



IGMP User Guide

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1. Introduction

Internet Group Management (IGMP) protocol allows a host to advertise its multicast group membership to neighboring switches and routers. IGMP is a standard protocol used by the TCP/IP protocol suite to achieve dynamic multicasting.

There are two components in the IGMP solution:

- IGMPv2/v3 Client: It sends Join or Leave messages to a multicast group. Typical example of a client is a SET-TOP box. The IGMP client can respond to any IGMP general queries or group-specific queries that are received.
- Multicast Router: The recipient of IGMP Join/Leave message. After receiving the message, it determines whether the corresponding message needs to be processed or not. After processing the IGMP messages, it sends this information to its multicast upstream router. Along with this, it can program certain entries in its routers which results in forwarding specific multicast packets on that interface.

1.1. IGMPv3 Lite

IGMP version 3 adds support for "source filtering", that is, the ability for a system to report interest in receiving packets **only** from specific source addresses, or from **all but** specific source addresses, sent to a particular multicast address. That information may be used by multicast routing protocols to avoid delivering multicast packets from specific sources to networks where there are no interested receivers.

The RtBrick IGMP v3lite solution adds support for source filtering. Source filtering enables a multicast receiver host to signal from which groups it wants to receive multicast traffic, and from which sources this traffic is expected. That information may be used by multicast routing protocols to avoid delivering multicast packets from specific sources to networks where there are no interested receivers.

IGMP Version 3 will help conserve bandwidth by allowing a host to select the specific sources from which it wants to receive traffic. Also, multicast routing protocols will be able to make use of this information to conserve bandwidth when constructing the branches of their multicast delivery trees.

1.1.1. Static Joins

After an interface on a multicast device is configured to statically join an IGMP group, the multicast device considers that the interface has static multicast group members and sends multicast packets to this interface, regardless of whether hosts connected to this interface request the multicast packets.

1.1.2. SSM Mapping

SSM mapping takes IGMPv2 reports and converts them to IGMPv3. In case of legacy devices, there could be a possibility that BNG might receive IGMPv2 membership reports. If BNG receives an IGMPv2 membership for a specific group G1, BNG uses the SSM mapping configuration to determine one or more Source (S) addresses for a given group. This SSM mappings are translated to the IGMPv3 joins like IGMPV3 JOIN INCLUDE (G, [S1, G1], [S2, G1] and so on) and BNG continues to process as if it has received from the subscriber.

