Chassis Component Temperature' table.

Name	Gauge Status	Temperature
Routing Engine	OK	Normal at 28° C (82° F)
Fan 0	OK	

Question: How can you display the serial number and assembly version of FPC 0 using J-Web?

Answer: You can expand a section of the display to view additional details by clicking the plus sign (+) next to a given section:

Hardware Summary

Router Model: J4300			Serial Number: JN001924AB																					
Name	Version	Part Number	Serial Number	Description																				
Midplane	REV 05	710-010001	ad04420245																					
System IO	REV 07	710-010003	AE04460979	System IO board																				
Routing Engine	REV 08	750-010005	btrd43700035	RE-J.2																				
FPC 0				FPC																				
<table><tr><td>Jedec Code</td><td>0x7fb0</td><td>Assembly Version</td><td>03.08</td></tr><tr><td>EEPROM Version</td><td>0x01</td><td>Date</td><td>11-22-2004</td></tr><tr><td>Part Number</td><td>.50-010005.</td><td>Assembly Flags</td><td>0x00</td></tr><tr><td>Serial Number</td><td>.trd43700035</td><td>I2C Version</td><td>.EV 08.....</td></tr><tr><td>Assembly ID</td><td>0x0707</td><td>ID</td><td>FPC</td></tr></table>					Jedec Code	0x7fb0	Assembly Version	03.08	EEPROM Version	0x01	Date	11-22-2004	Part Number	.50-010005.	Assembly Flags	0x00	Serial Number	.trd43700035	I2C Version	.EV 08.....	Assembly ID	0x0707	ID	FPC
Jedec Code	0x7fb0	Assembly Version	03.08																					
EEPROM Version	0x01	Date	11-22-2004																					
Part Number	.50-010005.	Assembly Flags	0x00																					
Serial Number	.trd43700035	I2C Version	.EV 08.....																					
Assembly ID	0x0707	ID	FPC																					
PIC 0				2x FE																				
FPC 1	REV 04	750-010356	AG04470400	FPC																				
PIC 0				2x Serial																				
FPC 2	REV 04	750-010353	AF04451711	FPC																				
PIC 0				2x FE																				


### Step 2.3

Click the Interfaces link to display interface status.

Question: What is the status of your station's 10fe-0/0/1 interface?

Answer: The fe-0/0/1 interface should indicate an administrative and operational status of up, and the display should indicate that the interface is not configured:




**LONDON - J4300**
Logged in as: lab
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

System

Chassis

**Interfaces**

Routing

Service Sets

Firewall

IPSec

NAT

RPM

[Monitor > Interfaces](#)

### Interfaces

#### Interface Summary

Interface Name	Oper State	Admin State	Description
<a href="#">fe-0/0/0</a>	Up	Up	Management interface, do not delete
<a href="#">fe-0/0/0.0</a>	Up	Up	
	inet	Address	10.250.0.143/16
<a href="#">qr-0/0/0</a>	Up	Up	
<a href="#">jp-0/0/0</a>	Up	Up	
<a href="#">ls-0/0/0</a>	Up	Up	
<a href="#">mt-0/0/0</a>	Up	Up	
<a href="#">pd-0/0/0</a>	Up	Up	
<a href="#">pe-0/0/0</a>	Up	Up	
<a href="#">sp-0/0/0</a>	Up	Up	
<a href="#">sp-0/0/0.16383</a>	Up	Up	
	inet		
<a href="#">fe-0/0/1</a>	Up	Up	
<a href="#">se-1/0/0</a>	Down	Up	
<a href="#">se-1/0/1</a>	Down	Up	
<a href="#">fe-2/0/0</a>	Down	Up	
<a href="#">fe-2/0/1</a>	Up	Up	
<a href="#">dsc</a>	Up	Up	
<a href="#">gre</a>	Up	Up	
<a href="#">pip</a>	Up	Up	
<a href="#">lo0</a>	Up	Up	
<a href="#">lo0.16385</a>	Up	Up	
	inet	Address	10.0.0.1 ⇒ 0/0
		Address	10.0.0.16 ⇒ 0/0
<a href="#">lsi</a>	Up	Up	
<a href="#">mtun</a>	Up	Up	
<a href="#">pimd</a>	Up	Up	
<a href="#">pime</a>	Up	Up	
<a href="#">pp0</a>	Up	Up	
<a href="#">tap</a>	Up	Up	

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Question: Are any interfaces marked as operationally down?

---

Answer: The answer can vary, but each station is expected to have serial interfaces that are operationally down, as shown in the previous capture. This condition stems from a lack of cabling or configuration, and you can assume it to be normal for now.

Question: How can you gain additional information regarding why a given interface is marked as down?

---

Answer: Expand the desired section by clicking the appropriate interface link. This capture is again taken from the *London* station:

Monitor Configuration Diagnose Manage [Monitor > Interfaces](#)

► System  
► Chassis  
► Interfaces  
► Routing  
► Service Sets  
► Firewall  
► IPsec  
► NAT  
► RPM

## Interfaces

### Interface: se-1/0/1

#### se-1/0/1

<b>State</b>	Down	<b>Hold Times</b>	up 0 ms, down 0 ms
<b>Admin State</b>	Up	<b>Last flapped</b>	2005-02-24 01:46:06 UTC (03:56:01 ago)
<b>SNMP Index</b>	38	<b>Statistics cleared</b>	Never
<b>Local Index</b>	139		
<b>MTU</b>	1504		
<b>Speed</b>			
<b>Type</b>	Serial		
<b>Link Type</b>	PPP		

**Device Flags** Present Running Down  
**Config Flags** Hardware-Down Point-To-Point  
**Media Flags** Keepalives

Traffic statistics	Packets	PPS	Bytes	BPS
Input	0	0	0	0
Output	0	0	0	0

Input Errors		Output Errors	
Errors	0	Carrier transitions	0
Drops	0	Errors	0
Framing errors	0	Drops	0
Runts	0		
Giants	0		
Policed discards	0		

[PFE Information](#)  
[Class of Service Information](#)

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

Question: Based on the display, can you venture a guess as to what is wrong with the interface?

---



---

Answer: The sample capture indicates that there is a *device down* flag. Because this is a serial interface, this flag indicates a lack of carrier or other presence normally received from the attached dataset (DSU).

## Part 3: Explore J-Web Configuration and Diagnostic Capabilities

### Step 3.1

Access the J-Web configuration page by clicking the Configuration tab.




Question: How do you display your station's current configuration?

---

---

Answer: Click the View and Edit link, then click the View Configuration Text link. This example is taken from *London*.


LONDON - J4300
Logged in as: lab
[Help](#) [About](#) [Logout](#)

Monitor
Configuration
Diagnose
Manage

[Configuration > View and Edit > View Configuration Text](#)

- Quick Configuration
- View and Edit
  - View Configuration
  - Text**
  - Edit Configuration
  - Edit Configuration Text
  - Upload Configuration File
- History
- Rescue

## View and Edit

### View Configuration Text

The current configuration running on the router

```

version 7.1R2.2;
system {
  host-name London;
  root-authentication {
    encrypted-password "$1s8D4xP2nO$KDJgw6Y1p0DHyt168ugWt0";
  }
  login {
    user lab {
      uid 2000;
      class superuser;
      authentication {
        encrypted-password "$1$7UN22IZ2$yTnptdwOAV2hdOGpMe3SF.";
      }
    }
  }
  services {
    ftp;
    ssh;
    telnet;
    web-management {
      http;
    }
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any notice;
      authorization info;
    }
    file cli-commands {
      interactive-commands any;
    }
    file config-changes {
      change-log info;
    }
    file errors {
      any error;
    }
  }
}
interfaces {
  fe-0/0/0 {
    description "Management interface, do not delete";
    unit 0 {
      family inet {
        address 10.250.0.143/16;
      }
    }
  }
}

```

## Step 3.2

Return to the Configuration > View and Edit page, and click the Edit Configuration link to open the clickable configuration editor.

## Step 3.3

Expand the system stanza.

The screenshot displays the Juniper J-series User Interface (J-UI) for a device named "LONDON - J4300". The user is logged in as "lab". The interface is divided into several sections:

- Top Navigation:** Includes tabs for Monitor, Configuration, Diagnose, and Manage. The Configuration tab is active.
- Left Sidebar:** Contains the Configuration menu with options like "Expand all", "Hide all", "system", and "interfaces". The "system" option is expanded.
- Main Content Area:**
  - Configuration Section:** Lists various configuration options with "Configure" links: Access, Accounting options, Applications, Chassis, Class of service, Firewall, Forwarding options, Interfaces (with "Edit" and "Delete" links), Policy options, Protocols, Routing instances, Routing options, Security, Services, Snmp, and System (with "Edit" and "Delete" links).
  - Advanced Section:** A section for advanced configuration options.
  - Icon Legend:** Explains symbols used in the configuration:
    - C (Comment):** The configuration statement has been annotated with a comment. To display the comment, place the cursor over the statement icon.
    - I (Inactive):** The configuration statement is not active and does not affect the device.
    - M (Modified):** The configuration statement has been changed or added.
    - \*** (Mandatory): The configuration statement must have a value.

At the bottom of the page, there is a copyright notice: "Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice."

## Step 3.4

Click the syslog link.

Juniper NETWORKS **LONDON - J4300** Logged in as: lab [Help](#) [About](#) [Logout](#)

**Monitor** **Configuration** **Diagnose** **Manage**

[Configuration](#) > [View and Edit](#) > [Edit Configuration](#) > [System](#) > [Syslog](#)

**Configuration**  
Expand all | Hide all |

- system
  - root-authentication
  - login
  - services
  - syslog
  - interfaces

**System**

**Syslog**

OK Cancel Refresh Commit... Discard...

Archive ☐ Yes

Source address  ?

Time format ☐ Yes

**Console** (None configured) [Add new entry](#)

**File** [Add new entry](#)

File name	Nested Configuration	Actions
<a href="#">messages</a>		<a href="#">Edit</a> <a href="#">Delete</a>
<a href="#">cli-commands</a>		<a href="#">Edit</a> <a href="#">Delete</a>
<a href="#">config-changes</a>		<a href="#">Edit</a> <a href="#">Delete</a>
<a href="#">errors</a>		<a href="#">Edit</a> <a href="#">Delete</a>

**Host** (None configured) [Add new entry](#)

**User** [Add new entry](#)

User name	Actions
*	<a href="#">Edit</a> <a href="#">Delete</a>

**Advanced**

OK Cancel Refresh Commit... Discard...

**Icon Legend**

- C** **Comment**  
The configuration statement has been annotated with a comment. To display the comment, place the cursor over the statement icon.
- I** **Inactive**  
The configuration statement is not active and does not affect the device.
- M** **Modified**  
The configuration statement has been changed or added.
- \*** **Mandatory**  
The configuration statement must have a value.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Question: Can you determine what type of information is written to the *cli-commands* log file?

---

Answer: Yes. By clicking the cli-commands link at Configuration > View and Edit > Edit Configuration > system > syslog > file > cli-commands, you can determine that the *interactive-commands* facility is associated with this log file. You can assume for now that this file holds a record of all commands executed on the router.

Question: How can you change the logging level from any to *info* (so that less information regarding CLI commands is logged)?

---

Answer: Click the interactive-commands link at the Configuration > View and Edit > Edit Configuration > system > syslog > file > cli-commands page to view the details of the *cli-commands* syslog. From here you can use the pull-down box to select the desired logging level:



Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Configuration > View and Edit > Edit Configuration > System > Syslog > File cli-commands > Contents interactive-commands

Configuration

Expand all | Hide all

- system
  - root-authentication
  - login
  - services
  - syslog
  - interfaces

File

Contents

OK Cancel Refresh Commit... Discard...

Facility interactive-commands

Level info \* M

OK Cancel Refresh Commit... Discard...

Icon Legend

- C** Comment  
The configuration statement has been annotated with a comment. To display the comment, place the cursor over the statement icon.
- I** Inactive  
The configuration statement is not active and does not affect the device.
- M** Modified  
The configuration statement has been changed or added.
- \*** Mandatory  
The configuration statement must have a value.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

Question: What does the letter M signify when working in the configuration editor?

Answer: The letter M indicates that a value that was modified.

Question: How do you activate the changes that you just made?

Answer: Click the Commit button to activate your changes. You are presented with the list of commands that will be executed when you click OK:




### Step 3.5

View your configuration history by clicking Configuration > History.

Question: Can you tell what entity made the last configuration change?

---

Answer: Yes, the display indicates the username and client method responsible for each commit. In this case you should see that the current configuration was changed by user *lab* via JUNOScript:



LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor

Configuration

Diagnose

Manage

► Quick Configuration

► View and Edit

► History

► Rescue

Configuration > History

History

Database Information

No users are editing the configuration database.

Configuration History

The following table shows the router's commit history.

To view a configuration, click the revision number.

To compare configurations, select two and click "Compare".

Compare

	Number	Date/Time	User	Client	Comment	Log Message	Action
<input type="checkbox"/>	<a href="#">Current</a>	2005-04-14 14:22:48 UTC	lab	junoscript			<a href="#">Download</a>

Question: How can you compare the active configuration to the previous configuration, known as rollback 1?

Answer: Select the active configuration and the rollback index of your choice, and click Compare:

Juniper NETWORKS **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

**Monitor** **Configuration** **Diagnose** **Manage**

► Quick Configuration  
 ► View and Edit  
 ► **History**  
 ► Rescue

[Configuration](#) > [History](#)

## History

### Database Information

No users are editing the configuration database.

### Configuration History

The following table shows the router's commit history.

To view a configuration, click the revision number.

To compare configurations, select two and click "Compare".

	Number	Date/Time	User	Client	Comment	Log Message	Action
<input checked="" type="checkbox"/>	<a href="#">Current</a>	2005-04-14 14:22:48 UTC	lab	junoscript			<a href="#">Download</a>
<input checked="" type="checkbox"/>	<a href="#">1</a>	2005-04-14 12:20:33 UTC	lab	cli			<a href="#">Download</a> <a href="#">Rollback</a>

Question: What differences are displayed?

Answer: The display should indicate that the logging level associated with the *cli-commands* log file was changed from any to info:

Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

► Quick Configuration

► View and Edit

► History

► Rescue

[Configuration](#) > [History](#)

## History

### Compare Rollback 1 Configuration to Current Configuration

Legend:

- Removed from Rollback 1 Configuration
- changed lines
- Added in Current Configuration

Rollback 1 Configuration	Current Configuration
[edit system syslog file cli-commands]	[edit system syslog file cli-commands]
interactive-commands any;	interactive-commands info;

Legend:

- Removed from Rollback 1 Configuration
- changed lines
- Added in Current Configuration

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

### Step 3.6

Access the J-Web diagnostics page by clicking the Diagnose link.

Question: What diagnostics options are supported?

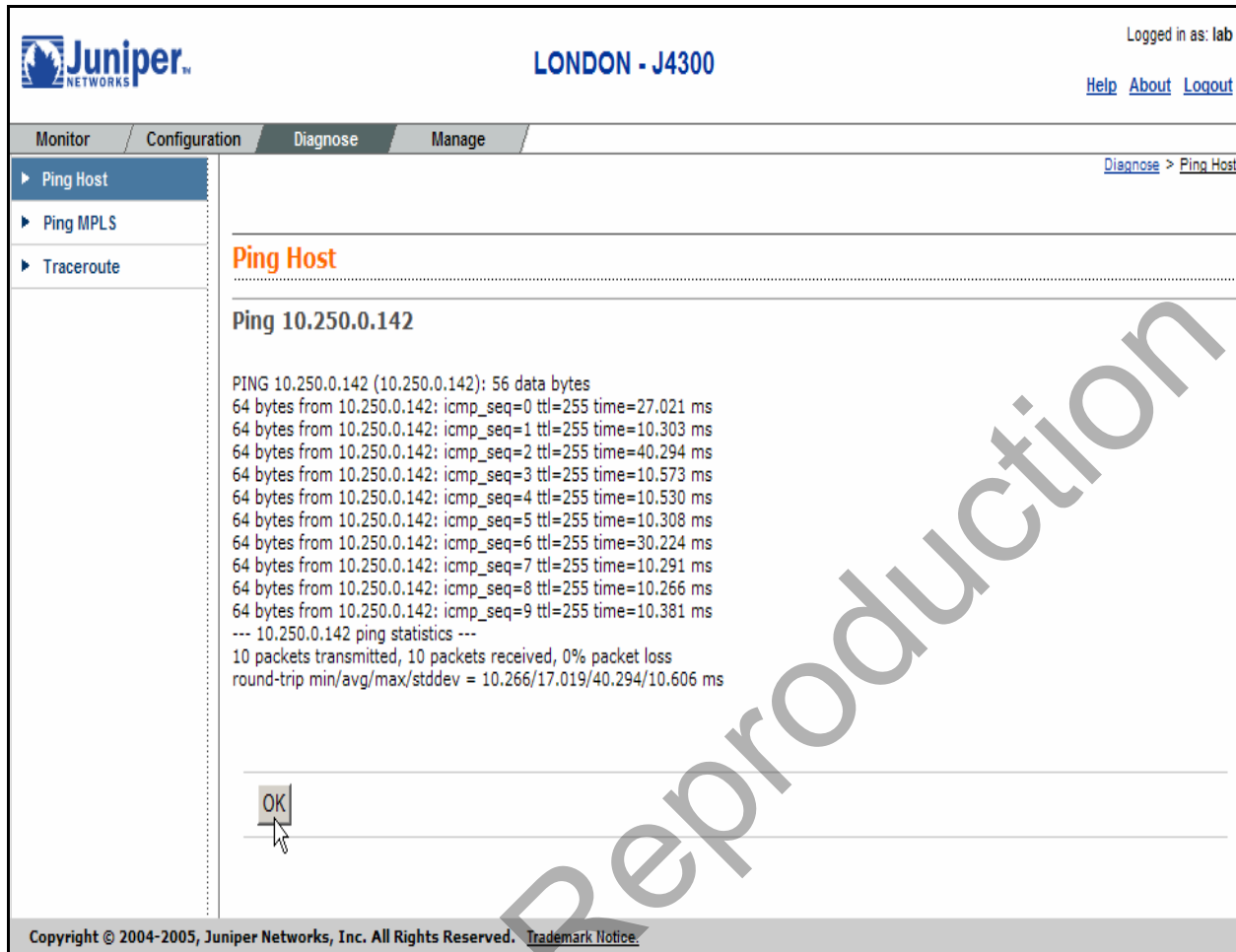
Answer: The current version of J-Web offers support for the traceroute, ping MPLS, and ping diagnostic utilities.

### Step 3.7

Use J-Web to confirm reachability to other stations over the OoB management network.

Question: Are your pings and traceroute test successful?

Answer: The answer should be yes, as shown in this capture taken as *London* pings *Tokyo*:



The screenshot shows the Juniper J-Web interface for a router named 'LONDON - J4300'. The user is logged in as 'lab'. The interface has tabs for Monitor, Configuration, Diagnose, and Manage. The 'Diagnose' tab is selected, and the 'Ping Host' option is chosen from the left sidebar. The main content area displays the results of a ping command to 10.250.0.142. The results show 10 successful pings with 0% packet loss and a round-trip time of approximately 10.266 ms. An 'OK' button is visible at the bottom of the results area.

Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Diagnose > Ping Host

Ping Host

Ping MPLS

Traceroute

**Ping Host**

**Ping 10.250.0.142**

PING 10.250.0.142 (10.250.0.142): 56 data bytes  
 64 bytes from 10.250.0.142: icmp\_seq=0 ttl=255 time=27.021 ms  
 64 bytes from 10.250.0.142: icmp\_seq=1 ttl=255 time=10.303 ms  
 64 bytes from 10.250.0.142: icmp\_seq=2 ttl=255 time=40.294 ms  
 64 bytes from 10.250.0.142: icmp\_seq=3 ttl=255 time=10.573 ms  
 64 bytes from 10.250.0.142: icmp\_seq=4 ttl=255 time=10.530 ms  
 64 bytes from 10.250.0.142: icmp\_seq=5 ttl=255 time=10.308 ms  
 64 bytes from 10.250.0.142: icmp\_seq=6 ttl=255 time=30.224 ms  
 64 bytes from 10.250.0.142: icmp\_seq=7 ttl=255 time=10.291 ms  
 64 bytes from 10.250.0.142: icmp\_seq=8 ttl=255 time=10.266 ms  
 64 bytes from 10.250.0.142: icmp\_seq=9 ttl=255 time=10.381 ms  
 --- 10.250.0.142 ping statistics ---  
 10 packets transmitted, 10 packets received, 0% packet loss  
 round-trip min/avg/max/stddev = 10.266/17.019/40.294/10.606 ms

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

#### Note

Notify your instructor if you detect any reachability problems over the OoB network.



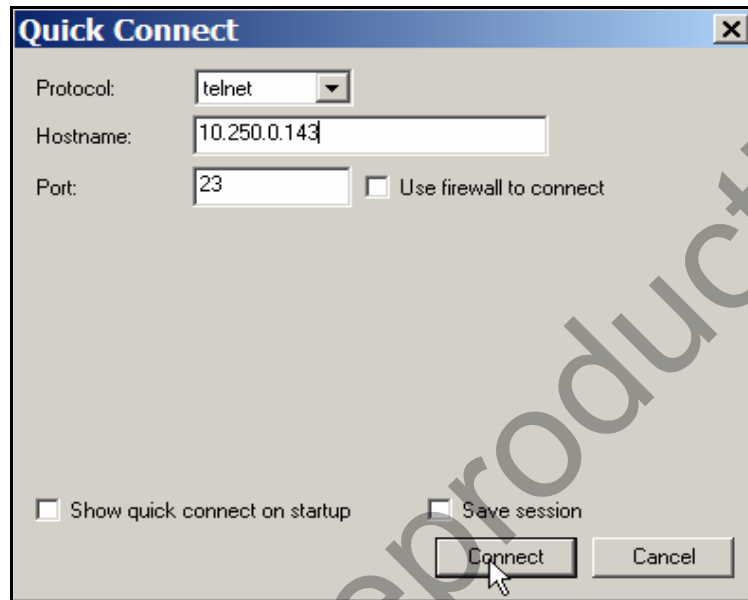
Tell your instructor that you have completed the J-Web portion of this lab.

## Part 4: Log In Using the CLI

---

### Step 4.1

Access the CLI at your station using either the console, Telnet, or SSH as directed by your instructor. The example shown here is based on simple Telnet access to *London* using the Secure CRT program:



### Step 4.2

Log in as user *lab* with the password supplied by your instructor.

London (ttyp0)

login: **lab**

Password:

--- JUNOS 7.5R1.12 built 2006-02-05 08:37:19 UTC

lab@London>

## Part 5: Experiment with the CLI's Operational and Configuration Modes

---

### Step 5.1

Determine what things you can clear from the operational-mode command prompt.

lab@London> **clear ?**

Possible completions:

Possible completions:

arp	Clear address resolution information
bfd	Clear Bidirectional Forwarding Detection information
bgp	Clear Border Gateway Protocol information
esis	Clear end system-to-intermediate system information

firewall	Clear firewall counters
helper	Clear port-forwarding helper information
igmp	Clear Internet Group Management Protocol information
ike	Clear IKE information
interfaces	Clear interface information
ipsec	Clear IP Security information
ipv6	Clear IP version 6 information
isdn	Clear Integrated Services Digital Network information
isis	Clear Intermediate System-to-Intermediate System
information	
ldp	Clear Label Distribution Protocol information
log	Clear contents of log file
mld	Clear multicast listener discovery information
mpls	Clear Multiprotocol Label Switching information
msdp	Clear Multicast Source Discovery Protocol information
multicast	Clear multicast information
ospf	Clear Open Shortest Path First information
ospf3	Clear Open Shortest Path First version 3 information
pgm	Clear Pragmatic Generalized Multicast information
pim	Clear Protocol Independent Multicast information
pppoe	Clear PPP over Ethernet information
rip	Clear Routing Information Protocol information
ripng	Clear Routing Information Protocol for IPv6 information
rsvp	Clear Resource Reservation Protocol information
security	
services	Clear services information
snmp	Clear Simple Network Management Protocol information
system	Clear system information
vrrp	Clear Virtual Router Redundancy Protocol statistics

Question: What command do you use to clear the contents of a system log (syslog) file?

---

Answer: Use the **clear log log-file-name** command to clear the contents of a particular syslog file.

## Step 5.2

Experiment with command completion by entering **show i<space>**

lab@London> **show i<space>**

^

'i' is ambiguous.

Possible completions:

igmp	Show Internet Group Management Protocol information
ike	Show Internet Key Exchange information
interfaces	Show interface information
ipsec	Show IP Security information
ipv6	Show IP version 6 information
isdn	Show Integrated Services Digital Network information
isis	Show Intermediate System-to-Intermediate System
information	



### Step 5.3

Add characters to disambiguate your command so that you can display interface-related information; use the Spacebar for automatic command completion.

```
lab@London> show in<space>terfaces
Physical interface: fe-0/0/0, Enabled, Physical link is Up
  Interface index: 136, SNMP ifIndex: 29
  Description: Management interface, do not delete
  Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled
  Device flags      : Present Running
  Interface flags: SNMP-Traps 16384
  Link flags       : 4
  CoS queues       : 8 supported
  Current address: 00:05:85:c8:03:d0, Hardware address: 00:05:85:c8:03:d0
  Last flapped    : 2005-02-24 01:46:07 UTC (04:48:46 ago)
  Input rate      : 0 bps (0 pps)
  Output rate     : 0 bps (0 pps)
  Active alarms   : None
Active defects : None

  Logical interface fe-0/0/0.0 (Index 67) (SNMP ifIndex 41)
    Flags: SNMP-Traps Encapsulation: ENET2
    Protocol inet, MTU: 1500
      Flags: Is-Primary
      Addresses, Flags: Is-Default Is-Preferred Is-Primary
  . . .
```

### Step 5.4

Try to clear routes by entering **clear route**.

```
lab@London> clear route
^
syntax error, expecting <command>.
```

Question: What do you suppose the resulting display means?

---

Answer: The display indicates that the command was incomplete as entered. The ^ symbol indicates the area of the problem, and the error message tells you that the router is expecting additional command input.

### Step 5.5

Verify that the CLI will not let you complete invalid commands by trying to enter the command **show ip interface brief**.

```
lab@London> show ip<space>sec interface
```

'ip' is ambiguous.

Possible completions:

```
  ipsec          Show IP Security information
  ipv6           Show IP version 6 information
```

```
lab@London> show ipinterface
```

syntax error, expecting <command>.

```
lab@London> show ipinterface
```

Question: What happens when you try to enter this command?

---

---

Answer: The router returns an error because no valid command uses the syntax **show ip interface**. In this case, the CLI has two valid commands—**show ipsec** and **show ipv6**—and the CLI prompts you to choose one. If you continue with invalid syntax, the router informs you of your error. Unlike some CLI implementations, JUNOS software will not let you waste time typing in a bogus command!

## Step 5.6

Enter a **show route** command followed by a **show system users** command. You are entering these commands to demonstrate command history recall. When done, enter the keyboard sequences indicated to answer the related questions.

```
lab@London> show route
```

```
inet.0: 2 destinations, 2 routes (2 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
10.250.0.0/16      *[Direct/0] 04:53:24
                   > via fe-0/0/0.0
10.250.0.143/32   *[Local/0] 04:53:27
                   Local via fe-0/0/0.0
```

```
__juniper_private1__inet.0: 2 destinations, 2 routes (2 active, 0 holddown, 0
hidden)
+ = Active Route, - = Last Active, * = Both
```

```
10.0.0.1/32       *[Direct/0] 04:53:57
                   > via lo0.16385
10.0.0.16/32      *[Direct/0] 04:53:57
                   > via lo0.16385
```

```
lab@London> show system users
6:41AM UTC up 4:56, 1 user, load averages: 0.08, 0.02, 0.01
USER      TTY      FROM            LOGIN@  IDLE WHAT
lab       p0       10.250.0.149    6:29AM      - -cli (cli)
```

What happens when you:

Question: Enter **Ctrl-p** twice?

---



---

Answer: The **show route** command is recalled from the command buffer.

Question: Enter **Ctrl-n**?

---

Answer: The next command in the buffer is recalled, which is a **show system users** command in this example.

Question: Use the Up and Down Arrow keys?

---

Answer: The Up and Down Arrow keys can function as substitutes for the **Ctrl-p** and **Ctrl-n** sequences when the router is so configured and you are using a VT100-type emulation.

## Step 5.7

In many cases, the output of a command might exceed one full screen. For example, the **show interfaces fe-0/0/0 extensive** command displays lots of information about the router's first built-in interface. Enter this command now, and answer the following questions. Use the **h** key as needed to obtain help when CLI output is paused at the **---more---** prompt.

```
lab@London> show interfaces fe-0/0/0 extensive
Physical interface: fe-0/0/0, Enabled, Physical link is Up
  Interface index: 136, SNMP ifIndex: 29, Generation: 17
  Description: Management interface, do not delete
  Link-level type: Ethernet, MTU: 1514, Speed: 100mbps, Loopback: Disabled,
  Source filtering: Disabled, Flow control: Enabled
  Device flags      : Present Running
  Interface flags: SNMP-Traps 16384
  Link flags       : 4
  CoS queues       : 8 supported
  Hold-times       : Up 0 ms, Down 0 ms
  Current address: 00:05:85:c8:03:d0, Hardware address: 00:05:85:c8:03:d0
  Last flapped    : 2005-02-24 01:46:07 UTC (04:59:55 ago)
  Statistics last cleared: Never
  Traffic statistics:
```

```
Input bytes :          973615          1880 bps
Output bytes :        6152953        1360 bps
Input packets:         11055          4 pps
Output packets:        7746          2 pps
Input errors:
  Errors: 8668, Drops: 0, Framing errors: 0, Runts: 0, Policed discards: 30,
  L3 incompletes: 0, L2 channel errors: 0, L2 mismatch timeouts: 0,
  FIFO errors: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, Collisions: 0, Aged packets:
0,
  FIFO errors: 0, HS link CRC errors: 0, MTU errors: 0, Resource errors: 0
. . .
```

Question: What effect does pressing the Spacebar have?

Answer: The Spacebar causes the display to scroll forward to display the next screen of output.

Question: What effect does pressing the Enter key have on the paused output?

Answer: The Enter key causes the display to scroll forward by one line.

Question: What effect does entering **b** have?

Answer: Entering **b** causes the display to scroll backwards by one full screen, up to the point where the first full screen of information is displayed.

Question: What about **u**?

Answer: Entering **u** causes the display to scroll backwards by one half of a screen, up to the point where the first screen is displayed.

Question: What key would you enter to search forward through a display that consists of multiple screens of output?

Answer: To search forward, you use the forward slash (/) character followed by the search pattern.

## Step 5.8

Use the pipe (|) and **match** functions of the JUNOS software CLI to list all interfaces that are physically down.

```
lab@London> show interfaces | match down
Physical interface: se-1/0/0, Enabled, Physical link is Down
  Device flags      : Present Running Down
  Interface flags: Hardware-Down Point-To-Point Internal: 0x4000
Physical interface: se-1/0/1, Enabled, Physical link is Down
  Device flags      : Present Running Down
  Interface flags: Hardware-Down Point-To-Point Internal: 0x4000
Physical interface: fe-2/0/0, Enabled, Physical link is Down
  Device flags      : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x4000
```

Question: Are any of your interfaces listed as down?

---

Answer: In this example, the answer is yes; the se-1/0/0, se-1/0/1, and fe-2/0/0 interfaces are listed as down.

Question: Can you think of a way to have JUNOS software count the number of interfaces that are physically down? (Hint: Remember that the results of one pipe can be used as input to another pipe operation.)

---

Answer: To count the number of down interfaces, pipe the results of the previous command to the CLI's **count** function. In this example, an extra **match** function is included to ensure that interfaces that are down both logically and physically are not counted twice:

```
lab@London> show interfaces | match down | match Physical | count
Count: 3 lines
```

## Step 5.9

A large portion of the JUNOS software documentation is available directly from the CLI. You can retrieve high-level topics using the **help topic** command, while detailed configuration-related information is made available with the **help reference** command.

Use the **help reference** command along with the CLI question-mark operator (?) to find detailed information about configuring a hostname.

Question: What CLI command displays reference information about configuration of the router's hostname?

---

Answer: The **help reference system host-name** command displays information regarding system host names, which is shown here:

```
lab@London> help reference system host-name
host-name
```

Syntax

```
host-name host-name;
```

Hierarchy Level

```
[edit system]
```

Description

Set the hostname of the router.

Options

```
host-name--Name of the router.
```

Usage Guidelines

See "Configuring the Router's Name and Addresses".

Required Privilege Level

```
system--To view this statement in the configuration.
```

```
system-control--To add this statement to the configuration.
```

## Step 5.10

Enter configuration mode.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London#
```

Question: What happens to your prompt?

---

Answer: The angle bracket (>) symbol is replaced with an octothorp (#), and a configuration hierarchy banner is displayed.

Question: According to the prompt, what is your position in the configuration hierarchy?

---

Answer: The display indicates that you are now at the [edit] hierarchy, which is the root of the configuration tree.

### Step 5.11

Display the interfaces portion of the candidate configuration.

```
[edit]
lab@London# show interfaces
fe-0/0/0 {
  description "MGMT INTERFACE - DO NOT DELETE";
  unit 0 {
    family inet {
      address 10.250.0.143/16;
    }
  }
}
```

### Step 5.12

Position yourself at the [edit interfaces] configuration hierarchy.

```
[edit]
lab@London# edit interfaces

[edit interfaces]
lab@London#
```

Question: What happens to the banner?

---

Answer: The banner now correctly shows that the user is parked at the [edit interfaces] portion of the configuration hierarchy.

Question: What is the result of a **show** command now?

---

Answer: A **show** command only displays information pertaining to configuration statements at and below the current hierarchy. In this case, only the configuration statements for the router's fe-0/0/0 interface are displayed:

```
[edit interfaces]
lab@London# show
fe-0/0/0 {
  description "MGMT INTERFACE - DO NOT DELETE";
  unit 0 {
```

```

        family inet {
            address 10.250.0.143/16;
        }
    }
}

```

### Step 5.13

Move to the `[edit protocols ospf]` portion of the hierarchy. This step requires that you first visit the root of the hierarchy, as you cannot jump directly between branches. You can do this with a single command in the form of **top edit protocols ospf**, however.

```

[edit interfaces]
lab@London# top edit protocols ospf

```

```

[edit protocols ospf]
lab@London#

```

Question: What commands could you now enter to reposition yourself at the `[edit]` portion of the hierarchy?

---

Answer: You can issue an **up** command twice, or an **up 2** command. You can also issue a **top** command.

```

[edit protocols ospf]
lab@London# top

```

```

[edit]
lab@London#

```

### Step 5.14

Try to display the status of chassis hardware with a **show chassis hardware** operational command while in configuration mode.

