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Document conventions

The document conventions describe text formatting conventions, command syntax conventions, and important notice formats used in Brocade technical documentation.

Text formatting conventions

Text formatting conventions such as boldface, italic, or Courier font may be used in the flow of the text to highlight specific words or phrases.

<table>
<thead>
<tr>
<th>Format</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bold text</td>
<td>Identifies command names</td>
</tr>
<tr>
<td></td>
<td>Identifies keywords and operands</td>
</tr>
<tr>
<td></td>
<td>Identifies the names of user-manipulated GUI elements</td>
</tr>
<tr>
<td></td>
<td>Identifies text to enter at the GUI</td>
</tr>
<tr>
<td>italic text</td>
<td>Identifies emphasis</td>
</tr>
<tr>
<td></td>
<td>Identifies variables</td>
</tr>
<tr>
<td></td>
<td>Identifies document titles</td>
</tr>
<tr>
<td>Courier font</td>
<td>Identifies CLI output</td>
</tr>
<tr>
<td></td>
<td>Identifies command syntax examples</td>
</tr>
</tbody>
</table>

Command syntax conventions

Bold and italic text identify command syntax components. Delimiters and operators define groupings of parameters and their logical relationships.

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>bold text</td>
<td>Identifies command names, keywords, and command options.</td>
</tr>
<tr>
<td>italic text</td>
<td>Identifies a variable.</td>
</tr>
<tr>
<td>value</td>
<td>In Fibre Channel products, a fixed value provided as input to a command option is printed in plain text, for example, --show WWN.</td>
</tr>
<tr>
<td>[]</td>
<td>Syntax components displayed within square brackets are optional.</td>
</tr>
<tr>
<td></td>
<td>Default responses to system prompts are enclosed in square brackets.</td>
</tr>
<tr>
<td>{ x</td>
<td>y</td>
</tr>
<tr>
<td>x</td>
<td>y</td>
</tr>
<tr>
<td>&lt; &gt;</td>
<td>Nonprinting characters, for example, passwords, are enclosed in angle brackets.</td>
</tr>
</tbody>
</table>
Notes, cautions, and warnings

Notes, cautions, and warning statements may be used in this document. They are listed in the order of increasing severity of potential hazards.

**NOTE**
A Note provides a tip, guidance, or advice, emphasizes important information, or provides a reference to related information.

**ATTENTION**
An Attention statement indicates a stronger note, for example, to alert you when traffic might be interrupted or the device might reboot.

**CAUTION**
A Caution statement alerts you to situations that can be potentially hazardous to you or cause damage to hardware, firmware, software, or data.

**DANGER**
A Danger statement indicates conditions or situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these conditions or situations.

Brocade resources

Visit the Brocade website to locate related documentation for your product and additional Brocade resources.

You can download additional publications supporting your product at [www.brocade.com](http://www.brocade.com). Select the Brocade Products tab to locate your product, then click the Brocade product name or image to open the individual product page. The user manuals are available in the resources module at the bottom of the page under the Documentation category.

To get up-to-the-minute information on Brocade products and resources, go to [MyBrocade](http://www.brocade.com). You can register at no cost to obtain a user ID and password.

Release notes are available on [MyBrocade](http://www.brocade.com) under Product Downloads.

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As a Brocade customer, you can contact Brocade Technical Support 24x7 online, by telephone, or by e-mail. Brocade OEM customers contact their OEM/Solutions provider.

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If you have purchased Brocade product support directly from Brocade, use one of the following methods to contact the Brocade Technical Assistance Center 24x7.
<table>
<thead>
<tr>
<th>Online</th>
<th>Telephone</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred method of contact for non-urgent issues:</td>
<td>Required for Sev 1-Critical and Sev 2-High issues:</td>
<td><a href="mailto:support@brocade.com">support@brocade.com</a></td>
</tr>
<tr>
<td>- My Cases through MyBrocade</td>
<td>- Continental US: 1-800-752-8061</td>
<td>Please include:</td>
</tr>
<tr>
<td>- Software downloads and licensing tools</td>
<td>- Europe, Middle East, Africa, and Asia Pacific: +800-AT FIBREE (+800 28 34 27 33)</td>
<td>• Problem summary</td>
</tr>
<tr>
<td>- Knowledge Base</td>
<td>- For areas unable to access toll free number: +1-408-333-6061</td>
<td>• Serial number</td>
</tr>
<tr>
<td></td>
<td>- Toll-free numbers are available in many countries.</td>
<td>• Installation details</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Environment description</td>
</tr>
</tbody>
</table>

**Brocade OEM customers**

If you have purchased Brocade product support from a Brocade OEM/Solution Provider, contact your OEM/Solution Provider for all of your product support needs.

- OEM/Solution Providers are trained and certified by Brocade to support Brocade® products.
- Brocade provides backline support for issues that cannot be resolved by the OEM/Solution Provider.
- Brocade Supplemental Support augments your existing OEM support contract, providing direct access to Brocade expertise. For more information, contact Brocade or your OEM.
- For questions regarding service levels and response times, contact your OEM/Solution Provider.

**Document feedback**

To send feedback and report errors in the documentation you can use the feedback form posted with the document or you can e-mail the documentation team.

Quality is our first concern at Brocade and we have made every effort to ensure the accuracy and completeness of this document. However, if you find an error or an omission, or you think that a topic needs further development, we want to hear from you. You can provide feedback in two ways:

- Through the online feedback form in the HTML documents posted on www.brocade.com.
- By sending your feedback to documentation@brocade.com.

Provide the publication title, part number, and as much detail as possible, including the topic heading and page number if applicable, as well as your suggestions for improvement.
About This Guide

This guide describes how to enable and configure multicast routing on the Brocade 5600 vRouter (referred to as a virtual router, vRouter, or router in the guide).
Multicast Routing Overview

- IP multicast
- Multicast channels
- Multicast addresses
- Multicast routing protocols
- Types of multicast
- Supported standards

**IP multicast**

There are four types of transmission over a network:

- Unicast—In unicast transmission, a single sender transmits a message to a single receiver (one-to-one). Unicast transmission is signaled to the network by using an IP address in the unicast range. Unicast transmission is supported in both IPv4 and IPv6.

- Broadcast—In broadcast transmission, a sender transmits a message to all possible destinations (‘all-hosts on this subnet’) and all receivers receive a copy of the message (one-to-many). In IPv4, broadcast transmission is signaled to the network by using the ‘broadcast address’ 255.255.255.255 or a directed broadcast address formed from the network prefix but using all binary 1s for the host portion of the address. Broadcast transmission is not supported in IPv6; instead, IPv6 defines the ‘all-nodes’ multicast address.

- Multicast—In multicast transmission, a group of receivers interested in a particular stream forms a group (one-to-many). The sender sends the message from its unicast address to the multicast group address. The network routers are responsible for propagating the message to all interested receivers. Multicast groups are identified using a special range of addresses. In IPv4, the former class D addresses compose the multicast range of addresses. In IPv6, multicast addresses are identified from the prefix FF00::/8.

- Anycast—In anycast transmission, a message from a single sender is sent to the topologically ‘closest’ node in a group of potential receivers (one-to-one-of-many). Anycast is used in network load balancing and in certain network protocols, such as Domain Name System (DNS).

