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H. Zhao  
Ericsson  
X. Liu  
Jabil  
Y. Liu  
Huawei  
M. Sivakumar  
Cisco  
A. Peter  
Individual

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A Yang Data Model for IGMP and MLD Snooping  
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## Abstract

This document defines a YANG data model that can be used to configure and manage Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping devices.

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IGMP &amp; MLD Snooping Yang Model

May 2018

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## Table of Contents

<a href="#">1.</a>	<a href="#">Introduction.....</a>	<a href="#">3</a>
<a href="#">1.1.</a>	<a href="#">Terminology.....</a>	<a href="#">3</a>
<a href="#">1.2.</a>	<a href="#">Tree Diagrams.....</a>	<a href="#">3</a>
<a href="#">2.</a>	<a href="#">Design of Data Model.....</a>	<a href="#">4</a>
<a href="#">2.1.</a>	<a href="#">Overview.....</a>	<a href="#">4</a>
<a href="#">2.2.</a>	<a href="#">IGMP Snooping Instances.....</a>	<a href="#">4</a>
<a href="#">2.3.</a>	<a href="#">MLD Snooping Instances.....</a>	<a href="#">7</a>
<a href="#">2.4.</a>	<a href="#">IGMP and MLD Snooping References.....</a>	<a href="#">9</a>
<a href="#">2.5.</a>	<a href="#">Augment /if:interfaces/if:interface.....</a>	<a href="#">10</a>
<a href="#">2.6.</a>	<a href="#">IGMP and MLD Snooping RPC.....</a>	<a href="#">12</a>
<a href="#">3.</a>	<a href="#">IGMP and MLD Snooping YANG Module.....</a>	<a href="#">13</a>
<a href="#">4.</a>	<a href="#">Security Considerations.....</a>	<a href="#">42</a>
<a href="#">5.</a>	<a href="#">IANA Considerations.....</a>	<a href="#">44</a>
<a href="#">6.</a>	<a href="#">Normative References.....</a>	<a href="#">44</a>
<a href="#">Appendix A.</a>	<a href="#">Data Tree Example.....</a>	<a href="#">46</a>
	<a href="#">Authors' Addresses.....</a>	<a href="#">52</a>

## 1. Introduction

This document defines a YANG [[RFC6020](#)] data model for the management of Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping devices.

The YANG model in this document conforms to the Network Management Datastore Architecture defined in [I-D.ietf-netmod-revised-datastores]. The "Network Management Datastore Architecture" (NMDA) adds the ability to inspect the current operational values for configuration, allowing clients to use identical paths for retrieving the configured values and the operational values.

### 1.1. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [[RFC2119](#)].

The terminology for describing YANG data models is found in [[RFC6020](#)].

### 1.2. Tree Diagrams

A simplified graphical representation of the data model is used in this document. The meaning of the symbols in these diagrams is as follows:

- o Brackets "[" and "]" enclose list keys.
- o Abbreviations before data node names: "rw" means configuration

(read-write), and "ro" means state data (read-only).

- o Symbols after data node names: "?" means an optional node, "!" means a presence container, and "\*" denotes a list and leaf-list.

- o Parentheses enclose choice and case nodes, and case nodes are also marked with a colon (":").

- o Ellipsis ("...") stands for contents of subtrees that are not shown.

## [2. Design of Data Model](#)

The model covers Considerations for Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping Switches [[RFC4541](#)].

The goal of this document is to define a data model that provides a common user interface to IGMP and MLD Snooping. This document provides freedom for vendors to adapt this data model to their product implementations.

### [2.1. Overview](#)

The IGMP and MLD Snooping YANG module defined in this document has all the common building blocks for the IGMP and MLD Snooping protocol.

The YANG module includes IGMP and MLD Snooping instance definition, instance reference in the scenario of BRIDGE, L2VPN. The module also includes the RPC methods for clearing IGMP and MLD Snooping group tables.

This YANG model follows the Guidelines for YANG Module Authors (NMDA) [[draft-dsdt-nmda-guidelines-01](#)]. This NMDA ("Network Management Datastore Architecture") architecture provides an architectural framework for datastores as they are used by network management

protocols such as NETCONF [[RFC6241](#)], RESTCONF [[RFC8040](#)] and the YANG [[RFC7950](#)] data modeling language.