```

[edit]
lab@London# show chassis hardware

```

syntax error.

Question: Why do you think you received an error? What can you do to execute operational-mode commands while in configuration mode?

---

Answer: Precede operational-mode commands with the keyword **run** to execute them while in configuration mode:



```
[edit]
lab@London# run show chassis hardware
Hardware inventory:
Item                Version  Part number  Serial number  Description
Chassis              REV 05   710-010001   JN001924AB    J4300
Midplane             REV 07   710-010003   AE04460979    System IO board
System IO            REV 08   750-010005   btrd43700035  RE-J.2
Routing Engine       REV 08   750-010005   btrd43700035  RE-J.2
FPC 0
  PIC 0
FPC 1                REV 04   750-010356   AG04470400    FPC
  PIC 0
FPC 2                REV 04   750-010353   AF04451711    FPC
  PIC 0
```

### Step 5.15

Try to return to operational mode by entering an **exit** command.

Question: What happens when you execute the **exit** command?

---



---

Answer: You should see an error indicating that you have uncommitted changes. This error results from the creation of an empty `[edit protocols ospf]` stanza. This empty stanza causes the configuration database to believe that the configuration actually changed:

```
[edit]
lab@London# exit
The configuration has been changed but not committed
Exit with uncommitted changes? [yes,no] (yes)
```

Question: What CLI command can you use to display any differences between a candidate and a previous configuration file?

---

Answer: Use the **show** command with the results piped to **compare rollback number**. In this example you should not see any actual configuration changes, as shown in the following sample capture:

```
[edit]
lab@London# show | compare rollback 0

[edit]
lab@London#
```

Question: Considering that nothing changed, what command can you enter to allow an exit from configuration mode without being warned of uncommitted changes?

---

---

Answer: Issue a **rollback 0** command to replace the candidate configuration with a new copy of the active configuration. You can now exit configuration mode without any nagging:

```
[edit]
lab@London# rollback 0
load complete

[edit]
lab@London# quit
Exiting configuration mode

lab@London>
```



Tell your instructor that you have completed Lab 1.

---

# Initial System Configuration (Detailed)

---

## Overview

---

This lab demonstrates typical J-series initial configuration tasks. In this lab you begin by experimenting with autoinstallation. You then move on to perform configuration steps typically associated with initial J-series platform installation using J-Web and (optionally) the CLI.

The lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- Invoke autoinstallation and monitor the results.
- Load a factory-default configuration and assign a management address.
- Perform initial configuration using J-Web.
- Perform initial configuration using the CLI (optional).

## Key Commands

---

Key operational-mode commands used in this lab include the following:

```
?
clear log
configure
monitor start
monitor stop
show log
show system autoinstallation status
```

## Part 1: Invoke Autoinstallation and Confirm Results

---

### Note

During the course of this lab you will disrupt the preconfigured OoB network serving your classroom. Make sure that you are using the console connection to access your assigned station during this lab. This type of attachment ensures that there will be no loss of connectivity when the classroom's existing OoB network is temporarily altered. Ask your instructor how to connect to your router using the console port.

### Step 1.1

Enter configuration mode and use the **load merge file-name** command to alter your current configuration by adding the contents of the file called *autoinstallation-stanza*, which is located in a sub-directory called *ojre*. Do not commit the changes at this time.

### Note

You must be sure to use the **merge** option to the **load** command to ensure that the contents of the *autoinstallation-stanza* file are added to your current configuration. Using the **override** option will replace your existing configuration with the contents of the file being loaded.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# load merge ojre/autoinstallation-stanza
load complete
```

## Step 1.2

Use the CLI's **compare** function to examine the differences in your configuration file; do not commit the changes. The sample capture is obtained from the *London* station; all stations should display the same changes, however:

```
[edit]
lab@London# show | compare
[edit system]
+   autoinstallation {
+       delete-upon-commit;
+       traceoptions {
+           level verbose;
+           flag {
+               all;
+           }
+       }
+   }
```

Question: What do you think will happen to the [edit system autoinstallation] stanza once a change is committed or a new configuration file is loaded and committed?

---



---

Answer: As indicated by the configuration, upon a change with a **commit**, the [edit system autoinstallation] stanza will be deleted.

Question: Assume that autoinstallation trace results are written to the file /var/log/autod. How can you display the contents of this file? How can you monitor changes to the file in real time?

---



---

Answer: To display a log or trace file, use the **show log log-file-name** command. To display changes in real time, use the **monitor start log-file-name** command. To display the files being monitored, issue the **monitor list** command. Use **monitor stop** to turn off all monitoring.

## Step 1.3

Use the **clear log log-file-name** command to clear the contents of the autod log file. This will make subsequent examination easier because you will have less information through which to parse.

### Note

Because you are still in configuration mode, you must be sure to preface operational-mode commands with **run**.

```
[edit]
lab@London# run clear log autod
```

### Note

It is possible that your router does not have an autod log file. If this is the case, you will receive an error message. If you do, you can ignore the error and continue.

## Step 1.4

Take note of your station's current hostname and which interfaces are configured. You can use either J-Web or the CLI to perform this step. The CLI approach is shown here because previous steps required use of the CLI.

Question: What is the current hostname, and which interfaces are configured?

---



---

Answer: The hostname will vary by station. All stations should have a single interface that is configured in the form of fe-0/0/0. The capture is taken from *London*:

```
[edit]
lab@London# show | match host
    host-name London;

[edit]
lab@London# show interfaces
fe-0/0/0 {
    description "Management interface, do not delete";
    unit 0 {
        family inet {
            address 10.250.0.143/16;
        }
    }
}
```

```
[edit]
lab@London# run show interfaces terse
Interface          Admin Link Proto Local                               Remote
fe-0/0/0            up    up
fe-0/0/0.0          up    up   inet  10.250.0.143/16
gr-0/0/0            up    up
ip-0/0/0            up    up
```

ls-0/0/0	up	up	
mt-0/0/0	up	up	
pd-0/0/0	up	up	
pe-0/0/0	up	up	
sp-0/0/0	up	up	
sp-0/0/0.16383	up	up	inet
fe-0/0/1	up	up	
se-1/0/0	up	down	
se-1/0/1	up	down	
fe-2/0/0	up	down	
fe-2/0/1	up	up	
dsc	up	up	
gre	up	up	
ipip	up	up	
lo0	up	up	
lo0.16385	up	up	inet 10.0.0.1 --> 0/0
			10.0.0.16 --> 0/0
lsi	up	up	
mtun	up	up	
pimd	up	up	
pime	up	up	
pp0	up	up	
tap	up	up	

### Step 1.5

Begin monitoring the autod trace file with a **monitor start file-name** command.

Question: Is there any activity in the autod trace file at this time? Explain why this is so.

---



---

Answer: There should be no activity at this time, which is because the autoinstallation configuration is not yet placed into effect with a **commit**.

```
[edit]
lab@London# run monitor start autod
```

```
[edit]
lab@London#
```

### Step 1.6

Commit the changes and return to operational mode.

```
lab@London# commit and-quit
commit complete
Exiting configuration mode
```

```
lab@London>
```

## Step 1.7

You should see autoinstallation activities displayed on your screen. During this time you can disable output to your screen by entering an **Esc-q** sequence. Repeat to enable monitor output as desired.

During this time you might want to issue **show system autoinstallation status** CLI commands to gain additional insight into what is happening at your station.

Question: Are there any indications that the process completed successfully?

---

Answer: Yes, there are some signs. The most obvious of these signs is that your station's hostname should now be altered to indicate that it was configured via autoinstallation. The contents of the `autod` trace file should also indicate successful completion. If the hostname did not change, you should wait a few more minutes.

```
. . .
Mar  3 05:23:12 configuration file successfully retrieved by tftp on pid 8325
on fe-0/0/0
Mar  3 05:23:13 got configuration on fe-0/0/0
Mar  3 05:23:13 interface fe-0/0/0 now in state Configuration Commit
Mar  3 05:23:13 replacing old configuration with new one
Mar  3 05:23:13 committing /var/run/autod/fe-000/London.conf
Mar  3 05:23:13 spawned /usr/sbin/mgd -zd -n autod autoinstall-commit /var/run/
autod/fe-000/London.conf for fe-0/0/0 at pid 8326
Mar  3 05:23:15 received SIGTERM signal: stopping autoinstallation gracefully
. . .
<user hits enter>
```

```
lab@London_via_autoinstallation>
```

## Step 1.8

Navigate to your station's OoB management address, and log in to J-Web. Once logged in, access the Configuration > History page.

Question: What client entity is responsible for the last configuration change?

---



---

Answer: The answer should be `autoinstall`, as shown in the sample capture:



Juniper NETWORKS

LONDON\_VIA\_AUTOINSTALLATION - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Configuration > History

Quick Configuration  
View and Edit  
History  
Rescue

### History

**Database Information**

No users are editing the configuration database.

**Configuration History**

The following table shows the router's commit history.

To view a configuration, click the revision number.

To compare configurations, select two and click "Compare".

Compare

	Number	Date/Time	User	Client	Comment	Log Message	Action
<input type="checkbox"/>	<a href="#">Current</a>	2005-04-21 14:11:26 UTC	root	autoinstall			<a href="#">Download</a>
<input type="checkbox"/>	<a href="#">1</a>	2005-04-21 14:11:18 UTC	lab	cli			<a href="#">Download</a> <a href="#">Rollback</a>

### Step 1.9

Use the J-Web (or CLI) compare function to determine what other changes occurred as a result of autoinstallation by comparing the current configuration to the first rollback file.

Compare

	Number	Date/Time	User	Client	Comment	Log Message	Action
<input checked="" type="checkbox"/>	<a href="#">Current</a>	2005-04-21 14:11:26 UTC	root	autoinstall			<a href="#">Download</a>
<input checked="" type="checkbox"/>	<a href="#">1</a>	2005-04-21 14:11:18 UTC	lab	cli			<a href="#">Download</a> <a href="#">Rollback</a>

Question: Besides a modified hostname, what else was added to your configuration?

Answer: The following capture shows that all interfaces are now properly configured for the main lab topology. The capture is taken from the *London* station:

## History

### Compare Rollback 1 Configuration to Current Configuration

Legend:
Removed from Rollback 1 Configuration
changed lines
Added in Current Configuration

Rollback 1 Configuration	Current Configuration
<b>[edit system]</b>	<b>[edit system]</b>
<pre> autoinstallation {   delete-upon-commit;   traceoptions {     level verbose;     flag {       all;     }   } } host-name London; </pre>	<pre> host-name London_via_autoinstallation; </pre>
<b>[edit system syslog file cli-commands]</b>	<b>[edit system syslog file cli-commands]</b>
<pre> interactive-commands info; </pre>	<pre> interactive-commands any; </pre>
<b>[edit interfaces]</b>	<b>[edit interfaces]</b>
	<pre> fe-0/0/1 {   description "to Amsterdam fe-0/0/1";   unit 0 {     family inet {       address 10.222.3.1/24;     }   } } se-1/0/1 {   description "to Tokyo se-1/0/0";   unit 0 {     family inet {       address 10.222.2.2/24;     }   } } lo0 {   description "London lo0";   unit 0 {     family inet {       address 192.168.36.1/32;     }   } } </pre>

Legend:
Removed from Rollback 1 Configuration
changed lines
Added in Current Configuration

## Part 2: Load a Factory-Default Configuration

---

### Step 2.1

Enter configuration mode and load a factory-default configuration using the **load** command.

```
lab@London_via_autoinstallation> configure
```

```
Entering configuration mode
```

```
[edit]
```

```
lab@London_via_autoinstallation# load factory-default
```

```
warning: activating factory configuration
```

### Step 2.2

Display the factory-default configuration.

```
[edit]
```

```
lab@London_via_autoinstallation# show
```

```
system {
  autoinstallation {
    delete-upon-commit; ## Deletes [system autoinstallation] upon change/
  }
  commit
  traceoptions {
    level verbose;
    flag {
      all;
    }
  }
}
services {
  web-management {
    http {
      interface [ fe-0/0/0.0 fe-0/0/1.0 ];
    }
  }
}
syslog {
  user * {
    any emergency;
  }
  file messages {
    any any;
    authorization info;
  }
  file interactive-commands {
    interactive-commands any;
  }
}
## Warning: missing mandatory statement(s): 'root-authentication'
}
```

### Step 2.3

Define a root password of *Rootroot* and commit the changes.

```
[edit]
lab@London_via_autoinstallation# edit system root-authentication

lab@London_via_autoinstallation# set plain-text-password
New password:
Retype new password:

[edit system root-authentication]
lab@London_via_autoinstallation# commit
commit complete
[edit]
lab@London_via_autoinstallation#
```

#### Note

To see the hostname change back to *amnesiac*, you must reboot the router. This is not required at this time as you will be configuring a new hostname shortly.

## Step 2.4

Log out as the *lab* user and log back in as *root*. Use the newly defined password of *Rootroot*.

```
[edit system root-authentication]
lab@London_via_autoinstallation# top

[edit]
lab@London_via_autoinstallation# quit
Exiting configuration mode

lab@London_via_autoinstallation> quit

London_via_autoinstallation (ttyd0)

login: root
Password:

--- JUNOS 8.1R2.2 built 2006-12-16 02:54:19 UTC
root@London_via_autoinstallation%
```

## Step 2.5

Start the CLI with the **cli** command, enter configuration mode, and park yourself at the `[edit interfaces fe-0/0/0]` hierarchy.

```

root@London_via_autoinstallation% cli
root@London_via_autoinstallation> configure
Entering configuration mode

[edit]
root@London_via_autoinstallation# edit interfaces fe-0/0/0

[edit interfaces fe-0/0/0]
root@London_via_autoinstallation#

```

## Step 2.6

For this class, you need a management address on your station. Configure this address by loading a configuration file that is stored on your router. Each router has a unique file loaded to represent its specific address. Use the file path `/var/home/lab/ojre/lab2p2-merge`. The following example is from the *London* station.

```

[edit interfaces fe-0/0/0]
root@London_via_autoinstallation# load merge /var/home/lab/ojre/lab2p2-merge

```

### Note

Accessing a factory-default router using J-Web does not always require that an IP address be assigned. Note that the classroom topology does not provide a DHCP service to assign dynamic addressing. Further, the built-in DHCP server mode associated with autoinstallation is problematic here because all OoB interfaces connect to a shared hub. While an address would be assigned, it would be impossible to predict which station would act as the DHCP server, and which addresses would actually be assigned to a given station.

In the field you can access J-Web to perform initial setup by simply attaching your PC, which is configured for automatic address assignment, directly to the `fe-0/0/0` interface of a J-series router with a factory-default configuration. After a few minutes, the router's `fe-0/0/0` interface will enter DHCP server mode and will assign an address to the PC in the form of `192.168.1.x/24`. The router will be reachable at `192.168.1.1`.

## Step 2.7

Confirm that you loaded the correct configuration file by viewing the address that you assigned to your management interface:

```

[edit interfaces fe-0/0/0]
root@London_via_autoinstallation# top

[edit]
root@London_via_autoinstallation# show interfaces fe-0/0/0
unit 0 {
    family inet {
        address 10.250.0.143/16;
    }
}

```

## Step 2.8

Compare the results to the network diagram that your instructor gave you. When satisfied with your work, commit your change and return to operational mode.

```
[edit]
root@London_via_autoinstallation# commit and-quit
commit complete
Exiting configuration mode

root@London_via_autoinstallation>
```

## Part 3: Perform Initial Configuration Using J-Web

---

### Step 3.1

Launch your PC's Web browser and point it to your assigned station's OoB address, as configured in the previous lab steps. When presented with the J-Web login screen, log in as *root* with the previously assigned password of *Rootroot*.

### Step 3.2

Because the *fe-0/0/0* network interface is now configured, you no longer have a factory-default configuration. As a result, you are not automatically directed to the J-Web Set Up wizard. Access the Set Up wizard now by clicking the Configuration tab followed by the Set Up link. Confirm that you are now on the Configuration > Quick Configuration > Set Up page by verifying that your screen is similar to the example taken from *London*:

Juniper NETWORKS

LONDON\_VIA\_AUTOINSTALLATION - J4300

Logged in as: root

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Configuration > Quick Configuration > Set Up

Quick Configuration

**Set Up**

Identification

\* Host Name  ?

Domain Name  ?

\* Root Password  ?

\* Verify Root Password  ?

Time

Time Zone  ?

NTP Servers  ?

Current System Time 04/21/2005 14:26 ?

?

?

Network

DNS Name Servers  ?

Domain Search  ?

Default Gateway

Loopback Address  ?

fe-0/0/0.0 Address 10.250.0.143/16

Management Access

The following access methods are considered insecure as any information sent over them will be sent without encryption and could possibly be intercepted during transmission.

Allow Telnet Access ☐

Allow JUNOScript over Clear-Text Access ☐

The following access method is considered secure as any information sent over it will be encrypted before transmission.

Allow SSH Access ☐

In order to enable HTTPS or JUNOScript over SSL, you will need to visit the SSL configuration page to configure certificates and associations.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

### Step 3.3

Use the Set Up wizard to configure and enable the following items. Refer to the lab diagram handout as needed to determine station specifics, such as loopback address and host name.

Parameter/Service	Value/Setting
Root Password	Rootroot
Hostname	Varies, see lab diagram
Time Zone	The lab location's local timezone
Time	Manually set the current time
Loopback Address	Varies, see lab diagram
Allow Telnet Access	Checked
Allow SSH Access	Checked

**Juniper** NETWORKS **LONDON\_VIA\_AUTOINSTALLATION - J4300** Logged in as: root  
[Help](#) [About](#) [Logout](#)

**Monitor** **Configuration** **Diagnose** **Manage**

**Quick Configuration**

**Set Up**

**SSL**

**Interfaces**

**Users**

**SNMP**

**Routing**

**Firewall/NAT**

**IPSec Tunnels**

**Realtime Performance Monitoring**

**View and Edit**

**History**

**Rescue**

**Quick Configuration**

**Set Up**

**Identification**

\* **Host Name**  ?

**Domain Name**  ?

\* **Root Password**  ?

\* **Verify Root Password**  ?

**Time**

**Time Zone**  ?

**NTP Servers**  ?

**Current System Time**  ?

?

?

**Network**

**DNS Name Servers**  ?

**Domain Search**  ?

**Default Gateway**

**Loopback Address**  ?

**fe-0/0/0.0 Address**

**Management Access**

The following access methods are considered insecure as any information sent over them will be sent without encryption and could possibly be intercepted during transmission.

**Allow Telnet Access** ☒

**Allow JUNOScript over Clear-Text Access** ☐

The following access method is considered secure as any information sent over it will be encrypted before transmission.

**Allow SSH Access** ☒

In order to enable HTTPS or JUNOScript over SSL, you will need to visit the SSL configuration page to configure certificates and associations.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)



**Step 3.4**

When satisfied with the initial settings, click Apply to activate the changes and then OK to return to the Configuration > Quick Configuration > Summary page.

**Step 3.5**

Use the Interface wizard at the Configuration > Quick Configuration > Interfaces page to configure the network interfaces shown in the lab diagrams' Universal Topology and Addressing page; refer back to the handout as needed to determine the addressing specifics for your station.

First, configure the necessary physical interface parameters. Then, configure a physical interface description in the form of "**to Station mm-x/0/y**". Finally, add a logical interface and configure the appropriate IP address and subnet mask. Do not forget to apply your changes by clicking Apply .

Use the following chart to determine the physical interface parameters needed for serial interfaces. Note that stations using an even-numbered serial interface have a DCE cable connected and should configure that interface to provide timing by setting the Clocking Mode option to internal. (This setting is indicated by the clock icon on the Universal Topology and Addressing page.) Stations using an odd-numbered serial interface have a DTE cable connected and should configure that interface to receive timing from the adjacent station by setting the Clocking Mode option to dce (the default).

Station Pairing	Serial Interface Parameters
HongKong/SanJose	Description = " <b>to Station mm-x/0/y</b> " Encapsulation = cisco-hdlc Clocking Mode = internal or dce per instructions Clock Rate = 1.3 Mhz IPv4 Addresses and Prefixes = per diagrams
Tokyo/London	Description = " <b>to Station mm-x/0/y</b> " Encapsulation = ppp Clocking Mode = internal or dce per instructions Clock Rate = 8.0 Mhz IPv4 Addresses and Prefixes = per diagrams
Montreal/Amsterdam	Description = " <b>to Station mm-x/0/y</b> " Encapsulation = cisco-hdlc Clocking Mode = internal or dce per instructions Clock Rate = 8.0 Mhz IPv4 Addresses and Prefixes = per diagrams
Denver/SaoPaulo	Description = " <b>to Station mm-x/0/y</b> " Encapsulation = ppp Clocking Mode = internal or dce per instructions Clock Rate = 1.3 Mhz IPv4 Addresses and Prefixes = per diagrams

The sample captures show the configuration of *London's* fe-0/0/1 and se-1/0/1 interfaces:

Juniper NETWORKS LONDON - J4300 Logged in as: root  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration  
 Set Up  
 SSL  
**Interfaces**  
 Users  
 SNMP  
 Routing  
 Firewall/NAT  
 IPSec Tunnels  
 Realtime Performance Monitoring

Configuration > Quick Configuration > Interfaces

**Quick Configuration**

**Interfaces** Physical Interface: 'fe-0/0/1'

**Logical Interfaces**

No logical interfaces configured.

**Physical Interface Description** to Amsterdam fe-0/0/1

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

Juniper NETWORKS LONDON - J4300 Logged in as: root  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration  
 Set Up  
 SSL  
**Interfaces**  
 Users  
 SNMP  
 Routing  
 Firewall/NAT  
 IPSec Tunnels  
 Realtime Performance Monitoring

Configuration > Quick Configuration > Interfaces

**Quick Configuration**

**Interfaces** Logical Interface: 'fe-0/0/1.0'

**Interface Information**

**Logical Interface Description**

**IPv4 Addresses and Prefixes**

10.222.3.1 / 24

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

Juniper NETWORKS **LONDON - J4300** Logged in as: root [Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration

Set Up  
SSL  
**Interfaces**  
Users  
SNMP  
Routing  
Firewall/NAT  
IPSec Tunnels  
Realtime Performance Monitoring

View and Edit  
History  
Rescue

Configuration > Quick Configuration > Interfaces

**Quick Configuration**

**Interfaces** Physical Interface: 'se-1/0/1'

**Logical Interfaces**

No logical interfaces configured.  
[Add...](#)

**Physical Interface Description** to Tokyo se-1/0/0

**Encapsulation**

Encapsulation  [?](#)  
Enable CHAP ☐

**CHAP Local Identity**

Use System Host Name ☒  
Local Name   
\* CHAP Peer Identity   
\* CHAP Secret

**Serial Options**

MTU (bytes)  [?](#)  
Clocking Mode  (dce) [?](#)  
Clock Rate  (8.0mhz) [?](#)

[OK](#) [Cancel](#) [Apply](#)

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Juniper NETWORKS **LONDON - J4300** Logged in as: root [Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration

Set Up  
SSL  
**Interfaces**  
Users  
SNMP  
Routing  
Firewall/NAT  
IPSec Tunnels  
Realtime Performance Monitoring

View and Edit  
History  
Rescue

Configuration > Quick Configuration > Interfaces

**Quick Configuration**

**Interfaces** Logical Interface: 'se-1/0/1.0'

**Interface Information**

**Logical Interface Description**

**IPv4 Addresses and Prefixes**

/

[Add](#) [Delete](#)

[OK](#) [Cancel](#) [Apply](#)

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

## Step 3.6

When all interfaces are configured, display their operational status at the Monitor > Interfaces page. Serial interface are expected to display a Down status until both ends of the link have completed their respective configurations. The sample capture, which is taken from the *London* station, shows that all of *London*'s network interfaces are correctly configured and that all network interfaces shown on the Universal Topology and Addressing page in the lab diagram handout are operational:

### Note

Notify your instructor if your station does not display all in-use interfaces as Up once both teams have completed their configurations.

Monitor	Configuration	Diagnose	Manage																																																																																																																																																								
<ul style="list-style-type: none"> <li>System</li> <li>Chassis</li> <li><b>Interfaces</b></li> <li>Routing</li> <li>Service Sets</li> <li>Firewall</li> <li>IPSec</li> <li>NAT</li> <li>RPM</li> </ul>	<p>Monitor &gt; Interfaces</p> <h2>Interfaces</h2> <h3>Interface Summary</h3> <table> <tr> <th>Interface Name</th><th>Oper State</th><th>Admin State</th><th>Description</th></tr> <tr><td><a href="#">fe-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">fe-0/0/0.0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td></td><td>inet</td><td>Address</td><td>10.250.0.143/16</td></tr> <tr><td><a href="#">qr-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">jp-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">ls-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">mt-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">pd-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">pe-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">sp-0/0/0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">sp-0/0/0.16383</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td></td><td>inet</td><td></td><td></td></tr> <tr><td><a href="#">fe-0/0/1</a></td><td>Up</td><td>Up</td><td>to Amsterdam fe-0/0/1</td></tr> <tr><td><a href="#">fe-0/0/1.0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td></td><td>inet</td><td>Address</td><td>10.222.3.1/24</td></tr> <tr><td><a href="#">se-1/0/0</a></td><td>Down</td><td>Up</td><td></td></tr> <tr><td><a href="#">se-1/0/1</a></td><td>Up</td><td>Up</td><td>to Tokyo se-1/0/0</td></tr> <tr><td><a href="#">se-1/0/1.0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td></td><td>inet</td><td>Address</td><td>10.222.2.2/24</td></tr> <tr><td><a href="#">fe-2/0/0</a></td><td>Down</td><td>Up</td><td></td></tr> <tr><td><a href="#">fe-2/0/1</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">dsc</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">gre</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">ipip</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">lo0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">lo0.0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td></td><td>inet</td><td>Address</td><td>127.0.0.1 ⇒ 0/0</td></tr> <tr><td></td><td></td><td>Address</td><td>192.168.36.1 ⇒ 0/0</td></tr> <tr><td><a href="#">lo0.16385</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td></td><td>inet</td><td>Address</td><td>10.0.0.1 ⇒ 0/0</td></tr> <tr><td></td><td></td><td>Address</td><td>10.0.0.16 ⇒ 0/0</td></tr> <tr><td><a href="#">lsi</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">mtun</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">pimd</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">pime</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">pp0</a></td><td>Up</td><td>Up</td><td></td></tr> <tr><td><a href="#">tap</a></td><td>Up</td><td>Up</td><td></td></tr> </table>			Interface Name	Oper State	Admin State	Description	<a href="#">fe-0/0/0</a>	Up	Up		<a href="#">fe-0/0/0.0</a>	Up	Up			inet	Address	10.250.0.143/16	<a href="#">qr-0/0/0</a>	Up	Up		<a href="#">jp-0/0/0</a>	Up	Up		<a href="#">ls-0/0/0</a>	Up	Up		<a href="#">mt-0/0/0</a>	Up	Up		<a href="#">pd-0/0/0</a>	Up	Up		<a href="#">pe-0/0/0</a>	Up	Up		<a href="#">sp-0/0/0</a>	Up	Up		<a href="#">sp-0/0/0.16383</a>	Up	Up			inet			<a href="#">fe-0/0/1</a>	Up	Up	to Amsterdam fe-0/0/1	<a href="#">fe-0/0/1.0</a>	Up	Up			inet	Address	10.222.3.1/24	<a href="#">se-1/0/0</a>	Down	Up		<a href="#">se-1/0/1</a>	Up	Up	to Tokyo se-1/0/0	<a href="#">se-1/0/1.0</a>	Up	Up			inet	Address	10.222.2.2/24	<a href="#">fe-2/0/0</a>	Down	Up		<a href="#">fe-2/0/1</a>	Up	Up		<a href="#">dsc</a>	Up	Up		<a href="#">gre</a>	Up	Up		<a href="#">ipip</a>	Up	Up		<a href="#">lo0</a>	Up	Up		<a href="#">lo0.0</a>	Up	Up			inet	Address	127.0.0.1 ⇒ 0/0			Address	192.168.36.1 ⇒ 0/0	<a href="#">lo0.16385</a>	Up	Up			inet	Address	10.0.0.1 ⇒ 0/0			Address	10.0.0.16 ⇒ 0/0	<a href="#">lsi</a>	Up	Up		<a href="#">mtun</a>	Up	Up		<a href="#">pimd</a>	Up	Up		<a href="#">pime</a>	Up	Up		<a href="#">pp0</a>	Up	Up		<a href="#">tap</a>	Up	Up	
Interface Name	Oper State	Admin State	Description																																																																																																																																																								
<a href="#">fe-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">fe-0/0/0.0</a>	Up	Up																																																																																																																																																									
	inet	Address	10.250.0.143/16																																																																																																																																																								
<a href="#">qr-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">jp-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">ls-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">mt-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">pd-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">pe-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">sp-0/0/0</a>	Up	Up																																																																																																																																																									
<a href="#">sp-0/0/0.16383</a>	Up	Up																																																																																																																																																									
	inet																																																																																																																																																										
<a href="#">fe-0/0/1</a>	Up	Up	to Amsterdam fe-0/0/1																																																																																																																																																								
<a href="#">fe-0/0/1.0</a>	Up	Up																																																																																																																																																									
	inet	Address	10.222.3.1/24																																																																																																																																																								
<a href="#">se-1/0/0</a>	Down	Up																																																																																																																																																									
<a href="#">se-1/0/1</a>	Up	Up	to Tokyo se-1/0/0																																																																																																																																																								
<a href="#">se-1/0/1.0</a>	Up	Up																																																																																																																																																									
	inet	Address	10.222.2.2/24																																																																																																																																																								
<a href="#">fe-2/0/0</a>	Down	Up																																																																																																																																																									
<a href="#">fe-2/0/1</a>	Up	Up																																																																																																																																																									
<a href="#">dsc</a>	Up	Up																																																																																																																																																									
<a href="#">gre</a>	Up	Up																																																																																																																																																									
<a href="#">ipip</a>	Up	Up																																																																																																																																																									
<a href="#">lo0</a>	Up	Up																																																																																																																																																									
<a href="#">lo0.0</a>	Up	Up																																																																																																																																																									
	inet	Address	127.0.0.1 ⇒ 0/0																																																																																																																																																								
		Address	192.168.36.1 ⇒ 0/0																																																																																																																																																								
<a href="#">lo0.16385</a>	Up	Up																																																																																																																																																									
	inet	Address	10.0.0.1 ⇒ 0/0																																																																																																																																																								
		Address	10.0.0.16 ⇒ 0/0																																																																																																																																																								
<a href="#">lsi</a>	Up	Up																																																																																																																																																									
<a href="#">mtun</a>	Up	Up																																																																																																																																																									
<a href="#">pimd</a>	Up	Up																																																																																																																																																									
<a href="#">pime</a>	Up	Up																																																																																																																																																									
<a href="#">pp0</a>	Up	Up																																																																																																																																																									
<a href="#">tap</a>	Up	Up																																																																																																																																																									
Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.																																																																																																																																																											

### Step 3.7

Use the Quick Configuration Users wizard to define a lab user. Refer to the following table for the particulars of the lab account. When done, click Apply or OK to activate the changes.

User	Login Parameters
<i>lab</i>	Class = superuser Password = supplied by instructor Full name = <i>Lab user</i>

The sample capture is taken from *London*.

Juniper NETWORKS LONDON - J4300 Logged in as: root  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration

Set Up  
 SSL  
 Interfaces  
**Users**  
 SNMP  
 Routing  
 Firewall/NAT  
 IPSec Tunnels  
 Realtime Performance Monitoring

View and Edit  
 History  
 Rescue

Configuration > Quick Configuration > Users

**Quick Configuration**

**Users** **Add a User**


**User Information**

\* Username   
 Full Name   
 \* Login Class   
 \* Login Password   
 \* Verify Login Password

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

### Step 3.8

This setup completes the initial configuration for the J-Web portion of this lab. Operational monitoring of the resulting configuration occurs in the following lab. You should now display your configuration using the J-Web Configuration > View and Edit > View Configuration Text page. Your configuration should now be similar to the sample capture, which was taken from *London*:


**LONDON - J4300**
Logged in as: root
[Help](#) [About](#) [Logout](#)

Monitor
Configuration
Diagnose
Manage

[Quick Configuration](#)
[View and Edit](#)
[View Configuration Text](#)
[Edit Configuration](#)
[Edit Configuration Text](#)
[Upload Configuration File](#)
[History](#)
[Rescue](#)

[Configuration](#) > [View and Edit](#) > [View Configuration Text](#)

### View and Edit

#### View Configuration Text

The current configuration running on the router

```

version 7.1R2.2;
system {
  host-name London;
  time-zone America/Los_Angeles;
  root-authentication {
    encrypted-password "$1$oRaKXBQ1$.Elj7nDHAWtp5F7V/IX9B/";
  }
  login {
    user lab {
      full-name "Lab user";
      uid 2001;
      class superuser;
      authentication {
        encrypted-password "$1$xtBcJFZ1$yj5ZWcKWk3faPUgz6.9eQ0";
      }
    }
  }
  services {
    ssh;
    telnet;
    web-management {
      http;
    }
  }
  syslog {
    user * {
      any emergency;
    }
    file messages {
      any any;
      authorization info;
    }
    file interactive-commands {
      interactive-commands any;
    }
  }
}
interfaces {
  fe-0/0/0 {
    unit 0 {
      family inet {
        address 10.250.0.143/16;
      }
    }
  }
  fe-0/0/1 {
    description "to Amsterdam fe-0/0/1";
    unit 0 {
      family inet {
        address 10.222.3.1/24;
      }
    }
  }
  se-1/0/1 {
    description "to Tokyo se-1/0/0";
    encapsulation ppp;
    serial-options {
      clocking-mode dce;
      clock-rate 8.0mhz;
    }
    unit 0 {
      family inet {
        address 10.222.2.2/24;
      }
    }
  }
  lo0 {
    unit 0 {
      family inet {
        address 127.0.0.1/32;
        address 192.168.36.1/32;
      }
    }
  }
}

```

### Step 3.9

Return to your console connection and log out as the *root* user. Log back in as the *lab* user.

```
root@London> quit
```

```
root@London% exit
logout
```

```
London (ttyd0)
```

```
login: lab
Password:
```

```
--- JUNOS 8.1R2.2 built 2006-12-16 02:54:19 UTC
lab@London>
```

### Step 3.10

Enter configuration mode, save your current configuration as *lab2-jweb*, and log out:

```
lab@London> configure
Entering configuration mode
```

```
[edit]
lab@London# save lab2-jweb
Wrote 80 lines of configuration to 'lab2-jweb'
```

```
[edit]
lab@London# exit
Exiting configuration mode
```

```
lab@London> exit
```

```
London (ttyd0)
```

```
login:
```



Tell your instructor that you have completed the J-Web portion of this lab. If time permits, you might be instructed to proceed to the optional CLI component of this lab.