**Multicast channels**

To receive a particular multicast data stream, hosts join a multicast group. The group is identified by its multicast address. The communication between the host and router for this purpose is managed by using the Internet Group Management Protocol (IGMP). Hosts send an IGMP Join message to their local multicast router, signaling their intention to join the group (G), as represented by a multicast address. The source device (S) that delivers the content sends the message addressed to the multicast address of G. The
multicast “channel” is the combination of the IP address of the content source and multicast address of the group—called an (S, G) pair. For messages for which the source can be any device, the S is replaced by the asterisk wildcard (**), which means “any source.”

**Multicast addresses**

For IPv4, addresses in the range 224.0.0.0 to 239.255.255.255 are reserved for multicasting. In the Classful addressing system, this is registered as class D. In the Classless Inter-Domain Routing (CIDR) addressing model, the prefix of this group is 224.0.0.0/4.

Within the IPv4 multicast range, address assignments are specified in RFC 5771, IANA Guidelines for IPv4 Multicast Address Assignments. Table 1 lists a summary of these assignments. Note that, of these addresses, the network address 224.0.0.0 is guaranteed not to be assigned to any group.

**TABLE 1 Multicast address assignments**

<table>
<thead>
<tr>
<th>Addresses</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Link Local Scope</strong></td>
<td></td>
</tr>
<tr>
<td>224.0.0.1</td>
<td>All systems on this subnet</td>
</tr>
<tr>
<td>224.0.0.2</td>
<td>All routers on this subnet</td>
</tr>
<tr>
<td>224.0.0.13</td>
<td>All PIM routers address group</td>
</tr>
<tr>
<td><strong>Global Scope</strong></td>
<td></td>
</tr>
<tr>
<td>224.0.1.0 to 238.255.255.255</td>
<td>Allocated for multicast traffic across the Internet. SSM reserves the range 232.0.0.0/8. The addresses 224.0.1.39 and 224.0.140 are used for Auto-RP negotiation. You can assign the remaining IP addresses to your ISM applications.</td>
</tr>
<tr>
<td><strong>Administrative Scope (AS)</strong></td>
<td></td>
</tr>
<tr>
<td>239.0.0.0/8</td>
<td>Allocated for organizations that own an AS number to multicast across the Internet. The AS number of the organization is embedded in the second and third octets of the multicast IP address. For example, AS64501 is 0xFB05, with FB and F5 (or 251 and 245 in decimal) representing the second and third octets of the IP address, respectively. The resulting subnet 233.251.24.0 is globally reserved for AS64201 to use. These addresses are called GLOP addresses.</td>
</tr>
</tbody>
</table>

For IPv6, multicast addressing is specified in RFC 3513, *IP Version 6 Addressing Architecture*. In essence, IPv6 multicast addresses are derived from the FF00::/8 prefix.

**Multicast routing protocols**

The multicast routing protocols supported by the Brocade vRouter are IGMP, Multicast Listener Discovery (MLD), and Protocol Independent Multicast (PIM).

- IGMP controls multicast communication between hosts and multicast routers on IPv4 networks, allowing hosts to manage membership of multicast groups. MLD performs this function on IPv6 networks.
- PIM controls multicast communication between multicast routers, so that they can track packet distribution.

**Types of multicast**

In IP networks, multicast information is propagated through the use of distribution trees created by the multicast routers. Routers create source trees that provide the shortest path to each destination; these trees are called shortest path trees (SPTs). The source of the multicast message is always the root of an SPT.
Multicast depends on which of two models of multicast is in effect:

- Internet standard multicast
- Source-specific multicast

**Internet standard multicast**

In Internet Standard Multicast (ISM), a receiver can receive messages from any source and from multiple sources. In ISM, receivers are not aware of sources; they express interest in receiving a traffic stream by subscribing to the group of interest (G).

In the ISM model, the multicast router discovers and tracks all multicast sources that are sending messages to an address, maintaining information about all sources, and routing data from all sources to all interested receivers. The router does this by maintaining a state table of (S, G) entries. When the number of sources is large, the burden on the multicast router can become heavy.

**Source-specific multicast**

In Source-Specific Multicast (SSM), receivers are aware of sources. A receiver explicitly requests a stream from a sender in the group the receiver has joined, using a Join message that specifies the source (an (S, G) Join), and explicitly excludes the use of the wildcard for source—that is, it disallows the (\*, G) Join.

Because SSM-enabled hosts track sources of the multicast transmission themselves, multicast routers do not need to discover the multicast sources themselves, and they need to store and maintain only the (\*, G) state in the multicast routing table. This greatly reduces the burden on the multicast router.

For IPv4, the destination addresses must be in the range 232.0.0.0/8. For IPv6, the addresses must be in the range FF3x::/96.

SSM is specified in RFC 3569, An Overview of Source-Specific Multicast (SSM) and RFC 4607, Source-Specific Multicast for IP.

**Supported standards**

This section presents the following topics:

- RFCs
- MIBs

**RFCs**

The Brocade Communications Systems, Inc. implementation of multicast routing complies with the following standards:

- RFC 1112: Host Extensions for IP Multicasting
- RFC 2710: Multicast Listener Discovery (MLD) for IPv6
- RFC 3376: Internet Group Management Protocol, Version 3
- RFC 3569: An Overview of Source-Specific Multicast (SSM)
- RFC 3810: Multicast Listener Discovery version 2 (MLDv2) for IPv6
- RFC 4604: Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast
- RFC 4607: Source-Specific Multicast for IP
The Vyatta implementation of multicast routing supports the following Simple Management Network Protocol (SNMP) management information bases (MIBs).

- IGMP-MIB, RFC 2933: Internet Group Management Protocol MIB
- IPMROUTE, RFC 2932: IPv4 Multicast Routing MIB

For a list of all MIBs supported on the Brocade vRouter, see Brocade 5600 vRouter Remote Management Configuration Guide.
Multicast Configuration

- Before you begin.................................................................................................................................................................................................................15
- Basic PIM-SM multicast configuration.................................................................................................................................................................. 15

Before you begin

It is assumed that routers depicted in the examples that follow are configured to provide basic connectivity. This configuration includes the host-name, Ethernet, or data plane interfaces, and gateway-address. See Brocade 5600 vRouter Quick Start Guide for information on basic system configuration.

NOTE
In the Brocade vRouter, a data plane interface is an abstraction that represents the underlying physical or virtual Ethernet interface of the system. The terms Ethernet interface and data plane interface are synonymous in this guide.

Basic PIM-SM multicast configuration

This section presents a configuration example that provides PIM sparse mode multicast capability between the sender of multicast traffic (Source) and a receiver of multicast traffic (Receiver). Three routers are configured for this example: R1, R2 and RP.

R1 and R2 are configured for PIM sparse mode operation and point to RP as the rendezvous point router. RP is configured as the rendezvous point router.

NOTE
It is assumed that the Sender and Receiver contain software to send and receive multicast traffic.

When you have finished the example, these systems will be configured as shown in the following figure.
Configure R1

The multicast network in the example extends from R1 through the 192.0.2.0/24 LAN segment to R2 and RP. In this example, you configure R1 for PIM sparse mode multicast operation.

Table 2 creates a PIM sparse mode multicast configuration on R1.