## [2.2](#). IGMP Snooping Instances

The YANG module defines igmp-snooping-instance which could be referenced in the BRIDGE or L2VPN scenario to enable IGMP Snooping.

All the IGMP Snooping related attributes have been defined in the igmp-snooping-instance. The read-write attribute is configurable data. The read-only attribute shows state data. The key attribute of the igmp-snooping-instance is name.

The value of type in igmp-snooping-instance is bridge or l2vpn. When it is bridge, the igmp-snooping-instance will be referenced in the BRIDGE scenario. When it is l2vpn, the igmp-snooping-instance will be referenced in the L2VPN scenario.

The value of bridge-mrouter-interface, l2vpn-mrouter-interface-ac, l2vpn-mrouter-interface-pw are filled by routing system dynamically. They are different from static-bridge-mrouter-interface, static-l2vpn-

Zhao & Liu, etc Expires November 13, 2018 [Page 4]

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Internet-Draft IGMP & MLD Snooping Yang Model May 2018

mrouter-interface-ac, and static-l2vpn-mrouter-interface-pw which are configured statically.

```
module: ietf-igmp-ml-d-snooping
```

```
  +--rw igmp-snooping-instances
```

```
    |  +--rw igmp-snooping-instance* [name]
```

```
      |    +--rw name string
```

```
      |    +--rw type? enumeration
```

```
      |    +--rw enable? boolean {admin-enable}?
```

```
      |    +--rw forwarding-mode? enumeration
```

```
      |    +--rw explicit-tracking? boolean {explicit-track}?
```

```
      |    +--rw exclude-lite? boolean {exclude-lite}?
```

	+++rw send-query?	boolean
	+++rw immediate-leave?	empty {immediate-leave}
	+++rw last-member-query-interval?	uint16
	+++rw query-interval?	uint16
	+++rw query-max-response-time?	uint16
	+++rw require-router-alert?	boolean {require-router
alert}?		
	+++rw robustness-variable?	uint8
	+++rw version?	uint8
	+++rw static-bridge-mrouter-interface*	if:interface-ref {static
mrouter-interface}?		
	+++rw static-l2vpn-mrouter-interface-ac*	if:interface-ref {static
mrouter-interface}?		
	+++rw static-l2vpn-mrouter-interface-pw*	l2vpn-instance-pw-ref
{static-mrouter-interface}?		
	+++rw querier-source?	inet:ipv4-address

	+++rw static-l2-multicast-group* [group source-addr] {static-l2-	
multicast-group}?		
	+++rw group	inet:ipv4-address
	+++rw source-addr	source-ipv4-addr-type
	+++rw bridge-outgoing-interface*	if:interface-ref
	+++rw l2vpn-outgoing-ac*	l2vpn-instance-ac-ref
	+++rw l2vpn-outgoing-pw*	l2vpn-instance-pw-ref

	+++ro entries-count?	uint32
	+++ro bridge-mrouter-interface*	if:interface-ref
	+++ro l2vpn-mrouter-interface-ac*	if:interface-ref
	+++ro l2vpn-mrouter-interface-pw*	l2vpn-instance-pw-ref
	+++ro group* [address]	
	+++ro address	inet:ipv4-address
	+++ro mac-address?	yang:phys-address
	+++ro expire?	uint32
	+++ro up-time?	uint32
	+++ro last-reporter?	inet:ipv4-address
	+++ro source* [address]	
	+++ro address	inet:ipv4-address
	+++ro bridge-outgoing-interface*	if:interface-ref
	+++ro l2vpn-outgoing-ac*	l2vpn-instance-ac-ref
	+++ro l2vpn-outgoing-pw*	l2vpn-instance-pw-ref
	+++ro up-time?	uint32
	+++ro expire?	uint32
	+++ro host-count?	uint32 {explicit-tracking}
	+++ro last-reporter?	inet:ipv4-address

	+++ro host* [host-address] {explicit-tracking}?	
	+++ro host-address	inet:ipv4-address
	+++ro host-filter-mode?	enumeration

### [2.3.](#) MLD Snooping Instances

The YANG module defines mld-snooping-instance which could be referenced in the BRIDGE or L2VPN scenario to enable MLD Snooping.

