# Multicast configuration on Brocade FastIron Switches

This guide is to assist in the basic understanding and configuration of IGMP snooping and PIM on Brocade ICX, FCX, and SX devices. More detailed information can be found in the “Brocade IP Multicast Configuration Guide”.

## **IGMP snooping overview**

When a device processes a multicast packet, by default, it broadcasts the packets to all ports except the incoming port of a VLAN. Packets are flooded by hardware without going to the CPU. This behavior causes some clients to receive unwanted traffic.

IGMP snooping provides multicast containment by forwarding traffic to only the ports that have IGMP receivers for a specific multicast group (destination address). A device maintains the IGMP group membership information by processing the IGMP reports and leave messages, so traffic can be forwarded to ports receiving IGMP reports.

An IPv4 multicast address is a destination address in the range of 224.0.0.0 to 239.255.255.255. Addresses of 224.0.0.X are reserved. Because packets destined for these addresses may require VLAN flooding, devices do not snoop in the reserved range. Data packets destined to addresses in the reserved range are flooded to the entire VLAN by hardware, and mirrored to the CPU. Multicast data packets destined for the non-reserved range of addresses are snooped. A client must send IGMP reports in order to receive traffic.

IGMP protocols provide a method for clients and a device to exchange messages, and let the device build a database indicating which port wants what traffic. The protocols do not specify forwarding methods. They require IGMP snooping or multicast protocols such as PIM to handle packet forwarding. PIM can route multicast packets within and outside a VLAN, while IGMP snooping can switch packets only within a VLAN.

If a VLAN is not IGMP snooping-enabled, it floods multicast data and control packets to the entire VLAN in hardware. When snooping is enabled, IGMP packets are trapped to the CPU. Data packets are mirrored to the CPU in addition to being VLAN flooded. The CPU then installs hardware resources, so that subsequent data packets can be switched to desired ports in hardware without going to the CPU. If there is no client report or port to queriers for a data stream, the hardware resource drops it.

## Configuring the IGMP mode

You can configure active or passive IGMP modes on the Brocade device. The default mode is passive. If you specify an IGMP mode for a VLAN, it overrides the global setting.

- Active - When active IGMP mode is enabled, a Brocade device actively sends out IGMP queries to identify multicast groups on the network, and makes entries in the IGMP table based on the group membership reports it receives.

  *NOTE: Routers in the network generally handle this operation. Use the active IGMP mode only when the device is in a stand-alone Layer 2 Switched network with no external IP multicast router attachments. In this case, enable the active IGMP mode on only one of the devices and leave the other devices configured for passive IGMP mode.*

- Passive - When passive IGMP mode is enabled, it forwards reports to the router ports which receive queries. IGMP snooping in the passive mode does not send queries. However, it forwards queries to the entire VLAN.

### Configuring the global IGMP mode

To globally set the IGMP mode, enter the following command.

```
device(config)#ip multicast passive
```

Syntax: [no] ip multicast [active | passive]

If you do not enter either active or passive, the passive mode is assumed.

### Configuring the IGMP mode for a VLAN

If you specify an IGMP mode for a VLAN, it overrides the global setting.

To set the IGMP mode for VLAN 20, enter the following commands.

```
device(config)#vlan 20
device(config-vlan-20)#multicast passive
```

Syntax: [no] multicast [active | passive]

## Configuring the IGMP version

Use the procedures in this section to specify the IGMP version.

### Configuring the global IGMP version

When you globally enable IGMP snooping, you can specify IGMP V2 or IGMP V3. The ip multicast version command enables IGMP V3.

```
device(config)#ip multicast version 3
```

Syntax: [no] ip multicast version [2 | 3]

If you do not specify a version number, IGMP V2 is assumed.

### Configuring the IGMP version for a VLAN

You can specify the IGMP version for a VLAN. For example, the following commands configure VLAN 20 to use IGMP V3.

```
device(config)#vlan 20
device(config-vlan-20)#multicast version 3
```

Syntax: [no] multicast version [2 | 3]

If no IGMP version is specified, then the globally-configured IGMP version is used. If an IGMP version is specified for individual ports, those ports use that version, instead of the VLAN version.

## Overview of IP multicasting

Multicast protocols allow a group or channel to be accessed over different networks by multiple stations (clients) for the receipt and transmission of multicast data.

PIM is a broadcast and pruning multicast protocol that delivers IP multicast datagrams. This protocol employs reverse path lookup check and pruning to allow source-specific multicast delivery trees to reach all group members. PIM builds a different multicast tree for each source and destination host group.

## Concurrent support for multicast routing and snooping

Multicast routing and multicast snooping instances work concurrently on the same device. For example, you can configure PIM routing on certain VEs interfaces and snooping on other VEs or VLANs. The limitation is that either multicast snooping or routing can be enabled on a VE interface or VLAN, but not on both. This is because all of the multicast data and control packets

(IGMP, PIM) received on the snooping VLAN are handled by multicast snooping and do not reach the multicast routing component. Similarly, any multicast data or control packets received on a VE interface enabled with PIM routing are handled by the PIM routing component and are not seen by the IGMP or PIM snooping component.

The following considerations apply when configuring concurrent operation of Multicast Routing and Snooping.