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configure PIM sparse mode on dp0p1p1.</td>
<td>vyatta@R1# set interfaces dataplane dp0p1p1 ip pim</td>
</tr>
<tr>
<td></td>
<td>mode sparse</td>
</tr>
</tbody>
</table>
**TABLE 2 Creating a PIM sparse mode configuration on R1 (continued)**

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commit the configuration.</td>
<td>vyatta@R1# commit</td>
</tr>
<tr>
<td>View the configuration.</td>
<td>vyatta@R1# show interfaces dataplane dp0p1p1 ip pim { mode sparse }</td>
</tr>
<tr>
<td>Configure PIM sparse mode on dp0p1p2.</td>
<td>vyatta@R1# set interfaces dataplane dp0p1p2 ip pim mode sparse</td>
</tr>
<tr>
<td>Commit the configuration.</td>
<td>vyatta@R1# commit</td>
</tr>
<tr>
<td>View the configuration.</td>
<td>vyatta@R1# show interfaces dataplane dp0p1p2 ip pim { mode sparse }</td>
</tr>
<tr>
<td>Configure multicast routing.</td>
<td>vyatta@R1# set protocols multicast ip routing</td>
</tr>
<tr>
<td>Specify the location of the rendezvous point router.</td>
<td>vyatta@R1# set protocols pim rp-address 192.0.2.99</td>
</tr>
<tr>
<td>Commit the configuration.</td>
<td>vyatta@R1# commit</td>
</tr>
<tr>
<td>View the configuration.</td>
<td>vyatta@R1# show protocols multicast { ip { routing { } } pim { rp-address 192.0.2.99 { } } }</td>
</tr>
</tbody>
</table>

**Configure R2**

The multicast network in the example extends from R1 through the 192.0.2.0/24 LAN segment to R2 and RP. In this example, you configure R2 for PIM sparse mode multicast operation.

Table 3 creates a PIM sparse mode multicast configuration on R2.

**TABLE 3 Creating a PIM sparse mode configuration on R2**

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configure PIM sparse mode on dp0p1p1.</td>
<td>vyatta@R2# set interfaces dataplane dp0p1p1 ip pim mode sparse</td>
</tr>
<tr>
<td>Commit the configuration.</td>
<td>vyatta@R2# commit</td>
</tr>
<tr>
<td>View the configuration.</td>
<td>vyatta@R2# show interfaces dataplane dp0p1p1 ip pim {</td>
</tr>
</tbody>
</table>
TABLE 3 Creating a PIM sparse mode configuration on R2 (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mode sparse</td>
</tr>
</tbody>
</table>

Configure PIM sparse mode on dp0p1p2.
vyatta@R2# set interfaces dataplane dp0p1p2 ip pim mode sparse

Commit the configuration.
vyatta@R2# commit

View the configuration.
vyyatta@R2# show interfaces dataplane dp0p1p2 ip pim { mode sparse }

Configure multicast routing.
vyyatta@R2# set protocols multicast ip routing

Specify the location of the rendezvous point router.
vyyatta@R2# set protocols pim rp-address 192.0.2.99

Commit the configuration.
vyyatta@R2# commit

View the configuration.
vyyatta@R2# show protocols multicast { ip { routing { } } pim { rp-address 192.0.2.99 { } } }

Configure RP

The multicast network in the example extends from R1 through the 192.0.2.0/24 LAN segment to R2 and RP. In this example, you configure RP for PIM sparse mode multicast operation.

Table 4 creates a PIM sparse mode multicast configuration on RP.

TABLE 4 Creating a PIM sparse mode configuration on RP

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mode sparse</td>
</tr>
</tbody>
</table>

Configure PIM sparse mode on dp0p1p1.
vyyatta@RP# set interfaces dataplane dp0p1p1 ip pim mode sparse

Commit the configuration.
vyyatta@RP# commit

View the configuration.
vyyatta@RP# show interfaces dataplane dp0p1p1 ip pim { mode sparse }

Configure multicast routing.
vyyatta@RP# set protocols multicast ip routing
### TABLE 4 Creating a PIM sparse mode configuration on RP (continued)

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify the location of the rendezvous point router.</td>
<td><code>vyatta@RP# set protocols pim rp-address 192.0.2.99</code></td>
</tr>
<tr>
<td>Commit the configuration.</td>
<td><code>vyatta@RP# commit</code></td>
</tr>
<tr>
<td>View the configuration.</td>
<td><code>vyatta@RP# show protocols multicast { ip { routing { } } pim { rp-address 192.0.2.99 { } } }</code></td>
</tr>
</tbody>
</table>
Multicast Routing Commands

- clear ip mroute statistics.................................................................................................................................................................................. 22
- clear ipv6 mroute statistics.................................................................................................................................................................................. 23
- interfaces <interface> ip multicast ttl-threshold <ttl>..................................................................................................................................... 24
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clear ip mroute statistics

Clears IPv4 statistics for multicast routing.

Syntax

```
clear ip mroute statistics [ group group [ source source ] ]
```

Command Default

When used with no option, this command clears all IPv4 statistics for multicast routing.

Parameters

- **group**
  Clears statistics for the specified IPv4 multicast group in IPv4 multicast address format.

- **source**
  Used in source-specific multicast. Clears statistics for the specified IPv4 multicast source. The format is an IPv4 multicast address.

Modes

- Operational mode

Usage Guidelines

Use this command to clear statistics for multicast routing.
clear ipv6 mroute statistics
Clears IPv6 statistics for multicast routing.

Syntax
```
clear ipv6 mroute statistics [ group group [ source source ]]  
```

Command Default
When used with no option, this command clears all IPv6 statistics for multicast routing.

Parameters
- **group group**: Clears statistics for the specified IPv6 multicast group. The format is an IPv6 multicast address.
- **source source**: Used in source-specific multicast. Clears statistics for the specified IPv6 multicast source. The format is an IPv6 multicast address.

Modes
- Operational mode

Usage Guidelines
Use this command to clear IPv6 statistics for multicast routing.
interfaces <interface> ip multicast ttl-threshold <ttl>
Sets the time-to-live (TTL) threshold for multicast packets.

Syntax

set interfaces interface ip multicast ttl-threshold ttl
delete interfaces interface ip multicast ttl-threshold
show interfaces interface ip multicast ttl-threshold

Command Default
The TTL for multicast packets is 0. The default value 0 means that all multicast packets are forwarded out to the interface.

Parameters

interface
The type keyword and identifier of an interface. For detailed keywords and arguments that can be specified as interfaces, refer to Supported Data Plane Interfaces on page 53.

ttl
The TTL value is the hop count. The range is 0 through 255. The default is 0.

Modes

Configuration mode

Configuration Statement

interfaces interface {
    ip {
        multicast {
            ttl-threshold ttl
        }
    }
}

Usage Guidelines
Use this command to configure the TTL threshold for multicast packets being forwarded from the specified interface. Only multicast packets with a TTL value greater than the threshold are forwarded.
Use the set form of this command to configure the multicast TTL value.
Use the delete form of this command to restore the default TTL value for multicast.
Use the show form of this command to show multicast TTL configuration.
**monitor command <mtrace-command>**

Monitors an mtrace command.

**Syntax**

```plaintext
monitor command mtrace-command
run monitor command mtrace-command
```

**Parameters**

```
mtrace-command
```

The mtrace command to be monitored. The mtrace command must be enclosed in quotation marks.

**Modes**

Operational mode.

Configuration mode

**Usage Guidelines**

Use this command to display the output of an mtrace command. The session stays open and display information is refreshed every two seconds.

Use the run form of this command in configuration mode.
monitor protocol multicast

Sets debugging options for multicast routing.