The mld-snooping-instance is the same as IGMP snooping except changing IPV4 addresses to IPV6 addresses.

```
module: ietf-igmp-mld-snooping

  +--rw mld-snooping-instances
    |   +--rw mld-snooping-instance* [name]
    |     +--rw name                               string
    |     +--rw type?                             enumeration
    |     +--rw enable?                           boolean {admin-enabl
    |     +--rw forwarding-mode?                  enumeration
    |     +--rw explicit-tracking?                boolean {explicit-
tracking}?
    |     +--rw exclude-lite?                     boolean {exclude-lit
    |     +--rw send-query?                       boolean
    |     +--rw immediate-leave?                  empty {immediate-lea
    |     +--rw last-member-query-interval?       uint16
    |     +--rw query-interval?                  uint16
    |     +--rw query-max-response-time?         uint16
    |     +--rw require-router-alert?            boolean {require-rou
alert}?
    |     +--rw robustness-variable?             uint8
```

	+++rw version?	uint8
	+++rw static-bridge-mrouter-interface* mrouter-interface}?	if:interface-ref {st
	+++rw static-l2vpn-mrouter-interface-ac* mrouter-interface}?	if:interface-ref {st
	+++rw static-l2vpn-mrouter-interface-pw* {static-mrouter-interface}?	l2vpn-instance-pw-re
	+++rw querier-source?	inet:ipv6-address
	+++rw static-l2-multicast-group* [group source-addr] {static-l2 multicast-group}?	
	+++rw group	inet:ipv6-address
	+++rw source-addr	source-ipv6-addr-type
	+++rw bridge-outgoing-interface*	if:interface-ref
	+++rw l2vpn-outgoing-ac*	l2vpn-instance-ac-ref
	+++rw l2vpn-outgoing-pw*	l2vpn-instance-pw-ref
	+++ro entries-count?	uint32
	+++ro bridge-mrouter-interface*	if:interface-ref
	+++ro l2vpn-mrouter-interface-ac*	if:interface-ref
	+++ro l2vpn-mrouter-interface-pw*	l2vpn-instance-pw-re
	+++ro group* [address]	
	+++ro address	inet:ipv6-address
	+++ro mac-address?	yang:phys-address
	+++ro expire?	uint32
	+++ro up-time?	uint32
	+++ro last-reporter?	inet:ipv6-address
	+++ro source* [address]	
	+++ro address	inet:ipv6-address

Internet-Draft

IGMP &amp; MLD Snooping Yang Model

May 2018

	+++ro bridge-outgoing-interface*	if:interface-ref
	+++ro l2vpn-outgoing-ac*	l2vpn-instance-ac-ref
	+++ro l2vpn-outgoing-pw*	l2vpn-instance-pw-ref
	+++ro up-time?	uint32
	+++ro expire?	uint32
	+++ro host-count?	uint32 {explicit-track
	+++ro last-reporter?	inet:ipv6-address
	+++ro host* [host-address] {explicit-tracking}?	
	+++ro host-address	inet:ipv6-address
	+++ro host-filter-mode?	enumeration

#### [2.4.](#) IGMP and MLD Snooping References

The `igmp-snooping-instance` could be referenced in the scenario of BRIDGE or L2VPN to configure the IGMP Snooping. The name of the instance is the key attribute.

When the `igmp-snooping-instance` is referenced under the bridge view, it means IGMP Snooping is enabled in the whole bridge. When the `igmp-snooping-instance` is referenced under the VLAN view, it means IGMP Snooping is enabled in the certain VLAN of the bridge.