1. Either multicast snooping or routing can be enabled on a VE or VLAN but not both.
2. Snooping can be enabled globally by configuring the ip multicast active | passive command.
3. The global snooping configuration is inherited by all current VLANs that are not enabled for multicast routing.
4. The global snooping configuration is also inherited by all new VLANs. Enabling multicast routing on a newly created VLAN or VE automatically disables snooping on the VLAN or VE.
5. When a VLAN-level snooping is configured, it is displayed.

## PIM

There are two modes in which PIM operates: Dense and Sparse. The Dense Mode is suitable for densely populated multicast groups, primarily in the LAN environment. The Sparse Mode is suitable for sparsely populated multicast groups with the focus on WAN.

PIM uses the IP routing table instead of maintaining its own, thereby being routing protocol independent.

### Globally enabling and disabling PIM

To globally enable PIM, enter the following command.

```
device(config)# router pim
```

Syntax:[no] router pim

The [no] router pim command behaves in the following manner:

- Entering a router pim command to enable PIM does not require a software reload.
- Entering a no router pim command removes all configuration for PIM multicast on a device (router pim level) only.

### Configuring PIM interface parameters

After you enable IP multicast routing and PIM Sparse at the global level, you must enable it on the individual interfaces connected to the PIM Sparse network.

To enable PIM Sparse mode on an interface, enter commands such as the following.

```
device(config)# interface ethernet 1/2/2
device(config-if-e10000-1/2/2)# ip address 207.95.7.1 255.255.255.0
device(config-if-e10000-1/2/2)# ip pim-sparse
```

Syntax: [no] ip [pim-sparse | pim-dense]

The commands in this example add an IP interface to port 1/2/2, then enable PIM Sparse on the interface.

If the interface is on the border of the PIM Sparse domain, you also must enter the following command.

```
device(config-if-e10000-1/2/2)# ip pim border
```

Syntax: [no] ip pim border

## Configuring BSRs

In addition to the global and interface parameters described in the previous sections, you need to identify an interface on at least one device as a candidate PIM Sparse Bootstrap router (BSR) and candidate PIM Sparse rendezvous point (RP).

*NOTE: It is possible to configure the device as only a candidate BSR or RP, but it is recommended that you configure the same interface on the same device as both a BSR and an RP.*

To configure the device as a candidate BSR, enter commands such as the following.

```
device(config)# router pim
device(config-pim-router)# bsr-candidate ethernet 1/2/2 30 255
```

These commands configure the PIM Sparse interface on port 1/2/2 as a BSR candidate, with a hash mask length of 30 and a priority of 255.

Syntax: [no] bsr-candidate { ethernet unit/slot/port | loopback num | ve num | tunnel } num hashmask-length [ priority ]

The ethernet unit/slot/port, loopback num, ve num, and tunnel num parameters specify the interface.

The device will advertise the IP address of the specified interface as a candidate BSR.

- Enter ethernet unit/slot/port for a physical interface (port).
- Enter ve num for a virtual interface.
- Enter loopback num for a loopback interface.
- Enter tunnel num for a GRE tunnel interface.

The numhash-mask-length variable specifies the number of bits in a group address that are significant when calculating the group-to-RP mapping. You can specify a value from 1 to 32.

*NOTE: it is recommended that you specify 30 for IP version 4 (IPv4) networks.*

The priority variable specifies the BSR priority. You can specify a value from 0 to 255. When the election process for BSR takes place, the candidate BSR with the highest priority becomes the BSR. The default is 0.

## Configuring RPs

Enter a command such as the following to configure the device as a candidate RP.

```
device(config-pim-router)# rp-candidate ethernet 1/2/2
```

Syntax: [no] rp-candidate ethernet { ethernet unit/slot/port | loopback num | ve num | tunnel num }

The ethernet unit/slot/port, loopback num, ve num, and tunnel num parameters specify the interface.

The device will advertise the IP address of the specified interface as a candidate RP.

- Enter ethernet unit/slot/port for a physical interface (port).
- Enter ve num for a virtual interface.
- Enter loopback num for a loopback interface.
- Enter tunnel num for a GRE tunnel interface.

By default, this command configures the device as a candidate RP for all group numbers beginning with 224. As a result, the device is a candidate RP for all valid PIM Sparse group numbers. You can change this by adding or deleting specific address ranges.

The following example narrows the group number range for which the device is a candidate RP by explicitly adding a range.

```
Device(config-pim-router)# rp-candidate add 224.126.0.0 16
```

Syntax: [no] rp-candidate add group-addr mask-bits

The group-addr mask-bits variable specifies the group address and the number of significant bits in the subnet mask. In this example, the device is a candidate RP for all groups that begin with 224.126.

When you add a range, you override the default. The device then becomes a candidate RP only for the group address ranges you add.