Syntax

```
monitor protocol multicast [ [ background { start | stop } ] | { enable | disable } { ip | ipv6 } [ event | fib-msg | mrib-msg | mrt | 
  mtrace | mtrace-detail | nsm-msg | register-msg | stats | vif ] ]
```

Command Default

Multicast debugging is disabled.

Parameters

- **background**
  Performs debugging operations in the background.
- **start**
  Starts debugging in the background.
- **stop**
  Stops debugging in the background.
- **enable**
  Enables the specified debugging option.
- **disable**
  Disables the specified debugging option.
- **ip**
  Specifies IPv4 multicast debugging.
- **ipv6**
  Specifies IPv6 multicast debugging.
- **event**
  Displays debugging messages for multicast events.
- **fib-msg**
  Reports all forwarding information base messages.
- **mrib-msg**
  Reports all multicast routing information base messages.
- **mrt**
  Displays debugging messages for multicast routes.
- **mtrace**
  Displays multicast traceroute debugging.
- **mtrace-detail**
  Displays detailed multicast traceroute debugging.
- **nsm-msg**
  Reports all Network Services Module messages.
**register-msg**

Reports all Protocol Independent Multicast (PIM) register messages.

**stats**

Displays debugging messages for multicast statistics.

**vif**

Displays debugging messages for multicast-enabled vif interfaces.

**Modes**

Operational mode

**Usage Guidelines**

Use this command to enable or disable debugging for multicast and to configure multicast debugging options.

**Examples**

The following example starts debugging in the background for IPv4 multicast events.

vyatta@vyatta:~$monitor protocol multicast enable ip event

The following example disables all IPv6 multicast debugging.

vyatta@vyatta:~$monitor protocol multicast disable ipv6
mtrace <host>
Displays the route that packets take from a multicast source.

Syntax

Command Default
Output shows routes from the source host to the host on which the command is entered.

Parameters
host
The host that is the source for the trace. The host is either a name (if DNS is being used on the network) or an IPv4 or IPv6 unicast address.

destaddr
The host that is the destination for the trace. The host is either an IPv4 or IPv6 unicast address.

group
The multicast group to trace. The format is an IPv4 or IPv6 multicast address.

detail
Displays detailed output. This output includes IP multicast packet-rate and packet-loss information.

Modes
Operational mode

Usage Guidelines
Use this command to show the path from a source to a receiver in a multicast network.
Examples

The following example displays a trace from 10.14.0.1 through 10.12.0.2 using group 226.0.0.1.

vyatta@vyatta:~$mtrace 10.14.0.1 destination 10.12.0.2 group 226.0.0.1
Mtrace from 10.14.0.1 to 10.12.0.2 via group 226.0.0.1
Querying full reverse path...
  0 ? (10.12.0.2)  
-1 ? (10.12.0.2) PIM thresh^ 1 RPF interface
-2 ? (10.12.0.1) PIM thresh^ 1
-3 ? (10.14.0.1)  
Round trip time 1 ms

The following example displays a detailed trace from 10.14.0.1 through 10.12.0.2 using group 226.0.0.1.

vyatta@vyatta:~$mtrace 10.14.0.1 destination 10.12.0.2 group 226.0.0.1 detail
Mtrace from 10.14.0.1 to 10.12.0.2 via group 226.0.0.1  
Round trip time 0 ms

Waiting to accumulate statistics... Results after 10 seconds:

<table>
<thead>
<tr>
<th>Source</th>
<th>Response Dest</th>
<th>Packet Statistics For</th>
<th>Only For Traffic</th>
<th>From 10.14.0.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.14.0.1</td>
<td>10.12.0.2</td>
<td>All Multicast Traffic</td>
<td>Lost/Sent = Pct Rate</td>
<td>To 226.0.0.1</td>
</tr>
<tr>
<td>v</td>
<td>__/</td>
<td>rtt 0 ms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.12.0.1</td>
<td>^</td>
<td>ttl 1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10.12.0.2</td>
<td>_</td>
<td>ttl 2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Receiver</td>
<td>Query Source</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
protocols multicast ip log

Enables IPv4 MRIB logs.

Syntax

- set protocols multicast ip log { all|event|fib-msg|mrib-msg|mrt|mtrace|mtrace-detail|nsm-msg|register-msg|stats|vif}
- delete protocols multicast ip log { all|event|fib-msg|mrib-msg|mrt|mtrace|mtrace-detail|nsm-msg|register-msg|stats|vif}
- show protocols multicast ip log { all|event|fib-msg|mrib-msg|mrt|mtrace|mtrace-detail|nsm-msg|register-msg|stats|vif}

Command Default
None

Parameters

- **all**
  Enables MRIB debugging for all multicast protocol parameters.

- **event**
  Enables MRIB debugging for all multicast events.

- **fib-msg**
  Enables MRIB debugging for only multicast FIB events.

- **mrib-msg**
  Enables MRIB debugging for only multicast RIB events.

- **mrt**
  Enables MRIB debugging for multicast routes.

- **mtrace**
  Enables MRIB debugging for multicast trace routes.

- **mtrace-detail**
  Enables MRIB debugging for multicast traceroute messages.

- **nsm-msg**
  Enables MRIB debugging for multicast NSM messages.

- **register-msg**
  Enables MRIB debugging for multicast PIM register messages.

- **stats**
  Enables MRIB debugging for multicast statistics.

- **vif**
  Enables MRIB debugging for multicast virtual interfaces.

Modes

Configuration mode
Configuration Statement

```plaintext
protocols {
    multicast ip {
        log {
            all
            event
            fib-msg
            mrib-msg
            mrt
            mtrace
            mtrace-detail
            nsm-msg
            register-msg
            stats
            vif
        }
    }
}
```

Usage Guidelines

Use the **set** form of this command to enable IPv4 multicast routing information base (MRIB) logs.

Use the **delete** form of this command to remove IPv4 MRIB logs.

Use the **show** form of this command to view IPv4 MRIB logs.
**protocols multicast ipv6 log**

Enables IPv6 MRIB logs.

**Syntax**

```plaintext
set protocols multicast ipv6 log { all|event|fib-msg|mrib-msg|mtrace|mtrace-detail|nsm-msg|register-msg|stats|vif}
delete protocols multicast ipv6 log { all|event|fib-msg|mrib-msg|mtrace|mtrace-detail|nsm-msg|register-msg|stats|vif}
show protocols multicast ipv6 log { all|event|fib-msg|mrib-msg|mtrace|mtrace-detail|nsm-msg|register-msg|stats|vif}
```

**Command Default**

None

**Parameters**

- **all**
  Enables MRIB debugging for all multicast protocol parameters.
- **event**
  Enables MRIB debugging for all multicast events.
- **fib-msg**
  Enables MRIB debugging for only multicast FIB events.
- **mrib-msg**
  Enables MRIB debugging for only multicast RIB events.
- **mrt**
  Enables MRIB debugging for multicast routes.
- **mtrace**
  Enables MRIB debugging for multicast trace routes.
- **mtrace-detail**
  Enables MRIB debugging for multicast traceroute messages.
- **nsm-msg**
  Enables MRIB debugging for multicast NSM messages.
- **register-msg**
  Enables MRIB debugging for multicast PIM register messages.
- **stats**
  Enables MRIB debugging for multicast statistics.
- **vif**
  Enables MRIB debugging for multicast virtual interfaces.

**Modes**

Configuration mode
Configuration Statement

```plaintext
protocols {
  multicast ipv6 {
    log {
      all
      event
      fib-msg
      mrib-msg
      mrt
      mtrace
      mtrace-detail
      nsm-msg
      register-msg
      stats
      vif
    }
  }
}
```

Usage Guidelines

Use the **set** form of this command to enable IPv6 multicast routing information base (MRIB) logs.