The `mld-snooping-instance` could be referenced in concurrence with `igmp-snooping-instance` to configure the MLD Snooping.

```

+++rw bridges

|  +++rw bridge* [name]

|      +++rw name                name-type

|      +++rw igmp-snooping-instance?  igmp-snooping-instance-ref

```

```

|      +--rw mld-snooping-instance?      mld-snooping-instance-ref
|
|      +--rw component* [name]
|
|      +---rw name                        string

```

```

|      +---rw bridge-vlan
|
|      +---rw vlan* [vid]
|
|      +---rw vid                        vlan-index-type
|
|      +---rw igmp-snooping-instance?    igmp-snooping-instance-ref
|
|      +---rw mld-snooping-instance?    mld-snooping-instance-ref
+---rw l2vpn-instances
    +---rw l2vpn-instance* [name]
        +---rw name                      string
        +---rw igmp-snooping-instance?  igmp-snooping-instance-ref
        +---rw mld-snooping-instance?  mld-snooping-instance-ref

```

## [2.5](#). Augment /if:interfaces/if:interface

This model augment /if:interfaces/if:interface and then add the IGMP and MLD Snooping related attributes under it. The attributes include enable, version, etc.

The static-mrouter-interface and static-l2-multicast-group could be configured statically under the /if:interfaces/if:interface/ims:igmp-mld-snooping view. Meanwhile, you can configure them under the IGMP and MLD Snooping instance view.

The attributes under the statistics are read-only. They show the statistics of IGMP and MLD Snooping related packets.

augment /if:interfaces/if:interface:

```
  +---rw igmp-mld-snooping
    +---rw enable?                boolean {admin-enable}?
    +---rw version?               uint8
    +---rw type?                  enumeration
    +---rw static-mrouter-interface
      |  +---rw (static-mrouter-interface)?
```

```
  |  +---:(bridge)
  |    |  +---rw bridge-name?      string
  |    |  +---rw vlan-id*          uint32
  |    +---:(l2vpn)
  |      +---rw l2vpn-instance-name? string
+---rw static-l2-multicast-group
|  +---rw (static-l2-multicast-group)?
|    +---:(bridge)
|      |  +---rw bridge-name?      string
|      |  +---rw bridge-group-v4* [group source-addr]
|      |    |  +---rw group        inet:ipv4-address
|      |    |  +---rw source-addr  source-ipv4-addr-type
|      |    |  +---rw vlan-id*     uint32
|      |  +---rw bridge-group-v6* [group source-addr]
|      |    +---rw group           inet:ipv6-address
```

```

|      |      +---rw source-addr      source-ipv6-addr-type
|      |      +---rw vlan-id*        uint32
|      +---:(l2vpn)
|          +---rw l2vpn-group-v4* [group source-addr]
|          |      +---rw group                inet:ipv4-address
|          |      +---rw source-addr          source-ipv4-addr-type
|          |      +---rw l2vpn-instance-name? string
|          +---rw l2vpn-group-v6* [group source-addr]
|              +---rw group                inet:ipv6-address
|              +---rw source-addr          source-ipv6-addr-type

```

```

|          +---rw l2vpn-instance-name? string
+---ro statistics
    +---ro received
        |      +---ro query?                yang:counter64
        |      +---ro membership-report-v1? yang:counter64
        |      +---ro membership-report-v2? yang:counter64
        |      +---ro membership-report-v3? yang:counter64
        |      +---ro leave?                yang:counter64
        |      +---ro non-member-leave?     yang:counter64
        |      +---ro pim?                  yang:counter64
    +---ro sent

```

```

+---ro query?                yang:counter64
+---ro membership-report-v1? yang:counter64
+---ro membership-report-v2? yang:counter64
+---ro membership-report-v3? yang:counter64
+---ro leave?                yang:counter64
+---ro non-member-leave?     yang:counter64
+---ro pim?                  yang:counter64

```

## 2.6. IGMP and MLD Snooping RPC

IGMP and MLD Snooping RPC clears the specified IGMP and MLD Snooping group tables.

```

rpcs:
+---x clear-igmp-snooping-groups {rpc-clear-groups}?
|   +---w input
|   +---w name?      string
|   +---w group?     inet:ipv4-address
|   +---w source?    inet:ipv4-address
+---x clear-mlt-snooping-groups {rpc-clear-groups}?