## Part 4: Perform Initial Configuration Using the CLI (Optional)

---

This part of the lab is optional. The objective is to perform typical system installation tasks using the JUNOS software CLI. Check with your instructor if you are unsure as to whether should perform this lab part.

### Step 4.1

Pipe your current configuration through the CLI's **display set** functionality to provide yourself with a cheat sheet of the command syntax you will need. The sample is taken from the *London* station:

#### Note

Some of the command syntax shown will not be needed because it is present in a factory-default configuration. Some syntax can be altered when entering the commands; for example you will enter a cleartext password so the encrypted-password keyword will not be used.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# show | display set
set version 7.1R2.2
set system host-name London
set system time-zone America/Los_Angeles
set system root-authentication encrypted-password
"$1$0RaKXBQ1$.Elj7nDHAWtp5F7V/IX9B/"
set system login user lab full-name "Lab user"
set system login user lab uid 2001
set system login user lab class superuser
set system login user lab authentication encrypted-password
"$1$xtBcJFZ1$yj5ZW0KWk3faPUgz6.9eQ0"
set system services ssh
set system services telnet
set system services web-management http
set system syslog user * any emergency
set system syslog file messages any any
set system syslog file messages authorization info
set system syslog file interactive-commands interactive-commands any
set interfaces fe-0/0/0 unit 0 family inet address 10.250.0.143/16
set interfaces fe-0/0/1 description "to Amsterdam fe-0/0/1"
set interfaces fe-0/0/1 unit 0 family inet address 10.222.3.1/24
set interfaces se-1/0/1 description "to Tokyo se-1/0/0"
set interfaces se-1/0/1 encapsulation ppp
set interfaces se-1/0/1 serial-options clocking-mode dce
set interfaces se-1/0/1 serial-options clock-rate 8.0mhz
set interfaces se-1/0/1 unit 0 family inet address 10.222.2.2/24
set interfaces lo0 unit 0 family inet address 127.0.0.1/32
set interfaces lo0 unit 0 family inet address 192.168.36.1/32

[edit]
lab@London#
```



## Step 4.2

Reload the factory-default configuration with a **load factory-default** command at the [edit] hierarchy, and display the contents. Note that the router will continue to operate with the active configuration until the next time you issue a commit.

```
[edit]
lab@London# load factory-default
warning: activating factory configuration

[edit]
lab@London# show
system {
  autoinstallation {
    delete-upon-commit; ## Deletes [system autoinstallation] upon change/
commit
  traceoptions {
    level verbose;
    flag {
      all;
    }
  }
}
services {
  web-management {
    http {
      interface [ fe-0/0/0.0 fe-0/0/1.0 ];
    }
  }
}
syslog {
  user * {
    any emergency;
  }
  file messages {
    any any;
    authorization info;
  }
  file interactive-commands {
    interactive-commands any;
  }
}
}

[edit]
root@London#
```

## Step 4.3

Delete the autoinstallation stanza in light of your manual configuration efforts.

```
[edit]
lab@London# delete system autoinstallation

[edit]
lab@London#
```

## Step 4.4

Configure your station's host name, the root password, and the *lab* user account.

```
[edit]
lab@London# edit system

[edit system]
lab@London# set host-name London

[edit system]
lab@London# set root-authentication plain-text-password
New password:
Retype new password:

[edit system]
lab@London# set login user lab class superuser

[edit system]
lab@London# set login user lab authentication plain-text-password
New password:
Retype new password:

[edit system]
lab@London#
```

## Step 4.5

Enable the Telnet and SSH services.

```
[edit system]
lab@London# set services telnet

[edit system]
lab@London# set services ssh
```

## Step 4.6

Configure the *fe-0/0/0*, loopback, and each network interface shown on the Universal Topology and Addressing page in the lab diagram handout.

Note that when configuring an IP address, omitting the network mask results in a /32 network mask. Such a mask is required on the loopback interface, but all other interfaces should specify the mask shown on the Universal Topology and Addressing page in the lab diagram handout.

For brevity's sake, only the command syntax needed for *London*'s *lo0* and *se-1/0/1* interfaces is shown.

```
[edit system]
lab@London# top edit interfaces

[edit interfaces]
lab@London# show

[edit interfaces]
lab@London# set lo0 unit 0 family inet address 192.168.36.1
```

```
[[edit interfaces]
lab@London# set se-1/0/1 description "to Tokyo se-1/0/0"
```

```
[edit interfaces]
lab@London# set se-1/0/1 unit 0 family inet address 10.222.2.2/24
```

### Step 4.7

Check your work by comparing the current configuration to the results of your J-Web session saved as *lab2-jweb* in Step 3.10. Some differences can be expected here and there, for example, the actual encryption hash values will not match. Do not commit the changes until you are sure that all major functionality is replicated.

The example taken from *London* shows only nonservice-affecting differences, so a **commit** is issued:

```
[[edit interfaces]
lab@London# top

[edit]
lab@London# show | compare lab2-jweb
[edit]
- version 7.1R2.2;
[edit system]
- time-zone America/Los_Angeles;
[edit system root-authentication]
- encrypted-password "$1$oRaKXBQ1$.Elj7nDHAwtp5F7V/IX9B/"; ## SECRET-DATA
+ encrypted-password "$1$3Mo5xGJX$1EAetGmmivnowrwd/Jp2D."; ## SECRET-DATA
[edit system login user lab]
- full-name "Lab user";
- uid 2001;
[edit system login user lab authentication]
- encrypted-password "$1$xtBcJFZl$yJ5ZWokWk3faPUgz6.9eQ0"; ## SECRET-DATA
+ encrypted-password "$1$PXIusiQZ$yXbsTqhnslnN6ZKtg0Ib6m0"; ## SECRET-DATA
[edit interfaces se-1/0/1]
- encapsulation ppp;
- serial-options {
-   clocking-mode dce;
-   clock-rate 8.0mhz;
- }
[edit interfaces lo0 unit 0 family inet]
- address 127.0.0.1/32;

[edit]
lab@London# commit
commit complete

[edit]
lab@London#
```

### Step 4.8

Save the current configuration as *lab2-cli*.

```
[edit]
lab@London# save lab2-cli
Wrote 65 lines of configuration to 'lab2-cli'
```

```
[edit]  
lab@London#
```



Tell your instructor that you have completed Lab 2.

Not For Reproduction

---

## Operational Monitoring and Maintenance (Detailed)

---

### Overview

---

This lab covers common operational monitoring and platform maintenance activities. In this lab, you monitor system, chassis, and interface operation, and perform software upgrades using the J-Web interface. An optional lab part involves the same set of tasks performed with the JUNOS software CLI.

The lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- The J-Web:
  - Load the configuration file produced by J-Web in the previous lab and save as a rescue configuration;
  - Monitor chassis and system operation;
  - Monitor interface operation; and
  - Manage the file system, licenses, and perform software upgrades.
- The CLI (optional):
  - Monitor chassis and system operation;
  - Monitor interface operation; and
  - Manage licenses and perform system snapshots and software upgrades.

## Key Commands

---

Key operational-mode commands used in this lab include the following:

```
?  
configure  
file delete  
file list  
file show  
monitor interfaces  
monitor traffic  
request system license  
request system reboot  
request system snapshot  
request system software add  
show chassis  
show configuration  
show interfaces  
show system  
show version
```

## Part 1: Reload and Commit the Previous J-Web Configuration

---

### Step 1.1

In the previous lab you saved your initial configuration, as created through the J-Web interface, to a file called *lab2-jweb*. To ensure that all stations begin this lab in a known state, you should now use the CLI to **load** and **commit** this configuration file.


```
lab@London> configure  
Entering configuration mode  
  
[edit]  
lab@London# load override lab2-jweb  
load complete  
  
[edit]  
lab@London# commit and-quit  
commit complete  
Exiting configuration mode
```

### Step 1.2

Launch your browser and open a J-Web session to your assigned station. Log in as the *lab* user.

### Step 1.3

Save the current configuration as a rescue configuration at the Configuration > Rescue page. Click the Set rescue configuration link, and then confirm by clicking OK. The sample capture was taken at *London*:


LONDON - J4300
Logged in as: lab

[Help](#)
[About](#)
[Logout](#)

Monitor
Configuration
Diagnose
Manage

[Configuration > Rescue](#)

- ▶ Quick Configuration
- ▶ View and Edit
- ▶ History
- ▶ Rescue

## Rescue

If you inadvertently commit a configuration that denies management access, the only recourse may be to connect the console. The rescue configuration gives you another alternative. The rescue configuration is a configuration you know will allow management access to the router.

Press and immediately release the Config button on the chassis to cause the router to load and commit the rescue configuration. This will put the router back into a manageable state. You must have set the rescue configuration for this feature to function properly.

### View Rescue Configuration

The rescue configuration for the router has been set. To view the rescue configuration, click the link below.

[View rescue configuration](#)

### Set or Delete Rescue Configuration

Clicking 'Set rescue configuration' will set the rescue configuration to the current running configuration of the router. Clicking 'Delete rescue configuration' will delete the rescue configuration.

[Set rescue configuration](#)

[Delete rescue configuration](#)

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

#### Note

Once saved, you can recall the rescue configuration from J-Web, the CLI, or by performing a momentary depression of the front-panel CONFIG button

## Part 2: Monitor System and Chassis Operation Using J-Web

### Step 2.1

Use J-Web to monitor system status at the Monitor > System page. Your display should be similar to the example taken at *London*:

Juniper NETWORKS **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage [Monitor > System](#)

System  
 Chassis  
 Interfaces  
 Routing  
 Service Sets  
 Firewall  
 IPSec  
 NAT  
 RPM

### System

#### System Identification

Serial Number	JN001924AB
JUNOS Software Version	7.1R2.2
Router Hostname	London
Router IP Address	Could not resolve hostname
Loopback Addresses	127.0.0.1, 192.168.36.1
Time Zone	America/Los_Angeles

#### System Time

	Date Time	Time Length	User
Current Time	2005-04-25 01:45:58 PDT		
System Booted Time	2005-04-14 05:08:19 PDT	1w3d 20:37	
Protocol Started Time	2005-04-14 05:08:50 PDT	1w3d 20:37	
Last Configured Time	2005-04-25 01:40:08 PDT	00:05:50	lab

Active User Count: 1  
 Load Averages (1/5/15 minutes): 0.08/0.04/0.01

#### Users

User	TTY	From	Login Time	Idle Time	Command
lab	d0	-	1:17AM	5	-cli (cli)

#### Memory Usage

Total Memory Available: 256M  
 Total Memory Used: 188M 73.43%

#### Top 5 Memory Consuming Processes

Process ID	Process Owner	Process Name	CPU Usage	Memory Usage
2392		Forwarding Daemon	3.37%	88M 35.22%
9994	root	Management Daemon	0%	10M 4.15%
59	root	mount_mfs	0%	9M 3.5%
2388		Management Daemon	0%	7M 2.63%
9925	lab	cli	0%	4M 1.65%

[Show complete process information](#)

#### CPU Usage

Total CPU Used: 4.54%

#### Top 5 CPU Consuming Processes

Process ID	Process Owner	Process Name	CPU Usage	Memory Usage
2392		Forwarding Daemon	3.37%	88M 35.22%
2385		Chassis Daemon	0.1%	3M 1.05%
9994	root	Management Daemon	0%	10M 4.15%
9925	lab	cli	0%	4M 1.65%
2480		Interface Daemon	0%	2M 0.87%

[Show complete process information](#)

#### System Storage

Primary Compact Flash (Boot Device)		Removable Compact Flash	USB
Total Flash Size	256M	Total Flash Size	256M
Usable Flash Size	131M		This device is not installed.
Flash Used	33M		
	25.23%		

#### File System Usage:

Log Files	1.9M
Temporary Files	11K
Crash (Core) Files	2.0K
Database Files	73K

[Manage file system usage](#)

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).



## Step 2.2

Use the J-Web display to answer the following questions:

Question: What user last changed the configuration?

---

Answer: The *lab* user should be shown as having issued the last commit.

Question: What process is currently using the most CPU time?

---



---

Answer: The answer can vary, but in the sample capture, the forwarding process is using the most CPU time at a whopping 3.37%.

Question: How much capacity remains on the current boot device?

---



---

Answer: The answer will vary. The sample capture shows that 33 MB of the usable 131 MB is used.

## Step 2.3

Monitor chassis operation at the Monitor > Chassis page. Your display should be similar to the example taken at *London*:

Juniper NETWORKS **LONDON - J4300** Logged in as: lab [Help](#) [About](#) [Logout](#)

**Monitor** Configuration Diagnose Manage

Monitor > Chassis

**Chassis**

**Alarm Summary**  
Currently, no alarms are active.

**Environment Information**

**Chassis Component Temperature**

Name	Gauge Status	Temperature
Routing Engine	OK	Normal at 29° C (84° F)
Jseries CPU fan	OK	Spinning at high speed
Jseries Chassis fan	OK	Spinning at high speed

**Hardware Summary**

**Router Model: J4300** **Serial Number: JN002425AB**

Name	Version	Part Number	Serial Number	Description
Midplane	REV 05	710-010001	ad04360715	
System IO	REV 07	710-010003	AE04460769	System IO board
Routing Engine	REV 08	750-010005	btrd43100219	RE-J.2
FPC 0				FPC
PIC 0				2x FE
FPC 1	REV 04	750-010356	AG04470416	FPC
PIC 0				2x Serial
FPC 2	REV 04	750-010353	AF04451849	FPC
PIC 0				2x FE

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

## Step 2.4

Use the display to answer the following questions:

Question: Are any alarms currently active?

---



---

Answer: The answer should be no, as reflected in the sample capture.

Question: What is the current temperature of the RE?

---

Answer: The answer varies, but the sample capture shows a normal temperature condition at 28 degrees Celsius.

## Step 2.5


Click the + next to PIC 0 in FPC2, and answer the following question:

Question: What is the assembly version and serial number of this PIC?

---

---

Answer: The answer varies, but the sample capture shows the PIC assembly version as 03.04. To locate the serial number for the PIC or PIM in this case, simply look at the serial number listed for the FPC, which is AF04451849. This is because the J-series PIM is equivalent in functionality to both the FPC and PIC, which are separate components on the M/T-series routers.


**LONDON - J4300**
Logged in as: lab
[Help](#) [About](#) [Logout](#)

**Monitor** Configuration Diagnose Manage

[Monitor > Chassis](#)

- System
- Chassis**
- Interfaces
- Routing
- Class of Service
- MPLS
- Service Sets
- Firewall
- IPSec
- NAT
- DHCP
- RPM
- PPPoE

## Chassis

### Alarm Summary

Currently, no alarms are active.

### Environment Information

#### Chassis Component Temperature

Name	Gauge Status	Temperature
Routing Engine	OK	Normal at 29° C (84° F)
Jseries CPU fan	OK	Spinning at high speed
Jseries Chassis fan	OK	Spinning at high speed

### Hardware Summary

**Router Model: J4300**
**Serial Number: JN002425AB**

Name	Version	Part Number	Serial Number	Description
Midplane	REV 05	710-010001	ad04360715	
System IO	REV 07	710-010003	AE04460769	System IO board
Routing Engine	REV 08	750-010005	btrd43100219	RE-J.2
FPC 0				FPC
PIC 0				2x FE
FPC 1	REV 04	750-010356	AG04470416	FPC
PIC 0				2x Serial
FPC 2	REV 04	750-010353	AF04451849	FPC
PIC 0				2x FE

Jedec Code	0x7fb0	Assembly Version	03.04
EEPROM Version	0x01	Date	12-07-2004
Part Number	.....	Assembly Flags	0x00
Serial Number	.....	I2C Version	.....
Assembly ID	0x0607	ID	2x FE

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice.](#)

## Part 3: Monitor Interface Operation Using J-Web

### Step 3.1

Display interface status using J-Web at the Monitor > Interfaces page, and use the display to answer the following questions.

Juniper NETWORKS LONDON - J4300 Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

System  
 Chassis  
**Interfaces**  
 Routing  
 Service Sets  
 Firewall  
 IPSec  
 NAT  
 RPM

Monitor > Interfaces

### Interfaces

#### Interface Summary

Interface Name	Oper State	Admin State	Description
<a href="#">fe-0/0/0</a>	Up	Up	
<a href="#">fe-0/0/0.0</a>	Up	Up	
	inet	Address	10.250.0.143/16
<a href="#">gr-0/0/0</a>	Up	Up	
<a href="#">ip-0/0/0</a>	Up	Up	
<a href="#">ls-0/0/0</a>	Up	Up	
<a href="#">mt-0/0/0</a>	Up	Up	
<a href="#">pd-0/0/0</a>	Up	Up	
<a href="#">pe-0/0/0</a>	Up	Up	
<a href="#">sp-0/0/0</a>	Up	Up	
<a href="#">sp-0/0/0.16383</a>	Up	Up	
	inet		
<a href="#">fe-0/0/1</a>	Up	Up	to Amsterdam fe-0/0/1
<a href="#">fe-0/0/1.0</a>	Up	Up	
	inet	Address	10.222.3.1/24
<a href="#">se-1/0/0</a>	Down	Up	
<a href="#">se-1/0/1</a>	Up	Up	to Tokyo se-1/0/0
<a href="#">se-1/0/1.0</a>	Up	Up	
	inet	Address	10.222.2.2/24
<a href="#">fe-2/0/0</a>	Down	Up	
<a href="#">fe-2/0/1</a>	Up	Up	
<a href="#">dsc</a>	Up	Up	
<a href="#">gre</a>	Up	Up	
<a href="#">ipip</a>	Up	Up	
<a href="#">lo0</a>	Up	Up	
<a href="#">lo0.0</a>	Up	Up	
	inet	Address	127.0.0.1 ⇒ 0/0
		Address	192.168.36.1 ⇒ 0/0
<a href="#">lo0.16385</a>	Up	Up	
	inet	Address	10.0.0.1 ⇒ 0/0
		Address	10.0.0.16 ⇒ 0/0
<a href="#">lsi</a>	Up	Up	
<a href="#">mtun</a>	Up	Up	
<a href="#">pimd</a>	Up	Up	
<a href="#">prime</a>	Up	Up	
<a href="#">pp0</a>	Up	Up	
<a href="#">tap</a>	Up	Up	

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

Question: Are any of the interfaces listed on the Universal Topology and Addressing page in the lab diagram handout shown as being administratively or operationally down?

---

---

Answer: The answer should be no. The sample capture, taken from *London*, confirms that all in-use interfaces are both administratively and operationally up.

### Step 3.2

Obtain device-level details about the `fe-0/0/0` interface by clicking the `fe-0/0/0` link. Use the resulting display to answer the following questions. The sample capture is again taken from *London*.

Not For Reproduction

**Juniper** NETWORKS LONDON - J4300 Logged in as: lab

[Help](#) [About](#) [Logout](#)

---

**Monitor** Configuration Diagnose Manage [Monitor > Interfaces](#)

---

[System](#)  
[Chassis](#)  
[Interfaces](#)  
[Routing](#)  
[Service Sets](#)  
[Firewall](#)  
[IPSec](#)  
[NAT](#)  
[RPM](#)

---

## Interfaces

---

**Interface: fe-0/0/0**

**fe-0/0/0**

<b>State</b>	<span style="color: green;">Up</span>	<b>Loopback</b>	disabled
<b>Admin State</b>	<span style="color: green;">Up</span>	<b>Source Filtering</b>	disabled
<b>SNMP Index</b>	29	<b>Current Address</b>	00:05:85:c8:03:d0
<b>Local Index</b>	136	<b>Hardware Address</b>	00:05:85:c8:03:d0
<b>MTU</b>	1514	<b>Hold Times</b>	up 0 ms, down 0 ms
<b>Speed</b>	100mbps	<b>Last flapped</b>	2005-04-14 05:12:42 PDT (1w3d 20:42 ago)
<b>Link Type</b>	Ethernet	<b>Statistics cleared</b>	Never

**Device Flags** Present Running

**Config Flags** SNMP-Traps

**Media Flags**

**Active alarms** None

**Active defects** None

**Autonegotiation status** complete

**Link partner status** ok

**Link partner** full-duplex

**Flow control** None

Traffic statistics	Packets	PPS	Bytes	BPS
Input	66009	0	6025079	0
Output	11484	0	9035439	0

Errors	14305
Drops	0
Framing errors	0
Runts	0
Policed discards	1694
L3 incompletes	0
L2 channel errors	0
L2 mismatch timeouts	0
FIFO errors	0

Carrier transitions	1
Errors	0
Drops	0
Collisions	0
Aged packets	0
FIFO errors	0
HS link CRC errors	0

[Queue counters](#)

[Ethernet MAC Statistics](#)

[Ethernet Filter Statistics](#)

[PFE Information](#)

[Class of Service Information](#)

fe-0/0/0.0  
Encapsulation: ENET2

<b>Family:</b> inet	<b>MTU:</b> 1500	<b>Flags:</b> <span style="border: 1px solid black; padding: 2px;">Is-Primary</span>	<b>Route Table:</b> 0
<b>Local</b>	<b>Destination</b>	<b>Broadcast</b>	<b>Flags</b>
10.250.0.143	10.250.16	10.250.255.255	<span style="border: 1px solid black; padding: 2px;">Is-Preferred</span> <span style="border: 1px solid black; padding: 2px;">Is-Primary</span>

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Question: Is source MAC address filtering currently enabled?

---

---

Answer: No, the Source Filtering field indicates that the feature is disabled.

Question: Are any alarms or defects currently being reported?

---

---

Answer: No, the sample capture shows that no alarms or defects are present.

Question: Have any policed discards occurred? (Note that a policed discard indicates that an unconfigured protocol was received on that interface—for example, the receipt of IPX or the Cisco Discovery Protocol (CDP).)

---

---

Answer: The sample capture shows that 1694 policed discards have occurred.

Question: What is the current packet-per-second (PPS) rate for both the send and receive directions?

---

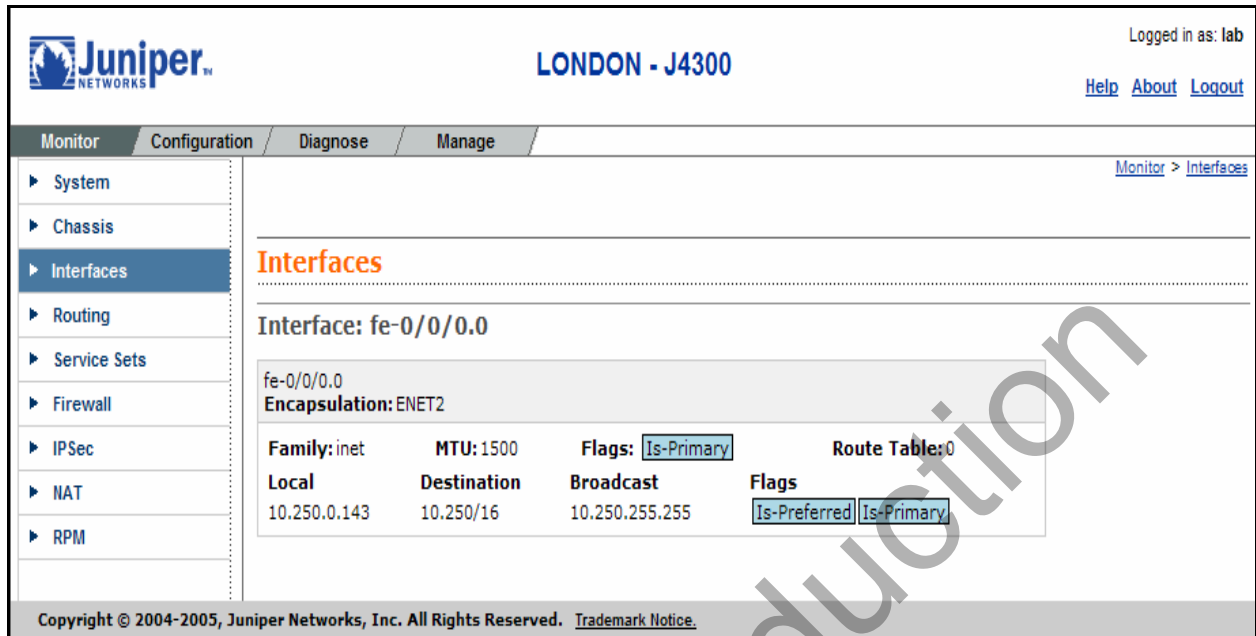
---

Answer: The answer can vary, but in the sample capture there is no traffic (0 PPS) in either direction.

### Step 3.3

Return to the previous page and click the fe-0/0/0.0 link to display information about the logical interface's parameters. Use the display to answer the related questions.





Juniper NETWORKS LONDON - J4300

Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

System Chassis Interfaces Routing Service Sets Firewall IPSec NAT RPM

Monitor > Interfaces

### Interfaces

Interface: fe-0/0/0.0

fe-0/0/0.0  
Encapsulation: ENET2

Family: inet	MTU: 1500	Flags: Is-Primary	Route Table: 0
Local	Destination	Broadcast	Flags
10.250.0.143	10.250/16	10.250.255.255	Is-Preferred Is-Primary

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

Question: What protocol family is configured on this unit?


Answer: The inet family is configured. This is the IPv4 family that provides IP, ARP, and ICMP support over this interface.

### Step 3.4

Use the J-Web diagnose function at the Diagnose page to generate some combination of pings and traceroutes to all directly attached neighbors. The lack of a routing protocol means you must limit your pings to directly connected neighbors' addresses; pings to loopback addresses will fail.

Question: Are the pings and traceroutes successful?

Answer: All pings and traceroutes to directly attached neighbors should pass. The following capture is taken from *London* and shows a successful ping to *Tokyo*:



LONDON - J4300

Logged in as: lab

[Help](#)
[About](#)
[Logout](#)

Monitor
Configuration
Diagnose
Manage

▶ Ping Host
▶ Ping MPLS
▶ Traceroute

### Ping Host

#### Ping 10.222.2.1