Use the **delete** form of this command to remove IPv6 MRIB logs.

Use the **show** form of this command to view IPv6 MRIB logs.
protocols multicast ip log-warning <warning-limit>
Sets a warning threshold for IPv4 multicast routes.

Syntax
- set protocols multicast ip log-warning warning-limit
- delete protocols multicast ip log-warning
- show protocols multicast ip log-warning

Command Default
If this value is not configured, the system issues a warning only when the maximum number of routes has been reached.

Parameters
- warning-limit
  The number of IPv4 multicast routes that causes the system to generate a warning. The value configured for this argument must not exceed the value set for the maximum route limit that is configured by using the protocols multicast ip route-limit route-limit command. The range is 1 through 2147483647.

Modes
- Configuration mode

Configuration Statement
```
protocols {
  multicast {
    ip {
      log-warning warning-limit
    }
  }
}
```

Usage Guidelines
Use this command to configure the warning threshold for IPv4 routes in the multicast routing table. When this limit is exceeded, the system continues to generate a message until the maximum number of multicast routes is reached that is configured by using the protocols multicast ip route-limit route-limit command.

Use the set form of this command to configure the warning threshold for IPv4 multicast routes.
Use the delete form of this command to restore the default IPv4 warning threshold.
Use the show form of this command to show the IPv4 warning threshold configuration.
protocols multicast ip route-limit <route-limit>

Sets the maximum number of IPv4 routes that can be added to the multicast routing table.

Syntax

set protocols multicast ip route-limit route-limit
delete protocols multicast ip route-limit
show protocols multicast ip route-limit

Command Default

The maximum number of IPv4 multicast routes is 2,147,483,647.

Parameters

route-limit

The maximum number of IPv4 routes that can be added to the multicast routing table. The value configured for this argument must be greater than or equal to the log warning limit that is configured by using the protocols multicast ip log-warning warning-limit command. The range is 1 through 2147483647.

Modes

Configuration mode

Configuration Statement

protocols {
  multicast {
    ip {
      route-limit route-limit
    }
  }
}

Usage Guidelines

Use this command to limit the number of IPv4 routes that can be added to the multicast routing table.

Use the set form of this command to specify the IPv4 multicast route limit.

Use the delete form of this command to restore the default IPv4 multicast route limit.

Use the show form of this command to show the IPv4 multicast route limit configuration.
protocols multicast ip routing
Enables IPv4 multicast routing.

Syntax
- set protocols multicast ip routing
- delete protocols multicast ip routing
- show protocols multicast ip routing

Command Default
IPv4 multicast routing is disabled.

Modes
Configuration mode

Configuration Statement
protocols {
  multicast {
    ip {
      routing {
      }
    }
  }
}

Usage Guidelines
Use this command to enable the system to use multicast routing protocols for IPv4 traffic.
When this configuration node is deleted, multicast routing protocols such as the Internet Group Management Protocol (IGMP) and Protocol Independent Multicast (PIM) do not work for IPv4 traffic, even if configured.
Use the set form of this command to enable multicast routing.
Use the delete form of this command to remove the multicast routing configuration.
Use the show form of this command to display the multicast routing configuration.
protocols multicast ipv6 log-warning <warning-limit>

Sets the warning threshold for IPv6 multicast routes.

Syntax

set protocols multicast ipv6 log-warning warning-limit
delete protocols multicast ipv6 log-warning
show protocols multicast ipv6 log-warning

Command Default

If this value is not configured, the system issues a warning only when the maximum number of routes has been reached.

Parameters

warning-limit

The number of IPv6 multicast routes that causes the system to generate a warning. The value configured for this argument must not exceed the value set for the maximum route limit that is configured by using the protocols multicast ipv6 route-limit route-limit command. The range is 1 through 2147483647.

Modes

Configuration mode

Configuration Statement

protocols {
  multicast {
    ipv6 {
      log-warning warning-limit
    }
  }
}

Usage Guidelines

Use this command to configure the warning threshold for IPv6 routes in the multicast routing table. When this limit is exceeded, the system continues to generate a message until the maximum number of multicast routes is reached that is configured by using the protocols multicast ipv6 route-limit route-limit command.

Use the set form of this command to configure the IPv6 warning threshold.

Use the delete form of this command to restore the default IPv6 warning threshold.

Use the show form of this command to show the IPv6 warning threshold configuration.
protocols multicast ipv6 route-limit <route-limit>

Sets the maximum number of IPv6 routes that can be added to the multicast routing table.

Syntax

set protocols multicast ipv6 route-limit route-limit
delete protocols multicast ipv6 route-limit
show protocols multicast ipv6 route-limit

Command Default

The maximum number of IPv6 multicast routes is 2,147,483,647.

Parameters

route-limit

The maximum number of IPv6 routes that can be added to the multicast routing table. The value configured for this argument must be greater than or equal to the log warning limit that is configured by using the protocols multicast ip log-warning warning-limit command. The range is 1 through 2147483647.

Modes

Configuration mode

Configuration Statement

protocols {
  multicast {
    ip {
      route-limit route-limit
    }
  }
}

Usage Guidelines

Use this command to limit the number of IPv6 routes that can be added to the multicast routing table.
Use the set form of this command to specify the IPv6 multicast route limit.
Use the delete form of this command to restore the default IPv6 multicast route limit.
Use the show form of this command to show the IPv6 multicast route limit configuration.
protocols multicast ipv6 routing

Enables IPv6 multicast routing.

Syntax

set protocols multicast ipv6 routing
delete protocols multicast ipv6 routing
show protocols multicast ipv6 routing

Command Default

IPv6 multicast routing is disabled.

Modes

Configuration mode

Configuration Statement

protocols {
  multicast {
    ipv6 {
      routing {
      }
    }
  }
}

Usage Guidelines

Use this command to enable the system to use multicast routing protocols for IPv6 traffic.

When this configuration is deleted, multicast routing protocols such as the Multicast Listener Discovery (MLD) and PIM do not work for IPv6 traffic, even if configured.

Use the set form of this command to enable IPv6 multicast routing.

Use the delete form of this command to remove IPv6 multicast routing configuration.

Use the show form of this command to display the IPv6 multicast routing configuration.
reset ip mroute

Removes IPv4 entries from the multicast routing information base of the specified group.

Syntax

```
reset ip mroute [ group group [ source source ] ]
```

Command Default

When used with no option, this command deletes all routes from the multicast routing information base.

Parameters

- **group**
  The IPv4 multicast group in IPv4 multicast address format. Routes are removed for the specified group.

- **source**
  Used in source-specific multicast. Removes routes for the specified IPv4 multicast source. The format is an IPv4 multicast address.

Modes

- Operational mode

Usage Guidelines

Use this command to remove IPv4 routes from the multicast routing and forwarding information bases.

Each multicast routing protocol has a distinct command for clearing multicast routes from the routing table for the protocol.
reset ipv6 mroute

Removes IPv6 entries from the multicast routing information base.

Syntax

reset ipv6 mroute [ group group [ source source ] ]

Command Default

When used with no option, this command deletes all routes from the multicast routing information base.

Parameters

  group group
    Removes IPv6 routes for the specified multicast group. The format is an IPv6 multicast address.
  source source
    Used in source-specific multicast. Shows multicast routes for the specified IPv6 multicast source. The format is an IPv6 address.