You also can delete the configured rp-candidate group ranges by entering the following command.

```
device(config-pim-router)# rp-candidate delete 224.126.22.0 24
```

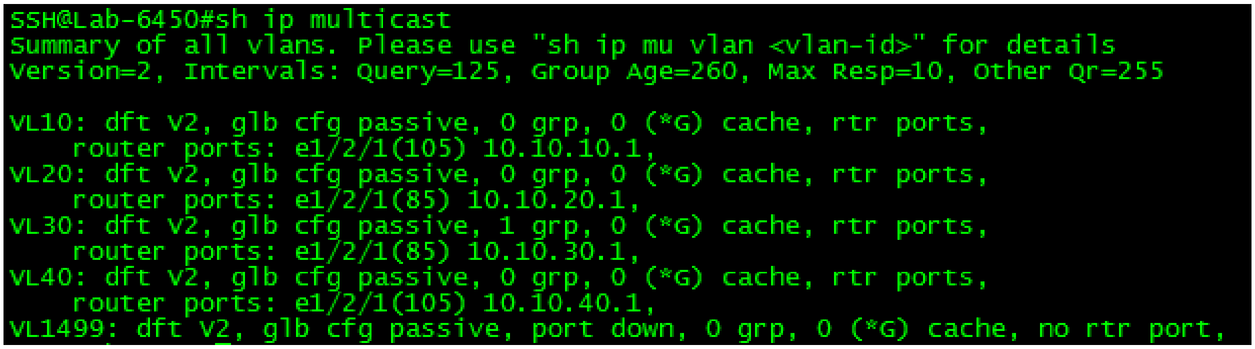
Syntax: [no] rp-candidate delete group-addr mask-bits

The usage of the group-addr mask-bits parameter is the same as for the rp-candidate add command.

# Show Commands

## Displaying the IGMP snooping configuration

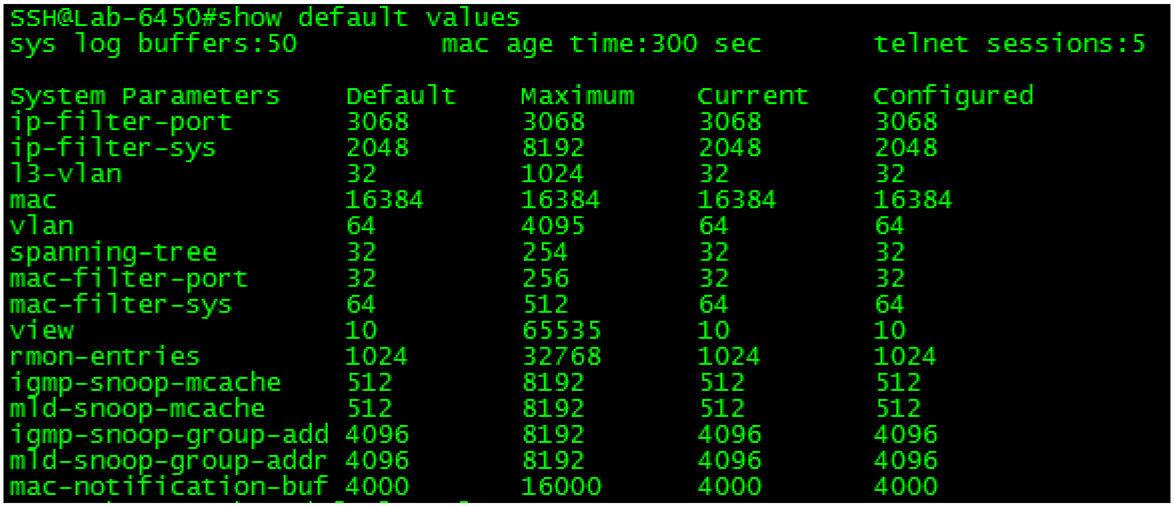
To display the global IGMP snooping configuration, enter the show ip multicast command at any level of the CLI.



```
SSH@Lab-6450#sh ip multicast
Summary of all vlans. Please use "sh ip mu vlan <vlan-id>" for details
Version=2, Intervals: Query=125, Group Age=260, Max Resp=10, Other Qr=255

VL10: dft V2, glb cfg passive, 0 grp, 0 (*G) cache, rtr ports,
    router ports: e1/2/1(105) 10.10.10.1,
VL20: dft V2, glb cfg passive, 0 grp, 0 (*G) cache, rtr ports,
    router ports: e1/2/1(85) 10.10.20.1,
VL30: dft V2, glb cfg passive, 1 grp, 0 (*G) cache, rtr ports,
    router ports: e1/2/1(85) 10.10.30.1,
VL40: dft V2, glb cfg passive, 0 grp, 0 (*G) cache, rtr ports,
    router ports: e1/2/1(105) 10.10.40.1,
VL1499: dft V2, glb cfg passive, port down, 0 grp, 0 (*G) cache, no rtr port,
```

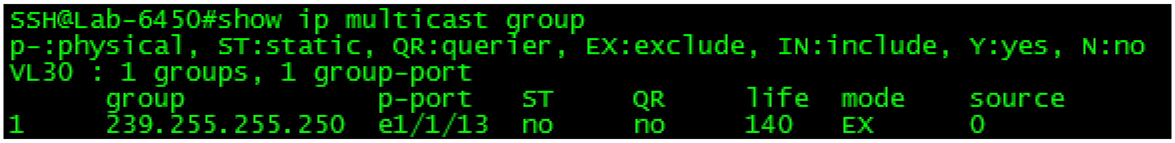
## Displaying IGMP group information

To display default, maximum, current, and configured values for system maximum parameters, use the show default values command. The following output example does not show complete output; it shows only IGMP group values.



```
SSH@Lab-6450#show default values
sys log buffers:50         mac age time:300 sec       telnet sessions:5

System Parameters     Default    Maximum    Current    Configured
ip-filter-port        3068       3068       3068       3068
ip-filter-sys         2048       8192       2048       2048
l3-vlan               32         1024       32         32
mac                   16384      16384      16384      16384
vlan                  64         4095       64         64
spanning-tree         32         254        32         32
mac-filter-port       32         256        32         32
mac-filter-sys        64         512        64         64
view                  10         65535      10         10
rmon-entries          1024       32768      1024       1024
igmp-snoop-mcache     512        8192       512        512
mld-snoop-mcache      512        8192       512        512
igmp-snoop-group-add 4096       8192       4096       4096
mld-snoop-group-addr 4096       8192       4096       4096
mac-notification-buf 4000       16000      4000       4000
```