```

PING 10.222.2.1 (10.222.2.1): 56 data bytes
64 bytes from 10.222.2.1: icmp_seq=0 ttl=255 time=14.800 ms
64 bytes from 10.222.2.1: icmp_seq=1 ttl=255 time=10.318 ms
64 bytes from 10.222.2.1: icmp_seq=2 ttl=255 time=25.599 ms
64 bytes from 10.222.2.1: icmp_seq=3 ttl=255 time=10.339 ms
64 bytes from 10.222.2.1: icmp_seq=4 ttl=255 time=10.301 ms
64 bytes from 10.222.2.1: icmp_seq=5 ttl=255 time=20.363 ms
64 bytes from 10.222.2.1: icmp_seq=6 ttl=255 time=20.349 ms
64 bytes from 10.222.2.1: icmp_seq=7 ttl=255 time=20.413 ms
64 bytes from 10.222.2.1: icmp_seq=8 ttl=255 time=10.540 ms
64 bytes from 10.222.2.1: icmp_seq=9 ttl=255 time=20.413 ms
--- 10.222.2.1 ping statistics ---
10 packets transmitted, 10 packets received, 0% packet loss
round-trip min/avg/max/stddev = 10.301/16.343/25.599/5.440 ms

```

OK

[Diagnose](#) > [Ping Host](#)

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

### Note

Notify your instructor if you experience reachability problems to any directly attached neighbor addresses.

## Part 4: License Management, File System Maintenance, and Software Upgrades: J-Web

### Step 4.1

Display licensing status for your router by accessing the Manage > Licenses page. Use the display to answer the related questions. The sample capture was obtained at *Denver*:

The screenshot shows the Juniper J-Web interface for a router named 'DENVER - J4300'. The 'Manage' tab is selected, and the 'Licenses' sub-tab is active. The left sidebar contains links for Files, Software, Licenses, Reboot, and Snapshot. The main content area is titled 'Licenses' and includes a 'Feature Summary' table and an 'Installed Licenses' section.

**Feature Summary**

Feature	Licenses Used	Licenses Installed	Licenses Needed
Stateful firewall	0	1	0
IPSec VPN tunnelling	0	1	0
One additional serial port	0	1	0
One additional fast ethernet port	0	1	0
J-FLOW traffic analysis (CFLOW reporting)	0	1	0
Service Level Agreement monitoring	0	1	0
Border Gateway Protocol route reflection	0	1	0

**Installed Licenses**

Buttons: Add..., Delete, Display Keys..., Download Keys

ID	State	Version	Group	Enabled Features
<input type="checkbox"/> G03000000597	valid	2	No group information	One additional serial port One additional fast ethernet port J-FLOW traffic analysis (CFLOW reporting) Service Level Agreement monitoring Border Gateway Protocol route reflection Stateful firewall IPSec VPN tunnelling

Buttons: Add..., Delete, Display Keys..., Download Keys

Copyright © 2004-2006, Juniper Networks, Inc. All Rights Reserved. Trademark Notice. Privacy. Juniper your Net.

Question: Does your device require any additional licensing?

Answer: The answer should be no. The sample capture shows that *Denver* requires zero (0) additional licenses.

Question: Does your device have a group license installed?

---

Answer: In this example the router does not have a group license installed. It has a single device license that enables several features. These features include Stateful firewall, IPSec VPN, J-FLOW, SLA monitoring, Advanced BGP, One additional serial port, and One additional fast ethernet port.

## Step 4.2

Save all license key data for your device to your PC desktop using the Download Keys button. You might have to perform this step twice if your router has both a group and a device license.

## Step 4.3

Delete the license data from your device by checking each key and clicking Delete Keys. Confirm the action by clicking OK in the resulting dialogue box.

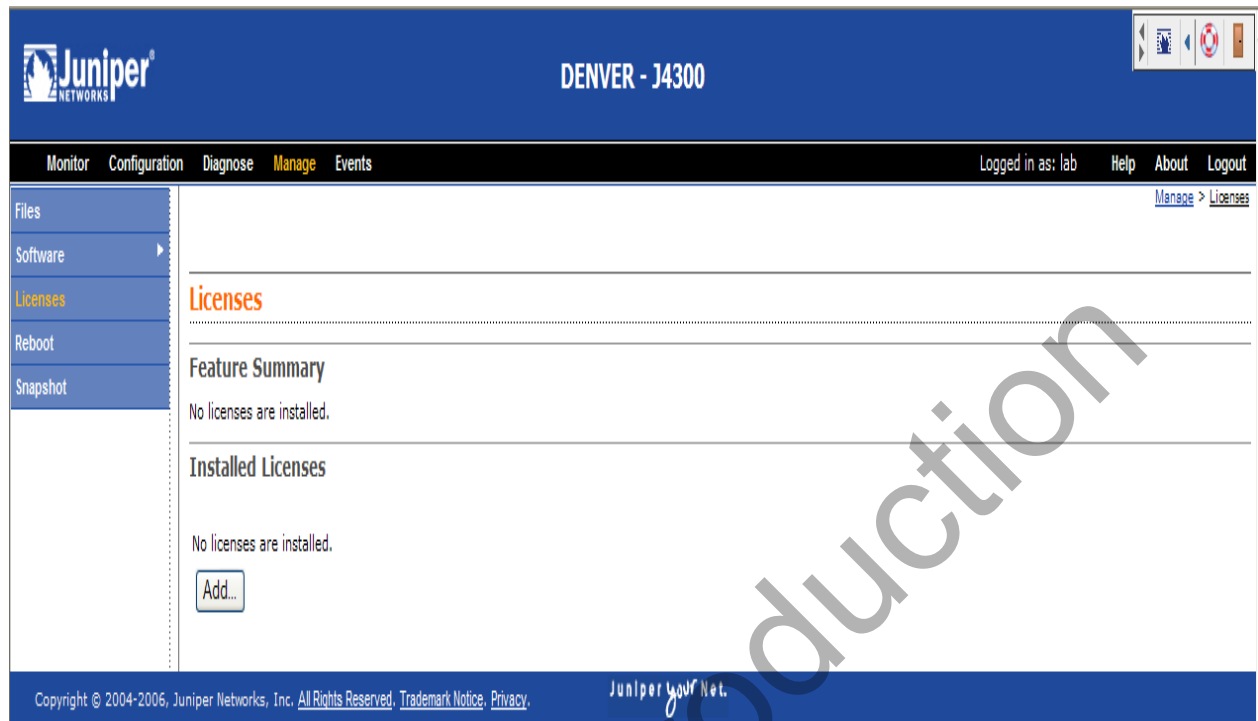
Make sure that you have saved these licenses to your PC desktop as instructed in the previous step before performing these actions!

Question: How does the J-Web licensing page change as a result of your actions?

---

---

Answer: The page should refresh and indicate that no licenses are installed. This condition is evident in the sample capture obtained at *Denver*:



#### Step 4.4

Create a minimal configuration on your router for BGP route reflection by going to the Configuration > View and Edit > Edit Configuration > Protocols > Bgp page, clicking in the Cluster box, adding a value of **100**, clicking Commit, and clicking OK on the summary of changes page. The sample capture is taken from *Denver*:

**Juniper NETWORKS** DENVER - J4300

Monitor **Configuration** Diagnose Manage Events Logged in as: lab Help About Logout

[Configuration](#) > [View and Edit](#) > [Edit Configuration](#) > [Protocols](#) > [Bgp](#)

**Configuration**  
Expand all | Hide all |  
+ system  
+ interfaces

**Protocols**  
**Bgp**

OK Cancel Refresh Commit... Discard...

Advertise inactive ☐ Yes

Advertise peer as ☐ Yes ☐ No

Authentication algorithm

Authentication key  ?

Authentication key chain  ?

Cluster  100 ? M

Damping ☐ Yes

Description  ?

Disable ☐ Yes

Graceful restart ☐ Yes

Hold time  ?

Include mp next hop ☐ Yes

Ipsec sa  ?

Keep

Local address  ?

Local interface  ?

Local preference  ?

Log updown ☐ Yes

Metric out [Configure](#)

Mtu discovery ☐ Yes

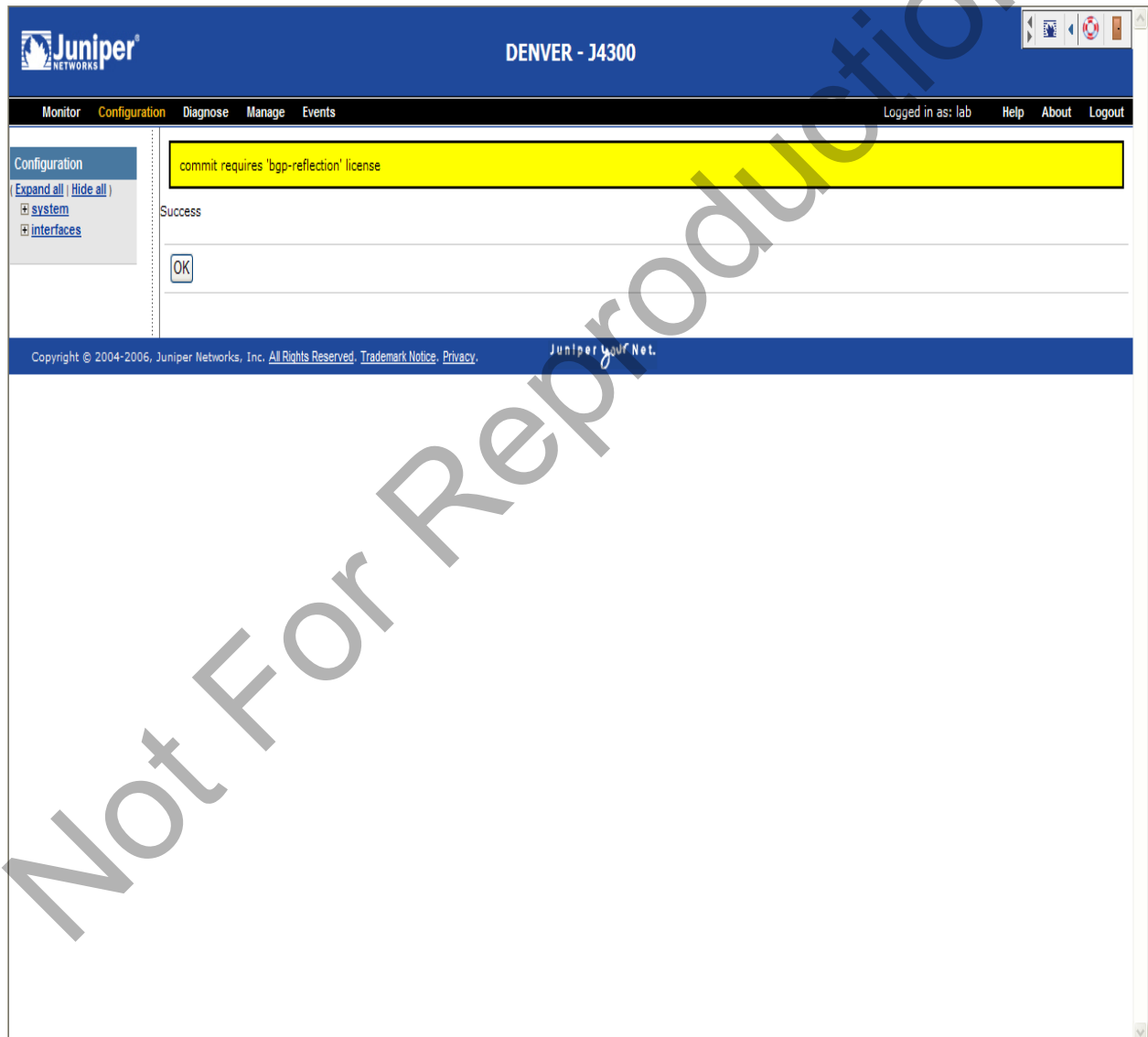
Multihop ☐ Yes

Question: What message do you receive when you commit your interface configuration by clicking OK?

---

---

Answer: The page should display a warning indicating that a BGP reflection license is required. This condition is evident in the sample capture obtained at *Denver*:



#### Step 4.5

Return to the Manage > Licenses page. The sample capture is taken from *Denver*:

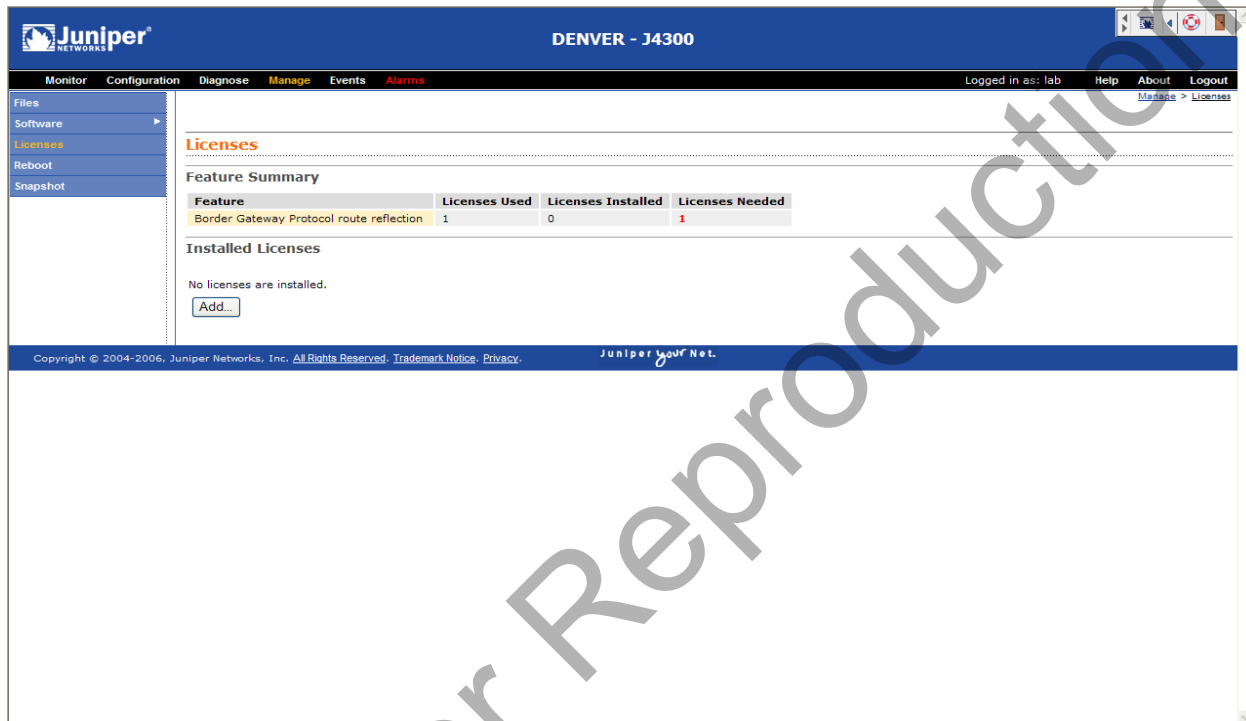
Question: What do you notice about the Border Gateway Protocol route reflection row?

---



---

Answer: The page should display that one license is needed. This is shown in the sample capture obtained at *Denver*:



#### Step 4.6

License files for all lab routers are saved in the licenses subdirectory on your local router.

Attempt to add the license for the instructor router to your station by using the Add... button and entering **licenses/Sydney.lic** in the resulting *License File URL* text box, as shown in the sample capture obtained at *Denver*:

#### Note

Because the JUNOS software is based on UNIX, all filenames are case sensitive. Ensure that you specify the License File URL exactly as specified.



Monitor Configuration Diagnose **Manage** Events Alarms Logged in as: lab Help About Logout

Files  
Software  
**Licenses**  
Reboot  
Snapshot

### Licenses

#### Add License

Enter a valid URL to the license file to add, or paste the text of the license file below. (Multiple keys separated by a blank line)

License File URL

License Key Text

Copyright © 2004-2006, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#) [Privacy](#) Juniper *your* Net.

Question: How does the J-Web licensing page change as a result of your actions?

---

---

Answer: You should see an error indicating that the license you tried to load is tied to a device with a different serial number. This error is demonstrated in the capture taken from *Denver*:

**Juniper NETWORKS** DENVER - J4300

Monitor Configuration Diagnose **Manage** Events Alarms Logged in as: lab Help About Logout

Files  
Software  
**Licenses**  
Reboot  
Snapshot

**Licenses**

**Add License**

The following errors occurred while adding a license:

- G03000000567: license is for device: [JN000721AB], serial number of device is: [JN001919AB]

Enter a valid URL to the license file to add, or paste the text of the license file below. (Multiple keys separated by a blank line)

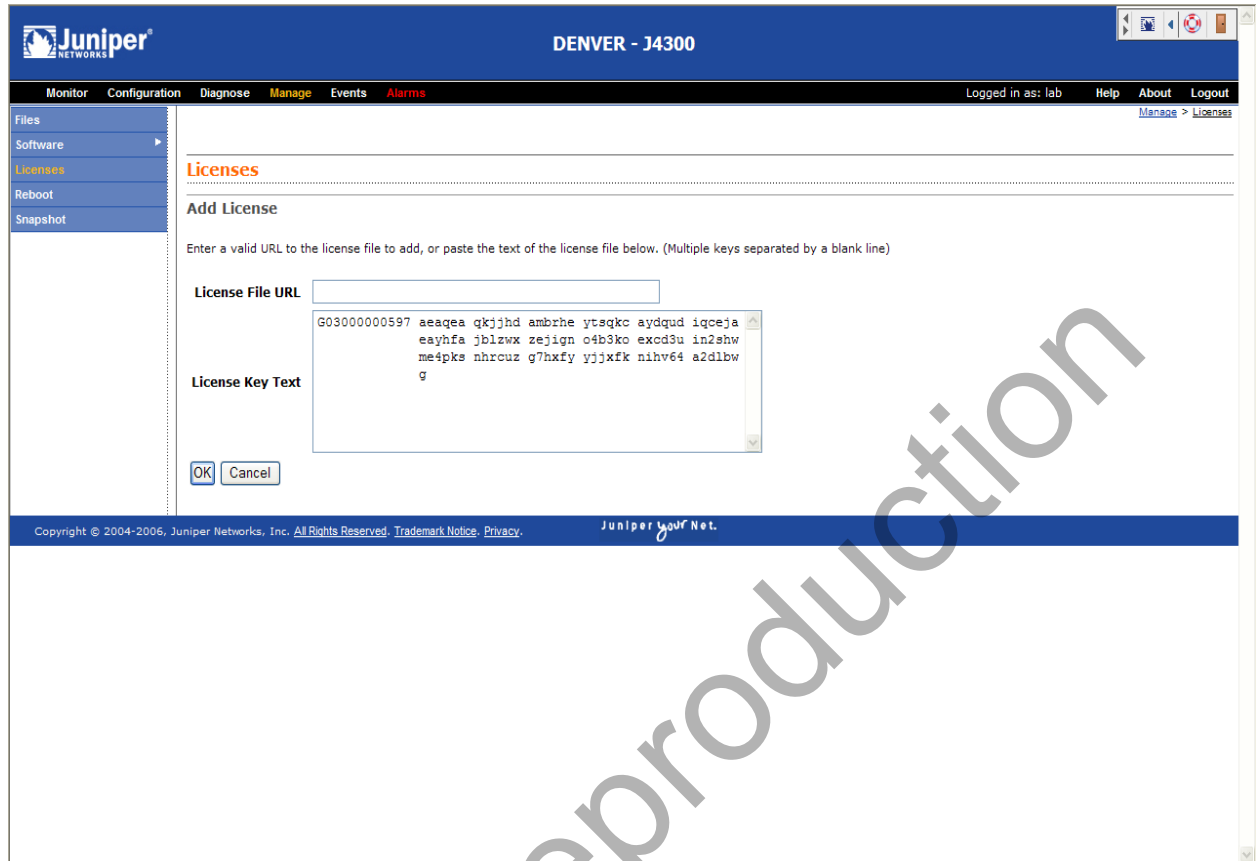
License File URL

License Key Text

Copyright © 2004-2006, Juniper Networks, Inc. All Rights Reserved. Trademark Notice. Privacy. Juniper your Net.

#### Step 4.7

Legitimize yourself by uploading the license key(s) that you saved to your PC desktop in Step 4.2. You will need to open the license key with a text editor so that you can paste the key data into the browser window. The file that was saved should have a name of the form host.lic, where host is your station's assigned host name. The capture shows *Denver*'s key data correctly pasted into the Add License page:



### Step 4.8

Access the File System Clean Up wizard at the Manage > Files page. Use the display to answer the following questions.

Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor / Configuration / Diagnose / **Manage**

[Manage > Files](#)

**Files**

**Clean Up Files**

If you are running low on storage space on your router, you can click on the "Clean Up Files" button below. By doing so, the router will perform the following:

- Rotate your log files
- Delete log files in /var/log that are not currently being written to
- Delete temporary files in /var/tmp that have not been touched in 2 days
- Delete all crash files in /var/crash

Alternatively, you can click on the "File Type" group name below to manually download and delete individual files.

[Clean Up Files](#)

**Download and Delete Files**

File Type	Directory	Usage
<a href="#">Log Files</a>	/cf/var/log	1.5M
<a href="#">Temporary Files</a>	/cf/var/tmp	28M
<a href="#">Crash (Core) Files</a>	/cf/var/crash	2.0K

**Delete Backup JUNOS Package**

There is no backup JUNOS package.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Question: Approximately how much free space could be made available by running the File System Clean Up wizard?

---



---

Answer: The answer will vary. The sample capture indicates that some 29.5 MB could be freed up on *London*.

Question: Is there a backup software package on your station?

---

---

Answer: Again, the answer will vary. The sample capture shows that *London* does not have a backup software package present. A backup package is used with the **request system software rollback** command to return to the previous software environment. If this capability is not needed, it is safe to delete the backup package.

### Step 4.9

Delete any temporary files, crash files, and backup software packages, and rotate your logs to free up as much storage space as possible. Start with the Clean Up Files link, and then click the Delete backup JUNOS package link if applicable to your station.

#### Note

---

Because some files are owned by *root*, you might see an occasional error regarding the inability to delete a file. You can log in to J-Web as *root* to delete these files if needed; this level of file cleanup is normally not required.

---

### Step 4.10

Upgrade (or downgrade) the software at your station by installing a JUNOS software package from the classroom file server. Begin by accessing the Manage > Software page, and then click the Specify A Package Location link. Your instructor will inform you of the IP address for the FTP server. Populate the various fields in the resulting display with the file transfer parameters specified below:


**Package Location:** `ftp://server-address/ojre/junos-jseries-domestic.tgz`

**User:** `ftp`

**Password:** `ftp`

**Reboot If Required:** `yes`

The sample captures are taken from *London*; they show the proper file transfer settings and a transfer that is underway. It might take a few moments for the transfer to complete and the resulting reboot to occur. You might want to access the console port during this time to monitor the status of your station.


**LONDON - J4300**
Logged in as: lab
[Help](#) [About](#) [Logout](#)

**Monitor** / **Configuration** / **Diagnose** / **Manage** / **Alarms**

[Manage](#) > [Software](#) > [Install Package](#)

**Files**  
**Software**  
**Install Remote**  
Downgrade  
**Licenses**  
**Reboot**  
**Snapshot**

### Software

## Install Package

You can instruct the router to retrieve a software package from a remote server by specifying the location below.


\* **Package Location**  ?

**User**  ?

**Password**  ?

**Reboot If Required** ☒ ?

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice.](#)


**LONDON - J4300**
Logged in as: lab
[Help](#) [About](#) [Logout](#)

**Monitor** / **Configuration** / **Diagnose** / **Manage**

[Manage](#) > [Software](#) > [Install Remote](#)

**Files**  
**Software**  
Upgrade Progress  
**Licenses**  
**Reboot**  
**Snapshot**

### Software

## Install Remote

### Installing Package From Remote Server

Installation of software package from 10.250.0.254 is underway.

Installation complete.

The installation requires a reboot which will now be carried out.

Installation Progress	
finished	Receive Package File
finished	Validate Package File
finished	Check Configuration Compatibility
finished	Install Package
NOW	Reboot

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice.](#)



Tell your instructor that you have completed the J-Web portion of this lab. If time permits, you might be instructed to proceed to the optional CLI component of this lab.

## Part 5: Monitor System and Chassis Operation Using the CLI (Optional)

### Step 5.1

Monitor system status by issuing **show system** CLI commands with the **processes**, **software**, **statistics**, **storage**, **uptime**, and **users** switches.

Sample command output taken from *London* is shown.

```
lab@London> show system storage
```

Filesystem	Size	Used	Avail	Capacity	Mounted on
/dev/ad0s1a	131M	64M	66M	49%	/
devfs	16K	16K	0B	100%	/dev/
/dev/vn0	73M	73M	0B	100%	/junos
/cf	131M	63M	66M	49%	/junos/cf
devfs	16K	16K	0B	100%	/junos/dev/
/dev/ad0s1e	24M	8.0K	24M	0%	/config
procfs	4.0K	4.0K	0B	100%	/proc
mfs:59	62M	5.0M	52M	9%	/mfs
mfs:1962	46M	1.0K	43M	0%	/jail/tmp
mfs:1964	7.7M	1.0K	7.1M	0%	/jail/var/etc
mfs:1966	23K	1.0K	21K	5%	/jail/dev
mfs:1968	1.9M	1.0K	1.8M	0%	/jail/html/oem

```
lab@London> show system uptime
Current time: 2005-04-25 04:07:09 PDT
System booted: 2005-04-25 03:25:47 PDT (00:41:22 ago)
Protocols started: 2005-04-25 03:26:16 PDT (00:40:53 ago)
Last configured: 2005-04-25 01:40:08 PDT (02:27:01 ago) by lab
4:07AM PDT up 41 mins, 1 user, load averages: 0.02, 0.03, 0.00
```

```
lab@London> show system users
4:07AM PDT up 41 mins, 1 user, load averages: 0.02, 0.03, 0.00
```

USER	TTY	FROM	LOGIN@	IDLE	WHAT
lab	d0	-	3:58AM	-	-cli (cli)

### Step 5.2

Monitor chassis operation by issuing **show chassis** commands including switches like **alarms**, **environment**, **routing-engine**, and **fpc**.

Question: What is the temperature and status of the RE?

Answer: All environmental conditions should be normal. The sample capture shows a temperature of 30 degrees Celsius:

```
lab@London> show chassis environment
```

Class	Item	Status	Measurement
Temp	Routing Engine	OK	30 degrees C / 86 degrees F
Fan	Fan 0	OK	
	Fan 1	OK	

Question: What CLI command displays the assembly version of the PIM installed in slot 2?

Answer: Issue a **show chassis pic fpc-slot 2 pic-slot 0** or a **show chassis hardware extensive** command:

```
lab@London> show chassis pic fpc-slot 2 pic-slot 0
```

PIC fpc slot 2 pic slot 0 information:

Type	2x FE
State	Online
PIC version	3.4
Uptime	51 minutes, 13 seconds

## Part 6: Monitor Interface Operation Using the CLI (Optional)

### Step 6.1

Display details about a serial interface with an attached neighbor using a **show interfaces interface-name** command. Use the output to answer the related questions. You might want to include the **terse**, **detail** or **extensive** switches. Do not forget to make use of the CLI's **match** function to save some time and effort!

Question: How many CoS queues are supported on this interface?

Answer: J-series platforms support eight (8) queues:

```
lab@London> show interfaces se-1/0/1 | match cos
```

CoS queues : 8 supported



Question: How many packets per second are being sent and received over this interface?

---

---

Answer: The answer can vary. Use the **extensive** switch to see traffic statistics. The sample capture shows very little traffic at *London*:

```
lab@London> show interfaces se-1/0/1 extensive | match pps
Input  packets:                651                0 pps
Output packets:                651                0 pps
```

Question: Have any errors occurred, and if so, should you be concerned?

---

---

Answer: Include the **extensive** switch to see error counts. As long as errors are not incrementing, you can probably chalk them up to transient phenomena. Use a **clear interfaces statistics** command to reset counters. The sample capture shows that *London*'s serial link is fine at present:

```
lab@London> show interfaces se-1/0/1 extensive | match error
Input errors:
  Errors: 0, Drops: 0, Framing errors: 0, Runts: 0, Giants: 0,
  Policed discards: 0, Resource errors: 0
Output errors:
  Carrier transitions: 1, Errors: 0, Drops: 0, MTU errors: 0,
  Resource errors: 0
```

Question: What line protocol is your serial interface using (as selected by the attached cable)?

---

---

Answer: The classroom routers should be equipped with V.35 cables; even-numbered serial interfaces have a DCE cable, and odd-numbered interfaces have a DTE cable, as shown in the sample capture from *London*:

```
lab@London> show interfaces se-1/0/1 detail | find media
Serial media information:
  Line protocol: v.35
  Resync history:
    Sync loss count: 0
  Data signal:
    Rx Clock: OK
```

```
Control signals:
  Local mode: DTE
  To DCE: DTR: up, RTS: up
  From DCE: CTS: up, DCD: up, DSR: up
Clocking mode: dce
Clock rate: 8.0 MHz
Loopback: none
Tx clock: non-invert
Line encoding: nrz
```

```
Logical interface se-1/0/1.0 (Index 70) (SNMP ifIndex 45) (Generation 7)
Flags: Point-To-Point SNMP-Traps Encapsulation: PPP
Protocol inet, MTU: 1500, Generation: 12, Route table: 0
Flags: None
Addresses, Flags: Is-Preferred Is-Primary
  Destination: 10.222.2/24, Local: 10.222.2.2, Broadcast: 10.222.2.255,
  Generation: 13
```

## Step 6.2

Use the **monitor interface** command to monitor your serial interface in real time. You might want to work with the attached team to have them generate ping traffic with a **ping rapid count 200000 size 1500 neighbor-address** command to make things interesting.

Question: Are any errors evident?

Answer: There should be no on-going errors.

Question: What is the packet-per-second rate for send and receive?

Answer: The answer varies. The capture taken at *London* while team *Tokyo* generated flood pings using the command syntax previously suggested shows some 57 to 58 PPS:

```
London                               Seconds: 48                               Time: 04:28:52
                                      Delay: 0/0/110

Interface: se-1/0/1, Enabled, Link is Up
Encapsulation: PPP, Keepalives, Speed: 8mbps
Traffic statistics:
  Input bytes:                2264476 (352808 bps)          [1658028]
  Output bytes:               2279798 (361320 bps)          [1668748]
  Input packets:              3666 (57 pps)                 [2152]
  Output packets:             3666 (58 pps)                 [2152]
Encapsulation statistics:
  Input keepalives:           375                             [5]
  Output keepalives:          373                             [5]
```

```

LCP state: Opened
Error statistics:
  Input errors:                0                [0]
  Input drops:                 0                [0]
  Input framing errors:        0  Carrier transitN  [0]

```

### Step 6.3

Get an idea of the local host traffic that is occurring on the serial interface with a **monitor traffic interface** command. Note that this tcpdump-like utility only displays traffic that is locally generated or terminated by the RE.

#### Note

---

Enter **Ctrl-c** to break out of the monitor command when done.

---

Question: What types of traffic are you seeing?

---



---

Answer: You should observe some link layer keepalives and perhaps some ICMP (ping) test traffic, as shown in the sample capture:

```

lab@London> monitor traffic interface se-1/0/1
verbose output suppressed, use <detail> or <extensive> for full protocol decode
Listening on se-1/0/1, capture size 96 bytes

04:31:33.690355 In LCP echo request          (type 0x09 id 0x4b len 0x0008)
04:31:33.690365 Out LCP echo reply          (type 0x0a id 0x4b len 0x0008)
04:31:34.570337 In IP 10.222.2.1 > 10.222.2.2: ICMP echo request seq 768,
length 1480
04:31:34.570766 In IP 10.222.2.1 > 10.222.2.2: icmp
04:31:34.570802 Out IP 10.222.2.2 > 10.222.2.1: ICMP echo reply seq 768, length
1480
04:31:34.570807 Out IP 10.222.2.2 > 10.222.2.1: icmp
04:31:35.580368 In IP 10.222.2.1 > 10.222.2.2: ICMP echo request seq 1024,
length 1480
04:31:35.580659 In IP 10.222.2.1 > 10.222.2.2: icmp
04:31:35.580742 Out IP 10.222.2.2 > 10.222.2.1: ICMP echo reply seq 1024,
length 1480
04:31:35.580747 Out IP 10.222.2.2 > 10.222.2.1: icmp
04:31:36.594819 In IP 10.222.2.1 > 10.222.2.2: ICMP echo request seq 1280,
length 1480
04:31:36.695042 In IP 10.222.2.1 > 10.222.2.2: icmp
04:31:36.695083 Out IP 10.222.2.2 > 10.222.2.1: ICMP echo reply seq 1280,
length 1480
04:31:36.695088 Out IP 10.222.2.2 > 10.222.2.1: icmp
^C
14 packets received by filter
0 packets dropped by kernel

lab@London>

```

## Part 7: License Management, Snapshots, and Software Upgrades: CLI (Optional)

---

### Step 7.1

Use various forms of the **show system license** command to answer the related questions.

Question: Does your devices require any additional licensing?

Answer: The answer should be no. The sample shows that *London* requires zero (0) additional licenses:

```
lab@London> show system license usage
```

Licenses	Licenses	Licenses
Feature name	used	installed needed
firewall	0	1 0
ipsec-vpn	0	1 0
if-se	0	1 0
if-fe	0	1 0
j-flow	0	1 0
sla	0	1 0
bgp-reflection	1	1 0

Question: Does your device have a group license installed?

Answer: In this example the *London* station does not have a group license installed. It has a single device license that enables several features. These include Stateful firewall, IPSec VPN, J-FLOW, SLA monitoring, Advanced BGP, one additional serial port, and one additional Fast Ethernet port:

```
lab@London> show system license installed
```

```
License identifier: G03000000593
```

```
State: valid
```

```
License version: 2
```

```
Valid for device: JN001924AB
```

```
Features:
```

```

  if-se          - One additional serial port
  if-fe          - One additional fast ethernet port
  j-flow         - J-FLOW traffic analysis (CFLOW reporting)
  sla            - Service Level Agreement monitoring
bgp-reflection   - Border Gateway Protocol route reflection
  firewall       - Stateful firewall
  ipsec-vpn      - IPSec VPN tunnelling
```

## Step 7.2

Save all license key data for your device to the lab user's home directory using the **request system license save** command. Name the file **station-name-license**.

```
lab@London> request system license save London-license
Wrote 4 lines of license data to 'London-license'
```

## Step 7.3

Display the contents of the **station-name-license** file with a **file show** command.

```
lab@London> file show London-license
G03000000593 aeagea qkjjhd ambrhe zdiqkc aydqud iqceja
              eayhfa jblzwx zejign o4b3ko excd3u in2shw
              mf2kni 46k62p ajb4qs opw6ou jtiukc ejwcad
              i
```

## Step 7.4

Delete all license data from your device with a **request system license delete** command. Once again, display licensing information for your device to answer the related question.

### Note

Make sure that you saved the license for your device to a file in the lab user's home directory as specified in Step 7.2!

```
lab@London> request system license delete ?
Possible completions:
  G03000000593      License key identifier
lab@London> request system license delete G03000000593
Delete license G03000000593 ? [yes,no] (no) yes
```

Question: Does your station require any licensing now?

---



---

Answer: Your station should indicate that an additional BGP reflection license is needed.

```
lab@London> show configuration |match license
## Warning: requires 'bgp-reflection' license
lab@London> show system license usage
Licenses      Licenses      Licenses
Feature name   used    installed    needed
bgp-reflection    1         0         1
```

## Step 7.5

Legitimize yourself by loading the license key(s) that were saved to the lab user's home directory in Step 7.2.

```
lab@London> request system license add London-license
G03000000593: successfully added
add license complete (no errors)
```

## Step 7.6

Display current system storage space usage with a **show system storage** command.

Question: How much free space is present on the `/cf` partition?

Answer: The answer will vary. In the sample capture taken at *London*, the `/cf` partition is at 49% capacity with 66 M available:

```
lab@London> show system storage
```

Filesystem	Size	Used	Avail	Capacity	Mounted on
/dev/ad0s1a	131M	64M	66M	49%	/
devfs	16K	16K	0B	100%	/dev/
/dev/vn0	73M	73M	0B	100%	/junos
/cf	131M	63M	66M	49%	/junos/cf
devfs	16K	16K	0B	100%	/junos/dev/
/dev/ad0s1e	24M	8.0K	24M	0%	/config
procfs	4.0K	4.0K	0B	100%	/proc
mfs:59	62M	5.0M	52M	9%	/mfs
mfs:1962	46M	1.0K	43M	0%	/jail/tmp
mfs:1964	7.7M	1.0K	7.1M	0%	/jail/var/etc
mfs:1966	23K	1.0K	21K	5%	/jail/dev
mfs:1968	1.9M	1.0K	1.8M	0%	/jail/html/oem

## Step 7.7

Use the CLI **file delete** command to delete the *station-name-license* file from the lab user's home directory. Then use the **request system software delete-backup** command to delete any software rollback bundles that might be present on your machine; note that some stations might not have a rollback package.

```
lab@London> file delete London-license
```

```
lab@London> request system software delete-backup
Delete backup system software package [yes,no] (no) yes
```

Question: Was any space made available on the `/cf` partition where the rollback software package is normally stored?

Answer: The answer will vary depending on whether your station had a rollback package to delete. The sample capture indicates that about 30 M of the partition's capacity was freed up at *London*; compare this output to that shown at Step 7.6:

```
lab@London> show system storage
```

Filesystem	Size	Used	Avail	Capacity	Mounted on
/dev/ad0sla	131M	64M	66M	49%	/
devfs	16K	16K	0B	100%	/dev/
/dev/vn0	73M	73M	0B	100%	/junos
/cf	131M	33M	96M	26%	/junos/cf
devfs	16K	16K	0B	100%	/junos/dev/
/dev/ad0sle	24M	8.0K	24M	0%	/config
procfs	4.0K	4.0K	0B	100%	/proc
mfs:59	62M	5.0M	52M	9%	/mfs
mfs:1962	46M	1.0K	43M	0%	/jail/tmp
mfs:1964	7.7M	1.0K	7.1M	0%	/jail/var/etc
mfs:1966	23K	1.0K	21K	5%	/jail/dev
mfs:1968	1.9M	1.0K	1.8M	0%	/jail/html/oem

### Step 7.8

Confirm that a removable compact flash device is installed in your system with a **show chassis hardware** command that includes the **detail** switch. Your display should be similar to the example taken from *London*:

```
lab@London> show chassis hardware detail
```

Hardware inventory:

Item	Version	Part number	Serial number	Description
Chassis			JN001924AB	J4300
Midplane	REV 05	710-010001	ad04420245	
System IO	REV 07	710-010003	AE04460979	System IO board
Routing Engine	REV 08	750-010005	btrd43700035	RE-J.2
ad0	244 MB	256MB CHH	504690C04A628400	Compact Flash
ad2	244 MB	Hitachi XXM2.3.0	X0602 2004031918	Removable Compact Flash
usb0 (addr 1)		UHCI root hub 0	(0x24428086)	uhub0
FPC 0				FPC
PIC 0				2x FE
FPC 1	REV 04	750-010356	AG04470400	FPC
PIC 0				2x Serial
FPC 2	REV 04	750-010353	AF04451711	FPC
PIC 0				2x FE

#### Note

Notify your instructor if the removable compact flash device is not installed at your station.

## Step 7.9

Back up the current software environment to the removable compact flash device with a **request system snapshot** command. You might need to include the **partition** switch to lay down a new partition table, but do *not* use the **as-primary** option, as this will prevent the router from booting from the removable compact flash device until the medium is physically moved to the primary compact flash slot; in our case, we want the router to be able to boot from either the primary or backup compact flash medium.

Question: Is the snapshot operation successful?

---



---

Answer: The process should complete normally, as shown here:

```
lab@London> request system snapshot partition
Clearing current label...
Partitioning removable-compact-flash media (ad2) ...
Running newfs (134MB) on removable-compact-flash media / partition (ad2sla)...
Running newfs (24MB) on removable-compact-flash media /config partition
(ad2sle)...
Copying '/dev/ad0sla' to '/dev/ad2sla' .. (this may take a few minutes)
Copying '/dev/ad0sle' to '/dev/ad2sle' .. (this may take a few minutes)
The following filesystems were archived: / /config
```

Question: What command will cause the router to reboot and use the removable compact flash device as the boot device?

---



---

Answer: Issuing a **request system reboot** command with the **media removable-compact-flash** switch results in a reboot and an attempt to boot from the removable compact flash device.

## Step 7.10

Upgrade (or downgrade) the software at your station by installing a JUNOS software package from the classroom file server. Use the file transfer parameters specified to form the URL that is passed to the **request system software add** command.

Package Name: `junos-jseries-domestic.tgz`

URL: `ftp://10.250.0.254`

User: `ftp`

Password: `ftp`

Reboot: `yes`



Question: Is the transfer and subsequent installation successful?

---



---



---



---

Answer: The transfer and software installation should succeed, as shown in the sample capture:

```
lab@London> request system software add ftp://ftp:ftp@10.250.0.254/
junos-jseries-domestic.tgz reboot

29054885 bytes transferred in 19.5 seconds (1.42 MBps)
Package contains junos-7.1R2.2.tgz ; renaming ...
Installing package '/var/tmp/junos-7.1R2.2.tgz' ...
Available space: 38685 require: 2346
Verified junos-boot-jseries-7.1R2.2.tgz signed by PackageDevelopment_0
Verified junos-jseries-7.1R2.2-domestic signed by PackageDevelopment_0
WARNING: junos-7.1R2.2-domestic is already installed,
WARNING: moving it aside.
ls: junos.old: No such file or directory
JUNOS 7.1R2.2 will become active at next reboot
Saving state for rollback ...
Rebooting ...
shutdown: [pid 2974]
Shutdown NOW!

*** FINAL System shutdown message from root@London ***
System going down IMMEDIATELY
```

### Step 7.11

After the reboot is completed, log back in as the *lab* user. Issue a **show version** command to confirm software installation status.

```
London (ttyd0)

login: lab
Password:

--- JUNOS 7.1R2.2 built 2005-03-25 04:25:13 UTC
lab@London> show version
Hostname: London
Model: j4300
JUNOS Software Release [7.1R2.2]

lab@London>
```



Tell your instructor that you have completed Lab 3.

Not For Reproduction

# Lab 4

## RIP and OSPF Routing (Detailed)

### Overview

This lab covers the configuration and operational analysis of the RIP and OSPF protocols. In this lab, you will configure basic RIP routing and single- and multiple-area OSPF. Emphasis is placed on the J-Web user interface where possible, except in the final lab part, which is optional and is based on the CLI.

The lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- Load and commit a previously saved configuration file.
- Configure and monitor RIP using J-Web.
- Monitor RIP using the CLI.
- Configure and monitor single-area OSPF using J-Web.
- Configure and monitor multiple-area OSPF using the CLI (optional).

## Key Commands

---

Key operational-mode commands used in this lab include the following:

```
?
clear ospf database
clear ospf neighbor
configure
monitor start
monitor stop
ping
show
show ospf database
show ospf interface
show ospf neighbor
show ospf route
show rip neighbor
show route advertising-protocol rip
show route protocol ospf
show route protocol rip
show route receive-protocol rip
traceroute
```

## Part 1: Reload and Commit Previous J-Web Configuration

---

### Note

You can use J-Web to load configuration files from your PC or to paste in configuration text from your PC's clipboard. Currently, you must use the CLI to load configuration files stored locally on the router.

### Step 1.1

In a previous lab you saved your initial configuration, as created through the J-Web interface, to a file called *lab2-jweb*. To ensure that all stations begin this lab in a known state, you should now use the CLI to load and commit this configuration file.

You should recall that this configuration was also saved as the rescue configuration. As a result, you can recall this configuration by momentarily depressing the front panel CONFIG button or by using a **rollback rescue** CLI command; remember that you must commit the rollback change to place it into effect. You can also use J-Web to view the rescue configuration, which can then be cut and pasted into your station.