Modes

  Operational mode

Usage Guidelines

Use this command to remove IPv6 routes from the multicast routing and forwarding information bases. Each multicast routing protocol has a distinct command for clearing multicast routes from the routing table for the protocol.
show ip mroute
Displays the IPv4 multicast routing table.

Syntax

```
show ip mroute [ group group ] [ source source ] [ dense | sparse | count | summary ]
```

Command Default
When used with no option, this command displays information for the complete IPv4 multicast routing table.

Parameters

- **group group**
  Shows IPv4 multicast routes for the specified multicast group. The format is an IPv4 multicast address.

- **source source**
  Used in source-specific multicast. Shows multicast routes for the specified IPv4 multicast source. The format is an IPv4 multicast address.

- **dense**
  Shows dense-mode IPv4 multicast routes.

- **sparse**
  Shows sparse-mode IPv4 multicast routes.

- **count**
  Shows IPv4 multicast-route and packet-count information.

- **summary**
  Shows abbreviated IPv4 multicast route information.

Modes
Operational mode

Usage Guidelines
Use this command to display the IPv4 multicast routing table.
Examples

The following example shows how to display an IPv4 multicast routing table.

vyatta@vyatta:~$ show ip mroute

IP Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(10.10.1.52, 224.0.1.3), uptime 00:00:31, stat expires 00:02:59
Owner PIM-SM, Flags: TF
Incoming interface: wm0
Outgoing interface list:
wm1 (1)
vyatta@vyatta:~$

The following example shows how to display routes for multicast group 224.0.1.3 and source 10.10.1.52.

vyatta@vyatta:~$ show ip mroute group 224.0.1.3 source 10.10.1.52

IP Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(10.10.1.52, 224.0.1.3), uptime 00:03:24, stat expires 00:01:28
Owner PIM-SM, Flags: TF
Incoming interface: wm0
Outgoing interface list:
wm1 (1)
vyyatta@vyatta:~$

The following example shows how to display packet counts for multicast routes.

vyatta@vyatta:~$ show ip mroute count

IP Multicast Statistics
Total 1 routes using 132 bytes memory
Route limit/Route threshold: 2147483647/2147483647
Total NOCACHE/WRONGVIF/WHOLEPKT recv from fwd: 1/0/0
Total NOCACHE/WRONGVIF/WHOLEPKT sent to clients: 1/0/0
Immediate/Timed stat updates sent to clients: 0/0/0
Reg ACK recv/Reg NACK recv/Reg pkt sent: 0/0/0
Next stats poll: 00:01:10
Forwarding Counts: Pkt count/Byte count, Other Counts: Wrong If pkts
Fwd msg counts: WRONGVIF/WHOLEPKT recv
Client msg counts: WRONGVIF/WHOLEPKT/Imm Stat/Timed Stat sent
Reg pkt counts: Reg ACK recv/Reg NACK recv/Reg pkt sent
(10.10.1.52, 224.0.1.3), Forwarding: 2/19456, Other: 0
Fwd msg: 0/0, Client msg: 0/0/0/0, Reg: 0/0/0/vyatta@vyatta:~$

The following example shows how to display a summary of the multicast routing table.

vyatta@vyatta:~$ show ip mroute summary

IP Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface (TTL)
(10.10.1.52, 224.0.1.3), 00:01:32/00:03:20, PIM-SM, Flags: TF
vyatta@vyatta:~$
show ip multicast interface
  Displays information about IPv4 multicast-enabled interfaces.

Syntax
  show ip multicast interface [interface]

Command Default
  When used with no option, this command shows information for all IPv4 multicast-enabled interfaces.

Parameters
  interface
    Mandatory. The type keyword and identifier of an interface. For detailed keywords and arguments that can be specified as interfaces, refer to Supported Data Plane Interfaces on page 53.

Modes
  Operational mode

Usage Guidelines
  Use this command to show operational information for IPv4 multicast-enabled interfaces.

Examples
  The following example shows how to display all IPv4 multicast interface information.

  vyatta@vyatta:~$ show ip multicast

  Interface Vif Owner TTL Local Remote Uptime
  Idx Module Address Address
  wlm0 0 PIM-SM 1 192.168.1.53 0.0.0.0 00:04:26
  Register 1 1 192.168.1.53 0.0.0.0 00:04:26
  wlm1 2 PIM-SM 1 192.168.10.53 0.0.0.0 00:04:25
  vyatta@vyatta:~$

  The following example shows how to display IPv4 multicast interface information for the wlm0 interface.

  vyatta@vyatta:~$ show ip multicast interface wlm0

  Interface Vif Owner TTL Local Remote Uptime
  Idx Module Address Address
  wlm0 0 PIM-SM 1 192.168.1.53 0.0.0.0 00:05:17
  vyatta@vyatta:~$
show ip multicast mrinfo <host>
Displays information about IPv4 multicast neighbors.

Syntax

```
show ip multicast mrinfo host [ source-addr | interface ]
```

Parameters

- **host**
  The host that is being queried. The host is either a name (if DNS is being used on the network) or an IPv4 unicast address.

- **source-addr**
  Optional. The source address used in the mrinfo request. If omitted, the IPv4 address of the interface on which the request is sent is used.

- **interface**
  Optional. The source address used in the mrinfo request is the IPv4 address of the interface specified. If omitted, the IPv4 address of the interface on which the request is sent is used. For detailed keywords and arguments that can be specified as interfaces, refer to Supported Data Plane Interfaces on page 53.

Modes

Operational mode

Usage Guidelines

Use this command to show information about IPv4 multicast neighbors.

Examples

The following example shows how to display information about the IPv4 multicast neighbor mbone.phony.dom.net.

```
vtyatta@vyatta:$ show ip multicast mrinfo mbone.phony.dom.net
127.148.176.10 (mbone.phony.dom.net) [version 3.3]:
127.148.176.10 -> 0.0.0.0 (?) [1/1/querier]
127.148.176.10 -> 127.0.8.4 (mbone2.phony.dom.net) [1/45/tunnel]
127.148.176.10 -> 105.1.41.9 (momoney.com) [1/32/tunnel/down]
127.148.176.10 -> 143.192.152.119 (mbone.dipu.edu) [1/32/tunnel]
vtyatta@vyatta:$
```
show ip rpf <source>
Displays Reverse Path Forwarding (RPF) information for a specific IPv4 multicast source address.

Syntax

    show ip rpf source

Parameters

    source
    An IPv4 multicast source address.

Modes

    Operational mode

Usage Guidelines

    Use this command to display the RPF information for a specific IPv4 multicast source address.

Examples

    The following example shows how to display RPF information for the source address 172.18.92.1.

    vyatta@vyatta:~$ show ip rpf 172.18.92.1
    RPF Information for 172.18.92.1
    RPF interface: dp0p1p1
    RPF neighbor: 172.18.93.100
    RPF prefix length: 24
    RPF distance: 1
    RPF mteric: 1
    vyatta@vyatta:~$
show ipv6 mroute
Displays the IPv6 multicast routing table.

Syntax
show ipv6 mroute [ group group [ source source ] ] [ dense | sparse | count | summary ]

Command Default
When used with no option, this command displays information for the complete IPv6 multicast routing table.