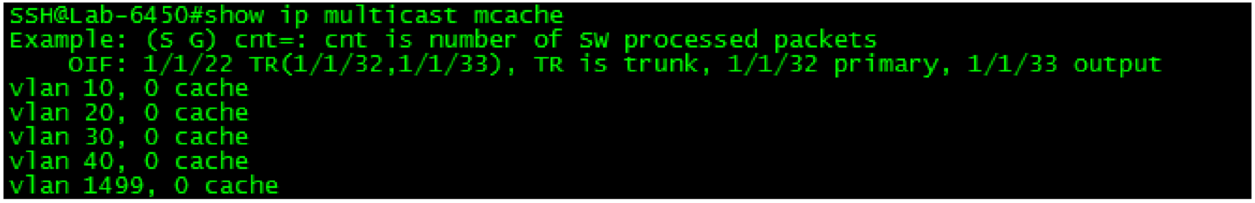
To display information about IGMP groups, enter the show ip multicast group command.



```
SSH@Lab-6450#show ip multicast group
p-:physical, ST:static, QR:querier, EX:exclude, IN:include, Y:yes, N:no
VL30 : 1 groups, 1 group-port
      group            p-port    ST     QR     life  mode     source
1     239.255.255.250  e1/1/13   no     no     140   EX       0
```

## Displaying IGMP snooping mcache information

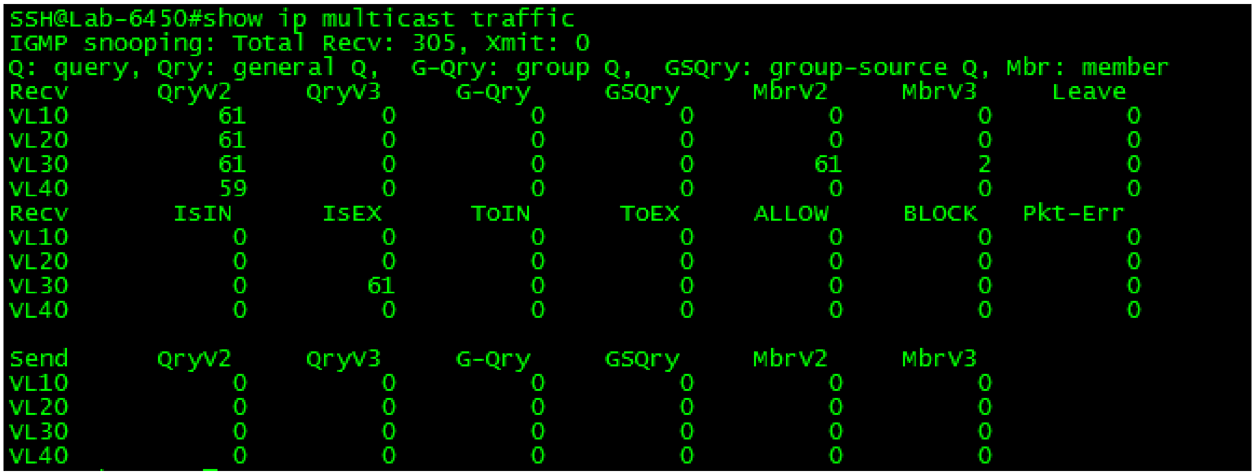
The IGMP snooping mcache contains multicast forwarding information for VLANs. To display information in the multicast forwarding mcache, enter the show ip multicast mcache command.



```
SSH@Lab-6450#show ip multicast mcache
Example: (S G) cnt=: cnt is number of SW processed packets
    OIF: 1/1/22 TR(1/1/32,1/1/33), TR is trunk, 1/1/32 primary, 1/1/33 output
vlan 10, 0 cache
vlan 20, 0 cache
vlan 30, 0 cache
vlan 40, 0 cache
vlan 1499, 0 cache
```

