



---

Junos<sup>®</sup> OS

# DHCP Relay Agent Feature Guide for MX Series Routers

Release  
15.1



---

Published: 2015-05-11

Juniper Networks, Inc.  
1133 Innovation Way  
Sunnyvale, California 94089  
USA  
408-745-2000  
[www.juniper.net](http://www.juniper.net)

Juniper Networks, Junos, Steel-Belted Radius, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. The Juniper Networks Logo, the Junos logo, 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.

Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

*Junos<sup>®</sup> OS DHCP Relay Agent Feature Guide for MX Series Routers*

15.1

Copyright © 2015, Juniper Networks, Inc.  
All rights reserved.

The information in this document is current as of the date on the title page.

#### YEAR 2000 NOTICE

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

#### END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at <http://www.juniper.net/support/eula.html>. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

# Table of Contents

	About the Documentation . . . . .	vii
	Documentation and Release Notes . . . . .	vii
	Supported Platforms . . . . .	vii
	Using the Examples in This Manual . . . . .	vii
	Merging a Full Example . . . . .	viii
	Merging a Snippet . . . . .	viii
	Documentation Conventions . . . . .	ix
	Documentation Feedback . . . . .	xi
	Requesting Technical Support . . . . .	xi
	Self-Help Online Tools and Resources . . . . .	xi
	Opening a Case with JTAC . . . . .	xii
<b>Chapter 1</b>	<b>Configuring MX Series Routers as Layer 2 DHCP Relay Agents . . . . .</b>	<b>13</b>
	MX Series Router as a Layer 2 DHCP Relay Agent . . . . .	13
	Example: Configuring DHCP Relay in a Bridge Domain VLAN Environment . . . . .	14
	Example: Configuring DHCP Relay in a VPLS Routing Instance Environment . . . . .	15



# List of Tables

<b>About the Documentation</b> .....	<b>vii</b>
Table 1: Notice Icons .....	ix
Table 2: Text and Syntax Conventions .....	ix



# About the Documentation

- Documentation and Release Notes on page vii
- Supported Platforms on page vii
- Using the Examples in This Manual on page vii
- Documentation Conventions on page ix
- Documentation Feedback on page xi
- Requesting Technical Support on page xi

## Documentation and Release Notes

---

To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

## Supported Platforms

---

For the features described in this document, the following platforms are supported:

- MX Series

## Using the Examples in This Manual

---

If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

## Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xml;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

## Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:



```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the *CLI User Guide*.

## Documentation Conventions

Table 1 on page ix defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page ix defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  user@host> <b>configure</b>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Fixed-width text like this	Represents output that appears on the terminal screen.	<pre>user@host&gt; show chassis alarms</pre> <p>No alarms currently active</p>
<i>Italic text like this</i>	<ul style="list-style-type: none"> <li>Introduces or emphasizes important new terms.</li> <li>Identifies guide names.</li> <li>Identifies RFC and Internet draft titles.</li> </ul>	<ul style="list-style-type: none"> <li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li> <li><i>Junos OS CLI User Guide</i></li> <li>RFC 1997, <i>BGP Communities Attribute</i></li> </ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	<p>Configure the machine's domain name:</p> <pre>[edit] root@# set system domain-name domain-name</pre>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"> <li>To configure a stub area, include the <b>stub</b> statement at the <code>[edit protocols ospf area area-id]</code> hierarchy level.</li> <li>The console port is labeled <b>CONSOLE</b>.</li> </ul>
< > (angle brackets)	Encloses optional keywords or variables.	<b>stub</b> <default-metric <i>metric</i> >;
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<b>broadcast</b>   <b>multicast</b> <i>(string1   string2   string3)</i>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
Indentation and braces ( { } )	Identifies a level in the configuration hierarchy.	<pre>[edit] routing-options {   static {     route default {       nexthop <i>address</i>;       retain;     }   } }</pre>
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
<b>GUI Conventions</b>		
<b>Bold text like this</b>	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"> <li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li> <li>To cancel the configuration, click <b>Cancel</b>.</li> </ul>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can provide feedback by using either of the following methods:

- Online feedback rating system—On any page at the Juniper Networks Technical Documentation site at <http://www.juniper.net/techpubs/index.html>, simply click the stars to rate the content, and use the pop-up form to provide us with information about your experience. Alternately, you can use the online feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>.
- E-mail—Send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net). Include the document or topic name, URL or page number, and software version (if applicable).

## Requesting Technical Support

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

- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

## Self-Help Online Tools and Resources

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

- Find CSC offerings: <http://www.juniper.net/customers/support/>
- Search for known bugs: <http://www2.juniper.net/kb/>
- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>

- Download the latest versions of software and review release notes:  
<http://www.juniper.net/customers/csc/software/>
- Search technical bulletins for relevant hardware and software notifications:  
<http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum:  
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

## Opening a Case with JTAC

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

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

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

## CHAPTER 1

# Configuring MX Series Routers as Layer 2 DHCP Relay Agents

- [MX Series Router as a Layer 2 DHCP Relay Agent on page 13](#)
- [Example: Configuring DHCP Relay in a Bridge Domain VLAN Environment on page 14](#)
- [Example: Configuring DHCP Relay in a VPLS Routing Instance Environment on page 15](#)

### MX Series Router as a Layer 2 DHCP Relay Agent

The Dynamic Host Configuration Protocol (DHCP) is used by a DHCP client (host) to determine Layer 3 information (such as an IP address) from a DHCP server. DHCP uses the client's MAC (Layer 2) address to query the server. A router can be used as a DHCP relay agent to pass the query on to a server while the router appears to reply to the client. You can configure a Juniper Networks MX Series Ethernet Services Router to act as a DHCP relay agent. The MX Series router configuration at Layer 2 accesses the Layer 3 information with DHCP snooping.

DHCP servers and relay agents have a level of trust in the MAC addresses used in DHCP client queries. A hacker can spoof invalid MAC addresses and overwhelm the server or relay agent with flooded traffic. Or the hacker can try to determine other information, such as the IP address range used by devices on the network. The DHCP process should only trust MAC addresses that are valid for a particular network.

You can configure the MX Series router to use MAC addresses obtained by the Layer 2 address learning process to control the flooding of DHCP packets.

Several restrictions apply to DHCP configuration on the MX Series routers:

- All statements referring to "option 82" (including circuit information in DHCP relay messages) are not supported on the MX Series routers.
- This feature works for static IP/MAC bindings on the MX Series routers.
- The DHCP snooping database table is not restored after a Routing Engine reboot.
- The DHCP Discover message is not flooded to the DHCP server when broadband service aggregator (BSA) and broadband service router (BSR) are provisioned on the same switch.

For more information on configuring DHCP, see the *Junos OS Broadband Subscriber Management and Services Library*.

**Related  
Documentation**

- [DHCP Relay Agent Feature Guide for MX Series Routers](#)
- [Example: Configuring DHCP Relay in a Bridge Domain VLAN Environment on page 14](#)
- [Example: Configuring DHCP Relay in a VPLS Routing Instance Environment on page 15](#)

---

## Example: Configuring DHCP Relay in a Bridge Domain VLAN Environment

---

The following example configures DHCP relay in a VPLS environment to trust only the MAC addresses learned on the listed interfaces.



**NOTE:** This is not a complete router configuration.