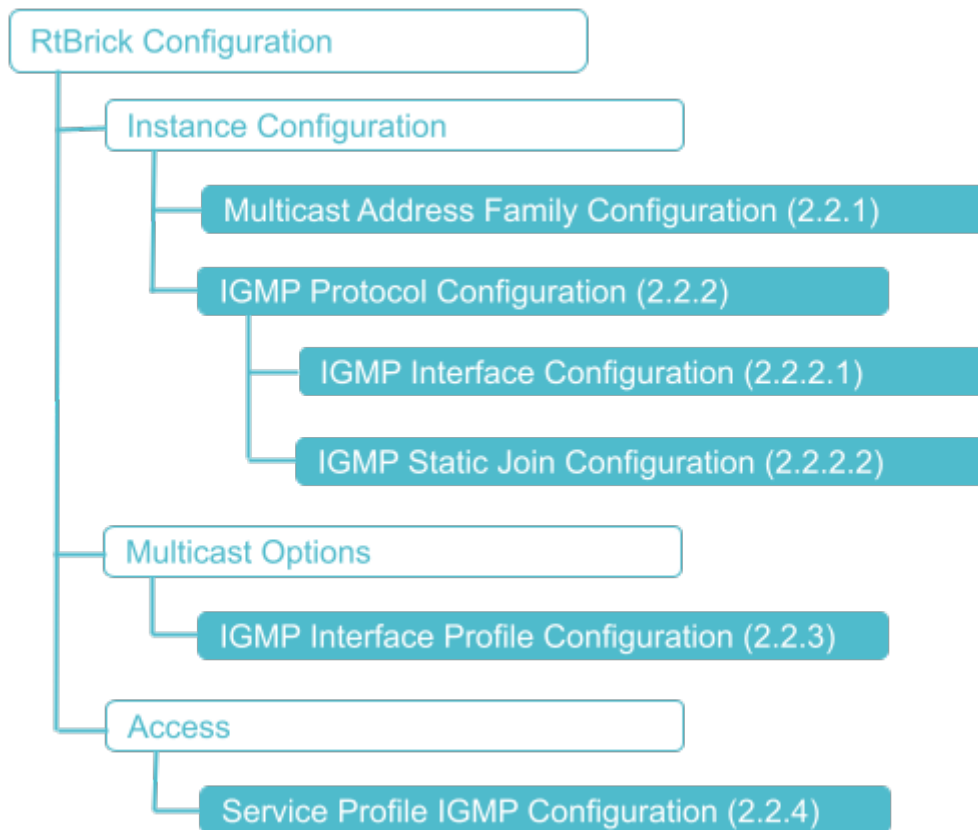
1.2. Supported Platforms

Not all features are necessarily supported on each hardware platform. Refer to the *Platform Guide* for the features and the sub-features that are or are not supported by each platform.

2. Configuring IGMP

2.1. Configuration Hierarchy

The diagram illustrates the IGMP configuration hierarchy.



2.2. Configuration Syntax and Commands

The following sections describe the interface configuration syntax and commands.

2.2.1. Multicast Address Family Configuration

You can enable the multicast IPv4 address family under the IGMP instance using the following command:

Syntax:

```
set instance <instance> address-family <attribute> <value>
```

Attribute	Description
<instance>	Specifies the name of the network instance

Attribute	Description
<afi>	Address family identifier (AFI). Supported value: ipv4
<safi>	Subsequent address family identifier (SAFI), that is, multicast.

Example: Multicast Address Family Configuration

```
{
  "rtbrick-config:address-family": [
    {
      "afi": "ipv4",
      "safi": "multicast"
    }
  ]
}
```

2.2.2. IGMP Protocol Configuration

To configure an IGMP on an instance, the same instance should be enabled globally with AFI IPv4 and SAFI as both unicast and multicast.

Syntax:

set instance <instance> **protocol igmp** <attribute> <values>



If no instance is specified, IGMP will be enabled on the default instance.

Options	Description
<instance>	Name of the IGMP instance.
interfaces <...>	IGMP interface configuration. Refer to section 2.2.1.1 for the IGMP interface configuration.
robustness-variable <variable-value>	The robustness value is used by IGMP to determine the number of times to send messages. Default value: 3. Range: 0-255.
source-address <source-address>	Source address of the IGMP query at the instance-level. NOTE: IF subscriber IFL is configured with the source address, then takes priority; otherwise, the the instance-level source address will be used. If source address is not configured, 0.0.0.0 will be the default address.
static-group <...>	Static multicast route configuration. Refer to section 2.2.2.2 for the IGMP static join configuration.

Example: IGMP Configuration

```
{
  "rtbrick-config:igmp": {
    "robustness-variable": 5,
    "source-address": "198.51.100.177"
  }
}
```

2.2.2.1. IGMP Interface Configuration



When you start IGMP on an interface, it operates with the default settings.

Syntax:

set instance <instance> **protocol igmp interfaces interface** <interface-name> <attribute> <value>

Attribute	Description
<instance>	Name of the instance
<interface-name>	Name of the IP multicast interface
max-groups <count>	Specifies the maximum count of multicast group memberships
version <version>	Specifies the IGMP version, that is, IGMPv2 or IGMPv3
interface-profile <profile>	Name of the interface configuration profile

Example: IGMP Interface Configuration

```
{
  "rtbrick-config:interface": [
    {
      "interface-name": "ifl-0/0/0/1",
      "version": "IGMPv3",
      "max-groups": 30,
      "interface-profile": "profile1"
    }
  ]
}
```

2.2.2.2. IGMP Static Join Configuration

Syntax:

set instance <instance> **protocol igmp static-group** <attribute> <value>

Command Parameters

<instance>	Specifies the instance name
<group-address>	Specifies the multicast address
<outgoing-interface>	Name of the outbound interface. The null0 is a discard or sink interface for IGMP static join configuration.