## Displaying the status of IGMP snooping traffic

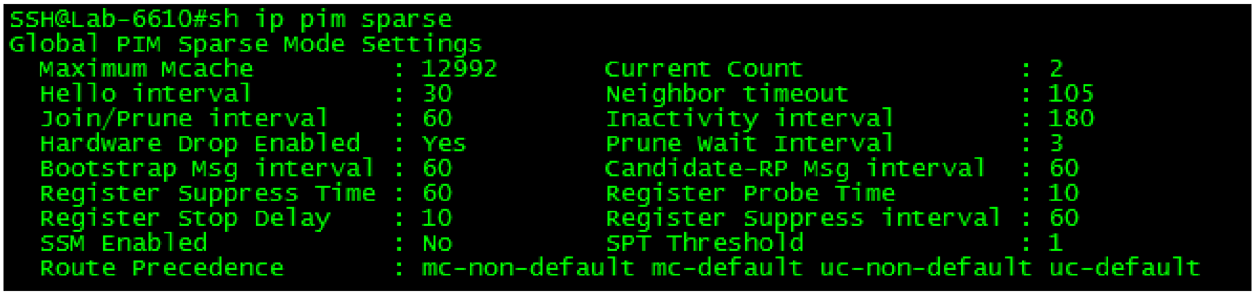
To display status information for IGMP snooping traffic, enter the show ip multicast traffic command.



```
SSH@Lab-6450#show ip multicast traffic
IGMP snooping: Total Recv: 305, Xmit: 0
Q: query, Qry: general Q,  G-Qry: group Q,  GSQry: group-source Q, Mbr: member
Recv      QryV2     QryV3     G-Qry     GSQry     MbrV2     MbrV3     Leave
VL10          61         0         0         0         0         0         0
VL20          61         0         0         0         0         0         0
VL30          61         0         0         0        61         2         0
VL40          59         0         0         0         0         0         0
Recv       IsIN      IsEX      ToIN      ToEX     ALLOW     BLOCK   Pkt-Err
VL10           0         0         0         0         0         0         0
VL20           0         0         0         0         0         0         0
VL30           0        61         0         0         0         0         0
VL40           0         0         0         0         0         0         0

Send      QryV2     QryV3     G-Qry     GSQry     MbrV2     MbrV3
VL10           0         0         0         0         0         0
VL20           0         0         0         0         0         0
VL30           0         0         0         0         0         0
VL40           0         0         0         0         0         0
```

## Displaying basic PIM Sparse configuration information

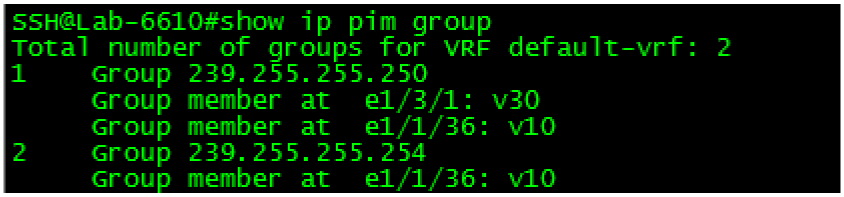
To display PIM Sparse configuration information, enter the following command at any CLI level.



```
SSH@Lab-6610#sh ip pim sparse
Global PIM Sparse Mode Settings
  Maximum Mcache          : 12992       Current Count              : 2
  Hello interval          : 30          Neighbor timeout           : 105
  Join/Prune interval     : 60          Inactivity interval        : 180
  Hardware Drop Enabled   : Yes         Prune Wait Interval        : 3
  Bootstrap Msg interval  : 60          Candidate-RP Msg interval  : 60
  Register Suppress Time  : 60          Register Probe Time        : 10
  Register Stop Delay     : 10          Register Suppress interval : 60
  SSM Enabled             : No          SPT Threshold              : 1
  Route Precedence        : mc-non-default mc-default uc-non-default uc-default
```

## Displaying a list of multicast groups

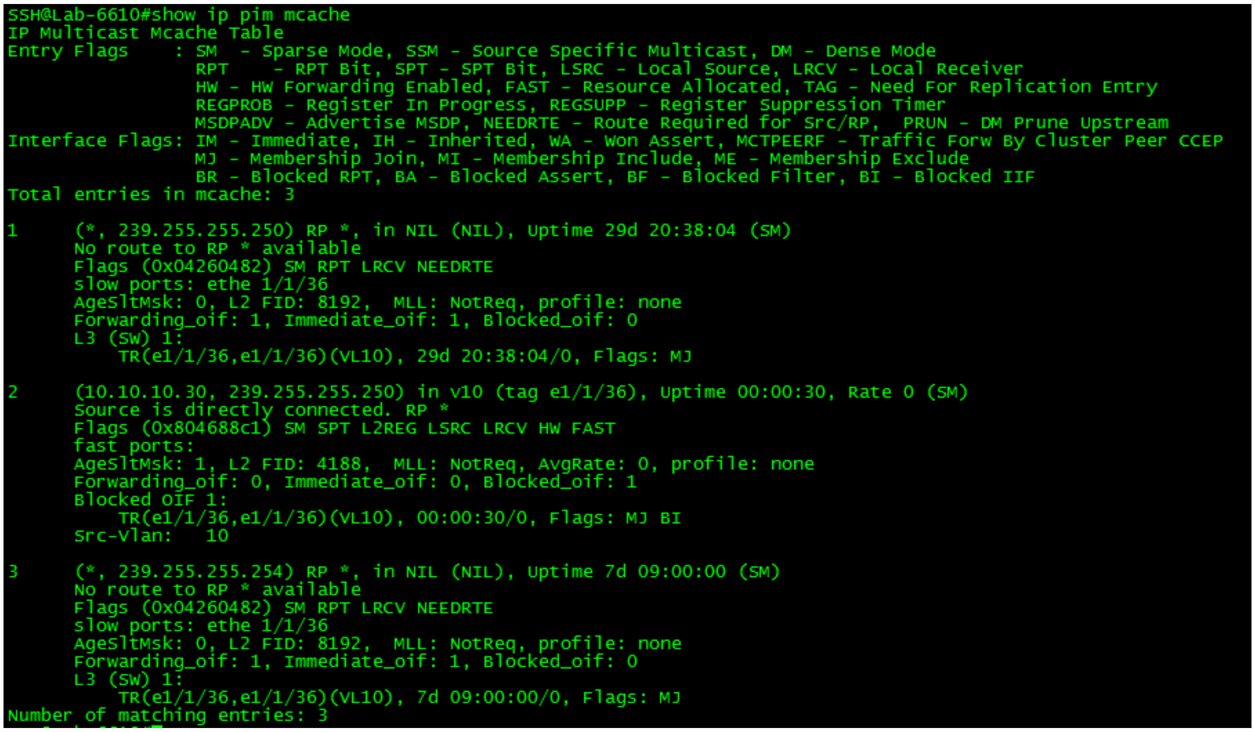
To display PIM group information, enter the following command at any CLI level.



```
SSH@Lab-6610#show ip pim group
Total number of groups for VRF default-vrf: 2
1     Group 239.255.255.250
      Group member at  e1/3/1: v30
      Group member at  e1/1/36: v10
2     Group 239.255.255.254
      Group member at  e1/1/36: v10
```