```
lab@London# load override lab2-jweb
load complete
```

```
[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode
```

```
lab@London>
```

## Step 1.2

Launch your browser and open a J-Web session to your assigned station. Log in as the *lab* user with the password supplied by your instructor.

## Part 2: Configure and Monitor RIP

Refer to the lab diagram handout to orient yourself with the RIP/single-area OSPF topology. The goal here is to configure RIP to provide connectivity between all network and loopback interfaces shown in the lab topology.

### Step 2.1

Use the J-Web Quick Configuration Routing wizard to configure RIP and its related routing policy at the Configuration > Quick Configuration > Routing and Protocols > RIP Routing page.

Click the check box to enable RIP, and add all the interfaces shown in the accompanying lab diagram to the RIP Interfaces window. Loopback address reachability requires that you also add your loopback interface. Be sure that you do not list your `fe-0/0/0` interface. The `fe-0/0/0` interface serves strictly as an OoB network interface in this classroom. The sample capture was obtained at *London*:

Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Configuration > Quick Configuration > Routing and Protocols

Quick Configuration

Routing and Protocols

RIP

Enable RIP ☒ ?

Advertise Default Route ☐ ?

RIP-Enabled Interfaces

Logical Interfaces ?

fe-0/0/1.0  
lo0.0  
se-1/0/1.0

fe-0/0/0.0

OK Cancel Apply

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

## Step 2.2

When satisfied with the RIP configuration, click OK to return to the Configuration > Quick Configuration > Routing and Protocols page.

## Step 2.3

Monitor RIP operation using J-Web at the Monitor > Routing > RIP Information page. Use the display to answer the related questions.

Question: What version of RIP is your router running?

---

---

Answer: By default, JUNOS software uses RIP version 2.

Question: What is the state of your RIP-enabled interfaces, and what is the metric assigned to each?

---

---

Answer: All your RIP interfaces should be in an operationally up state, and a default metric value of 1 should be in effect. The sample capture was obtained at *London*:

Juniper NETWORKS **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Routing > [Routing](#) > [RIP Information](#)

### Routing

#### RIP Information

##### RIP Statistics

RIP Protocol Name	RIPv2
RIP Port	520
RIP Update Interval	30s
Hold Down	180s
Timeout	120s

Routes Learned	Routes Held Down	Requests Dropped	Responses Dropped
16	0	0	0

##### RIP Neighbors

Neighbor	State	Source Address	Destination Address	Send Mode	Receive Mode	In Metric
<a href="#">fe-0/0/1.0</a>	Up	10.222.3.1	224.0.0.9	mcast	both	1
<a href="#">lo0.0</a>	Up	192.168.36.1	224.0.0.9	mcast	both	1
<a href="#">se-1/0/1.0</a>	Up	10.222.2.2	224.0.0.9	mcast	both	1

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

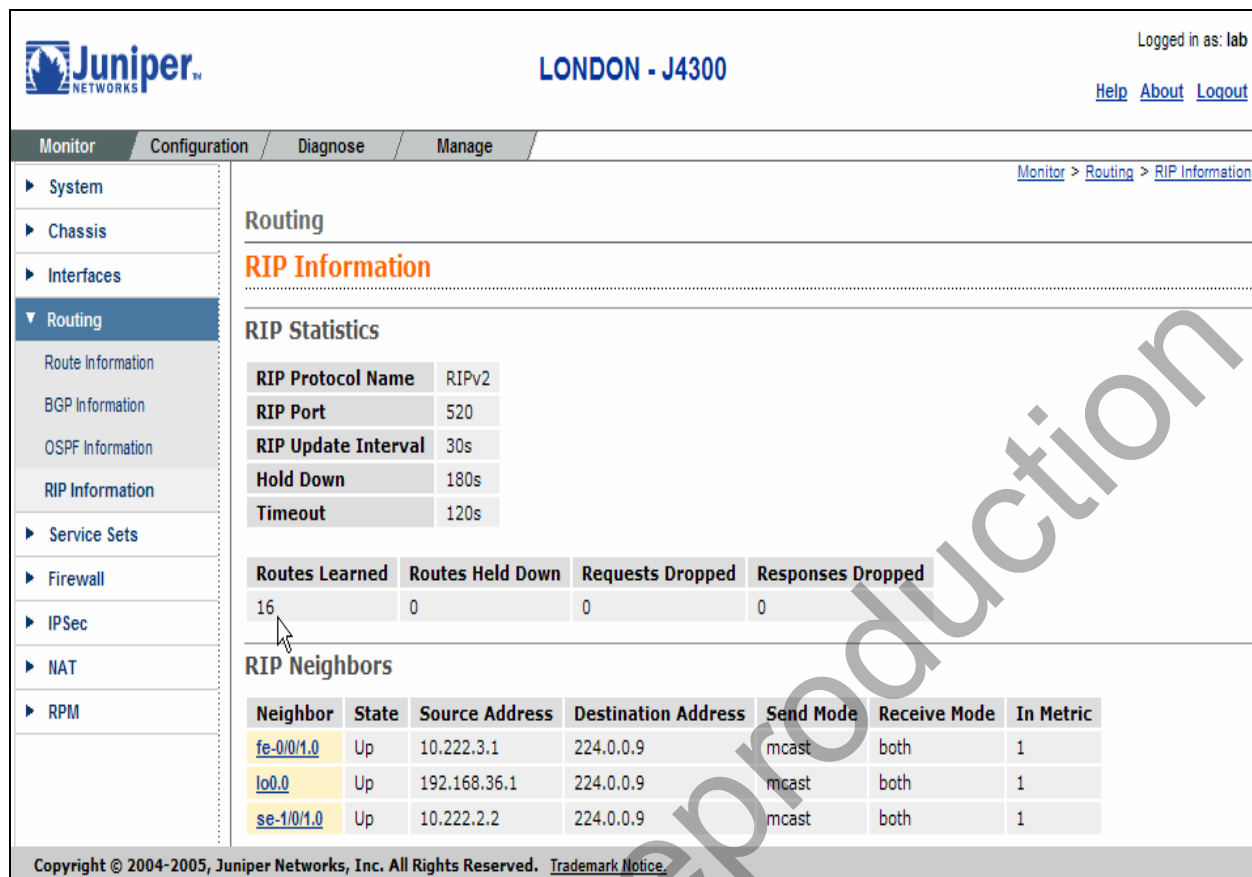
Question: Has your station learned any routes through RIP, and if so, how many?

---



---

Answer: All stations should be learning RIP routes for all network and loopback interfaces in use in the classroom lab. The sample capture shows that *London* has learned sixteen (16) prefixes through RIP:



Juniper NETWORKS LONDON - J4300 Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

Monitor > Routing > RIP Information

**Routing**

**RIP Information**

**RIP Statistics**

<b>RIP Protocol Name</b>	RIPv2
<b>RIP Port</b>	520
<b>RIP Update Interval</b>	30s
<b>Hold Down</b>	180s
<b>Timeout</b>	120s

<b>Routes Learned</b>	<b>Routes Held Down</b>	<b>Requests Dropped</b>	<b>Responses Dropped</b>
16	0	0	0

**RIP Neighbors**

Neighbor	State	Source Address	Destination Address	Send Mode	Receive Mode	In Metric
fe-0/0/1.0	Up	10.222.3.1	224.0.0.9	mcast	both	1
lo0.0	Up	192.168.36.1	224.0.0.9	mcast	both	1
se-1/0/1.0	Up	10.222.2.2	224.0.0.9	mcast	both	1

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

## Step 2.4

Use the Monitor > Routing > Route Information page to display the routing table. Use the output to answer the following questions.

Question: What is the global preference for RIP routes in JUNOS software?

Answer: By default, RIP versions 1 and 2 are assigned a global preference of 100. You can modify this value with configuration, and the value is used in a manner similar to administrative distance on other vendors' equipment.

Question: How can you see the metric for a given RIP route using J-Web?

Answer: Click + next to a route to display its details. In this example the RIP metric for *London* to reach the 10.222.6.0/24 subnet is 2:



Juniper NETWORKS **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Monitor > Routing > Route Information

Routing

Route Information

25 destinations, 25 routes (24 active, 0 hold down, 1 hidden) Showing 24 of 25 routes (Page 1 of 1)

inet.0

Destination	Protocol/Preference	Next-Hop	Age
10.222.1.0/24	*RIP/100	to 10.222.2.1 via se-1/0/1.0, selected	18:01
10.222.2.0/24	*Direct/0	Interface	39:45
10.222.2.2/32	*Local/0	Local	39:49
10.222.3.0/24	*Direct/0	Interface	39:47
10.222.3.1/32	*Local/0	Local	39:50
10.222.4.0/24	*RIP/100	to 10.222.2.1 via se-1/0/1.0, selected	17:37
10.222.5.0/24	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected	15:37
10.222.6.0/24	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected	16:40

Preference 100  
 State Active Int  
 Metric 2  
 AS Path I  
 Route learned from 10.222.3.2 expires in 103 seconds

Question: Are there any destinations with multiple, equal-cost paths?

---



---

Answer: Given the rich interconnection of the lab topology, the answer should be yes. The specifics vary by station, however. This capture shows that *London* has the expected equal-cost paths to the loopback address of *SanJose*:

192.168.20.1/32	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected to 10.222.2.1 via se-1/0/1.0	9:34
Preference 100 State Active Int Metric 4 AS Path I Route learned from 10.222.3.2 expires in 103 seconds Route learned from 10.222.2.1 expires in 115 seconds			

Question: How can you use J-Web to display only RIP-learned routes to loopback addresses?

Answer: Use the J-Web Monitor > Routing > Route Information page, and choose RIP as the route source while also entering a **192.168/16** in the Destination Address field:

Juniper NETWORKS LONDON - J4300

Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

Monitor > Routing > Route Information

**Routing**

**Route Information**

25 destinations, 25 routes (24 active, 0 hold down, 1 hidden) Showing 7 of 25 routes (Page 1 of 4)

**inet.0**

Destination	Protocol/Preference	Next-Hop	Age
192.168.16.1/32	*RIP/100	to 10.222.2.1 via se-1/0/1.0, selected	1:01:40
192.168.20.1/32	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected to 10.222.2.1 via se-1/0/1.0	53:37
192.168.24.1/32	*RIP/100	to 10.222.2.1 via se-1/0/1.0, selected	1:02:04
192.168.32.1/32	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected	1:00:43
192.168.40.1/32	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected	59:40
192.168.48.1/32	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected	52:12
192.168.56.1/32	*RIP/100	to 10.222.3.2 via fe-0/0/1.0, selected	52:58

**Narrow Search**

Destination Address: 192.168/16 Protocol: rip

Next Hop Address:

Receive Protocol:

Best Route: ☐ Inactive Routes: ☐

Exact Route: ☐ Hidden Routes: ☐

Number of Routes to Display: 25

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

## Step 2.5

Use the J-Web Diagnose > Traceroute page to conduct traceroute testing to various destinations in the room. Pay special attention to the paths that traffic takes, and relate these paths back to the current classroom lab topology.

Question: Are the traceroutes successful, and does the traffic flow over optimal paths?

---



---



---

Answer: Your ping and traceroute testing should succeed. If not, you might want to check with the remote team to confirm that its RIP configuration is in place. Traceroutes should follow paths that are dictated by the fewest number of hops, as shown in the sample capture from *London*:

Juniper NETWORKS LONDON - J4300 Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

Diagnose > Traceroute

Traceroute

Traceroute to 192.168.40.1

traceroute to 192.168.40.1 (192.168.40.1), 32 hops max, 40 byte packets

1 10.222.3.2 (10.222.3.2) 12.765 ms 10.520 ms 8.520 ms

2 192.168.40.1 (192.168.40.1) 99.116 ms 9.238 ms 9.039 ms

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

## Part 3: Monitor RIP Using the CLI

### Step 3.1

Use a **show route** command to display only routes learned through RIP.

Question: What command will count the number of RIP-learned routes for you?

Answer: Try piping the results of a **show route protocol rip** command to the CLI's **match** and **count** functions as shown; matching on the value, RIP eliminates extra lines from the count and also shows any inactive RIP routes that might be present. The example shows that 17 RIP routes are seen at *London*:

```
lab@London> show route protocol rip
```

```
inet.0: 25 destinations, 25 routes (24 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
10.222.1.0/24      *[RIP/100] 01:05:48, metric 2, tag 0
                  > to 10.222.2.1 via se-1/0/1.0
10.222.4.0/24      *[RIP/100] 01:05:24, metric 3, tag 0
                  > to 10.222.2.1 via se-1/0/1.0
10.222.5.0/24      *[RIP/100] 01:03:24, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.6.0/24      *[RIP/100] 01:04:27, metric 2, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.8.0/24      *[RIP/100] 00:57:21, metric 4, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
                  to 10.222.2.1 via se-1/0/1.0
10.222.9.0/24      *[RIP/100] 01:03:24, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.10.0/24     *[RIP/100] 01:04:27, metric 2, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.11.0/24     *[RIP/100] 00:56:42, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.12.0/24     *[RIP/100] 01:05:24, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
                  to 10.222.2.1 via se-1/0/1.0
192.168.16.1/32    *[RIP/100] 01:05:24, metric 3, tag 0
                  > to 10.222.2.1 via se-1/0/1.0
192.168.20.1/32    *[RIP/100] 00:57:21, metric 4, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
                  to 10.222.2.1 via se-1/0/1.0
192.168.24.1/32    *[RIP/100] 01:05:48, metric 2, tag 0
                  > to 10.222.2.1 via se-1/0/1.0
192.168.32.1/32    *[RIP/100] 01:04:27, metric 2, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
192.168.40.1/32    *[RIP/100] 01:03:24, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
192.168.48.1/32    *[RIP/100] 00:55:56, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
192.168.56.1/32    *[RIP/100] 00:56:42, metric 4, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
```

```
224.0.0.9/32      *[RIP/100] 01:07:16, metric 1
                  MultiRecv
```

```
__juniper_private1__inet.0: 2 destinations, 2 routes (2 active, 0 holddown, 0
hidden)
```

```
lab@London> show route protocol rip | match RIP | count
Count: 17 lines
```

```
lab@London>
```

### Step 3.2

Use a **show route advertising-protocol rip** command to display the RIP routes your station is advertising to a neighboring router. Use your local RIP interface address as the neighbor variable in this command.

Question: What metric are you advertising for the routes that your station originates?

---



---

Answer: This is a tricky question because the metric displayed in the output of a **show route advertising-protocol rip** command is the RIP metric that is stored in the routing table. Because a locally originated route is not a RIP route in the routing table, a metric value is not displayed for routes being originated into RIP:

```
lab@London> show route advertising-protocol rip 10.222.2.2

inet.0: 25 destinations, 25 routes (24 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both

10.222.3.0/24      *[Direct/0] 01:34:24
                  > via fe-0/0/1.0
10.222.5.0/24      *[RIP/100] 01:10:14, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.6.0/24      *[RIP/100] 01:11:17, metric 2, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.9.0/24      *[RIP/100] 01:10:14, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.10.0/24     *[RIP/100] 01:11:17, metric 2, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
10.222.11.0/24     *[RIP/100] 01:03:32, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
192.168.32.1/32    *[RIP/100] 01:11:17, metric 2, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
192.168.36.1/32    *[Direct/0] 01:34:58
                  > via lo0.0
192.168.40.1/32    *[RIP/100] 01:10:14, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
```

```
192.168.48.1/32    *[RIP/100] 01:02:46, metric 3, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
192.168.56.1/32    *[RIP/100] 01:03:32, metric 4, tag 0
                  > to 10.222.3.2 via fe-0/0/1.0
```

Question: How can you prove that your station advertises locally originated routes into RIP with a metric of 1?

---



---



---

Answer: Multiple solutions are possible here. You can use a **show route receive-protocol rip** command at the neighboring station, or simply display the route in that neighbor's routing table. The sample capture from *Tokyo* shows that *London*'s loopback address is associated with a metric of 2. Knowing that a RIP router adds the incoming interface metric to a route before installing it into the routing table, and that the incoming interface metric is 1, proves that the route was originated with a metric of 1:

```
lab@Tokyo> show rip neighbor se-1/0/0.0
```

Neighbor	State	Source Address	Destination Address	Send Mode	Receive Mode	In Met
se-1/0/0.0	Up	10.222.2.1	224.0.0.9	mcast	both	1

```
lab@Tokyo> show route 192.168.36.1
```

```
inet.0: 25 destinations, 25 routes (24 active, 0 holddown, 1 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
192.168.36.1/32    *[RIP/100] 01:59:44, metric 2, tag 0
                  > to 10.222.2.2 via se-1/0/0.0
```

### Step 3.3

Configure RIP tracing according to the sample [edit protocols rip traceoptions] stanza and related command syntax shown:

```
[edit protocols rip]
lab@London# show traceoptions | display set
set protocols rip traceoptions file rip-trace
set protocols rip traceoptions flag update detail
set protocols rip traceoptions flag error detail
set protocols rip traceoptions flag packets detail
```

```
[edit protocols rip]
lab@London# show traceoptions
file rip-trace;
flag update detail;
flag error detail;
flag packets detail;
```

**Note**


---

Be sure to commit your changes when done.

---

**Step 3.4**

Monitor the *rip-trace* file with a **monitor start** command, and answer the related questions.

Question: How often is your station sending and receiving updates?

---



---

Answer: You should see periodic update activity approximately every 30 seconds with the default RIP timers at play:

```
lab@London> monitor start rip-trace
```

```
lab@London>
```

```
*** rip-trace ***
```

```

. . .
Mar  4 13:17:29 Preparing to send RIPv2 updates.
Mar  4 13:17:29 Update job: sending 20 msgs; group: jweb-rip.
. . .
Mar  4 13:17:29      Group jweb-rip done.
Mar  4 13:17:29 Update job done!
. . .
Mar  4 13:17:58 Preparing to send RIPv2 updates.
Mar  4 13:17:58 Update job: sending 20 msgs; group: jweb-rip.
. . .
Mar  4 13:17:58      Group jweb-rip done.
Mar  4 13:17:58 Update job done!
. . .
*** monitor and syslog output disabled, press ESC-Q to enable ***
```

Question: What is the metric associated with routes originated into RIP by your station?

---



---

Answer: The trace output makes it clear that locally originated routes are assigned a RIP metric of 1:

```
. . .
Mar  4 13:17:58 Preparing to send RIPv2 updates.
Mar  4 13:17:58 Update job: sending 20 msgs; group: jweb-rip.
Mar  4 13:17:58      nbr 10.0.0; msgp: 0x860b000.
Mar  4 13:17:58      10.222.2.0/0xffffffff00: tag 0, nh
0.0.0.0, met 1.
Mar  4 13:17:58      10.222.3.0/0xffffffff00: tag 0, nh
0.0.0.0, met 1.
. . .
```

#### Note

When you are done with a tracing operation, you should delete the tracing configuration and commit the changes to turnoff tracing. This step will save compact flash storage and processor cycles.

### Step 3.5

Delete the RIP tracing configuration and commit the changes.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# delete protocols rip traceoptions

[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>
```



Pause here to allow all teams to complete the previous lab steps before proceeding.

Tell your instructor that you have completed the RIP configuration and monitoring portion of this lab.

## Part 4: Configure and Monitor Single-Area OSPF: J-Web

### Step 4.1

Use the CLI to delete the protocols and policy-options portion of your configuration. These actions remove all aspects of the RIP configuration configured in the previous lab part. Be sure to commit your changes when done.



```
lab@London> configure
Entering configuration mode

[edit]
lab@London# delete protocols

[edit]
lab@London# delete policy-options

[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>
```

### Step 4.2

Access the J-Web OSPF wizard at the Configuration > Quick Configuration > Routing and Protocols > OSPF Routing page.

### Step 4.3

Click the check box to enable the OSPF instance. You should not modify the default loopback-based router ID, area number, and area type settings at this time. Next, click to add each network interface that is part of the lab topology. You must also add your station's loopback interface to ensure OSPF reachability to loopback addresses. As with RIP, do not enable OSPF on your station's fe-0/0/0 interface. A correct configuration example, as taken from *London*, is shown:

Juniper  
NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration

Set Up

SSL

Interfaces

Users

SNMP

Routing

Firewall/NAT

IPSec Tunnels

Realtime Performance Monitoring

View and Edit

History

Rescue

Configuration > Quick Configuration > Routing

### Quick Configuration

### Routing

#### Router Identification

Router Identifier

#### OSPF

Enable OSPF ☒

OSPF Area ID

Area Type

Enable OSPF on All Interfaces ☐

OSPF-Enabled Interfaces

fe-0/0/1.0

lo0.0

se-1/0/1.0

OSPF-Disabled Interfaces

fe-0/0/0.0

OK Cancel Apply

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

#### Step 4.4

When satisfied with your changes, click OK to activate the configuration and return to the Quick Configuration > Routing and Protocols page.

#### Step 4.5

Use J-Web to monitor OSPF at the Monitor > Routing > OSPF Information page. Use the output to answer the related questions.

Question: Why are some interfaces shown as having no DR or BDR?

---



---

Answer: Showing no DR or BDR is normal for point-to-point interfaces. The designated and backup designated routers are only elected on broadcast and NBMA topologies.

Question: Are any interfaces listed as having zero (0) neighbors? If so, is this a sign of problems?

Answer: All real interfaces should be listed as having a single OSPF neighbor given the classroom topology. You should see that your loopback interface does not have any neighbors, which is to be expected given its virtual status.

Juniper NETWORKS LONDON - J4300 Logged in as: lab [Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Routing > OSPF Information

**Routing**

**OSPF Information**

**OSPF Neighbors**

Address	Interface Name	State	ID	Priority	Activity Timer	Area	Options	DR Address	BDR Address	Up Time	Adjacency Time
10.222.3.2	fe-0/0/1.0	Full	192.168.32.1	128	37	0.0.0.0	0x42	10.222.3.1	10.222.3.2	00:04:02	00:04:02
10.222.2.1	se-1/0/1.0	Full	192.168.24.1	128	32	0.0.0.0	0x42	0.0.0.0	0.0.0.0	00:04:48	00:04:48

**OSPF Interfaces**

Interface	State	Area	DR ID	BDR ID	Neighbors
fe-0/0/1.0	DR	0.0.0.0	192.168.32.1	192.168.32.1	1
lo0.0	DR	0.0.0.0	192.168.32.1	0.0.0.0	0
lo0.0	DR	0.0.0.0	192.168.32.1	0.0.0.0	0
se-1/0/1.0	PtToPt	0.0.0.0	0.0.0.0	0.0.0.0	1

**OSPF Statistics**

Packet Type	Packets Sent	Packets Received
Hello	12	5
DbD	4	6
LSReq	2	2
LSUpdate	30	34
LSAck	29	25

Depth of flood Queue	Total Retransmits	Total Database Summaries
0	0	0

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

Question: What is the OSPF cost (metric) associated with your station's LAN and serial interfaces? Why do you think they are different?

---

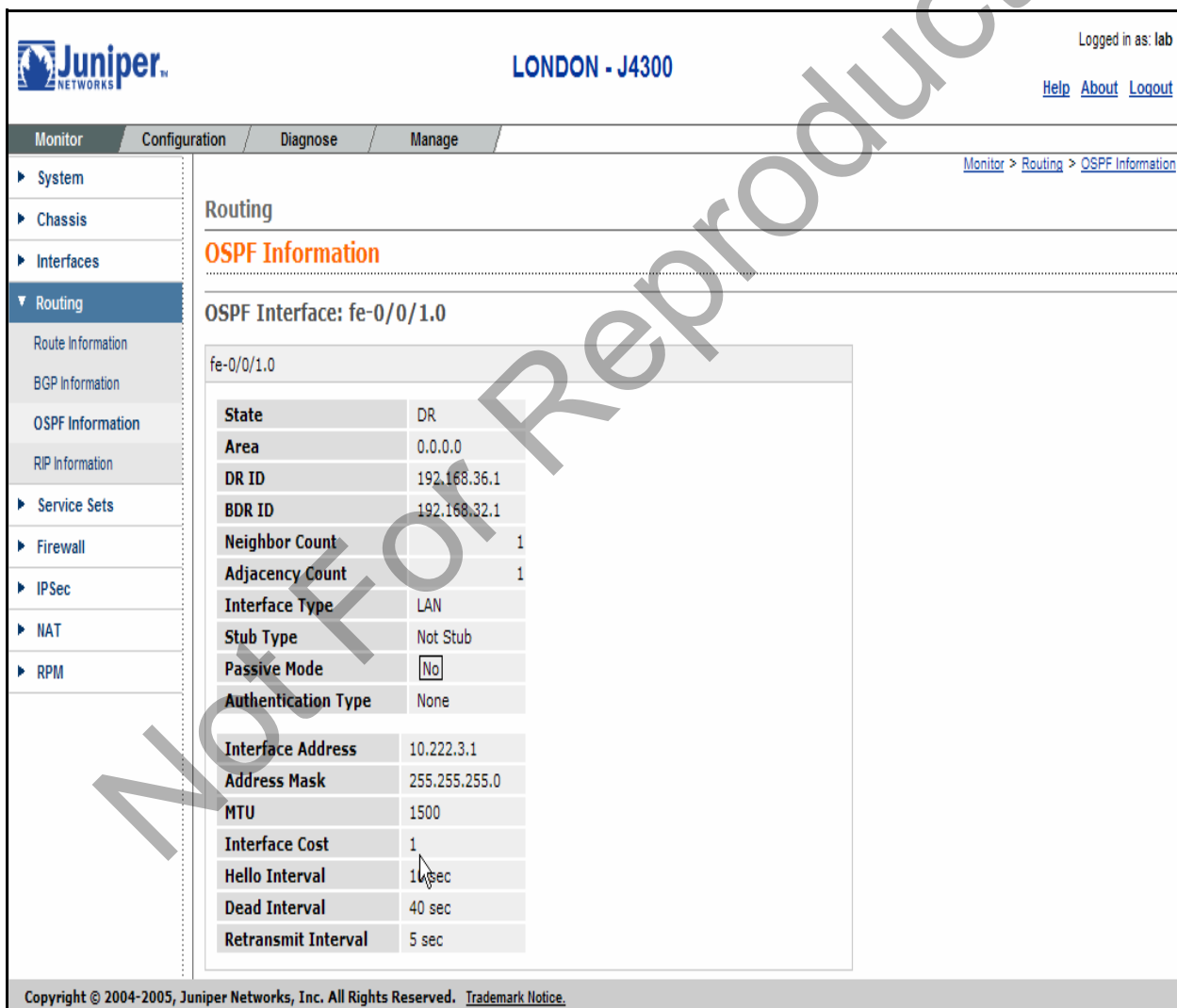


---



---

Answer: By default, OSPF metrics are assigned based on interface bandwidth scaled to 100 Mb. As a result, Fast Ethernet interfaces are assigned an OSPF cost of 1. Serial interfaces have variable speeds based on their provided timing. These interfaces are assigned an OSPF metric of 12 by default:



Juniper NETWORKS LONDON - J4300 Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

Monitor > Routing > OSPF Information


Routing

OSPF Information

OSPF Interface: fe-0/0/1.0

fe-0/0/1.0	
State	DR
Area	0.0.0.0
DR ID	192.168.36.1
BDR ID	192.168.32.1
Neighbor Count	1
Adjacency Count	1
Interface Type	LAN
Stub Type	Not Stub
Passive Mode	<input type="checkbox"/> No
Authentication Type	None
Interface Address	10.222.3.1
Address Mask	255.255.255.0
MTU	1500
Interface Cost	1
Hello Interval	1 sec
Dead Interval	40 sec
Retransmit Interval	5 sec

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.


**LONDON - J4300**
Logged in as: lab
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

- System
- Chassis
- Interfaces
- Routing**
  - Route Information
  - BGP Information
  - OSPF Information**
  - RIP Information
- Service Sets
- Firewall
- IPSec
- NAT
- RPM

[Monitor](#) > [Routing](#) > [OSPF Information](#)

## Routing

### OSPF Information

#### OSPF Interface: se-1/0/1.0

se-1/0/1.0

State	PtToPt
Area	0.0.0.0
DR ID	0.0.0.0
BDR ID	0.0.0.0
Neighbor Count	1
Adjacency Count	1
Interface Type	P2P
Stub Type	Not Stub
Passive Mode	<input type="checkbox"/> No
Authentication Type	None
Interface Address	0.0.0.0
Address Mask	0.0.0.0
MTU	1500
Interface Cost	12
Hello Interval	10 sec
Dead Interval	40 sec
Retransmit Interval	5 sec

Question: Why do you think that your loopback interface is listed twice in the OSPF Interfaces section?

---



---



---



---

Answer: The loopback interface is listed twice because two distinct logical IP subnets are configured on this interface. The 127.0.0.1 address came from the factory, and a 192.168.x.1 address was configured by the user. The 127.0.0.1 address is not actually advertised via LSAs to any other stations, however. Click the link for the 100.0.0.0 interface to confirm.

### Note

You might notice that in JUNOS software point-to-point interfaces are listed twice in the output of a **show ospf interface detail** command or when clicking point-to-point interface type in the OSPF Interfaces portion of the Monitor > Routing > OSPF Information page. This is because point-to-point interfaces are always treated as an unnumbered interface. If an address is assigned, the same interface is also advertised as a numbered link. This behavior results in the interface being listed twice in the router advertisement and appearing twice in the GUI. This behavior is in keeping with the OSPF standard.

## Step 4.6

Use the Monitor > Routing > Route Information page to display the routing table. Use the resulting display to answer the following questions.

Question: What is the global preference for OSPF internal routes in JUNOS software?

Answer: By default, OSPF internal routes are assigned a global preference of 10. You can modify this value with configuration, and this value is used in a manner similar to administrative distance on other vendors' equipment.

Question: How can you see the metric for a given OSPF route using J-Web?

Answer: Click + next to a route to display its details. In this example the metric for *London* to reach the loopback address of *SanJose* is 14:

⊕ 192.168.16.1/32	*OSPF/10	to 10.222.3.2 via fe-0/0/1.0, selected	9:05
⊖ 192.168.20.1/32	*OSPF/10	to 10.222.3.2 via fe-0/0/1.0, selected	9:58
	<div><div>Preference</div><div>State</div><div>Metric</div><div>AS Path</div></div>	<div><div>10</div><div>Active Int</div><div>14</div><div>I</div></div>	
⊕ 192.168.24.1/32	*OSPF/10	to 10.222.3.2 via fe-0/0/1.0, selected	9:05

## Step 4.7

Use the J-Web Diagnose > Traceroute page to conduct traceroute testing to various destinations within the network. Pay special attention to the paths that traffic takes, and relate these paths back to the current classroom lab topology.

Question: Are the traceroutes successful, and does the traffic flow over optimal paths?

---



---



---

Answer: Your ping and traceroute testing should be successful. If not, you might want to check with the remote team to confirm that its OSPF configuration is in place. Traceroutes should follow paths that are dictated by lowest OSPF metric; note that the mixture of low-speed serial and high-speed Ethernet combined with dynamic metric calculation based on bandwidth means that multiple, equal-cost paths might no longer exists for some destinations and stations:

Juniper NETWORKS LONDON - J4300 Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

► Ping Host  
 ► Ping MPLS  
 ► Traceroute

Diagnose > Traceroute

### Traceroute

#### Traceroute to 192.168.20.1

traceroute to 192.168.20.1 (192.168.20.1), 32 hops max, 40 byte packets

```

1 10.222.3.2 (10.222.3.2) 11.465 ms 7.843 ms 16.136 ms
2 10.222.6.1 (10.222.6.1) 78.967 ms 18.965 ms 9.344 ms
3 192.168.20.1 (192.168.20.1) 18.827 ms 18.782 ms 19.104 ms
  
```

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)



Pause here to allow all teams to complete the previous lab steps before proceeding.

Tell your instructor that you have completed the J-Web OSPF configuration and monitoring portion of this lab. Your instructor will inform you as to whether you should proceed onto the optional CLI portion of this lab.

## Part 5: Configure and Monitor Multiarea OSPF Using the CLI (Optional)

---

Begin by familiarizing yourself with the multiple-area OSPF topology. In this topology, the *Denver*, *Montreal*, and *San Jose* stations function as area border routers (ABRs). Links that cross area boundaries that are not attached to an ABR are marked with a skull-and-crossbones symbol to indicate that OSPF adjacencies cannot be formed over these links. You should configure the related interfaces to be passive so that the interface's direct routes are advertised by OSPF to maintain full reachability within the room. By making these interfaces passive, the hello process is suspended; this results in an OSPF internal route for that interface without wasting cycles trying to bring up an adjacency that can never be established. Again, do not configure OSPF on your `fe-0/0/0` interface.

### Step 5.1

Use the CLI to delete the OSPF stanza and the explicit router ID statement that was configured by the J-Web OSPF wizard in a previous lab part. Be sure to commit the changes when done.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# delete protocols ospf

[edit]
lab@London# delete routing-options router-id

[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>
```



**Note**


---

You do not need the explicit declaration of a router ID (RID) with JUNOS software. By default, the router uses the primary (non-Martian) address on the first interface that is activated as a RID. This will be the loopback interface when a non-127.0.0.1 address is configured, as is the case in the current lab topology where 192.168.x.1/32 addressing is assigned to loopback interfaces. Further, when the RID is chosen in this dynamic, but deterministic, manner, a route is automatically advertised to the router's loopback address even though OSPF is not explicitly enabled on the loopback interface. The configuration examples in this section make use of this dynamic RID behavior.

---

**Step 5.2**

Configure multiarea OSPF by listing each transit interface with an attached neighbor into the correct area. Use the **passive** keyword for any links marked with the skull-and-crossbones symbol. Note that OSPF does not have to be enabled on your loopback interface in this lab part.

A sample configuration from ABR *Montreal* is shown along with the related configuration syntax, courtesy of the CLI's **display set** functionality:

```
[edit protocols ospf]
lab@Montreal# show
area 0.0.0.0 {
    interface fe-2/0/0.0;
    interface fe-0/0/1.0;
}
area 0.0.0.2 {
    interface se-1/0/0.0;
}
```

```
[edit protocols ospf]
lab@Montreal# show | display set
set protocols ospf area 0.0.0.0 interface fe-2/0/0.0
set protocols ospf area 0.0.0.0 interface fe-0/0/1.0
set protocols ospf area 0.0.0.2 interface se-1/0/0.0
```

A sample configuration from internal router London is shown along with the related configuration syntax:

```
[edit protocols ospf]
lab@London# show
area 0.0.0.2 {
    interface se-1/0/1.0 {
        passive;
    }
    interface fe-0/0/1.0;
}
```

```
[edit protocols ospf]
lab@London# show | display set
set protocols ospf area 0.0.0.2 interface se-1/0/1.0 passive
set protocols ospf area 0.0.0.2 interface fe-0/0/1.0
```

### Step 5.3

When satisfied with your multiarea OSPF configuration, commit the changes and return to operational mode.