Parameters
- `group group`: Shows IPv6 multicast routes for the specified multicast group. The format is an IPv6 multicast address.
- `source source`: Used in source-specific multicast. Shows multicast routes for the specified IPv6 multicast source. The format is an IPv6 multicast address.
- `dense`: Shows dense-mode IPv6 multicast routes.
- `sparse`: Shows sparse-mode IPv6 multicast routes.
- `summary`: Shows abbreviated IPv6 multicast route information.

Modes
Operational mode

Usage Guidelines
Use this command to display the IPv6 multicast routing table.
The following example shows how to display an IPv6 multicast routing table.

```bash
vyatta@vyatta:~$ show ipv6 mroute
IPv6 Multicast Routing Table
Flags: I - Immediate Stat, T - Timed Stat, F - Forwarder installed
Timers: Uptime/Stat Expiry
Interface State: Interface
(3ffe:10:10:1::96, ff1e::10), uptime 00:00:09, stat expires 00:03:21
  Owner PIM-SMv6, Flags: TF
  Incoming interface: wm0
  Outgoing interface list:
    wm1
(3ffe:10:10:1::96, ff1e::12), uptime 00:00:02, stat expires 00:03:28
  Owner PIM-SMv6, Flags: TF
  Incoming interface: wm0
  Outgoing interface list:
    wm1
vyatta@vyatta:~$
```
show ipv6 multicast interface
Displays information about IPv6 multicast-enabled interfaces.

Syntax

```
show ipv6 multicast interface [ interface ]
```

Command Default
When used with no option, this command shows information for all IPv6 multicast-enabled interfaces.

Parameters

interface
The type keyword and identifier of an interface. For detailed keywords and arguments that can be specified as interfaces, refer to Supported Data Plane Interfaces on page 53.

Modes
Operational mode

Usage Guidelines
Use this command to show operational information for IPv6 multicast-enabled interfaces.

Examples
The following example shows how to display all IPv6 multicast interface information.

```
vtyatta@vyatta:~$show ipv6 multicast

Interface Mif Owner Uptime
Idx Module
wlm0 0 PIM-SMv6 00:17:18
Register 1 00:17:18
wlm1 2 PIM-SMv6 00:17:18
vyatta@vyatta:-$
```

The following example shows how to display all IPv6 multicast interface information for the wlm0 interface.

```
vtyatta@vyatta:~$show ipv6 multicast wlm0

Interface Mif Owner Uptime
Idx Module
wlm0 0 PIM-SMv6 00:19:06
vyatta@vyatta:-$
```
show ipv6 rpf <source>
Displays Reverse Path Forwarding (RPF) information for a specific IPv6 multicast source address.

Syntax
show ipv6 rpf source

Parameters
source
An IPv6 multicast source address.

Modes
Operational mode

Usage Guidelines
Use this command to display RPF information for a specific IPv6 multicast source address.

Examples
The following example shows how to display RPF information for the IPv6 source address 2036::6.

vyatta@vyatta:~$ show ipv6 rpf 2036::6
RPF Information for 2036::6
RPF interface: dp0p1p3
RPF neighbor: fe80::250:56ff:fe9b:5aaf
RPF prefix length: 64
RPF distance: 2
RPF metric: 110
vyatta@vyatta:~$
show monitoring protocols multicast
   Shows information about multicast debugging configuration.

Syntax
   show monitoring protocols multicast { ip | ipv6 }

Parameters
   ip
      Shows what IPv4 multicast debugging options are enabled.
   ipv6
      Shows what IPv6 multicast debugging options are enabled.

Modes
   Operational mode

Usage Guidelines
   Use this command to see what debugging options are currently enabled for IPv4 or IPv6 multicast routing.

Examples
   The following example shows how to display the current configuration for IPv4 multicast debugging.

   vyatta@vyatta:~$ show monitoring protocols multicast ip

   Debugging status:
   MRIBv4 event debugging is on
   MRIBv4 VIF debugging is on
   MRIBv4 route debugging is on
   MRIBv4 route statistics debugging is on
   MRIBv4 FIB message debugging is on
   MRIBv4 PIM Register message debugging is on
   MRIBv4 NSM IPC message debugging is on
   MRIBv4 MRIB IPC message debugging is on
   MRIBv4 traceroute debugging is on
   MRIBv4 traceroute detailed debugging is on
   vyatta@vyatta:~$
## Supported Data Plane Interfaces

The following table shows the syntax and parameters of the supported types of data plane interfaces.

<table>
<thead>
<tr>
<th>Interface Type</th>
<th>Syntax</th>
<th>Parameters</th>
</tr>
</thead>
</table>
| Data plane     | `dataplane interface-name` | `interface-name`: The name of a data plane interface. Following are the supported formats of the interface name:  
  - `dpxypz`—The name of a data plane interface, where  
    - `dpx` specifies the data plane identifier (ID). Currently, only dp0 is supported.  
    - `py` specifies a physical or virtual PCI slot index (for example, p129).  
    - `pz` specifies a port index (for example, p1). For example, dp0p1p2, dp0p160p1, and dp0p192p1.  
  - `dpxemy`—The name of a data plane interface on a LAN-on-motherboard (LOM) device that does not have a PCI slot, where `emy` specifies an embedded network interface number (typically, a small number). For example, dp0em3.  
  - `dpxsy`—The name of a data plane interface on a device that is installed on a virtual PCI slot, where `xsy` specifies an embedded network interface number (typically, a small number). For example, dp0s2.  
  - `dpxPnpypz`—The name of a data plane interface on a device that is installed on a secondary PCI bus, where `n` specifies the bus number. You can use this format to name data plane interfaces on large physical devices with multiple PCI buses. For these devices, it is possible to have network interface cards installed on different buses with these cards having the same slot ID. The value of `n` must be an integer greater than 0. For example, dp0P1p162p1 and dp0P2p162p1. |
| Data plane vif | `dataplane interface-name vif vif-id[vlan vlan-id]` | `interface-name`: Refer to the preceding description.  
  - `vif`: A virtual interface ID. The ID ranges from 1 through 4094.  
  - `vlan`: The VLAN ID of a virtual interface. The ID ranges from 1 through 4094. |
## List of Acronyms