## Displaying PIM mcache table entries

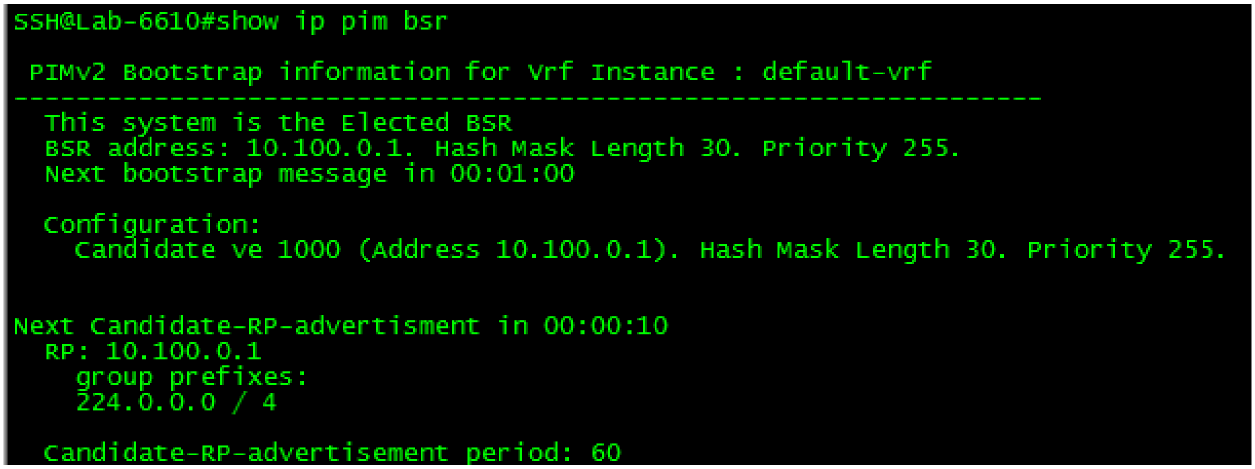
To display PIM mcache information, enter the following command at any CLI level.



```
SSH@Lab-6610#show ip pim mcache
IP Multicast Mcache Table
Entry Flags     : SM  - Sparse Mode, SSM - Source Specific Multicast, DM - Dense Mode
                  RPT    - RPT Bit, SPT - SPT Bit, LSRC - Local Source, LRCV - Local Receiver
                  HW - HW Forwarding Enabled, FAST - Resource Allocated, TAG - Need For Replication Entry
                  REGPROB - Register In Progress, REGSUPP - Register Suppression Timer
                  MSDPADV - Advertise MSDP, NEEDRTE - Route Required for Src/RP,  PRUN - DM Prune Upstream
Interface Flags: IM - Immediate, IH - Inherited, WA - Won Assert, MCTPEERF - Traffic Forw By Cluster Peer CCEP
                  MJ - Membership Join, MI - Membership Include, ME - Membership Exclude
                  BR - Blocked RPT, BA - Blocked Assert, BF - Blocked Filter, BI - Blocked IIF
Total entries in mcache: 3

1      (*, 239.255.255.250) RP *, in NIL (NIL), Uptime 29d 20:38:04 (SM)
       No route to RP * available
       Flags (0x04260482) SM RPT LRCV NEEDRTE
       slow ports: ethe 1/1/36
       AgeSltMsk: 0, L2 FID: 8192,  MLL: NotReq, profile: none
       Forwarding_oif: 1, Immediate_oif: 1, Blocked_oif: 0
       L3 (SW) 1:
           TR(e1/1/36,e1/1/36)(VL10), 29d 20:38:04/0, Flags: MJ

2      (10.10.10.30, 239.255.255.250) in v10 (tag e1/1/36), Uptime 00:00:30, Rate 0 (SM)
       Source is directly connected. RP *
       Flags (0x804688c1) SM SPT L2REG LSRC LRCV HW FAST
       fast ports:
       AgeSltMsk: 1, L2 FID: 4188,  MLL: NotReq, AvgRate: 0, profile: none
       Forwarding_oif: 0, Immediate_oif: 0, Blocked_oif: 1
       Blocked OIF 1:
           TR(e1/1/36,e1/1/36)(VL10), 00:00:30/0, Flags: MJ BI
       Src-Vlan:   10

3      (*, 239.255.255.254) RP *, in NIL (NIL), Uptime 7d 09:00:00 (SM)
       No route to RP * available
       Flags (0x04260482) SM RPT LRCV NEEDRTE
       slow ports: ethe 1/1/36
       AgeSltMsk: 0, L2 FID: 8192,  MLL: NotReq, profile: none
       Forwarding_oif: 1, Immediate_oif: 1, Blocked_oif: 0
       L3 (SW) 1:
           TR(e1/1/36,e1/1/36)(VL10), 7d 09:00:00/0, Flags: MJ
Number of matching entries: 3
```