```
[edit protocols ospf]
lab@London# commit and-quit
commit complete
Exiting configuration mode
```

```
lab@London>
```

### Step 5.4

Issue a **show ospf interface** command to confirm that your interfaces are in the correct areas.

Question: Are all network interfaces shown in the lab topology listed as running OSPF in the correct area?

---



---

Answer: The answer should be yes, as is the case in the sample output obtained at *Montreal*:

```
lab@Montreal> show ospf interface
```

Interface	State	Area	DR ID	BDR ID	Nbrs
fe-0/0/1.0	DR	0.0.0.0	192.168.40.1	192.168.56.1	1
fe-2/0/0.0	DR	0.0.0.0	192.168.40.1	192.168.20.1	1
se-1/0/0.0	PtToPt	0.0.0.2	0.0.0.0	0.0.0.0	1

Question: Are any neighbors detected on your OSPF interfaces?

---

Answer: Each station should have at least one interface with an OSPF neighbor. Note that passive interfaces do not detect neighbors.

Question: What metric is associated with your passive and active interfaces? (Hint: You might want to include the **detail** switch to the **show ospf interface** command).

Answer: The OSPF metric values are not affected by an interface's status as active or passive. You should see the same default metric values as observed through J-Web during the single-area portion of this lab:

```
lab@London> show ospf interface detail
```

Interface	State	Area	DR ID	BDR ID	Nbrs
fe-0/0/1.0	DR	0.0.0.2	192.168.36.1	192.168.32.1	1
Type: LAN, Address: 10.222.3.1, Mask: 255.255.255.0, MTU: 1500, Cost: 1 DR addr: 10.222.3.1, BDR addr: 10.222.3.2, Adj count: 1, Priority: 128 Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None					
se-1/0/1.0	PtToPt	0.0.0.2	0.0.0.0	0.0.0.0	0
Type: P2P, Address: 0.0.0.0, Mask: 0.0.0.0, MTU: 1500, Cost: 12 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None					
se-1/0/1.0	PtToPt	0.0.0.2	0.0.0.0	0.0.0.0	0
Type: P2P, Address: 10.222.2.2, Mask: 255.255.255.0, MTU: 1500, Cost: 6 Adj count: 0, Passive Hello: 10, Dead: 40, ReXmit: 5, Not Stub Auth type: None					

## Step 5.5

Use the **show ospf neighbor** command to confirm establishment of all expected OSPF adjacencies.

Question: Why are adjacencies not expected on the skull-and-crossbones links?

Answer: An OSPF adjacency cannot form between routers that do not agree on the OSPF area ID. Further, these links should be configured to operate as passive, which means that hello-based neighbor discovery cannot function. A single adjacency is therefore expected, and confirmed, at *London*:

```
lab@London> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
10.222.3.2	fe-0/0/1.0	Full	192.168.32.1	128	31

## Step 5.6

Use various forms of the **show ospf database** command to answer the following questions.

Question: What types of LSAs are present in your router's LSDB?

---



---

Answer: All stations should see Type 1 (router) and Type 3 (network summary) LSAs. You might also see Type 2 (network) LSAs when there is an Ethernet-based adjacency in your area, as is the case at *London*:

```
lab@London> show ospf database
```

```

    OSPF link state database, area 0.0.0.2
  Type      ID          Adv Rtr          Seq          Age    Opt   Cksum   Len
Router     192.168.32.1       192.168.32.1     0x80000003    367    0x2   0x8099   84
Router     *192.168.36.1       192.168.36.1     0x80000004    840    0x2   0xdd5    60
Router     192.168.40.1       192.168.40.1     0x80000002    368    0x2   0xa752   60
Network    *10.222.3.1         192.168.36.1     0x80000001    840    0x2   0xcb9    32
Summary    10.222.1.0          192.168.40.1     0x80000003    368    0x2   0xc808   28
Summary    10.222.4.0          192.168.40.1     0x80000003    368    0x2   0x9d31   28
Summary    10.222.5.0          192.168.40.1     0x80000005    368    0x2   0x16c1   28
Summary    10.222.8.0          192.168.40.1     0x80000006    368    0x2   0xfcd5   28
Summary    10.222.9.0          192.168.40.1     0x80000009    368    0x2   0xe1ed   28
Summary    10.222.11.0         192.168.40.1     0x80000002    368    0x2   0x5276   28
Summary    10.222.12.0         192.168.40.1     0x80000004    368    0x2   0x4d77   28
Summary    192.168.16.1        192.168.40.1     0x80000003    368    0x2   0x52ee   28
Summary    192.168.20.1        192.168.40.1     0x80000003    368    0x2   0xad9b   28
Summary    192.168.24.1        192.168.40.1     0x80000002    368    0x2   0x633    28
Summary    192.168.48.1        192.168.40.1     0x80000002    368    0x2   0xf22f   28
Summary    192.168.56.1        192.168.40.1     0x80000002    368    0x2   0x2204   28

```

Question: What metric (cost) is your station advertising in its router LSA for your serial interface? (Hint: You should use the **detail** switch when you want to see additional information. Also, try filtering the output by indicating the type of LSA you are interested in seeing).

---



---

Answer: The sample capture shows that the serial interface is advertised with a metric of 12 at *London*:

```
lab@London > show ospf database router detail advertising-router 192.168.36.1
```

```

    OSPF link state database, area 0.0.0.2
  Type      ID          Adv Rtr          Seq      Age  Opt  Cksum  Len
Router *192.168.36.1    192.168.36.1    0x80000004  1014  0x2  0xdd5  60
  bits 0x0, link count 3
  id 10.222.3.1, data 10.222.3.1, Type Transit (2)
  TOS count 0, TOS 0 metric 1
  id 10.222.2.0, data 255.255.255.0, Type Stub (3)
  TOS count 0, TOS 0 metric 6
  id 192.168.36.1, data 255.255.255.255, Type Stub (3)
  TOS count 0, TOS 0 metric 0

```

### Step 5.7

Clear OSPF adjacencies and the OSPF database with the **clear ospf** command. You might want to experiment with the **purge** option to the **clear** command as this will age out all entries in your database, forcing it to be rebuilt with fresh LSAs.

Question: Are your adjacencies correctly rebuilt after they are cleared?

---



---

Answer: The answer should be yes, and is demonstrated in the sample capture; note that you must be very fast, or lucky, to see all of these states. Try the following: open a second window and type the **show** command before the **clear** command, but do not press Enter on the **show** command until just after you execute the **clear** command:

```
lab@London> clear ospf neighbor
```

```
lab@London> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
10.222.3.2	fe-0/0/1.0	ExStart	192.168.32.1	128	39

```
lab@London> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
10.222.3.2	fe-0/0/1.0	Loading	192.168.32.1	128	31

```
lab@London> show ospf neighbor
```

Address	Interface	State	ID	Pri	Dead
10.222.3.2	fe-0/0/1.0	Full	192.168.32.1	128	30

Question: Is the OSPF database correctly repopulated after it is cleared?

Answer: Again, the answer should be yes. Note how the sample capture shows LSAs that are set to 3600 seconds (maximum age) and then later reborn in phoenix fashion as a result of their being reflooded by the originating station:

```
lab@London> clear ospf database purge
```

```
lab@London> show ospf database
```

```

OSPF link state database, area 0.0.0.2
Type      ID                Adv Rtr          Seq      Age  Opt  Cksum  Len
Router    192.168.32.1       192.168.32.1    0x8000001c  3600 0x2  0x4eb2  84
Router    *192.168.36.1      192.168.36.1    0x8000001e   1  0x2  0xa9ef  60
Router    192.168.40.1       192.168.40.1    0x80000003  3600 0x2  0xa553  60
Network   *10.222.3.1        192.168.36.1    0x8000001b   1  0x2  0xd7d3  32
Summary   10.222.1.0         192.168.40.1    0x80000005  3600 0x2  0xc40a  28
Summary   10.222.4.0         192.168.40.1    0x80000005  3600 0x2  0x9933  28
Summary   10.222.5.0         192.168.40.1    0x80000017  3600 0x2  0xf1d3  28
Summary   10.222.8.0         192.168.40.1    0x80000018  3600 0x2  0xd8e7  28
Summary   10.222.9.0         192.168.40.1    0x8000001b  3600 0x2  0xbdff  28
Summary   10.222.11.0        192.168.40.1    0x80000004  3600 0x2  0x4e78  28
Summary   10.222.12.0        192.168.40.1    0x80000005  3600 0x2  0x4b78  28
Summary   192.168.16.1       192.168.40.1    0x80000004  3600 0x2  0x50ef  28
Summary   192.168.20.1       192.168.40.1    0x80000004  3600 0x2  0xab9c  28
Summary   192.168.24.1       192.168.40.1    0x80000003  3600 0x2  0x434   28
Summary   192.168.48.1       192.168.40.1    0x80000003  3600 0x2  0xf030  28
Summary   192.168.56.1       192.168.40.1    0x80000003  3600 0x2  0x2005  28

```

```
lab@London> show ospf database
```

```

OSPF link state database, area 0.0.0.2
Type      ID                Adv Rtr          Seq      Age  Opt  Cksum  Len
Router    192.168.32.1       192.168.32.1    0x8000001d   10 0x2  0x4cb3  84
Router    *192.168.36.1      192.168.36.1    0x8000001e    9 0x2  0xa9ef  60
Router    192.168.40.1       192.168.40.1    0x80000004   10 0x2  0xa354  60
Network   *10.222.3.1        192.168.36.1    0x8000001b    9 0x2  0xd7d3  32
Summary   10.222.1.0         192.168.40.1    0x80000006   10 0x2  0xc20b  28
Summary   10.222.4.0         192.168.40.1    0x80000006   10 0x2  0x9734  28
Summary   10.222.5.0         192.168.40.1    0x80000018   10 0x2  0xefd4  28
Summary   10.222.8.0         192.168.40.1    0x80000019   10 0x2  0xd6e8  28
Summary   10.222.9.0         192.168.40.1    0x8000001c   10 0x2  0xbb01  28
Summary   10.222.11.0        192.168.40.1    0x80000005   10 0x2  0x4c79  28
Summary   10.222.12.0        192.168.40.1    0x80000006   10 0x2  0x4979  28
Summary   192.168.16.1       192.168.40.1    0x80000005   10 0x2  0x4ef0  28
Summary   192.168.20.1       192.168.40.1    0x80000005   10 0x2  0xa99d  28
Summary   192.168.24.1       192.168.40.1    0x80000004   10 0x2  0x235   28

```

Summary	192.168.48.1	192.168.40.1	0x80000004	10	0x2	0xee31	28
Summary	192.168.56.1	192.168.40.1	0x80000004	10	0x2	0x1e06	28

## Step 5.8

Use the **show route protocol ospf 192.168.0.0/16** command to quickly confirm that you have a route to the loopback address of all OSPF routers in the lab topology. Use **traceroute** to confirm loopback reachability and forwarding paths.

Question: Are all remote loopback addresses represented as OSPF routes, and do the traceroute results indicate the use of optimal paths?

Answer: The following sample capture, which is taken from the *London* router, indicates that routes for all 7 of the 7 possible OSPF-learned loopback addresses are present. Your results will vary based on the number of student teams participating in your class. The traceroute results show that traffic from *London* to the loopback address of *Hong Kong* follows an optimal path, given the lack of an adjacency between the *Tokyo* and *London* routers:

```
lab@London> show route protocol ospf 192.168.0.0/16
```

```
inet.0: 27 destinations, 28 routes (27 active, 0 holddown, 0 hidden)
+ = Active Route, - = Last Active, * = Both
```

```
192.168.16.1/32    *[OSPF/10] 00:02:22, metric 26
> to 10.222.3.2 via fe-0/0/1.0
192.168.20.1/32    *[OSPF/10] 00:02:22, metric 14
> to 10.222.3.2 via fe-0/0/1.0
192.168.24.1/32    *[OSPF/10] 00:02:22, metric 27
> to 10.222.3.2 via fe-0/0/1.0
192.168.32.1/32    *[OSPF/10] 00:02:22, metric 1
> to 10.222.3.2 via fe-0/0/1.0
192.168.40.1/32    *[OSPF/10] 00:02:22, metric 13
> to 10.222.3.2 via fe-0/0/1.0
192.168.48.1/32    *[OSPF/10] 00:02:22, metric 26
> to 10.222.3.2 via fe-0/0/1.0
192.168.56.1/32    *[OSPF/10] 00:02:22, metric 14
> to 10.222.3.2 via fe-0/0/1.0
```

```
lab@London> traceroute 192.168.16.1
```

```
traceroute to 192.168.16.1 (192.168.16.1), 30 hops max, 40 byte packets
 1  10.222.3.2 (10.222.3.2)  9.670 ms  18.397 ms  19.349 ms
 2  10.222.6.1 (10.222.6.1)  19.427 ms  18.850 ms  9.382 ms
 3  10.222.5.2 (10.222.5.2)  19.126 ms  18.891 ms  19.133 ms
 4  192.168.16.1 (192.168.16.1)  19.997 ms  17.997 ms  19.461 ms
```

## Step 5.9

Configure OSPF tracing according to the sample traceoptions stanza. Commit your changes when done.

```
[edit protocols ospf]
lab@London# show traceoptions
file ospf-trace;
flag error detail;
flag hello detail;
flag lsa-update detail;

[edit protocols ospf]
lab@London# show traceoptions | display set
set protocols ospf traceoptions file ospf-trace
set protocols ospf traceoptions flag error detail
set protocols ospf traceoptions flag hello detail
set protocols ospf traceoptions flag lsa-update detail

[edit protocols ospf]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>
```

## Step 5.10

Monitor the *ospf-trace* file, and use the output to answer the related questions.

Question: How often are hello packets being exchanged?

---

---

Answer: Once a neighbor is detected, all interface types generate hellos approximately every 10 seconds by default:

```
lab@London> monitor start ospf-trace | match "OSPF hello from"

lab@London>
*** ospf-trace ***
Mar  4 17:40:24 OSPF hello from 10.222.3.2 (IFL 68, transit area 0.0.0.0)
absorbed
Mar  4 17:40:32 OSPF hello from 10.222.3.2 (IFL 68, transit area 0.0.0.0)
absorbed
Mar  4 17:40:40 OSPF hello from 10.222.3.2 (IFL 68, transit area 0.0.0.0)
absorbed

lab@London> monitor stop
```



Question: Is any LSA update activity occurring?

---

---

Answer: The answer will depend on the overall stability of the classroom topology. In most cases you will see only periodic hello traffic. You can deactivate an interface or purge the database to see LSA update activity, if desired.

### Step 5.11

Delete the traceoptions stanza from the [edit protocols ospf] hierarchy to deactivate tracing.

```
lab@London> configure  
Entering configuration mode
```

```
[edit]  
lab@London# delete protocols ospf traceoptions
```

```
[edit]  
lab@London# commit and-quit  
commit complete  
Exiting configuration mode
```

```
lab@London>
```



Please tell your instructor that you have completed Lab 4.

Not For Reproduction

# Lab 5

---

## Static and BGP Routing (Detailed)

---

### Overview

This lab covers the configuration and operational analysis of static and BGP routing. In this lab you will configure typical static and BGP routing scenarios that support attachment to an Internet service provider (ISP). Emphasis is placed on the J-Web user interface where possible.

The lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- Modify your configuration to accommodate a new lab topology.
- Configure and monitor static routing.
- Configure and monitor BGP routing.

## Key Commands

---

Key operational-mode commands used in this lab include the following:

```
?
configure
monitor start
monitor stop
ping
show bgp neighbor
show bgp summary
show configuration
show route
show route advertising-protocol
show route receive-protocol
traceroute
```

## Part 1: Reload and Commit the Previous J-Web Configuration

---

### Note

You can use J-Web to load configuration files from your PC or to paste in configuration text from your PC's clipboard. Currently, you must use the CLI to load configuration files stored locally on the router.

### Step 1.1

In a previous lab you saved your initial configuration, as created through the J-Web interface, to a file called *lab2-jweb*. To ensure that all stations begin this lab in a known state, you should now use the CLI to load and commit this configuration file.

You should recall that this configuration was also saved as the rescue configuration. As a result, you can recall this configuration by momentarily depressing the front panel CONFIG button or by issuing a **rollback rescue** CLI command. Remember that you must commit the rollback change to place it into effect. You can also use J-Web to view the rescue configuration, which can then be cut and pasted into your station.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# load override lab2-jweb
load complete

[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>
```

## Step 1.2

Launch your browser and open a J-Web session to your assigned station. Log in as the *lab* user with the password supplied by your instructor.


## Step 1.3

Refer to the Lab 5 topology diagram. Those stations that peer with *Sydney* should now use the J-Web Quick Configuration interface wizard to configure the *fe-2/0/1* interface at the Configuration > Quick Configuration > Interfaces page. The remaining stations that do not peer with *Sydney* should confirm that the *fe-2/0/1* interface is not configured. A sample capture is taken from *London*:

The screenshot shows the Juniper J-Web interface for a router named 'LONDON - J4300'. The user is logged in as 'lab'. The navigation menu on the left includes 'Monitor', 'Configuration', 'Diagnose', and 'Manage'. The 'Configuration' menu is expanded, showing 'Quick Configuration', 'Set Up', 'SSL', 'Interfaces', 'Users', 'SNMP', 'Routing', 'Firewall/NAT', 'IPSec Tunnels', 'Realtime Performance Monitoring', 'View and Edit', 'History', and 'Rescue'. The 'Quick Configuration' page is displayed, with the 'Interfaces' section selected. The 'Logical Interface Description' field is set to 'fe-2/0/1'. The 'IPv4 Addresses and Prefixes' field is set to '172.16.13/24'. The 'Add' button is highlighted, and the 'OK' button is also visible. The page footer shows the copyright notice: 'Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.'

## Step 1.4

Those stations that peer with *Sydney* should use ping to confirm reachability to *Sydney*'s 172.16.1.9 address. Again, a sample capture from *London* is shown:



## LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor
Configuration
Diagnose
Manage

- ▶ Ping Host
- ▶ Ping MPLS
- ▶ Traceroute

[Diagnose](#) > [Ping Host](#)

### Ping Host

---

#### Ping 172.16.1.9

PING 172.16.1.9 (172.16.1.9): 56 data bytes  
 64 bytes from 172.16.1.9: icmp\_seq=0 ttl=255 time=87.833 ms  
 64 bytes from 172.16.1.9: icmp\_seq=1 ttl=255 time=10.357 ms  
 64 bytes from 172.16.1.9: icmp\_seq=2 ttl=255 time=40.331 ms  
 64 bytes from 172.16.1.9: icmp\_seq=3 ttl=255 time=10.378 ms  
 64 bytes from 172.16.1.9: icmp\_seq=4 ttl=255 time=10.176 ms  
 64 bytes from 172.16.1.9: icmp\_seq=5 ttl=255 time=10.355 ms  
 64 bytes from 172.16.1.9: icmp\_seq=6 ttl=255 time=10.255 ms  
 64 bytes from 172.16.1.9: icmp\_seq=7 ttl=255 time=40.321 ms  
 64 bytes from 172.16.1.9: icmp\_seq=8 ttl=255 time=10.568 ms  
 64 bytes from 172.16.1.9: icmp\_seq=9 ttl=255 time=10.267 ms  
 --- 172.16.1.9 ping statistics ---  
 10 packets transmitted, 10 packets received, 0% packet loss  
 round-trip min/avg/max/stddev = 10.176/24.084/87.833/24.320 ms

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice.](#)

### Step 1.5

All stations should configure the OSPF IGP that provides connectivity within their AS. Use the J-Web OSPF wizard to configure a single-area OSPF. You should list only your station's loopback and serial interface as running OSPF at this time. The sample capture is taken from *London*:



LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor	Configuration	Diagnose	Manage
<a href="#">Configuration</a> > <a href="#">Quick Configuration</a> > <a href="#">Routing</a>			
<b>Quick Configuration</b>			
<b>Routing</b>			
<b>Router Identification</b>			
<b>Router Identifier</b> <input type="text" value="192.168.36.1"/> ?			
<b>OSPF</b>			
<b>Enable OSPF</b> <input checked="" type="checkbox"/>			
<b>OSPF Area ID</b> <input type="text" value="0.0.0.0"/>			
<b>Area Type</b> <input type="text" value="regular"/> ?			
<b>Enable OSPF on All Interfaces</b> <input type="checkbox"/>			
<div> <div> <b>OSPF-Enabled Interfaces</b> </div> <div> <input type="text" value="lo0.0"/>  <input type="text" value="se-1/0/1.0"/> </div> </div> <div> <input type="button" value="--&gt;"/> <input type="button" value="&lt;--"/> </div> <div> <b>OSPF-Disabled Interfaces</b> ?           <div> <input type="text" value="fe-0/0/0.0"/>  <input type="text" value="fe-0/0/1.0"/>  <input type="text" value="fe-2/0/1.0"/> </div> </div>			
<div> <input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Apply"/> </div>			

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

## Step 1.6

Stations that peer with *Sydney* must set their `fe-2/0/1` interface to be passive so that the EBGP next hop associated with routes from other ASs can be resolved. You could also use a policy to set the BGP next hop to self to achieve this goal. The use of policy to alter a BGP next hop is beyond the scope of this course, however.

You can set the `fe-2/0/1` interface to passive using J-Web at the Configuration > View and Edit > Edit Configuration > Protocols > Ospf > Area 0.0.0.0 > Interface > Add new entry page, as shown, or with the CLI command **`set protocols ospf area 0 interface fe-2/0/1 passive`**. Either way, be sure to commit those changes!



**LONDON - J4300**

Logged in as: lab

[Help](#) [About](#) [Logout](#)

**Monitor**   **Configuration**   Diagnose   Manage

[Configuration](#) > [View and Edit](#) > [Edit Configuration](#) > [Protocols](#) > [Ospf](#) > [Area 0.0.0.0](#) > [Interface](#)

**Configuration**

[Expand all](#) | [Hide all](#)

- [+ system](#)
- [+ interfaces](#)
- [+ routing-options](#)
- [- protocols](#)
  - [- ospf](#)
    - [- area](#)
      - [- 0.0.0.0](#)
        - [- interface](#)
          - [+ lo0.0](#)
          - [+ se-1/0/1.0](#)

**Area**

---

**Interface**

---

OK Cancel

Refresh Commit... Discard...

---

**Interface name** fe-2/0/1.0 ? M

---

**Bfd liveness detection** [Configure](#)

Dead interval  ?

Disable ☐ Yes

Hello interval  ?

Interface type  ?

Metric  ?

Passive ☒ Yes M

Poll interval  ?

Priority  ?

Retransmit interval  ?

Te metric  ?

Transit delay  ?

---

**Auth**

---

**Neighbor** (None configured) [Add new entry](#)

---

**Advanced**

---

OK Cancel

Refresh Commit... Discard...

---

**Icon Legend**

---

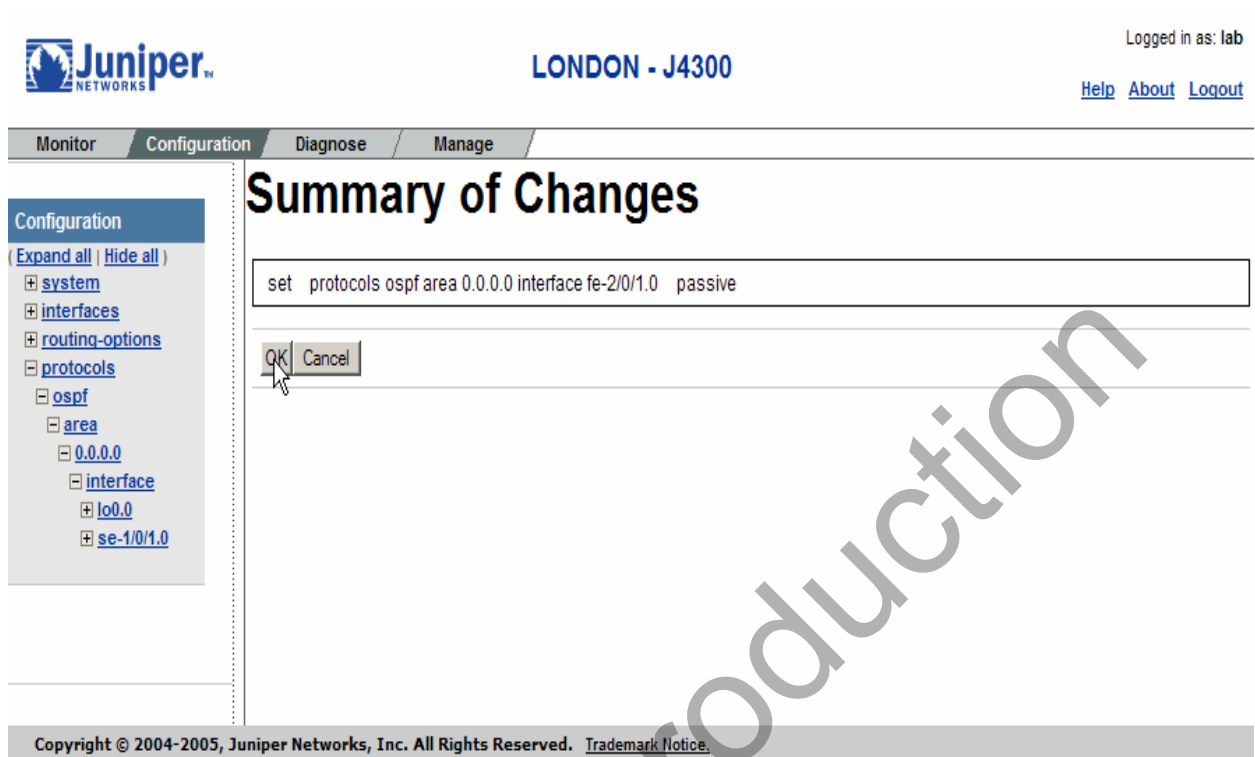
C **Comment**  
The configuration statement has been annotated with a comment. To display the comment, place the cursor over the statement icon.

I **Inactive**  
The configuration statement is not active and does not affect the device.

M **Modified**  
The configuration statement has been changed or added.

\* **Mandatory**  
The configuration statement must have a value.





The screenshot shows the Juniper Networks configuration interface for a device named 'LONDON - J4300'. The user is logged in as 'lab'. The 'Configuration' tab is active, and the left sidebar shows the configuration tree with 'protocols' expanded, then 'ospf', then 'area', and finally '0.0.0.0' and 'interface' expanded. The 'Summary of Changes' dialog box is open, displaying the command 'set protocols ospf area 0.0.0.0 interface fe-2/0/1.0 passive'. The dialog has 'OK' and 'Cancel' buttons. A large diagonal watermark 'NOT FOR REPRODUCTION' is visible across the image.

### Step 1.7

The changes made to the baseline configuration at *London* are called out here:

```
lab@London> show configuration | compare lab2-jweb
[edit interfaces]
+   fe-2/0/1 {
+       description "to shared fe-2/0/1 172.16.1.0/24 network";
+       unit 0 {
+           family inet {
+               address 172.16.1.3/24;
+           }
+       }
+   }
[edit]
+   routing-options {
+       router-id 192.168.36.1;
+   }
+   protocols {
+       ospf {
+           area 0.0.0.0 {
+               interface lo0.0;
+               interface se-1/0/1.0;
+               interface fe-2/0/1.0 {
+                   passive;
+               }
+           }
+       }
+   }
+ }
```

lab@London>

## Part 2: Configure and Monitor Static Routing

Refer to the Lab 5 topology diagram to orient yourself with the static/BGP routing topology. The goal is to configure static routing to provide connectivity among the various station pairings that represent distinct ASs. In this lab the instructor-controlled *Sydney* station functions as a service provider that interconnects each AS.

### Step 2.1

Use the CLI or the J-Web Quick Configuration Routing wizard to configure a default static route. Static routes are configured at the [edit routing-options static route] CLI hierarchy or at the J-Web Configuration > Quick Configuration > Routing > Static Routing page. Stations that peer with *Sydney* should define *Sydney* as the default route's next hop. In contrast, internal stations should point their default route towards the upstream router. The J-Web capture shows a correct default route configuration for *Sydney* peering station *London*. The CLI example shows the correct static route definition at *Tokyo*:

Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Configuration > Quick Configuration > Routing

Quick Configuration

Set Up

SSL

Interfaces

Users

SNMP

**Routing**

Firewall/NAT

IPSec Tunnels

Realtime Performance Monitoring

View and Edit

History

Rescue

Quick Configuration

**Routing**

Default Route

Default Route

Static Routes

No static routes are defined.

Add...

OK Cancel Apply

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

```
lab@Tokyo> configure
Entering configuration mode
```

```
[edit]
lab@Tokyo# edit routing-options
```

```
[edit routing-options]
lab@Tokyo# set static route 0.0.0.0/0 next-hop 10.222.2.2
```

```
[edit routing-options]  
lab@Tokyo# commit and-quit  
commit complete  
Exiting configuration mode
```

```
lab@Tokyo>
```

## Step 2.2


When satisfied with the default route definition at your station, use J-Web to display your station's routing table at the Monitor > Routing > Route Information page.

Question: Is the default static route active and pointing to the correct next hop?

---

---

Answer: The answer should be yes, as shown in the sample capture taken at *London*:



**LONDON - J4300**

Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor

Configuration

Diagnose

Manage

▶ System  
 ▶ Chassis  
 ▶ Interfaces  
 ▼ Routing  
   Route Information  
   BGP Information  
   OSPF Information  
   RIP Information  
 ▶ Service Sets  
 ▶ Firewall  
 ▶ IPsec  
 ▶ NAT  
 ▶ RPM

[Monitor](#) > [Routing](#) > [Route Information](#)

## Routing

### Route Information

13 destinations, 14 routes (12 active, 0 hold down, 1 hidden) Showing 13 of 14 routes (Page 1 of 1)

inet.0

Destination	Protocol/Preference	Next-Hop	Age
⊕ 0.0.0.0/0	*Static/5	to 172.16.1.9 via fe-2/0/1.0, selected	8
⊕ 10.222.2.0/24	*Direct/0	Interface	22:04:57
⊕	OSPF/10	via se-1/0/1.0, selected	8
⊕ 10.222.2.2/32	*Local/0	Local	22:05:01
⊕ 10.222.3.0/24	*Direct/0	Interface	22:04:59
⊕ 10.222.3.1/32	*Local/0	Local	22:05:02
⊕ 10.250.0.0/16	*Direct/0	Interface	22:04:59
⊕ 10.250.0.143/32	*Local/0	Local	22:05:02
⊕ 172.16.1.0/24	*Direct/0	Interface	21:01
⊕ 172.16.1.3/32	*Local/0	Local	21:01
⊕ 192.168.24.1/32	*OSPF/10	via se-1/0/1.0, selected	8
⊕ 192.168.36.1/32	*Direct/0	Interface	22:05:33
⊕ 224.0.0.5/32	*OSPF/10		13:59

Narrow Search

Destination Address   
 Next Hop Address   
 Best Route ☐  
 Exact Route ☐  
 Number of Routes to Display

Protocol   
 Receive Protocol   
 Inactive Routes ☐  
 Hidden Routes ☐

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

### Step 2.3

Use the J-Web Diagnose page to conduct traceroute testing between your station's loopback address and the loopback address of stations in remote ASs. Use the Advanced options to select a source address that matches your station's loopback address.


Question: Are the traceroutes successful?

---



---

Answer: The answer should be yes. The sample captures taken at *Tokyo* confirm connectivity between AS 65000 and 65002:



**TOKYO - J4300**

Logged in as: lab  
[Help](#) [About](#) [Logout](#)

**Monitor**   Configuration   Diagnose   Manage

[Diagnose > Traceroute](#)

- ▶ Ping Host
- ▶ Ping MPLS
- ▶ Traceroute

## Traceroute

---

### Traceroute to Host

The traceroute diagnostic tool uses a series of packets crafted to elicit an ICMP "time exceeded" messages from intermediate points in the network between your router and the specified host.

The time-to-live for a packet is decremented each time the packet is routed, so traceroute generally receives at least one "time exceeded" response from each waypoint. Traceroute starts with a packet with a time-to-live value of one, and increments the time to live for subsequent packets, thereby constructing a rudimentary map of the path between hosts.

Entering a host below creates a traceroute task that will run until the traceroute is complete or until it fails due to time out.

**\* Remote Host**  ?

☐ **Advanced options**

**Don't Resolve Addresses** ☐ ?

**Interface**  ?

**Time-to-Live**  ?

**Type-of-Service**  ?

**Resolve AS Numbers** ☐ ?


**Routing Instance**  ?

**Gateway**  ?

**Source Address**  ?

**Bypass Routing** ☐ ?

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).



**TOKYO - J4300**

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor / Configuration / **Diagnose** / Manage

- ▶ Ping Host
- ▶ Ping MPLS
- ▶ **Traceroute**

[Diagnose](#) > [Traceroute](#)

---

### Traceroute

---

#### Traceroute to 192.168.40.1

traceroute to 192.168.40.1 (192.168.40.1) from 192.168.24.1, 32 hops max, 40 byte packets

```

1 10.222.2.2 (10.222.2.2) 9.423 ms 5.910 ms 6.917 ms
2 172.16.1.9 (172.16.1.9) 21.699 ms 18.741 ms 19.479 ms
3 172.16.1.4 (172.16.1.4) 18.763 ms 18.471 ms 19.459 ms
4 192.168.40.1 (192.168.40.1) 18.242 ms 19.322 ms 19.312 ms
                    