Example: IGMP Static Join Configuration

```
{
  "rtbrick-config:static-group": [
    {
      "group-address": "198.51.100.200",
      "source-address": "198.51.100.1",
      "outgoing-interface": "null0"
    }
  ]
}
```

2.2.3. IGMP Interface Profile Configuration

Syntax:

set multicast-options igmp interface-profile <attribute> <value>

Attribute	Description
filter-policy <filter-policy>	Specifies the filter policy. The policy should be defined under policy statement.
immediate-leave <enable disable>	Enable or disable the immediate leave option. The immediate-leave attribute removes group membership immediately upon receiving a group leave membership report. If enabled, IGMP perform an immediate leave upon receiving an IGMP group leave message. If the router is IGMP-enabled, it sends an IGMP last member query with a last member query response time. However, the router does not wait for the response time before it prunes off the group querier-timeout-interval IGMP other querier timeout. Default: 425s
query-interval <query-interval>	IGMP query interval in seconds. The query interval ranges from 1 to 1024 seconds. The default value is 125 seconds.
query-max-response-time <query-max-response-time>	Maximum query response interval in seconds. The maximum query response interval ranges from 1 to 1024 seconds. The default value is 100 seconds.

Attribute	Description
ssm-map-policy <ssm-map-policy>	IGMP SSM policy name. The policy for (,G) mapping to (S,G)
start-query-count <start-query-count>	Specifies the number of queries sent out on startup, separated by the Start Query Interval. The start query count ranges from 1 to 1024. The default value is 3.
start-query-interval <start-query-interval>	Specifies the start query interval. The start-query-interval ranges from 1 to 1024 seconds. The default value is 31 seconds (query-interval/4).

Example: IGMP Interface Profile Configuration

```
{
  "rtbrick-config:interface-profile": [
    {
      "profile-name": "profile1",
      "immediate-leave": "enable",
      "query-interval": 30,
      "query-max-response-time": 10,
      "start-query-count": 10,
      "start-query-interval": 10,
      "filter-policy": "filter_policy",
      "ssm-map-policy": "ssm_policy"
    }
  ]
}
```

2.2.4. Service Profile IGMP Configuration

Syntax:

set access service-profile <profile-name> **igmp** <attribute> <value>

Attribute	Description
<profile-name>	Name of the service profile
enable <true false>	Enable IGMP service
max-members <max-members>	Maximum IGMP membership per subscriber
profile <profile>	IGMP profile
version [IGMPv1/IGMPv2/IGMPv3]	IGMP version. The default IGMP version is IGMPv3.

Example: Service Profile IGMP Configuration

```

{
  "rtbrick-config:service-profile": [
    {
      "profile-name": "service-profile1",
      "igmp": {
        "enable": "true",
        "profile": "INTERFACE_PROFILE_1",
        "version": "IGMPv3",
        "max-members": 10
      }
    }
  ]
}

```

2.3. IGMP Configuration Example

```

{
  "ietf-restconf:data": {
    "rtbrick-config:instance": [
      {
        "name": "default",
        "protocol": {
          "igmp": {
            "robustness-variable": 5,
            "source-address": "198.51.100.91"
          }
        }
      }
    ],
    "rtbrick-config:multicast-options": {
      "igmp": {
        "interface-profile": [
          {
            "profile-name": "INTERFACE_PROFILE_1",
            "query-interval": 10,
            "filter-policy": "FILTER_POLICY_1"
          },
          {
            "profile-name": "INTERFACE_PROFILE_2",
            "query-interval": 20,
            "ssm-map-policy": "SSM_POLICY_1"
          }
        ]
      }
    },
    "rtbrick-config:policy": {
      "statement": [
        {
          "name": "FILTER_POLICY_1",
          "ordinal": [
            {
              "ordinal": 1,
              "match": {
                "rule": [
                  {
                    "rule": 1,
                    "type": "ipv4-mcast-group",