## Displaying BSR information

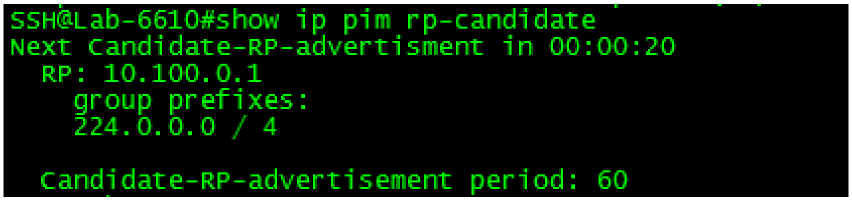
To display BSR information, enter the following command at any CLI level.



```
SSH@Lab-6610#show ip pim bsr

 PIMv2 Bootstrap information for Vrf Instance : default-vrf
------------------------------------------------------------------
  This system is the Elected BSR
  BSR address: 10.100.0.1. Hash Mask Length 30. Priority 255.
  Next bootstrap message in 00:01:00

  Configuration:
    Candidate ve 1000 (Address 10.100.0.1). Hash Mask Length 30. Priority 255.


Next Candidate-RP-advertisment in 00:00:10
  RP: 10.100.0.1
    group prefixes:
    224.0.0.0 / 4

  Candidate-RP-advertisement period: 60
```

## Displaying candidate RP information

To display candidate RP information, enter the following command at any CLI level.

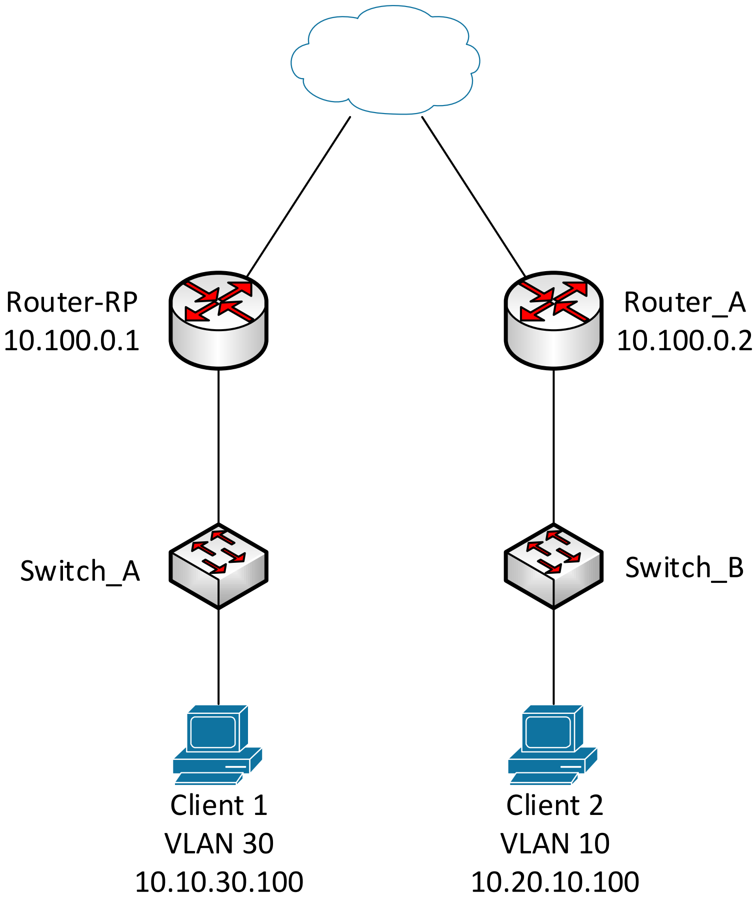


```
SSH@Lab-6610#show ip pim rp-candidate
Next Candidate-RP-advertisment in 00:00:20
  RP: 10.100.0.1
    group prefixes:
    224.0.0.0 / 4

  Candidate-RP-advertisement period: 60
```

## Example:

The following example shows how to configure IGMP snooping and PIM-Sparse on two networks that need to transport multicast information from a source to a client. For this example, we are using Brocade ICX routers and switches as the infrastructure. We are using VLC as the source on a server and VLC player on two windows clients on different networks.