```

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

#### Note

You should notify your instructor if you detect any connectivity problems after confirming that the remote teams have finished their configuration activities.



Pause here to allow all teams to complete the previous lab steps before proceeding.

Tell your instructor that you have completed the static route configuration and monitoring portion of this lab.

## Part 3: Configure and Monitor BGP Routing

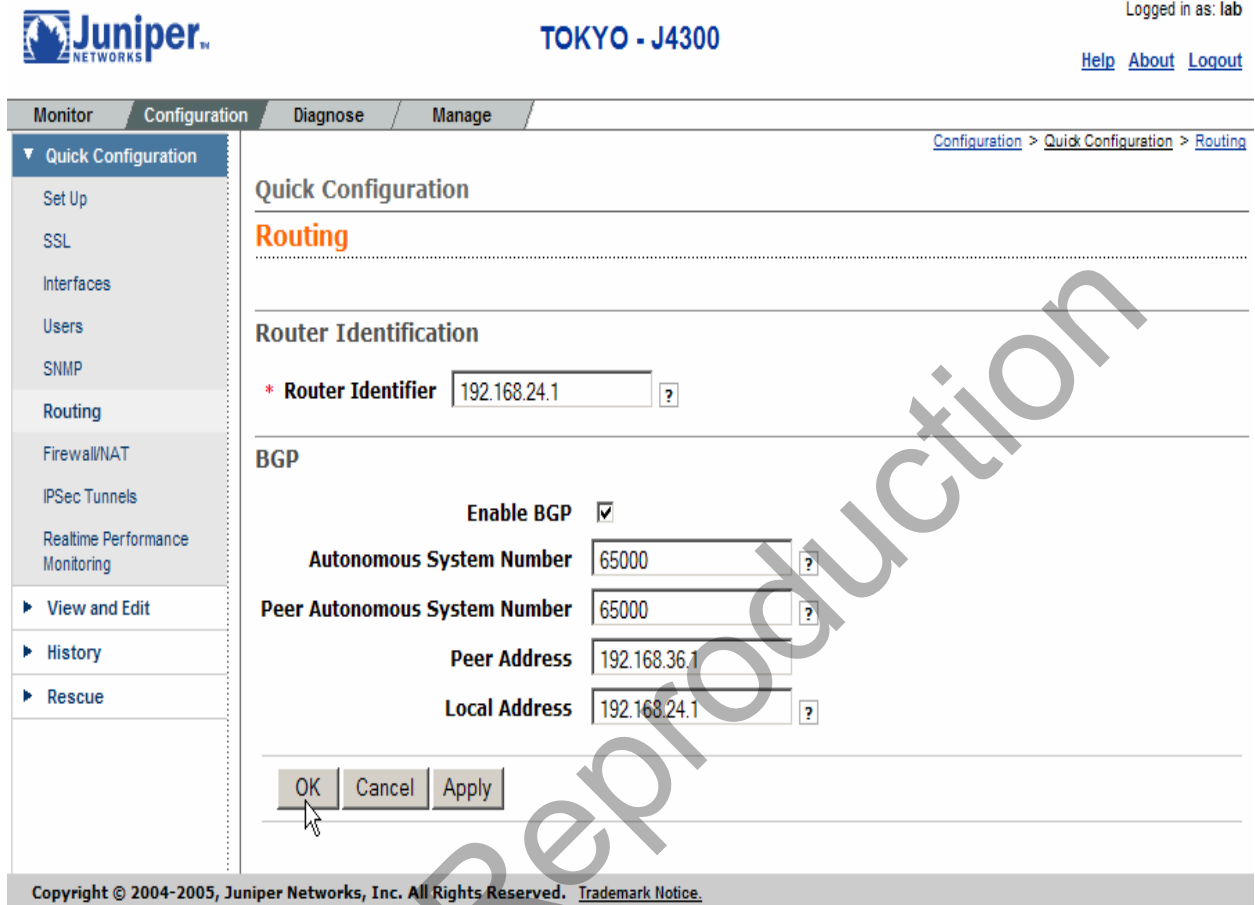
### Step 3.1

Begin by deleting the static default route definition at your station. Use J-Web or a **delete routing-options static** CLI command, as desired.

### Step 3.2

Use the J-Web BGP wizard to define your internal BGP session at the Configuration > Quick Configuration > Routing and Protocols > BGP Routing page. Be sure to peer between loopback addresses using the local-address option.

The capture taken at *Tokyo* shows the expected IBGP session parameters:



Juniper NETWORKS

TOKYO - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Configuration > Quick Configuration > Routing

Quick Configuration

**Routing**

Router Identification

\* Router Identifier 192.168.24.1 ?

BGP

Enable BGP ☒

Autonomous System Number 65000 ?

Peer Autonomous System Number 65000 ?

Peer Address 192.168.36.1

Local Address 192.168.24.1 ?

OK Cancel Apply

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

### Step 3.3

All teams that use EBGp to peer with *Sydney* must now use the CLI to define their EBGp peering session. These steps should be performed on *London*, *San Jose*, *Amsterdam*, and *Sao Paulo* only. A working BGP stanza is taken from *London*. The commands needed to define the EBGp peering session are also shown. Be sure to commit the changes when done:

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# edit protocols bgp

[edit protocols bgp]
lab@London# show
group jweb-bgp {
    local-address 192.168.36.1;
    peer-as 65000;
    neighbor 192.168.24.1;
}

[edit protocols bgp]
lab@London# edit group ext
```

```
[edit protocols bgp group ext]
lab@London# set type external neighbor 172.16.1.9 peer-as 65420
```

```
[edit protocols bgp group ext]
lab@London# show
type external;
neighbor 172.16.1.9 {
    peer-as 65420;
}
```

```
[edit protocols bgp group ext]
lab@London# commit and-quit
commit complete
Exiting configuration mode
```

### Step 3.4

Use the CLI (or the J-Web view and edit) to define a simple policy that redistributes direct and OSPF-learned routes into BGP. Recall that the default policy for BGP is to accept and advertise BGP routes only. All teams can use the sample policy (and the related command syntax) shown here:

```
lab@London> configure
Entering configuration mode
```

```
[edit]
lab@London# edit policy-options policy-statement direct-ospf
```

```
[edit policy-options policy-statement direct-ospf]
lab@London# set from protocol [ direct ospf ]
```

```
[edit policy-options policy-statement direct-ospf]
lab@London# set then accept
```

```
[edit policy-options policy-statement direct-ospf]
lab@London# show
from protocol [ direct ospf ];
then accept;
```

```
[edit policy-options policy-statement direct-ospf]
lab@London# commit and-quit
commit complete
Exiting configuration mode
```

```
lab@London>
```

### Step 3.5

Apply the *direct-ospf* policy as export at the [edit protocol bgp] hierarchy and display the resulting BGP stanza top confirm your work. Your station's configuration should be similar to the sample taken from *London*. Be sure to commit your changes when satisfied with your work:



```
lab@London> configure
Entering configuration mode

[edit]
lab@London# set protocols bgp export direct-ospf

[edit]
lab@London# show protocols bgp
export direct-ospf;
group jweb-bgp {
    local-address 192.168.36.1;
    peer-as 65000;
    neighbor 192.168.24.1;
}
group ext {
    type external;
    neighbor 172.16.1.9 {
        peer-as 65420;
    }
}

[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>
```

### Step 3.6

When satisfied with the BGP and policy configuration, use J-Web to display your station's routing table at the Monitor > Routing > Route Information page.

Question: Is your station learning routes through BGP?

---

---

Answer: The answer should be yes, as shown in the sample capture taken at *London*:



LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor
Configuration
Diagnose
Manage

[Monitor](#) > [Routing](#) > [Route Information](#)

System
Chassis
Interfaces
Routing
Route Information
BGP Information
OSPF Information
RIP Information
Service Sets
Firewall
IPSec
NAT
RPM

## Routing

### Route Information

28 destinations, 34 routes (27 active, 0 hold down, 1 hidden) Showing 31 of 34 routes (Page 1 of 1)

**inet.0**

Destination	Protocol/Preference	Next-Hop	Age
10.222.1.0/24	*BGP/170	via se-1/0/1.0, selected	40:09
10.222.2.0/24	*Direct/0	Interface	1d 0:10:13
	OSPF/10	via se-1/0/1.0, selected	7
	BGP/170	via se-1/0/1.0, selected	40:09
10.222.2.2/32	*Local/0	Local	1d 0:10:17
10.222.3.0/24	*Direct/0	Interface	1d 0:10:15
10.222.3.1/32	*Local/0	Local	1d 0:10:18
10.222.4.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	29:51
10.222.5.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	29:51
10.222.6.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	24:53
10.222.8.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	29:51
10.222.9.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	21:00
10.222.10.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	24:53
10.222.11.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	17:51
10.222.12.0/24	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	28:19
10.250.0.0/16	*Direct/0	Interface	1d 0:10:15
	BGP/170	via se-1/0/1.0, selected	40:09
10.250.0.143/32	*Local/0	Local	1d 0:10:18
172.16.1.0/24	*Direct/0	Interface	2:26:17
	BGP/170	via se-1/0/1.0, selected	35:57
172.16.1.3/32	*Local/0	Local	2:26:17
192.168.16.1/32	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	29:51
192.168.20.1/32	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	29:51
192.168.24.1/32	*OSPF/10	via se-1/0/1.0, selected	7
	BGP/170	via se-1/0/1.0, selected	40:09
192.168.32.1/32	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	24:53
192.168.36.1/32	*Direct/0	Interface	1d 0:10:49
	BGP/170	via se-1/0/1.0, selected	35:57
192.168.40.1/32	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	24:53
192.168.48.1/32	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	17:51
192.168.56.1/32	*BGP/170	to 172.16.1.9 via fe-2/0/1.0, selected	17:51

**Narrow Search**

## Step 3.7

Use the J-Web Monitor > Routing > BGP Information page to display BGP status information.

Question: Are all the BGP sessions defined at your station established?

Answer: The answer should be yes. The sample captures taken at *London* confirms that both the internal and external BGP sessions are established:

Logged in as: lab  
[Help](#) [About](#) [Logout](#)

**Monitor** Configuration Diagnose Manage

Monitor > Routing > BGP Information

**Routing**

**BGP Information**

**BGP Summary**

**BGP Peer Summary**

Total Groups	Total Peers	Down Peers	Unconfigured Peers
2	2	0	

**RIB Summary**

RIB Name	Total Prefixes	Active Prefixes	Suppressed Prefixes	History Prefixes	Damped Prefixes	Pending Prefixes	State
inet.0	21	16	0	0	0	0	

**BGP Neighbors**

Peer Address	Autonomous System	Peer State	Elapsed Time	Description
172.16.1.9	65420	Established	51:50	
192.168.24.1	65000	Established	54:55	

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

## Step 3.8

Use the J-Web Diagnose > Traceroute page to conduct traceroute testing between your station's loopback address and the loopback address of stations in remote ASs. Use the Advanced options to select a source address that matches your station's loopback address.

Question: Are the traceroutes successful?

Answer: The answer should be yes. The sample captures taken at *Tokyo* confirms connectivity between AS 65000 and 65002:

Logged in as: lab

TOKYO - J4300

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

- ▶ Ping Host
- ▶ Ping MPLS
- ▶ Traceroute

## Traceroute

### Traceroute to Host

The traceroute diagnostic tool uses a series of packets crafted to elicit an ICMP "time exceeded" messages from intermediate points in the network between your router and the specified host.

The time-to-live for a packet is decremented each time the packet is routed, so traceroute generally receives at least one "time exceeded" response from each waypoint. Traceroute starts with a packet with a time-to-live value of one, and increments the time to live for subsequent packets, thereby constructing a rudimentary map of the path between hosts.

Entering a host below creates a traceroute task that will run until the traceroute is complete or until it fails due to time out.

**\* Remote Host**  ?

☐ **Advanced options**

**Don't Resolve Addresses** ☐ ?

**Interface**  ?

**Time-to-Live**  ?

**Type-of-Service**  ?

**Resolve AS Numbers** ☐ ?

**Routing Instance**  ?

**Gateway**  ?

**Source Address**  ?

**Bypass Routing** ☐ ?

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

 **TOKYO - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor / Configuration / **Diagnose** / Manage

► Ping Host

► Ping MPLS

**► Traceroute**

Diagnose > Traceroute

### Traceroute

---

#### Traceroute to 192.168.40.1

traceroute to 192.168.40.1 (192.168.40.1) from 192.168.24.1, 32 hops max, 40 byte packets

1	10.222.2.2 (10.222.2.2)	11.745 ms	7.573 ms	13.836 ms
2	172.16.1.9 (172.16.1.9)	18.100 ms	19.039 ms	18.959 ms
3	172.16.1.4 (172.16.1.4)	18.858 ms	19.304 ms	19.606 ms
4	192.168.40.1 (192.168.40.1)	68.966 ms	8.604 ms	19.364 ms

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

#### Note

You should notify your instructor if you detect any connectivity problems after confirming that the remote teams have finished their configuration activities.



Tell your instructor that you have completed Lab 5.

Not For Reproduction

---

## J-series Services (Detailed)

---

### Overview

---

This lab covers the configuration and operational analysis of static Network Address Translation (NAT) and stateful firewall services. In this lab you will configure a basic NAT and stateful firewall scenario that is typical for branch-office attachment to the Internet.

The lab is available in two formats: a high-level format that is designed to make you think through each step and a detailed format that offers step-by-step instructions complete with sample output from most commands.

By completing this lab, you will perform the following tasks:

- Modify your configuration to accommodate the lab topology.
- Configure NAT and stateful firewall using the J-Web wizard.
- Monitor NAT and stateful firewall using J-Web.
- Modify stateful firewall rule sets using the CLI.

## Key Commands

---

Key operational-mode commands used in this lab include the following:

```
?  
configure  
monitor start  
monitor stop  
ping  
show services  
traceroute
```

## Part 1: Reload and Commit the Previous J-Web Configuration

---

### Step 1.1

In a previous lab you saved your initial configuration, as created through the J-Web interface, to a file called *lab2-jweb*. To ensure that all stations begin this lab in a known state, you should now use the CLI to load and commit this configuration file.

You should recall that this configuration was also saved as the rescue configuration. As a result, you can recall this configuration by momentarily depressing the front panel CONFIG button or by using a **rollback rescue** CLI command. Remember that you must **commit** the rollback change to place it into effect. You can also use J-Web to view the rescue configuration, which can then be copied and pasted into your station.

```
lab@London> configure  
Entering configuration mode  
  
[edit]  
lab@London# load override lab2-jweb  
load complete  
  
[edit]  
lab@London# commit and-quit  
commit complete  
Exiting configuration mode  
  
lab@London>
```

### Step 1.2

Launch your browser and open a J-Web session to your assigned station. Log in as the *lab* user with the password supplied by your instructor.

### Step 1.3

This lab requires that all stations have direct connectivity to *Sydney* via the *fe-2/0/1* interface. You should now use the CLI or the J-Web Quick Configuration interface wizard to configure the IP address of the *fe-2/0/1* interface according to the Lab 6 topology diagram. This configuration is accomplished at the `[edit interfaces fe-2/0/1]` CLI hierarchy or the J-Web Configuration > Quick Configuration > Interfaces page. The sample J-Web capture shows the correct parameters being configured at the *London* station, and the CLI shows *Tokyo* being configured:



Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Quick Configuration

Set Up

SSL

Interfaces

Users

SNMP

Routing

Firewall/NAT

IPSec Tunnels

Realtime Performance Monitoring

View and Edit

History

Rescue

Configuration > Quick Configuration > Interfaces

Quick Configuration

Interfaces [Add a Logical Interface](#)

Interface Information

Logical Interface Description

IPv4 Addresses and Prefixes 172.16.1.3/24 ?

Add Delete

OK Cancel

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

```

lab@Tokyo> configure
Entering configuration mode

[edit]
lab@Tokyo# edit interfaces fe-2/0/1

[edit interfaces fe-2/0/1]
lab@Tokyo# set unit 0 family inet address 172.16.1.2/24

[edit interfaces fe-2/0/1]
lab@Tokyo# show
unit 0 {
    family inet {
        address 172.16.1.2/24;
    }
}

[edit interfaces fe-2/0/1]
lab@Tokyo# commit and-quit
commit complete
Exiting configuration mode

lab@Tokyo>

```

## Step 1.4

All stations should now define a static default route that points to *Sydney*'s 172.16.1.9 address. Use the J-Web Configuration > Quick Configuration > Routing > Static Routing page to complete this task. The capture taken at *London* shows this configuration:

The screenshot shows the Juniper J-Web interface for a router named 'LONDON - J4300'. The user is logged in as 'lab'. The navigation menu on the left includes 'Quick Configuration', 'View and Edit', 'History', and 'Rescue'. The 'Quick Configuration' section is expanded, showing 'Set Up', 'SSL', 'Interfaces', 'Users', 'SNMP', 'Routing', 'Firewall/NAT', 'IPSec Tunnels', and 'Realtime Performance Monitoring'. The 'Routing' section is selected, and the 'Static Routing' page is displayed. The 'Default Route' section shows a text box with the value '172.16.1.9'. The 'Static Routes' section shows the message 'No static routes are defined.' and an 'Add...' button. At the bottom of the 'Static Routes' section are 'OK', 'Cancel', and 'Apply' buttons. A large diagonal watermark 'Not for Reproduction' is visible across the page.

## Step 1.5

Use the J-Web Diagnose page or CLI to confirm reachability to *Sydney*'s 172.16.1.9 address and to the server's 172.16.2.254 address. The sample J-Web captures confirm the required connectivity at *London*:

Juniper NETWORKS LONDON - J4300 Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Diagnose > Ping Host

Ping Host

Ping MPLS

Traceroute

### Ping Host

#### Ping 172.16.1.9

PING 172.16.1.9 (172.16.1.9): 56 data bytes  
 64 bytes from 172.16.1.9: icmp\_seq=0 ttl=255 time=15.767 ms  
 64 bytes from 172.16.1.9: icmp\_seq=1 ttl=255 time=10.225 ms  
 64 bytes from 172.16.1.9: icmp\_seq=2 ttl=255 time=10.256 ms  
 64 bytes from 172.16.1.9: icmp\_seq=3 ttl=255 time=10.544 ms  
 64 bytes from 172.16.1.9: icmp\_seq=4 ttl=255 time=10.239 ms  
 64 bytes from 172.16.1.9: icmp\_seq=5 ttl=255 time=25.281 ms  
 64 bytes from 172.16.1.9: icmp\_seq=6 ttl=255 time=10.412 ms  
 64 bytes from 172.16.1.9: icmp\_seq=7 ttl=255 time=10.393 ms  
 64 bytes from 172.16.1.9: icmp\_seq=8 ttl=255 time=10.239 ms  
 64 bytes from 172.16.1.9: icmp\_seq=9 ttl=255 time=10.473 ms  
 --- 172.16.1.9 ping statistics ---  
 10 packets transmitted, 10 packets received, 0% packet loss  
 round-trip min/avg/max/stddev = 10.225/12.383/25.281/4.594 ms

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Juniper NETWORKS LONDON - J4300 Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Diagnose > Traceroute

Ping Host

Ping MPLS

Traceroute

### Traceroute

#### Traceroute to 172.16.2.254

traceroute to 172.16.2.254 (172.16.2.254), 32 hops max, 40 byte packets  
 1 172.16.1.9 (172.16.1.9) 9.826 ms 5.318 ms 10.552 ms  
 2 172.16.2.254 (172.16.2.254) 9.263 ms 8.868 ms 9.453 ms

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

**Note**

Sydney's configuration is such that it can only route packets between its directly connected subnets. This is an important point because this condition is later used to confirm NAT functionality.

**Step 1.6**

Confirm that *Sydney* cannot route to non-172.16.x.0/24 prefixes by generating test traffic to *Sydney*'s 172.16.1.9 address that is sourced from your station's loopback address. The following sample captures show a traceroute that fails as expected because of *Sydney*'s inability to route to *London*'s 192.168.36.1 source address:

Juniper NETWORKS LONDON - J4300 Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

► Ping Host  
► Ping MPLS  
► Traceroute

Diagnose > Traceroute

### Traceroute

#### Traceroute to Host

The traceroute diagnostic tool uses a series of packets crafted to elicit an ICMP "time exceeded" messages from intermediate points in the network between your router and the specified host.

The time-to-live for a packet is decremented each time the packet is routed, so traceroute generally receives at least one "time exceeded" response from each waypoint. Traceroute starts with a packet with a time-to-live value of one, and increments the time to live for subsequent packets, thereby constructing a rudimentary map of the path between hosts.

Entering a host below creates a traceroute task that will run until the traceroute is complete or until it fails due to time out.

\* Remote Host  ?

☐ Advanced options

Don't Resolve Addresses ☐ ?

Interface  ?

Time-to-Live  ?

Type-of-Service  ?

Resolve AS Numbers ☐ ?

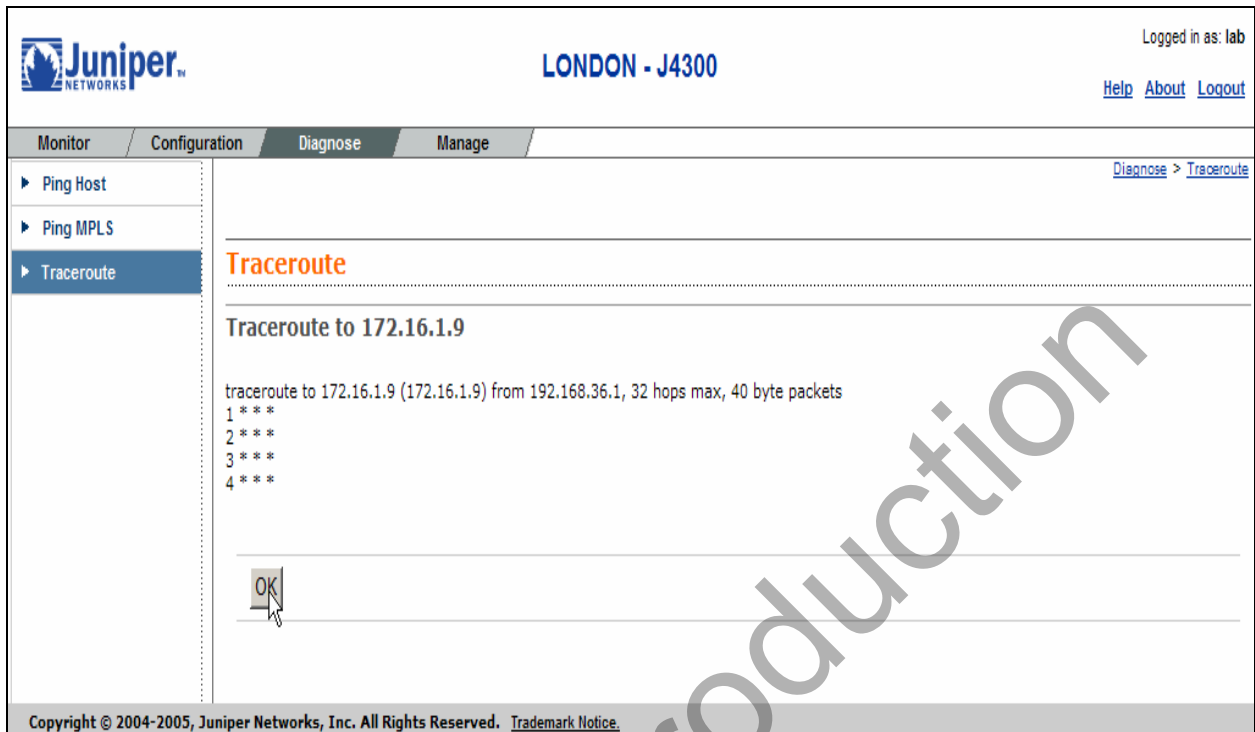
Routing Instance  ?

Gateway  ?

Source Address  ?

Bypass Routing ☐ ?

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)



The screenshot shows the Juniper J-Web interface for a router named 'LONDON - J4300'. The user is logged in as 'lab'. The interface has tabs for Monitor, Configuration, Diagnose, and Manage. The 'Diagnose' tab is selected, and the 'Traceroute' option is chosen from the left-hand menu. The main content area displays the results of a traceroute to 172.16.1.9. The results show four hops, each with three asterisks indicating successful connections. The source IP is 192.168.36.1, and the maximum hops are 32 with 40 byte packets. An 'OK' button is visible at the bottom of the results area.

Juniper NETWORKS

LONDON - J4300

Logged in as: lab

[Help](#) [About](#) [Logout](#)

Monitor / Configuration / Diagnose / Manage

[Diagnose > Traceroute](#)

Traceroute

Traceroute to 172.16.1.9

traceroute to 172.16.1.9 (172.16.1.9) from 192.168.36.1, 32 hops max, 40 byte packets

```

1 * * *
2 * * *
3 * * *
4 * * *

```

OK


Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

## Part 2: Configure Stateful Firewall and NAT

In this lab part you use the J-Web Quick Configuration NAT/stateful firewall wizard to quickly configure basic NAT and stateful firewall functionality. The symmetric nature of the lab topology accommodates a common configuration among all student teams.

### Step 2.1

Access the NAT/stateful firewall wizard at the Configuration > Quick Configuration > Firewall/NAT page. Enable stateful firewall by clicking the Enable Stateful Firewall check box. Add the fe-2/0/1 interface as an untrusted (outside) interface.



LONDON - J4300

Logged in as: lab

[Help](#)
[About](#)
[Logout](#)

Monitor
Configuration
Diagnose
Manage

Quick Configuration
Set Up
SSL
Interfaces
Users
SNMP
Routing
Firewall/NAT
IPSec Tunnels
Realtime Performance Monitoring
View and Edit
History
Rescue

Configuration > Quick Configuration > Firewall/NAT

### Quick Configuration

## Firewall/NAT

---

### Stateful Firewall

Stateful firewall inspects traffic flowing between a trusted network and an untrusted network. All packets flowing from a trusted network to an untrusted network are allowed. Packets flowing from an untrusted network to a trusted network are allowed only if they are responses to a session originated by the trusted network.

**Enable Stateful Firewall** ☒

---

### Trusted Interfaces

Select the interfaces to be part of a trusted network. Stateful firewall is applied to the untrusted interfaces.

**Untrusted Interfaces**

fe-2/0/1.0

-->

**Trusted Interfaces**

fe-0/0/0.0

fe-0/0/1.0

se-1/0/1.0

<--

---

### Network Address Translation (NAT)

When NAT is enabled, the source address of a packet flowing from a trusted network to an untrusted network is replaced with an address chosen from the specified range. The source port of the packet is also replaced with a dynamically chosen port.

**Enable NAT** ☐

\* **Low Address in Address Range**

**High Address in Address Range**

---

### Outside Applications Allowed

The following applications are allowed to operate from the untrusted network to the trusted network.

No applications are allowed from the untrusted network onto the trusted network.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.

## Step 2.2

Enable NAT by clicking the Enable NAT check box. By default, the NAT pool is taken from the address configured on the loopback interface; all teams must alter this addresses to reflect the 172.16.1.x IP address assigned to their untrusted (outside) interface. The sample capture shows the correct parameters for the *London* station:

Juniper NETWORKS LONDON - J4300 Logged in as: lab

[Help](#) [About](#) [Logout](#)

---

**Monitor**   **Configuration**   **Diagnose**   **Manage**

[Configuration](#) > [Quick Configuration](#) > [Firewall/NAT](#)

**Quick Configuration**

**Firewall/NAT**

---

**Stateful Firewall**

Stateful firewall inspects traffic flowing between a trusted network and an untrusted network. All packets flowing from a trusted network to an untrusted network are allowed. Packets flowing from an untrusted network to a trusted network are allowed only if they are responses to a session originated by the trusted network.

**Enable Stateful Firewall** ☒

---

**Trusted Interfaces**

Select the interfaces to be part of a trusted network. Stateful firewall is applied to the untrusted interfaces.

**Untrusted Interfaces**

fe-2/0/1.0

-->

<--

**Trusted Interfaces**

fe-0/0/0.0  
fe-0/0/1.0  
se-1/0/1.0

---

**Network Address Translation (NAT)**

When NAT is enabled, the source address of a packet flowing from a trusted network to an untrusted network is replaced with an address chosen from the specified range. The source port of the packet is also replaced with a dynamically chosen port.

**Enable NAT** ☒

\* **Low Address in Address Range**

**High Address in Address Range**

---

**Outside Applications Allowed**

The following applications are allowed to operate from the untrusted network to the trusted network.

No applications are allowed from the untrusted network onto the trusted network.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

### Step 2.3

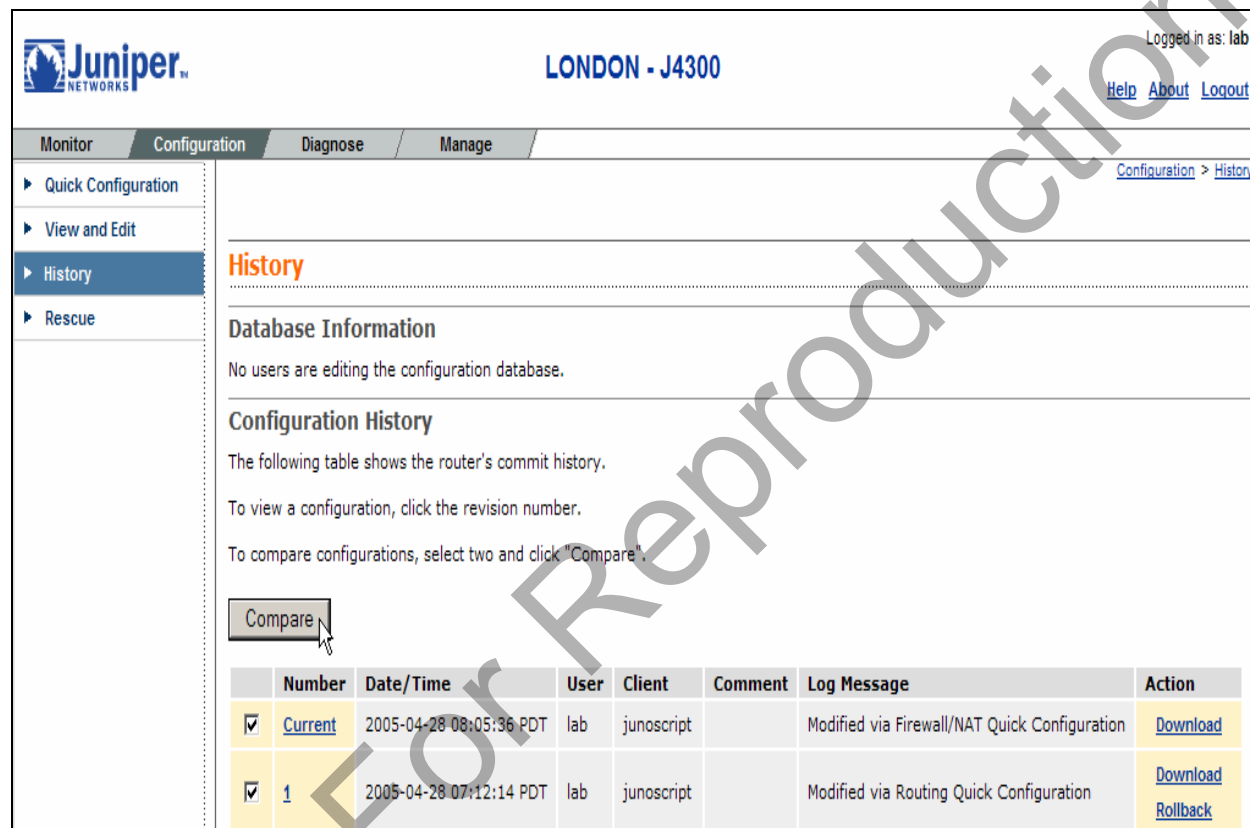
Click OK to activate your initial NAT/stateful firewall configuration when satisfied with your work.

## Part 3: Monitor NAT/Stateful Firewall

### Step 3.1

Use J-Web to display the changes made to your baseline configuration at the Configuration > History page. The display no doubt makes you want to buy the NAT/stateful firewall wizard a beer, if such an entity could actually imbibe, that is!

The sample capture reflects the changes made to *London*'s configuration as it was left at the end of Part 1 of this lab:



Juniper NETWORKS LONDON - J4300 Logged in as: lab Help About Logout

Monitor Configuration Diagnose Manage

Configuration > History

History

Database Information

No users are editing the configuration database.

Configuration History

The following table shows the router's commit history.

To view a configuration, click the revision number.

To compare configurations, select two and click "Compare".

Compare

	Number	Date/Time	User	Client	Comment	Log Message	Action
<input checked="" type="checkbox"/>	<a href="#">Current</a>	2005-04-28 08:05:36 PDT	lab	junoscript		Modified via Firewall/NAT Quick Configuration	<a href="#">Download</a>
<input checked="" type="checkbox"/>	<a href="#">1</a>	2005-04-28 07:12:14 PDT	lab	junoscript		Modified via Routing Quick Configuration	<a href="#">Download</a> <a href="#">Rollback</a>



Juniper NETWORKS **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage Configuration > History

► Quick Configuration  
 ► View and Edit  
 ► **History**  
 ► Rescue

### History

#### Compare Rollback 1 Configuration to Current Configuration

Legend:  
 Removed from Rollback 1 Configuration  
 changed lines  
 Added in Current Configuration

Rollback 1 Configuration	Current Configuration
<b>[edit interfaces]</b>	<b>[edit interfaces]</b>
	sp-0/0/0 { unit 0 { family inet; } }
<b>[edit interfaces fe-2/0/1 unit 0 family inet]</b>	<b>[edit interfaces fe-2/0/1 unit 0 family inet]</b>
	service { input { service-set jweb-wan-sfw-service-set; } output { service-set jweb-wan-sfw-service-set; } }
<b>[edit]</b>	<b>[edit]</b>
	services { stateful-firewall { rule jweb-sfw-to-wan { match-direction output; term jweb-apply-alg { from { application-sets junos-algs-outbound; } then { accept; } } term jweb-accept-all { then { accept; } } rule jweb-sfw-from-wan { match-direction input; term jweb-discard-all { then { discard; } } } nat { pool jweb-nat-pool { address-range low 172.16.1.3 high 172.16.1.3; port automatic; } rule jweb-nat-to-wan { match-direction output; term jweb-nat-term { then { translated { source-pool jweb-nat-pool; translation-type source dynamic; } } } } service-set jweb-wan-sfw-service-set { stateful-firewall-rules jweb-sfw-to-wan; stateful-firewall-rules jweb-sfw-from-wan; nat-rules jweb-nat-to-wan; interface-service { service-interface sp-0/0/0; } } }

Legend:  
 Removed from Rollback 1 Configuration  
 changed lines  
 Added in Current Configuration

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#).

Question: Based on the configuration, what traffic and applications are accepted in the input direction when there is no matching state?

---



---



---

Answer: With the current configuration no traffic is accepted on the untrusted interface unless there is matching state for that flow. This behavior is described by the following configuration snippet:

```
lab@London# show | find jweb-sfw-from-wan
rule jweb-sfw-from-wan {
  match-direction input;
  term jweb-discard-all {
    then {
      discard;
    }
  }
}
```

### Step 3.2

Monitor current NAT pool usage at the Monitor > NAT page of J-Web or with the **show services nat pool** CLI command. CLI output from *London* is shown:

```
lab@London> show services nat pool
Interface: sp-0/0/0, Service set: jweb-wan-sfw-service-set
NAT pool      Address      Port      Ports in use
jweb-nat-pool  172.16.1.3-172.16.1.3  65535-512  0
```

Question: Is this an example of NAT, or NAT and PAT? Explain your answer.