```

```

        "value-type": "discrete",
        "match-type": "or-longer",
        "value": "198.51.100.20/24"
      }
    ],
  },
  "action": {
    "rule": [
      {
        "rule": 1,
        "operation": "return-deny"
      }
    ]
  }
},
{
  "ordinal": 2,
  "action": {
    "rule": [
      {
        "rule": 1,
        "operation": "return-permit"
      }
    ]
  }
}
]
},
{
  "name": "SSM_POLICY_1",
  "ordinal": [
    {
      "ordinal": 1,
      "match": {
        "rule": [
          {
            "rule": 1,
            "type": "ipv4-mcast-group",
            "value-type": "discrete",
            "match-type": "or-longer",
            "value": "198.51.100.10/24"
          }
        ]
      },
      "action": {
        "rule": [
          {
            "rule": 1,
            "type": "ipv4-mcast-source",
            "operation": "overwrite",
            "value": "198.51.100.11/24"
          }
        ]
      }
    }
  ]
}
]
},
"rtbrick-config:access": {
  "interface": {

```

```
"double-tagged": [  
  {  
    "interface-name": "ifp-0/0/1",  
    "outer-vlan-min": 1,  
    "outer-vlan-max": 4049,  
    "inner-vlan-min": 1,  
    "inner-vlan-max": 4049,  
    "access-type": "PPPoE",  
    "access-profile-name": "access-profile1",  
    "service-profile-name": "service-profile1",  
    "aaa-profile-name": "aaa-profile1"  
  }  
],  
"service-profile": [  
  {  
    "profile-name": "service-profile1",  
    "igmp": {  
      "enable": "true",  
      "profile": "INTERFACE_PROFILE_1",  
      "version": "IGMPv3",  
      "max-members": 10  
    }  
  }  
]  
}  
}
```

3. Operational Commands

3.1. IGMP Show Commands

Syntax:

show igmp <option>

Option	Description
group	IGMP group summary information
group <group>	IGMP group detailed information
group instance <name>	IGMP group summary information in a specific instance
group outgoing-interface <interface_name>	IGMP group detailed information over a specific interface
interface	IGMP logical-interface summary information
interface instance <name>	IGMP interface summary information on specific instance
interface <interface_name>	IGMP interface detailed information

Example 1: Display IGMP interface details for all instances

```
supervisor@rtbrick>LEAF01: op> show igmp interface
Interface          Primary Address  State           Querier Address
Instance          Uptime
null0              n/a              n/a             n/a
vpn1                n/a
ppp-0/0/3/72339069014638597  198.51.100.100  Querier        198.51.100.133
vpn1               03h:37m:31s
```

Example 2: Display the interface summary for a specific instance

```
supervisor@rtbrick>LEAF01: op> show igmp interface instance vpn1
Interface          Primary Address  State           Querier Address
Instance          Uptime
null0              n/a              n/a             n/a
vpn1                n/a
ppp-0/0/3/72339069014638597  198.51.100.100  Querier        198.51.100.133
vpn1               03h:37m:39s
```

