Layer 2 Firewall Filters Feature Guide for MX Series Routers

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

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Documentation and Release Notes

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

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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.xsl;
       }
     }
   }
   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.xsl; }
   ```

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 xi 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 xi defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

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

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

Convention	Description	Examples
`Fixed-width text like this`	Represents output that appears on the terminal screen.	`user@host>` **show chassis alarms** `No alarms currently active`
Italic text like this	• Introduces or emphasizes important new terms. • Identifies guide names. • Identifies RFC and Internet draft titles.	• A policy *term* is a named structure that defines match conditions and actions. • *Junos OS CLI User Guide* • RFC 1997, *BGP Communities Attribute*
Italic text like this	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name: [edit] root@# **set system domain-name** *domain-name*
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	• To configure a stub area, include the **stub** statement at the **[edit protocols ospf area area-id]** hierarchy level. • The console port is labeled **CONSOLE**.
< > (angle brackets)	Encloses optional keywords or variables.	**stub <default-metric** ***metric*****>;**
| (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.	**broadcast | multicast** **(*string1* | *string2* | *string3*)**
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	**rsvp { # Required for dynamic MPLS only**
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	**community name members [** ***community-ids*** **]**

Indention and braces ({ })	Identifies a level in the configuration hierarchy.	[edit]
		routing-options {
		  static {
		  route default {
		  nexthop *address*;
		  retain;
		  }
		  }
		}

; (semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	• In the Logical Interfaces box, select **All Interfaces**. • To cancel the configuration, click **Cancel**.

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 **Protocols>Ospf**.

Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to **techpubs-comments@juniper.net**, or fill out the documentation feedback form at https://www.juniper.net/cgi-bin/docbugreport/. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release 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.

PART 1

Overview

CHAPTER 1

Layer 2 Firewall Filters

Firewall Filters for Bridge Domains and VPLS Instances

Juniper Networks MX Series 3D Universal Edge Routers support firewall filters for the **bridge** and **vpls** protocol families. You configure these firewall filters to control traffic within bridge domains and VPLS instances. This chapter explores some of the ways that filters can be used in a Layer 2 environment to control traffic.

MX Series router firewall filters can be applied to:

- Input interfaces
- Output interfaces
- Input to the Layer 2 forwarding table

NOTE: **Broadcast, unicast unknown, and multicast (BUM) traffic is not affected by input and output policies. BUM traffic can only be filtered by forwarding table policies.**

You use a firewall filter after taking the following two steps:

1. You configure any policers and the firewall filter at the **[edit firewall]** hierarchy level.
2. You apply the properly configured firewall filter to an interface or bridge-domain.

NOTE: **You should deploy firewall filters carefully because it is easy to cause unforeseen side effects on all traffic, especially traffic that is not the intended target of the filter. For more information about configuring firewall filters, see the *Routing Policy Feature Guide for Routing Devices*.**

NOTE: If the chassis is running in Enhanced IP mode, a single shared filter instance is created for a filter applied across bridge domains. However, if the chassis is not running in Enhanced IP mode, then separate filter instances are created for each bridge domain that the filter is applied to.

Related Documentation

- *Layer 2 Firewall Filters Feature Guide for MX Series Routers*
- Example: Configuring Policing and Marking of Traffic Entering a VPLS Core on page 7
- Example: Configuring Filtering of Frames by MAC Address on page 9
- Example: Configuring Filtering of Frames by IEEE 802.1p Bits on page 10
- Example: Configuring Filtering of Frames by Packet Loss Priority on page 12

PART 2

Configuration

CHAPTER 2

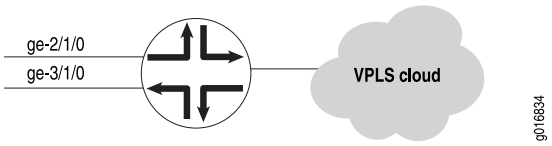
Examples

Example: Configuring Policing and Marking of Traffic Entering a VPLS Core

This example firewall filter allows a service provider to limit the aggregate broadcast traffic entering the virtual private LAN service (VPLS) core. The broadcast, unknown unicast, and non-IP multicast traffic received from one of the service provider's customers on a logical interface has a policer applied. The service provider has also configured a two-rate, three-color policer to limit the customer's IP multicast traffic. For more information on the configuration of policers, see the *Junos OS Class of Service Library for Routing Devices*.

The position of the router is shown in Figure 1 on page 7.

Figure 1: Policing and Marking Traffic Entering a VPLS Core



There are four major parts to the configuration:

- The policer for broadcast, unknown unicast, and non-IP multicast traffic. This example marks the loss priority as high if this type of traffic exceeds 50 Kbps.
- The two-rate, three-color policer for IP multicast traffic. This example configures a committed information rate (CIR) of 4 Mbps, a committed burst size of 256 Kbytes, a peak information rate of 4.1 Mbps, and a peak burst size of 256 Kbytes (the same as the CIR).
- The filter that applies the two policers to VPLS.
- The application of the filter to the customer interface configuration as an input filter.

NOTE: This example does not present exhaustive configuration listings for all routers in the figures. However, you can use this example with a broader configuration strategy to complete the MX Series router network Ethernet Operations, Administration, and Maintenance (OAM) configurations.

To configure policing and marking of traffic entering a VPLS core:

1. Configure **policer bcast-unknown-unicast-non-ip-mcast-policer**, a firewall policer to limit the aggregate broadcast, unknown unicast, and non-IP multicast to 50 kbps:

```
[edit firewall]
policer bcast-unknown-unicast-non-ip-mcast-policer {
  if-exceeding {
    bandwidth-limit 50k;
    burst-size-limit 150k;
  }
  then loss-priority high;
}
```

2. Configure **three-color-policer ip-multicast-traffic-policer**, a three-color policer to limit the IP multicast traffic:

```
[edit firewall]
three-color-policer ip-multicast-traffic-policer {
  two-rate {
    color-blind;
    committed-information-rate 4m;
    committed-burst-size 256k;
    peak-information-rate 4100000;
    peak-burst-size 256k;
  }
}
```

3. Configure **customer-1**, a firewall filter that uses the two policers to limit and mark customer traffic. The first term marks the IP multicast traffic based on the destination MAC address, and the second term polices the broadcast, unknown unicast, and non-IP multicast traffic:

```
[edit firewall]
family vpls {
  filter customer-1 {
    term t0 {
      from {
        destination-mac-address {
          01:00:5e:00:00:00/24;
        }
      }
      then {
        three-color-policer {
          two-rate ip-multicast-traffic-policer;
        }
        forwarding-class expedited-forwarding;
      }
    }
    term t1 {
```

```
            from {
              traffic-type [ broadcast unknown-unicast multicast ];
            }
            then policer bcast-unknown-unicast-non-ip-mcast-policer;
          }
        }
      }
```

4. Apply the firewall filter as an input filter to the customer interface at **ge-2/1/0**:

```
[edit interfaces]
ge-2/1/0 {
  vlan-tagging;
  encapsulation flexible-ethernet-services;
  unit 5 {
    encapsulation vlan-vpls;
    vlan-id 9;
    family vpls {
      filter {
        input customer-1;
      }
    }
  }
}
```

Related Documentation

- *Layer 2 Firewall Filters Feature Guide for MX Series Routers*
- Firewall Filters for Bridge Domains and VPLS Instances on page 3
- Example: Configuring Filtering of Frames by MAC Address on page 9
- Example: Configuring Filtering of Frames by IEEE 802.1p Bits on page 10
- Example: Configuring Filtering of Frames by Packet Loss Priority on page 12

Example: Configuring Filtering of Frames by MAC Address

This example firewall filter finds frames with a certain source MAC address (**88:05:00:29:3c:de/48**), then counts and silently discards them. For more information about configuring firewall filter match conditions, see the *Routing Policy Feature Guide for Routing Devices*. The filter is applied to the VLAN configured as **vlan100200** as an input filter on Router 1.

NOTE: This example does not present exhaustive configuration listings for all routers in the figures. However, you can use this example with a broader configuration strategy to complete the MX Series router network Ethernet Operations, Administration, and Maintenance (OAM) configurations.

To configure filtering of frames by MAC address:

1. Configure **evil-mac-address**, the firewall filter:

```
[edit firewall]
```

```
family bridge {
  filter evil-mac-address {
    term one {
      from {
        source-mac-address 88:05:00:29:3c:de/48;
      }
      then {
        count evil-mac-address; # Counts frame with the bad source MAC address
        discard;
      }
      term two {
        then accept; # Make sure to accept other traffic
      }
    }
  }
}
```

2. Apply **evil-mac-address** as an input filter to **vlan100200** on Router 1:

```
[edit routing-instances]
virtual-switch-R1-1 {
  bridge-domains {
    vlan100200 {
      domain-type bridge;
      forwarding-options {
        filter {
          input evil-mac-address;
        }
      }
    }
  }
}
```

Related Documentation

- *Layer 2 Firewall Filters Feature Guide for MX Series Routers*
- Firewall Filters for Bridge Domains and VPLS Instances on page 3
- Example: Configuring Policing and Marking of Traffic Entering a VPLS Core on page 7
- Example: Configuring Filtering of Frames by IEEE 802.1p Bits on page 10
- Example: Configuring Filtering of Frames by Packet Loss Priority on page 12

Example: Configuring Filtering of Frames by IEEE 802.1p Bits

For the **bridge** and **vpls** protocol families only, MX Series router firewall filters can be configured to provide matching on IEEE 802.1p priority bits in packets with VLAN tagging:

- To configure a firewall filter term that includes matching on IEEE 802.1p learned VLAN priority (in the outer VLAN tag), use the **learn-vlan-1p-priority** or **learn-vlan-1p-priority-except** match condition.
- To configure a firewall filter term that includes matching on IEEE 802.1p user priority (in the inner VLAN tag), use the **user-vlan-1p-priority** or **user-vlan-1p-priority-except** match condition.

For more detailed information about configuring firewall filters and configuring filter match conditions for Layer 2 bridging traffic on the MX Series routers, see the *Routing Policy Feature Guide for Routing Devices*.

NOTE: Layer 2 bridging is supported only on the MX Series routers. For more information about how to configure Layer 2 bridging, see the *Routing Policy Feature Guide for Routing Devices*, the *Junos OS Routing Protocols Library for Routing Devices*, and the *Junos OS, Release 14.1*.

This example Layer 2 bridging firewall filter finds any incoming frames with an IEEE 802.1p learned VLAN priority level of either 1 or 2, and then classifies the packet in the **best-effort** default forwarding class.

NOTE: This example does not present exhaustive configuration listings for all routers in the figures. However, you can use this example with a broader configuration strategy to complete the MX Series router network Ethernet Operations, Administration, and Maintenance (OAM) configurations.

To configure filtering of frames by IEEE 802.1p bits:

1. Configure the firewall filter **filter-learn-vlan-configure-forwarding**:

```
[edit firewall]
family bridge {
  filter filter-learn-vlan-configure-forwarding {
    term 0 {
      from {
        learn-vlan-1p-priority [1 2];
      }
      then forwarding-class best-effort;
    }
  }
}
```

2. Apply the firewall filter **filter-learn-vlan-configure-forwarding** as an input filter to **ge-0/0/0**:

```
[edit interfaces]
ge-0/0/0 {
  unit 0 {
    family bridge {
      filter {
        input filter-learn-vlan-configure-forwarding;
      }
    }
  }
}
```

Related Documentation

- *Layer 2 Firewall Filters Feature Guide for MX Series Routers*
- Firewall Filters for Bridge Domains and VPLS Instances on page 3

Example: Configuring Filtering of Frames by Packet Loss Priority

To configure an MX Series router firewall filter to provide matching on the packet loss priority (PLP) level carried in the frame, use the **loss-priority** or **loss-priority-except** match condition. Packet loss priority matching is available for all protocols. For more detailed information about configuring firewall filters and configuring filter match conditions for Layer 2 bridging traffic on the MX Series routers, see the *Routing Policy Feature Guide for Routing Devices*.

NOTE: Layer 2 bridging is supported only on the MX Series routers. For more information about how to configure Layer 2 bridging, see the *Junos OS Network Interfaces Library for Routing Devices*, the *Junos OS Routing Protocols Library for Routing Devices*, and the *Junos OS, Release 14.1*.

This example Layer 2 bridging firewall filter finds any incoming frames with a packet loss priority (PLP) level of **medium-high**, and then classifies the packet in the **expedited-forwarding** default forwarding class.

NOTE: This example does not present exhaustive configuration listings for all routers in the figures. However, you can use this example with a broader configuration strategy to complete the MX Series router network Ethernet Operations, Administration, and Maintenance (OAM) configurations.

To configure filtering of frames by packet loss priority:

1. Configure the firewall filter **filter-plp-configure-forwarding**:

```
[edit firewall]
family bridge {
  filter filter-plp-configure-forwarding {
    term 0 {
      from {
        loss-priority medium-high;
      }
      then forwarding-class expedited-forwarding;
    }
  }
}
```

2. Configure a Layer 2 bridging domain **bd** for the **ge-0/0/0** interface (that has already been configured at the **[edit interfaces]** hierarchy level):

```
[edit bridge-domains]
```

```
bd {
  domain-type bridge {
    interface ge-0/0/0;
  }
}
```

3. Apply the filter **filter-plp-configure-forwarding** as an input filter to the **ge-0/0/0** interface:

```
[edit interfaces]
ge-0/0/0 {
  unit 0 {
    family bridge {
      filter {
        input filter-plp-configure-forwarding;
      }
    }
  }
}
```

Related Documentation

- *Layer 2 Firewall Filters Feature Guide for MX Series Routers*
- Firewall Filters for Bridge Domains and VPLS Instances on page 3
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