---



---

Answer: This is an example of NAT and PAT because a single IP address makes up the NAT pool. Multiple sessions can share this single address through port translation. This is called overload on some vendors' equipment.

Question: How many ports are currently in use in your NAT pool?

---



---

Answer: You should see that no (0) ports are in use because no traffic should have been subjected to the NAT processing at this stage of the lab.


### Step 3.3

Source ping traffic from your station's loopback address to *Sydney*'s 172.16.1.9 address. You can perform this action using the J-Web Diagnose page or using the CLI. The samples taken from *London* demonstrate both approaches:

The screenshot shows the Juniper J-Web interface for the LONDON - J4300 router. The 'Diagnose' tab is selected, and the 'Ping Host' option is chosen from the left sidebar. The 'Ping Host' configuration page is displayed, showing the following settings:

- Remote Host:** 172.16.1.9
- Advanced options:**
  - Don't Resolve Addresses:** ☐
  - Interface:** any
  - Count:** 10
  - Don't Fragment:** ☐
  - Record Route:** ☐
  - Type-of-Service:** 0
  - Routing Instance:** default
  - Interval:** 1
  - Packet Size:** 56
  - Source Address:** 192.168.36.1
  - Time-to-Live:** 32
  - Bypass Routing:** ☐
- Start:** A button to initiate the ping test.

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. Trademark Notice.


LONDON - J4300
Logged in as: lab

[Help](#)
[About](#)
[Logout](#)

Monitor
Configuration
Diagnose
Manage

Diagnose > Ping Host

- ▶ Ping Host
- ▶ Ping MPLS
- ▶ Traceroute

### Ping Host

#### Ping 172.16.1.9

PING 172.16.1.9 (172.16.1.9): 56 data bytes  
 64 bytes from 172.16.1.9: icmp\_seq=0 ttl=255 time=7.698 ms  
 64 bytes from 172.16.1.9: icmp\_seq=1 ttl=255 time=10.316 ms  
 64 bytes from 172.16.1.9: icmp\_seq=2 ttl=255 time=10.361 ms  
 64 bytes from 172.16.1.9: icmp\_seq=3 ttl=255 time=10.314 ms  
 64 bytes from 172.16.1.9: icmp\_seq=4 ttl=255 time=10.154 ms  
 64 bytes from 172.16.1.9: icmp\_seq=5 ttl=255 time=10.325 ms  
 64 bytes from 172.16.1.9: icmp\_seq=6 ttl=255 time=10.322 ms  
 64 bytes from 172.16.1.9: icmp\_seq=7 ttl=255 time=10.369 ms  
 64 bytes from 172.16.1.9: icmp\_seq=8 ttl=255 time=10.325 ms  
 64 bytes from 172.16.1.9: icmp\_seq=9 ttl=255 time=17.572 ms  
 --- 172.16.1.9 ping statistics ---  
 10 packets transmitted, 10 packets received, 0% packet loss  
 round-trip min/avg/max/stddev = 7.698/10.776/17.572/2.396 ms

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

```
lab@London> ping source G19
172.16.1.9
PING 172.16.1.9 (172.16.1.9): 56 data bytes
64 bytes from 172.16.1.9: icmp_seq=0 ttl=255 time=9.126 ms
64 bytes from 172.16.1.9: icmp_seq=1 ttl=255 time=10.321 ms
64 bytes from 172.16.1.9: icmp_seq=2 ttl=255 time=10.365 ms
64 bytes from 172.16.1.9: icmp_seq=3 ttl=255 time=10.344 ms
64 bytes from 172.16.1.9: icmp_seq=4 ttl=255 time=10.314 ms
64 bytes from 172.16.1.9: icmp_seq=5 ttl=255 time=10.338 ms
^C
--- 172.16.1.9 ping statistics ---
6 packets transmitted, 6 packets received, 0% packet loss
round-trip min/avg/max/stddev = 9.126/10.135/10.365/0.451 ms

lab@London>
```

Question: Does the NAT pool indicate that any ports are now in use?

---



---

Answer: A single port should now be in use, as shown in the sample J-Web output taken at *London*:

Juniper NETWORKS LONDON - J4300

Logged in as: lab [Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Monitor > NAT

**NAT**

**NAT Pools**

Service set 'jweb-wan-sfw-service-set' on service interface 'sp-0/0/0'

NAT Pool	Pool Address Start	Pool Address End	Port High	Port Low	Ports In Use
jweb-nat-pool	172.16.1.3	172.16.1.3	65535	512	1

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

### Step 3.4

Use J-Web to monitor stateful firewall usage at the Monitor > Firewall > Stateful Firewall page. You can display similar information with the **show services stateful-firewall flows** CLI command, if desired.


Question: Are any stateful firewall flows currently active?

---



---

Answer: The answer can vary based on the timing between the generation of ping traffic and the display of stateful firewall flows. By definition, a stateful firewall only maintains state for connectionless applications like ping for a brief period of time. If no flows are displayed, you should once again generate the test traffic as instructed in Step 3.3. Your display should be similar to the sample obtained at *London*:



LONDON - J4300

Logged in as: lab

[Help](#)
[About](#)
[Logout](#)

Monitor
Configuration
Diagnose
Manage

System
Chassis
Interfaces
Routing
Service Sets
**Firewall**
Statistics Summary
Stateful Firewall
IDS Information
IPSec
NAT
RPM

Monitor > Firewall > Stateful Firewall

Firewall

Stateful Firewall

Service set 'jweb-wan-sfw-service-set' on service interface 'sp-0/0/0'

Showing 2 flows

Protocol	Source IP	Source Port	Destination IP	Destination Port	Flow State	Direction	Frames
⊕ ICMP	192.168.36.1	8	172.16.1.9		Watch	Outbound	126
⊕ ICMP	172.16.1.9	0	172.16.1.3		Watch	Inbound	126

Narrow Search

Destination Address
Source Address

Destination Port
Source Port

Protocol
Service Set

Number of Flows or Conversations to Display
Show only Established Conversations

OK

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

Question: How can you determine which flow initiates the state and which flow is considered the response to that state?


---



---

Answer: Click + next to a stateful firewall entry to display details. In this example it is easy to see that traffic flowing from 172.16.1.9 to 192.168.36.1 is in response to a previous request that established firewall state.

Lab 6-16 • J-series Services (Detailed)



Juniper NETWORKS **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor Configuration Diagnose Manage

Monitor > Firewall > Stateful Firewall

Firewall

**Stateful Firewall**

Service set 'jweb-wan-sfw-service-set' on service interface 'sp-0/0/0' Showing 2 flows

Protocol	Source IP	Source Port	Destination IP	Destination Port	Flow State	Direction	Frames
ICMP	192.168.36.1	8	172.16.1.9		Watch	Outbound	126
ICMP	172.16.1.9	0	172.16.1.3		Watch	Inbound	126

NAT Type: NAT dest  
 Original Address: 172.16.1.3  
 Translated Address: 192.168.36.1  
 Byte Count: 10584  
 Flow Role: Responder

Original Port: 0  
 Translated Port: 4900  
 TCP Window Size:  
 Flow Timeout: 30

Narrow Search

Destination Address:   
 Destination Port:   
 Protocol:   
 Number of Flows or Conversations to Display:   
 Source Address:   
 Source Port:   
 Service Set:   
 Show only Established Conversations: ☐

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

### Step 3.5

Attempt to trace the route from your station to *Sydney*'s 172.16.1.9 address while again sourcing the traffic from your loopback address. Use the J-Web Diagnose page or the CLI, as desired. In the latter case, use **Ctrl-C** to break out of a command that has not completed normally.


Question: Do the traceroutes succeed?

---



---

Answer: The answer should be no, as shown in the sample J-Web and CLI outputs obtained at *London*:

 **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor / Configuration / **Diagnose** / Manage

[Ping Host](#)  
[Ping MPLS](#)  
[Traceroute](#)

[Diagnose > Traceroute](#)

### Traceroute

#### Traceroute to Host

The traceroute diagnostic tool uses a series of packets crafted to elicit an ICMP "time exceeded" messages from intermediate points in the network between your router and the specified host.

The time-to-live for a packet is decremented each time the packet is routed, so traceroute generally receives at least one "time exceeded" response from each waypoint. Traceroute starts with a packet with a time-to-live value of one, and increments the time to live for subsequent packets, thereby constructing a rudimentary map of the path between hosts.

Entering a host below creates a traceroute task that will run until the traceroute is complete or until it fails due to time out.

\* Remote Host  ?

☐ Advanced options

Don't Resolve Addresses ☐ ?

Interface  ?

Time-to-Live  ?

Type-of-Service  ?

Resolve AS Numbers ☐ ?

Routing Instance  ?

Gateway  ?

Source Address  ?

Bypass Routing ☐ ?

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)

 **LONDON - J4300** Logged in as: lab  
[Help](#) [About](#) [Logout](#)

Monitor / Configuration / **Diagnose** / Manage

[Ping Host](#)  
[Ping MPLS](#)  
[Traceroute](#)

[Diagnose > Traceroute](#)

### Traceroute

#### Traceroute to 172.16.1.9

traceroute to 172.16.1.9 (172.16.1.9) from 192.168.36.1, 32 hops max, 40 byte packets

```
1 ***
2 ***
3 ***
4 ***
5 ***
```

Copyright © 2004-2005, Juniper Networks, Inc. All Rights Reserved. [Trademark Notice](#)



```
lab@London> traceroute 172.16.1.9 source 192.168.36.1
traceroute to 172.16.1.9 (172.16.1.9) from 192.168.36.1, 30 hops max, 40 byte
packets
 1  * * *
 2  * * *
 3  * * *
 4  * ^C
lab@London>
```

Question: Can you form a hypothesis as to why pings pass but traceroute fail, given the current NAT/stateful firewall configuration?

---



---



---



---

The issue here relates to the fact that two independent protocols are used by UNIX-based systems to support traceroute. Specifically, UDP is used to probe each hop, while ICMP error messages report each hop that is detected. Your station generates UDP packets with increasing TTL values when probing, and each hop is detected by the resulting ICMP TTL expired/destination unreachable error message (the former is returned by intermediate hops, while the latter is generated by the target). Your station is configured to discard all incoming traffic that does not have matching outgoing state, which breaks traceroute because the returning ICMP error messages have no outgoing state.

We explore ways of diagnosing and resolving this issue in the next lab part.

## Part 4: Modify Stateful Firewall Configuration

In this part of the lab you use the CLI or J-Web click-and-edit functionality to modify your NAT/stateful firewall configuration. These changes provide additional diagnostic capabilities through system logging and ultimately allow traceroute testing through the acceptance of incoming ICMP messages.

### Note

You can make the configuration changes required in this lab part with J-Web click-and-edit functionality at the Configuration > View and Edit > Edit Configuration page. The examples provided in this section are based on the CLI to help save space (and the rain forest).

### Step 4.1

In this step you modify the existing stateful firewall service set to support system logging. The resulting log entries help you diagnose stateful firewall operation by telling you which packets are matching a given term. Begin by positioning yourself at the [edit services service-set jweb-wan-sfw-service-set] configuration hierarchy.

```
lab@London> configure
Entering configuration mode

[edit]
lab@London# edit services service-set jweb-wan-sfw-service-set

[edit services service-set jweb-wan-sfw-service-set]
lab@London#
```

## Step 4.2

Enable system logging by defining syslog parameters for the *jweb-wan-sfw-service-set* using a **set syslog host local** command. The **local** keyword results in logging to the local `/var/log/messages` file; remote system logging is also supported.

```
[edit services service-set jweb-wan-sfw-service-set]
lab@London# set syslog host local
```

## Step 4.3

You now alter your stateful firewall rules to invoke the syslog action modifier for matching packets. In this case you will log packets that are discarded by the *jweb-discard-all* term in the *jweb-sfw-from-wan* firewall rule. Position yourself at the `[edit services stateful-firewall rule jweb-sfw-from-wan]` hierarchy, and modify the *jweb-discard-all* term so that it includes the syslog action modifier.

```
[edit services service-set jweb-wan-sfw-service-set]
lab@London# up

[edit services]
lab@London# edit stateful-firewall rule jweb-sfw-from-wan

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# set term jweb-discard-all then syslog

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London#
```

## Step 4.4

Commit the changes when satisfied with your work. The changes made to the configuration are called out using the CLI's **compare** function before the commit is performed at *London* by comparing the candidate configuration to the `rollback 0` index. Because `rollback 0` is the default target for the **compare** function, the **rollback** keyword can be omitted.

```
[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# top

[edit]
lab@London# show | compare
[edit services stateful-firewall rule jweb-sfw-from-wan term jweb-discard-all
then]
+     syslog;
[edit services service-set jweb-wan-sfw-service-set]
+     syslog {
+         host local;
```

```

+    }

[edit]
lab@London# commit and-quit
commit complete
Exiting configuration mode

lab@London>

```

### Step 4.5

Use the CLI's **monitor start** command to view changes to the messages log in real time and then repeat the traceroute that was attempted back at Step 3.5. If you are still in configuration mode, be sure to preface the command with the **run** verb.

Question: Are any syslog entries being written regarding your stateful firewall, and if so, what do these messages tell you?

---



---



---

Answer: You should now see syslog messages relating to your stateful firewall filter. As shown in the sample capture, these messages indicate that ICMP destination unreachable messages are being discarded on the untrusted interface:

```

lab@London> traceroute 172.16.1.9 source 192.168.36.1
traceroute to 172.16.1.9 (172.16.1.9) from 192.168.36.1, 30 hops max, 40 byte
packets
 1  *^C
lab@London>
*** messages ***
Mar  7 23:15:10 London mgd[12990]: UI_CMDLINE_READ_LINE: User 'lab', command
'traceroute 172.16.1.9 source 192.168.36.1 '
Mar  7 23:15:10 (FPC Slot 0, PIC Slot 0) {jweb-wan-sfw-service-set}[FWNAT]:
ASP_SFW_RULE_DISCARD: proto 1 (ICMP DEST UNREACH) application: , fe-2/0/
1.0:172.16.1.9:0 -> 172.16.1.3, Match SFW discard rule-set: , rule:
jweb-sfw-from-wan, term: jweb-discard-all
Mar  7 23:15:10 (FPC Slot 0, PIC Slot 0) {jweb-wan-sfw-service-set}[FWNAT]:
ASP_SFW_CREATE_DISCARD_FLOW: proto 1 (ICMP DEST UNREACH) application: , fe-2/
0/1.0:172.16.1.9:0 -> 172.16.1.3, Creating discard flow
Mar  7 23:15:15 (FPC Slot 0, PIC Slot 0) {jweb-wan-sfw-service-set}[FWNAT]:
ASP_SFW_RULE_DISCARD: proto 1 (ICMP DEST UNREACH) application: , fe-2/0/
1.0:172.16.1.9:0 -> 172.16.1.3, Match SFW discard rule-set: , rule:
jweb-sfw-from-wan, term: jweb-discard-all
Mar  7 23:15:15 (FPC Slot 0, PIC Slot 0) {jweb-wan-sfw-service-set}[FWNAT]:
ASP_SFW_CREATE_DISCARD_FLOW: proto 1 (ICMP DEST UNREACH) application: , fe-2/
0/1.0:172.16.1.9:0 -> 172.16.1.3, Creating discard flow

```

**Note**


---

You might want to turn off monitoring, or use the **Esc-q** sequence to temporarily suspend screen output. If you opt for the latter approach simply enter **Esc-q** again to resume monitor output to your terminal.

---

**Step 4.6**

Modify the *jweb-sfw-from-wan* rule by adding a new term that accepts all ICMP messages. Although you can be more specific regarding the exact ICMP message types that are accepted, this level of control is not needed for our purposes.

Begin by positioning yourself at the [edit services stateful-firewall rule jweb-sfw-from-wan] configuration hierarchy.

```
lab@London> monitor stop messages
```

```
lab@London> configure
Entering configuration mode
```

```
[edit]
lab@London# edit services stateful-firewall rule jweb-sfw-from-wan

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London#
```

**Step 4.7**

Use the **set** command to add a new term called *accept-icmp*. Use the **applications** keyword and question mark (?) as needed to specify the ICMP application group. Specify an **accept** action for traffic matching this term.

```
[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# set term accept-icmp from applications junos-icmp-all

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# set term accept-icmp then accept
```

**Step 4.8**

Display the modified rule. Your display should be similar to the example taken from *London*:

```
[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# show
match-direction input;
term jweb-discard-all {
    then {
        discard;
        syslog;
    }
}
term accept-icmp {
    from {
        applications junos-icmp-all;
    }
}
```

```

    then {
        accept;
    }
}

```

Question: Given the current configuration, do you think that traceroutes will now succeed? Explain your answer.

---



---



---

Answer: The answer is no. The ordering of the terms in the stateful firewall rule are such that all traffic will match the *jweb-discard-all* term and be discarded before ever hitting the newly added *accept-icmp* term.

### Step 4.9

Use the CLI's **insert** function to insert the *accept-icmp* term before the *jweb-discard-all* term. When finished, commit the changes.

```

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# insert term accept-icmp before term jweb-discard-all

```

```

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# show
match-direction input;
term accept-icmp {
    from {
        applications junos-icmp-all;
    }
    then {
        accept;
    }
}
term jweb-discard-all {
    then {
        discard;
        syslog;
    }
}

```

```

[edit services stateful-firewall rule jweb-sfw-from-wan]
lab@London# commit and-quit
commit complete
Exiting configuration mode

```

```
lab@London>
```

## Step 4.10

Once again, monitor your system log and repeat the traceroute from your station's loopback address to the 172.16.1.9 address of *Sydney*.

Question: Do the traceroutes succeed?

---

---

Answer: The answer should be yes, as shown in the sample command output taken at *London*:

```
lab@London> monitor start messages
```

```
lab@London> traceroute 172.16.1.9 source 192.168.36.1
```

```
traceroute to 172.16.1.9 (172.16.1.9) from 192.168.36.1, 30 hops max, 40 byte packets
```

```
 1  172.16.1.9 (172.16.1.9)  9.540 ms  28.233 ms  9.380 ms
```

```
lab@London>
```

```
*** messages ***
```

```
Mar  7 23:37:07  London mgd[12990]: UI_CMDLINE_READ_LINE: User 'lab', command  
'traceroute 172.16.1.9 source 192.168.36.1 '
```



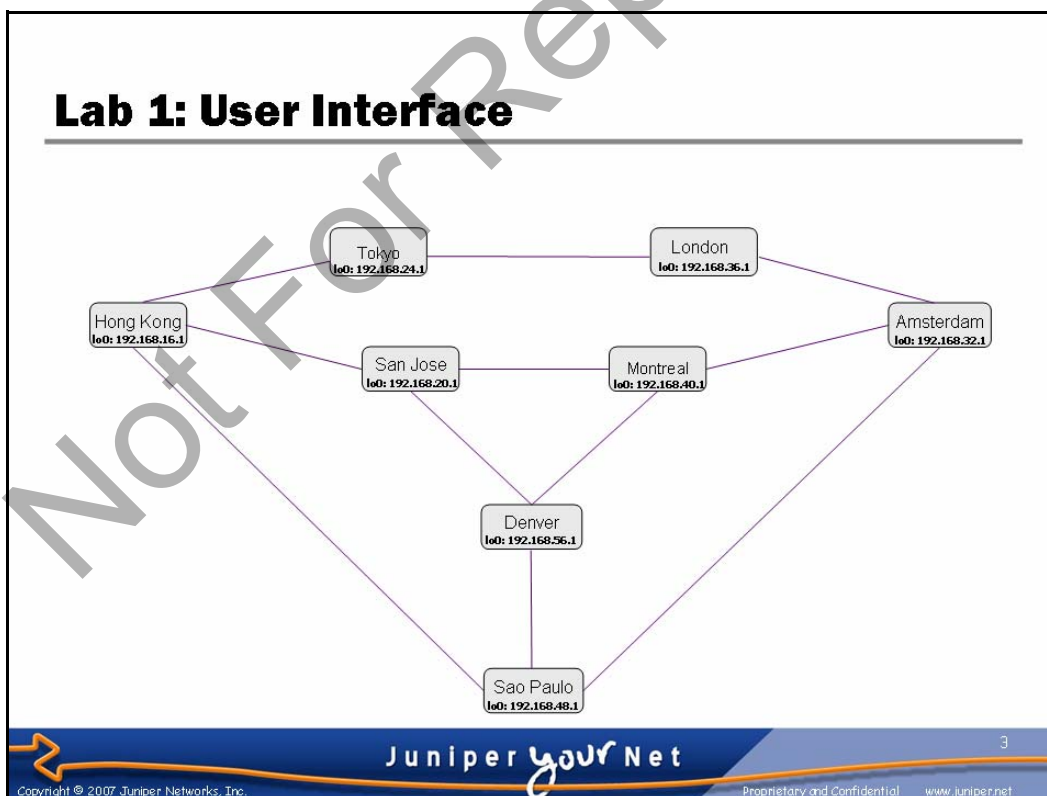
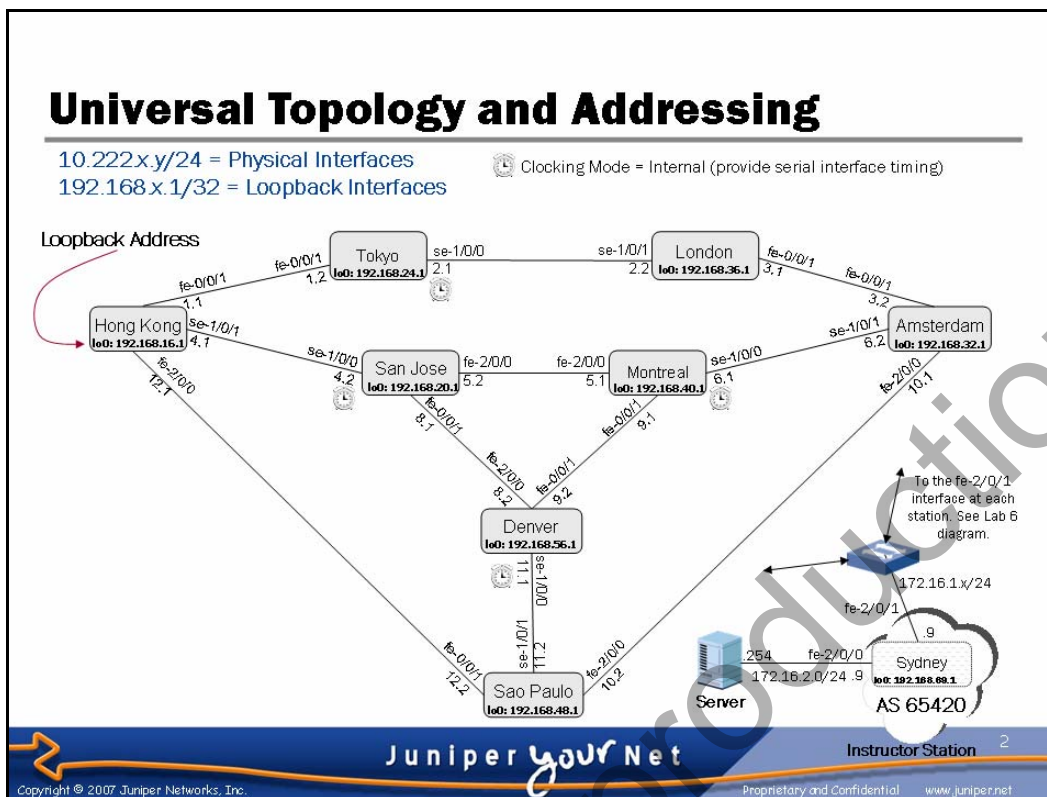
Tell your instructor that you have completed Lab 6.



# **Operating Juniper Networks Routers—J-series**

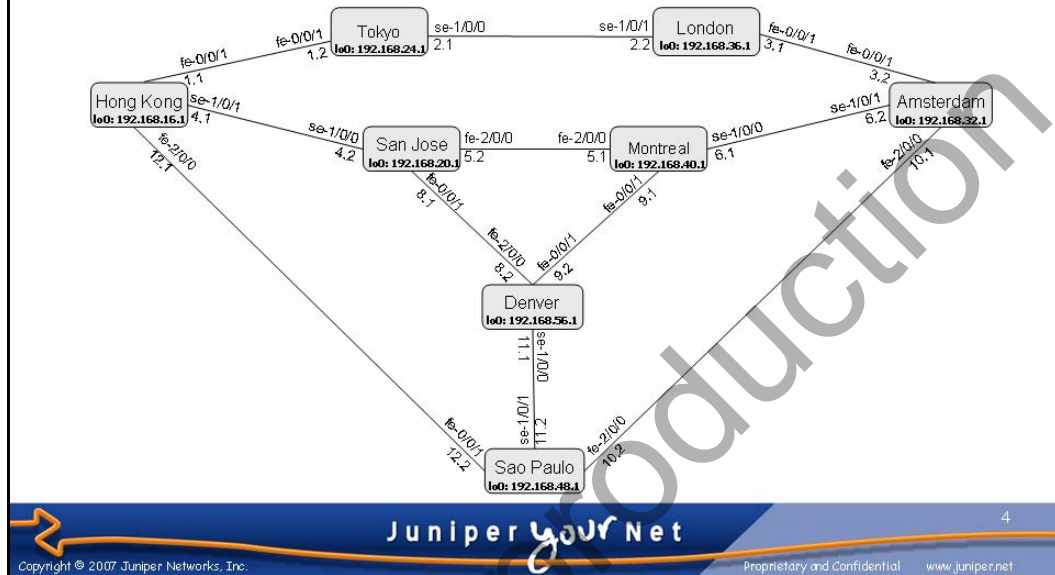
## **Appendix A: Lab Diagrams**

Not For Reproduction

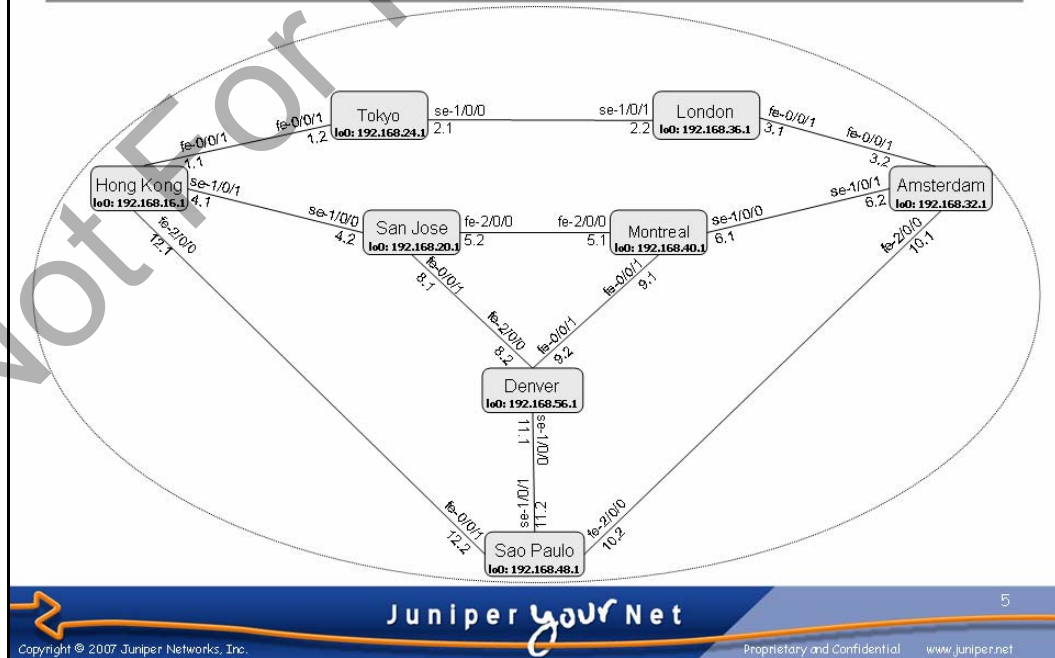




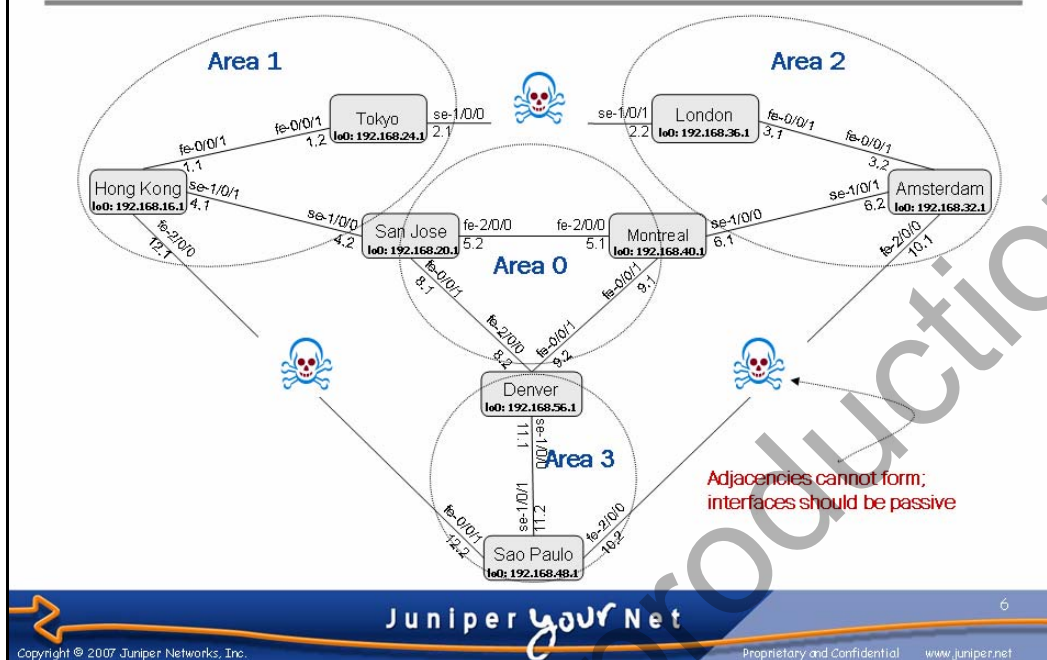
## Labs 2 and 3: Installation and Operational Monitoring



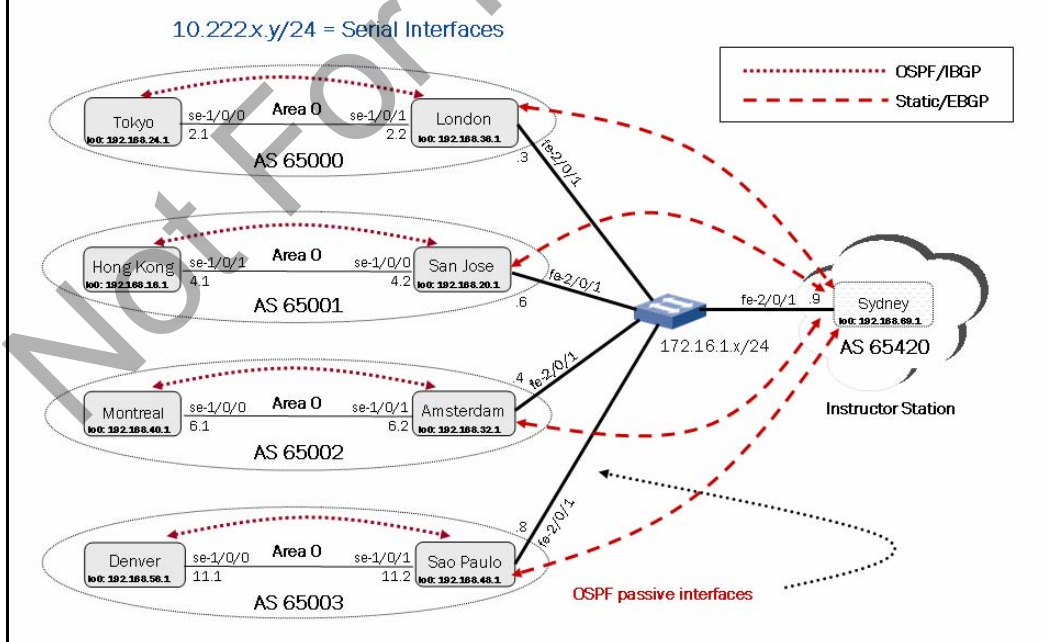
## Lab 4: RIP and Single-Area OSPF



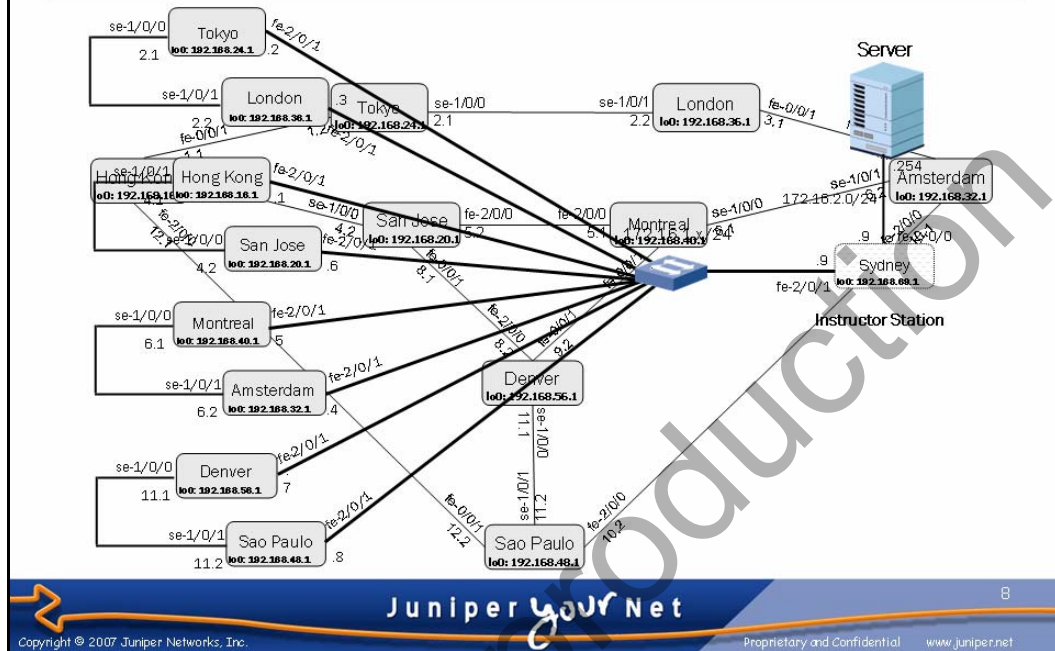
## Lab 4: Multiarea OSPF (Optional)



## Lab 5: Static/BGP Routing



## Lab 6: J-series Services



Not For Reproduction