Example 3: Display IGMP group summary on all instances

```

supervisor@rtbrick>LEAF01: op> show igmp group
Source Address      Group Address      Interface          Instance
Uptime             Expires            Version
198.51.100.79      198.51.100.233    null0              vpn1
03h:42m:33s       n/a                IGMP
198.51.100.43      198.51.100.222    null0              vpn1
03h:42m:33s       n/a                IGMP
198.51.100.51      198.51.100.71     ppp-0/0/3/72339069014638597  vpn1
00h:32m:58s       1m 43s            IGMPv3
198.51.100.51      198.51.100.72     ppp-0/0/3/72339069014638597  vpn1
00h:33m:03s       1m 48s            IGMPv3
198.51.100.53      198.51.100.73     ppp-0/0/3/72339069014638597  vpn1
00h:35m:26s       3m 36s            IGMPv3
198.51.100.54      198.51.100.74     ppp-0/0/3/72339069014638597  vpn1
00h:35m:26s       3m 35s            IGMPv3
198.51.100.56      198.51.100.115    ppp-0/0/3/72339069014638597  vpn1
03h:38m:16s       3m 33s            IGMPv3
198.51.100.57      198.51.100.117    ppp-0/0/3/72339069014638597  vpn1
03h:38m:16s       3m 29s            IGMPv3
198.51.100.58      198.51.100.18     ppp-0/0/3/72339069014638597  vpn1
03h:38m:16s       3m 42s            IGMPv3
198.51.100.59      198.51.100.19     ppp-0/0/3/72339069014638597  vpn1
03h:38m:16s       3m 35s            IGMPv3
198.51.100.90      198.51.100.64     ppp-0/0/3/72339069014638597  vpn1
03h:38m:16s       3m 40s            IGMPv3
198.51.100.225     198.51.100.68     ppp-0/0/3/72339069014638597  vpn1
00h:35m:26s       3m 40s            IGMPv3

```

Example 4: Display the group summary on specific instance

```

supervisor@rtbrick>LEAF01: op> show igmp group instance vpn1
Source Address      Group Address      Interface          Instance
Uptime             Expires            Version
198.51.100.79      198.51.100.233    null0              vpn1
03h:42m:37s       n/a                IGMP
198.51.100.43      198.51.100.233    null0              vpn1
03h:42m:37s       n/a                IGMP
198.51.100.51      198.51.100.71     ppp-0/0/3/72339069014638597  vpn1
00h:33m:02s       1m 40s            IGMPv3
198.51.100.51      198.51.100.72     ppp-0/0/3/72339069014638597  vpn1
00h:33m:07s       1m 45s            IGMPv3
198.51.100.53      198.51.100.73     ppp-0/0/3/72339069014638597  vpn1
00h:35m:30s       3m 41s            IGMPv3
198.51.100.54      198.51.100.74     ppp-0/0/3/72339069014638597  vpn1
00h:35m:30s       3m 43s            IGMPv3
198.51.100.56      198.51.100.115    ppp-0/0/3/72339069014638597  vpn1
03h:38m:20s       3m 43s            IGMPv3
198.51.100.57      198.51.100.117    ppp-0/0/3/72339069014638597  vpn1
03h:38m:20s       3m 42s            IGMPv3
198.51.100.58      198.51.100.18     ppp-0/0/3/72339069014638597  vpn1
03h:38m:20s       3m 39s            IGMPv3
198.51.100.59      198.51.100.19     ppp-0/0/3/72339069014638597  vpn1
03h:38m:20s       3m 42s            IGMPv3
198.51.100.90      198.51.100.64     ppp-0/0/3/72339069014638597  vpn1
03h:38m:20s       3m 37s            IGMPv3
198.51.100.225     198.51.100.68     ppp-0/0/3/72339069014638597  vpn1
00h:35m:30s       3m 36s            IGMPv3

```

Example 5: Display detailed group information for specific group and source on all instances

```

supervisor@rtbrick>LEAF01: op> show igmp group 198.51.100.233 198.51.100.79
(198.51.100.79, 198.51.100.233)
  Outgoing interface      : null0
  Instance                : vpn1
  Source                  : Static
  State                   : No Members Present
  Version                 : IGMP
  Uptime                  : 03h:42m:54s
  Expires                 : n/a
  Membership interval     : n/a
  Last reporter           : n/a
  Last member query count : n/a
  Last member interval    : n/a
  Retransmit time        : n/a
  Max response time       : n/a