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>ACL</td>
<td>access control list</td>
</tr>
<tr>
<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
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<tr>
<td>AH</td>
<td>Authentication Header</td>
</tr>
<tr>
<td>AMI</td>
<td>Amazon Machine Image</td>
</tr>
<tr>
<td>API</td>
<td>Application Programming Interface</td>
</tr>
<tr>
<td>AS</td>
<td>autonomous system</td>
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<td>ARP</td>
<td>Address Resolution Protocol</td>
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<td>AWS</td>
<td>Amazon Web Services</td>
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<tr>
<td>BGP</td>
<td>Border Gateway Protocol</td>
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<tr>
<td>BIOS</td>
<td>Basic Input Output System</td>
</tr>
<tr>
<td>BPDU</td>
<td>Bridge Protocol Data Unit</td>
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<tr>
<td>CA</td>
<td>certificate authority</td>
</tr>
<tr>
<td>CCMP</td>
<td>AES in counter mode with CBC-MAC</td>
</tr>
<tr>
<td>CHAP</td>
<td>Challenge Handshake Authentication Protocol</td>
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<tr>
<td>CLI</td>
<td>command-line interface</td>
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<td>DDNS</td>
<td>dynamic DNS</td>
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<td>DHCP</td>
<td>Dynamic Host Configuration Protocol</td>
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<tr>
<td>DHCPv6</td>
<td>Dynamic Host Configuration Protocol version 6</td>
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<td>DLCI</td>
<td>data-link connection identifier</td>
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<td>DMI</td>
<td>desktop management interface</td>
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<td>dynamic multipoint VPN</td>
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<tr>
<td>DMZ</td>
<td>demilitarized zone</td>
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<tr>
<td>DN</td>
<td>distinguished name</td>
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<td>DNS</td>
<td>Domain Name System</td>
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<td>DSCP</td>
<td>Differentiated Services Code Point</td>
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<td>DSL</td>
<td>Digital Subscriber Line</td>
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<td>external BGP</td>
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<td>EC2</td>
<td>Amazon Elastic Compute Cloud</td>
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<td>EGP</td>
<td>Exterior Gateway Protocol</td>
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<td>equal-cost multipath</td>
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<td>FIB</td>
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<td>FTP</td>
<td>File Transfer Protocol</td>
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<td>Generic Routing Encapsulation</td>
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<td>HDLC</td>
<td>High-Level Data Link Control</td>
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<td>I/O</td>
<td>Input/Output</td>
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<td>Internet Control Message Protocol</td>
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<tr>
<td>IDS</td>
<td>Intrusion Detection System</td>
</tr>
<tr>
<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers</td>
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<tr>
<td>IGMP</td>
<td>Internet Group Management Protocol</td>
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<tr>
<td>IGP</td>
<td>Interior Gateway Protocol</td>
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<td>IPS</td>
<td>Intrusion Protection System</td>
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<td>IKE</td>
<td>Internet Key Exchange</td>
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<td>IP</td>
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<td>IPsec</td>
<td>IP Security</td>
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<td>IP Version 6</td>
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<td>ISAKMP</td>
<td>Internet Security Association and Key Management Protocol</td>
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<td>ISM</td>
<td>Internet Standard Multicast</td>
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<td>ISP</td>
<td>Internet Service Provider</td>
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<td>KVM</td>
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<td>Layer 2 Tunneling Protocol</td>
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<td>Link Aggregation Control Protocol</td>
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<td>LAN</td>
<td>local area network</td>
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<td>LDAP</td>
<td>Lightweight Directory Access Protocol</td>
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<td>LLDP</td>
<td>Link Layer Discovery Protocol</td>
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<td>MAC</td>
<td>medium access control</td>
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<td>mGRE</td>
<td>multipoint GRE</td>
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<td>MIB</td>
<td>Management Information Base</td>
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<td>Multicast Listener Discovery</td>
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<td>MLPPP</td>
<td>multilink PPP</td>
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<td>MRRU</td>
<td>maximum received reconstructed unit</td>
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<td>MTU</td>
<td>maximum transmission unit</td>
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<td>NBMA</td>
<td>Non-Broadcast Multi-Access</td>
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<td>ND</td>
<td>Neighbor Discovery</td>
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<td>NIC</td>
<td>network interface card</td>
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<td>NTP</td>
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<td>OSPF</td>
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<td>PAM</td>
<td>Pluggable Authentication Module</td>
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<tr>
<td>PAP</td>
<td>Password Authentication Protocol</td>
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<tr>
<td>PAT</td>
<td>Port Address Translation</td>
</tr>
<tr>
<td>PCI</td>
<td>peripheral component interconnect</td>
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<tr>
<td>PIM</td>
<td>Protocol Independent Multicast</td>
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<tr>
<td>PIM-DM</td>
<td>PIM Dense Mode</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>PIM-SM</td>
<td>PIM Sparse Mode</td>
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<td>PKI</td>
<td>Public Key Infrastructure</td>
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<tr>
<td>PPP</td>
<td>Point-to-Point Protocol</td>
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<tr>
<td>PPPoA</td>
<td>PPP over ATM</td>
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<tr>
<td>PPPoE</td>
<td>PPP over Ethernet</td>
</tr>
<tr>
<td>PPTP</td>
<td>Point-to-Point Tunneling Protocol</td>
</tr>
<tr>
<td>PTMU</td>
<td>Path Maximum Transfer Unit</td>
</tr>
<tr>
<td>PVC</td>
<td>permanent virtual circuit</td>
</tr>
<tr>
<td>QoS</td>
<td>quality of service</td>
</tr>
<tr>
<td>RADIUS</td>
<td>Remote Authentication Dial-In User Service</td>
</tr>
<tr>
<td>RHEL</td>
<td>Red Hat Enterprise Linux</td>
</tr>
<tr>
<td>RIB</td>
<td>Routing Information Base</td>
</tr>
<tr>
<td>RIP</td>
<td>Routing Information Protocol</td>
</tr>
<tr>
<td>RIPng</td>
<td>RIP next generation</td>
</tr>
<tr>
<td>RP</td>
<td>Rendezvous Point</td>
</tr>
<tr>
<td>RPF</td>
<td>Reverse Path Forwarding</td>
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<tr>
<td>RSA</td>
<td>Rivest, Shamir, and Adleman</td>
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<tr>
<td>Rx</td>
<td>receive</td>
</tr>
<tr>
<td>S3</td>
<td>Amazon Simple Storage Service</td>
</tr>
<tr>
<td>SLAAC</td>
<td>Stateless Address Auto-Configuration</td>
</tr>
<tr>
<td>SNMP</td>
<td>Simple Network Management Protocol</td>
</tr>
<tr>
<td>SMTP</td>
<td>Simple Mail Transfer Protocol</td>
</tr>
<tr>
<td>SONET</td>
<td>Synchronous Optical Network</td>
</tr>
<tr>
<td>SPT</td>
<td>Shortest Path Tree</td>
</tr>
<tr>
<td>SSH</td>
<td>Secure Shell</td>
</tr>
<tr>
<td>SSID</td>
<td>Service Set Identifier</td>
</tr>
<tr>
<td>SSM</td>
<td>Source-Specific Multicast</td>
</tr>
<tr>
<td>STP</td>
<td>Spanning Tree Protocol</td>
</tr>
<tr>
<td>TACACS+</td>
<td>Terminal Access Controller Access Control System Plus</td>
</tr>
<tr>
<td>TBF</td>
<td>Token Bucket Filter</td>
</tr>
<tr>
<td>TCP</td>
<td>Transmission Control Protocol</td>
</tr>
<tr>
<td>TKIP</td>
<td>Temporal Key Integrity Protocol</td>
</tr>
<tr>
<td>ToS</td>
<td>Type of Service</td>
</tr>
<tr>
<td>TSS</td>
<td>TCP Maximum Segment Size</td>
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<tr>
<td>Tx</td>
<td>transmit</td>
</tr>
<tr>
<td>UDP</td>
<td>User Datagram Protocol</td>
</tr>
<tr>
<td>VHD</td>
<td>virtual hard disk</td>
</tr>
<tr>
<td>vif</td>
<td>virtual interface</td>
</tr>
<tr>
<td>VLAN</td>
<td>virtual LAN</td>
</tr>
<tr>
<td>VPC</td>
<td>Amazon virtual private cloud</td>
</tr>
<tr>
<td>VPN</td>
<td>virtual private network</td>
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<tr>
<td>VRRP</td>
<td>Virtual Router Redundancy Protocol</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
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<td>------------------------</td>
</tr>
<tr>
<td>WAN</td>
<td>wide area network</td>
</tr>
<tr>
<td>WAP</td>
<td>wireless access point</td>
</tr>
<tr>
<td>WPA</td>
<td>Wired Protected Access</td>
</tr>
</tbody>
</table>