```
[edit]
routing-instances {
  classic-vpls {
    instance-type vpls;
    interface ge-1/1/1.0;
    interface ge-1/1/2.0;
    interface ge-1/1/3.0;
    interface ge-1/1/4.0;
    interface ge-1/1/5.0;
    vlan-id 20;
    forwarding-options {
      dhcp-relay { # Here is where DHCP is configured.
        group vlan-20-bridge {
          interface ge-1/1/1.0;
          interface ge-1/1/2.0;
          interface ge-1/1/3.0;
          interface ge-1/1/4.0;
          interface ge-1/1/5.0;
        }
      }
    }
    protocol vpls {
      site-id 567;
      # Other VPLS configuration statements...
    }
  }
}
```

Only MAC addresses learned on the five listed Gigabit Ethernet interfaces will be trusted for DHCP relay purposes.

For more information on configuring DHCP, see the *Junos OS Broadband Subscriber Management and Services Library*.

**Related  
Documentation**

- [DHCP Relay Agent Feature Guide for MX Series Routers](#)
- [MX Series Router as a Layer 2 DHCP Relay Agent on page 13](#)

- [Example: Configuring DHCP Relay in a VPLS Routing Instance Environment on page 15](#)

## Example: Configuring DHCP Relay in a VPLS Routing Instance Environment

The following example configures DHCP relay in a bridge domain (VLAN) environment. The MX Series router will trust only the MAC addresses learned on the listed interfaces.



**NOTE:** This is not a complete router configuration.

The router has three interfaces: two interfaces (**ge-2/2/4** and **ge-2/2/6**) using VLAN 100 for the DHCP clients, and one (**xe-9/2/0**) leading to the DHCP server. The router performs the DHCP snooping (relay) function.

### Configure the Interfaces

```
[edit interfaces]
ge-2/2/4 {
  encapsulation ethernet-bridge;
  unit 0 {
    family bridge {
      interface-mode access;
      vlan-id 100;
    }
  }
}
ge-2/2/6 {
  encapsulation ethernet-bridge;
  unit 0 {
    family bridge {
      interface-mode access;
      vlan-id 100;
    }
  }
}
xe-9/2/0 {
  unit 0 {
    family bridge {
      interface-mode access;
      vlan-id 100;
    }
  }
}
```

### Configure the Routing Instance (Virtual Switch)

```
[edit routing-instances]
vsl {
  instance-type virtual-switch;
  interface ge-2/2/4.0;
  interface ge-2/2/6.0;
  interface xe-9/2/0;
  bridge-domains {
    bd1 {
      domain-type bridge;
      vlan-id 100;
      forwarding-options {
```

```
        dhcp-relay { # DHCP snooping
            group hdhcp {
                interface ge-2/2/4.0;
                interface ge-2/2/6.0;
            }
        }
    }
}
```

You verify your configuration by using two related commands:

- **show dhcp relay binding routing-instance vs1 bridge-domains bd1**
- **show dhcp relay binding routing-instance vs1 bridge-domains bd1 detail**

```
user@router1> show dhcp relay binding routing-instance vs1 bridge-domains bd1
2 clients, (2 bound, 0 selecting, 0 renewing, 0 rebinding)
IP address    Hardware address  Type    Lease expires at
192.168.1.1   00:00:00:42:a8:e3  active  2008-12-12 15:56:04 PST
192.168.1.2   00:00:00:42:a8:e4  active  2008-12-12 15:56:10 PST
```

```
user@router1> show dhcp relay binding routing-instance vs1 bridge-domains bd1 detail
2 clients, (2 bound, 0 selecting, 0 renewing, 0 rebinding)
Clients bindings information:
IP address      : 192.168.1.1
Hardware address : 00:00:00:42:a8:e3
Type            : active
Lease expires at : 2008-12-12 15:56:04 PST
State           : bound
interface       : ge-2/2/6.0
IP address      : 192.168.1.2
Hardware address : 00:00:00:42:a8:e4
Type            : active
Lease expires at : 2008-12-12 15:56:10 PST
State           : bound
interface       : ge-2/2/4.0
```

#### Related Documentation

- [DHCP Relay Agent Feature Guide for MX Series Routers](#)
- [MX Series Router as a Layer 2 DHCP Relay Agent on page 13](#)
- [Example: Configuring DHCP Relay in a Bridge Domain VLAN Environment on page 14](#)