```

Example 6: Display detailed group information for specific group and source on all instances

```

supervisor@rtbrick>LEAF01: op> show igmp group outgoing-interface ppp-
0/0/3/72339069014638597
(198.51.100.51, 198.51.100.71)
  Outgoing interface      : ppp-0/0/3/72339069014638597
  Instance                : vpn1
  Source                  : Dynamic
  State                   : Members Present
  Version                 : IGMPv3
  Uptime                  : 00h:33m:44s
  Expires                 : 1m 43s
  Membership interval     : 110s
  Last reporter           : 198.51.100.100
  Last member query count : 3
  Last member interval    : 1s
  Retransmit time        : 1s
  Max response time       : 0s
(198.51.100.51, 198.51.100.72)
  Outgoing interface      : ppp-0/0/3/72339069014638597
  Instance                : vpn1
  Source                  : Dynamic
  State                   : Members Present
  Version                 : IGMPv3
  Uptime                  : 00h:33m:49s
  Expires                 : 1m 48s
  Membership interval     : 110s
  Last reporter           : 198.51.100.100
  Last member query count : 3
  Last member interval    : 1s
  Retransmit time        : 1s
  Max response time       : 0s
(198.51.100.53, 198.51.100.73)
  Outgoing interface      : ppp-0/0/3/72339069014638597
  Instance                : vpn1
  Source                  : Dynamic
  State                   : Members Present

```



```

Version           : IGMPv3
Uptime           : 00h:36m:12s
Expires          : 3m 37s
Membership interval : 225s
Last reporter    : 198.51.100.100
Last member query count : 3
Last member interval : 1s
Retransmit time  : 1s
Max response time : 0s
(198.51.100.54, 198.51.100.74)
Outgoing interface : ppp-0/0/3/72339069014638597
Instance          : vpn1
Source           : Dynamic
State            : Members Present
Version          : IGMPv3
Uptime           : 00h:36m:12s
Expires          : 3m 41s
Membership interval : 225s
Last reporter    : 198.51.100.100
Last member query count : 3
Last member interval : 1s
Retransmit time  : 1s
Max response time : 0s
(198.51.100.56, 198.51.100.115)
Outgoing interface : ppp-0/0/3/72339069014638597
Instance          : vpn1
Source           : Dynamic
State            : Members Present
Version          : IGMPv3
Uptime           : 03h:39m:02s
Expires          : 3m 38s
Membership interval : 225s
Last reporter    : 198.51.100.100
Last member query count : 3
Last member interval : 1s
Retransmit time  : 1s
Max response time : 0s

```

Example 7: Display detailed group information for specific group and source on selected instance

```

supervisor@rtbrick>LEAF01: op> show igmp group instance vpn1 198.51.100.117
198.51.100.57
(198.51.100.57, 198.51.100.117)
Outgoing interface : ppp-0/0/3/72339069014638597
Instance          : vpn1
Source           : Dynamic
State            : Members Present
Version          : IGMPv3
Uptime           : 03h:39m:31s
Expires          : 3m 34s
Membership interval : 225s
Last reporter    : 198.51.100.100
Last member query count : 3
Last member interval : 1s
Retransmit time  : 1s
Max response time : 0s
supervisor@rtbrick>LEAF01: op>

```

3.2. IGMP Clear Commands

3.2.1. IGMP Interface

Syntax:

clear igmp interface <attribute> <value>

Option	Description
<interface_name>	Clears the specified IGMP interface
instance <instance> statistics	Clears the IGMP interface statistics for the specified instance.

Example: Clear interface IGMP statistics

```
supervisor@rtbrick>LEAF01: op> clear igmp interface instance default statistics
Interface IGMP statistics were successfully cleared
supervisor@rtbrick>LEAF01: op>
```

3.2.2. IGMP Group

Syntax:

clear igmp group <attribute> <value>

Option	Description
all	Clear all IGMP groups present on all instances
instance <instance>	Clear all IGMP groups present on specific instance
interface <interface_name>	Clear all IGMP groups present on specific interface

Example: Clear all IGMP groups present on all instances

```
supervisor@rtbrick>LEAF01: op> clear igmp group all
IGMP groups were successfully cleared
supervisor@rtbrick>LEAF01: op>
```