*Figure 1:*



**Router-RP Configuration**

```
ver 08.0.30dT7f3
!
stack unit 1
  module 1 icx6610-48-port-management-module
  module 2 icx6610-qsfp-10-port-160g-module
  module 3 icx6610-8-port-10g-dual-mode-module
  stack-trunk 1/2/1 to 1/2/2
  stack-trunk 1/2/6 to 1/2/7
stack mac 748e.f8e6.cc80
!
global-stp
!
vlan 1 name VLAN1 by port
 tagged ethe 1/1/43 to 1/1/47
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 10 name Network by port
 tagged ethe 1/1/1 ethe 1/1/3 to 1/1/10 ethe 1/1/35 to 1/1/36 ethe 1/1/43 to 1/1/47 ethe
/3/1 ethe 1/3/3
 untagged ethe 1/1/12 to 1/1/20
 router-interface ve 10
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 20 name Voice by port
 tagged ethe 1/1/1 to 1/1/10 ethe 1/1/35 to 1/1/36 ethe 1/1/43 to 1/1/47 ethe 1/3/1 ethe
/3/3
 router-interface ve 20
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 30 name Guest by port
 tagged ethe 1/1/35 to 1/1/36 ethe 1/1/43 to 1/1/47 ethe 1/3/1 ethe 1/3/3
 router-interface ve 30
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 40 name Servers by port
 tagged ethe 1/1/35 to 1/1/36 ethe 1/1/43 to 1/1/47 ethe 1/3/1 ethe 1/3/3
 router-interface ve 40
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 1000 name OSPF by port
 tagged ethe 1/3/2
 router-interface ve 1000
!
vlan 1499 name DEFAULT-VLAN by port
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
```

```
!
!
aaa authentication web-server default local
aaa authentication enable default enable
aaa authentication login default local
aaa authentication login privilege-mode
default-vlan-id 1499
enable password-display
enable super-user-password brocade
hostname RP-Router
ip route 0.0.0.0/0 10.0.0.1
!
no telnet server
username admin password brocade
fdp run
!
clock summer-time
clock timezone us Central
!
ntp
server 129.6.15.28
 server 129.6.15.29
 server 129.6.15.30
!
!
hitless-failover enable
ip multicast-routing!
!
!
router ospf
 area 0
!
router pim
 bsr-candidate ve 1000 30 255
 rp-candidate ve 1000
 rp-candidate add 224.0.0.0 4
!
!
interface ve 10
 ip address 10.10.10.1 255.255.255.0
 ip pim-sparse
!
interface ve 20
 ip address 10.10.20.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
!
interface ve 30
 ip address 10.10.30.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
!
interface ve 40
 ip address 10.10.40.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
!
interface ve 1000
 ip address 10.100.0.1 255.255.255.0
 ip pim-sparse
 ip ospf area 0
!
lldp run
!
end
```

## **Router_A Configuration**

```
ver 08.0.30dT213
!
stack unit 1
  module 1 icx7450-24-port-management-module
  module 2 icx7400-xgf-4port-40g-module
  module 3 icx7400-qsfp-1port-40g-module
  module 4 icx7400-qsfp-1port-40g-module
  priority 128
  stack-port 1/3/1 1/4/1
stack unit 2
  module 1 icx7450-24-port-management-module
  module 2 icx7400-xgf-4port-40g-module
  module 3 icx7400-qsfp-1port-40g-module
  module 4 icx7400-qsfp-1port-40g-module
  stack-port 2/3/1 2/4/1
stack enable
stack mac cc4e.2488.7cc8
!
global-stp
```

```
!
!
!
vlan 10 name Network by port
 tagged ethe 1/2/4
 router-interface ve 10
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 20 name Voice by port
 tagged ethe 1/2/4
 router-interface ve 20
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 30 name Guest by port
 tagged ethe 1/2/4
 router-interface ve 30
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 40 name Servers by port
 tagged ethe 1/2/4
 router-interface ve 40
 spanning-tree 802-1w
 spanning-tree 802-1w priority 8192
!
vlan 1000 name OSPF by port
 tagged ethe 1/2/3
 router-interface ve 1000
!
vlan 1499 name DEFAULT-VLAN by port
!
aaa authentication web-server default local
aaa authentication enable default enable
aaa authentication login default local
aaa authentication login privilege-mode
default-vlan-id 1499
enable password-display
enable super-user-password brocade
hostname Router_A
!
username admin password brocade
fdp run
```

```
!
clock summer-time
clock timezone us Central
!
ntp
 server 129.6.15.28
 server 129.6.15.29
 server 129.6.15.30
!
hitless-failover enable
ip multicast-routing
!
router ospf
 area 0
!
router pim
 bsr-candidate ve 1000 30 1
 rp-candidate ve 1000
 rp-candidate add 239.0.0.0 24
!
interface ve 10
 ip address 10.20.10.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
 ip ospf area 0
 ip ospf passive
!
interface ve 20
 ip address 10.20.20.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
 ip ospf area 0
 ip ospf passive
!
interface ve 30
 ip address 10.20.30.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
 ip ospf area 0
 ip ospf passive
!
interface ve 40
 ip address 10.20.40.1 255.255.255.0
 ip pim-sparse
 ip helper-address 1 10.10.10.50
 ip ospf area 0
 ip ospf passive
!
interface ve 1000
 ip address 10.100.0.2 255.255.255.0
 ip pim-sparse
 ip ospf area 0
!
lldp run
!
end
```

## Switch Configuration

SwitchA and Switch_B configuration is configured with the required VLANs and the following command:

```
ip multicast passive
```