```

```

+---w input
+---w name?      string
+---w group?     inet:ipv6-address
+---w source?    inet:ipv6-address

```

## 3. IGMP and MLD Snooping YANG Module

```

<CODE BEGINS> file ietf-igmp-mlt-snooping@2018-05-03.yang
module ietf-igmp-mlt-snooping {
  namespace "urn:ietf:params:xml:ns:yang:ietf-igmp-mlt-snooping";
  // replace with IANA namespace when assigned
  prefix ims;

```

```

import ietf-inet-types {
    prefix inet;
}

import ietf-yang-types {
    prefix "yang";
}

import ietf-interfaces {
    prefix "if";
}

import ietf-l2vpn {
    prefix "l2vpn";
}

import ietf-network-instance {
    prefix "ni";
}

organization
    "IETF PIM Working Group";

contact
    "WG Web:    <http://tools.ietf.org/wg/pim/>
    WG List:    <mailto:pim@ietf.org>

    Editors:    Hongji Zhao
                <mailto:hongji.zhao@ericsson.com>

                Xufeng Liu
                <mailto:xufeng.liu.ietf@gmail.com>

```

Yisong Liu  
 <mailto:liuyisong@huawei.com>

Anish Peter  
 <mailto:anish.ietf@gmail.com>

Mahesh Sivakumar  
 <mailto:sivakumar.mahesh@gmail.com>

";

description

"The module defines a collection of YANG definitions common for all Internet Group Management Protocol (IGMP) and Multicast Listener Discovery (MLD) Snooping devices.

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This version of this YANG module is part of RFC XXXX; see the RFC itself for full legal notices.";

revision 2018-05-03 {

description

"Initial revision.";

reference

"RFC XXXX: A YANG Data Model for IGMP and MLD Snooping";

}

/\*

\* Features

\*/

feature admin-enable {

description

"Support configuration to enable or disable IGMP and MLD Snooping.";

}

feature immediate-leave {

description

"Support configuration of immediate-leave.";

}

```

feature join-group {
    description
        "Support configuration of join-group.";
}

feature require-router-alert {
    description
        "Support configuration of require-router-alert.";
}

feature static-l2-multicast-group {
    description
        "Support configuration of L2 multicast static-group.";
}

feature static-mrouter-interface {
    description
        "Support configuration of mrouter interface.";
}

feature per-instance-config {
    description
        "Support configuration of each VLAN or l2vpn instance or EVPN
instance.";
}

feature rpc-clear-groups {
    description
        "Support to clear statistics by RPC for IGMP and MLD
Snooping.";
}

feature explicit-tracking {
    description
        "Support configuration of per instance explicit-tracking
hosts.";
}

feature exclude-lite {
    description
        "Support configuration of per instance exclude-lite.";
}

/*
 * Typedefs
 */
typedef name-type {
    type string {

```

---

```
        length "0..32";
    }
    description
        "A text string of up to 32 characters, of locally determined
        significance.";
}
typedef vlan-index-type {
    type uint32 {
        range "1..4094 | 4096..4294967295";
    }
    description
        "A value used to index per-VLAN tables. Values of 0 and 4095
        are not permitted. The range of valid VLAN indices. If the
        value is greater than 4095, then it represents a VLAN with
        scope local to the particular agent, i.e., one without a
        global VLAN-ID assigned to it. Such VLANs are outside the
        scope of IEEE 802.1Q, but it is convenient to be able to
        manage them in the same way using this YANG module.";
    reference
        "IEEE Std 802.1Q-2014: Virtual Bridged Local Area Networks.";
}

typedef igmp-snooping-instance-ref {
    type leafref {
        path "/igmp-snooping-instances/igmp-snooping-instance/name";
    }
    description
        "This type is used by data models that need to reference igmp
snooping instance.";
}

typedef mld-snooping-instance-ref {
    type leafref {
        path "/mld-snooping-instances/mld-snooping-instance/name";
    }
    description
        "This type is used by data models that need to reference mld
snooping instance.";
}

typedef l2vpn-instance-ac-ref {
    type leafref {
        path "/ni:network-instances/ni:network-instance/l2vpn:endpoint/l2vpn:name";
    }
    description "l2vpn-instance-ac-ref";
}
```

```
typedef l2vpn-instance-pw-ref {  
    type leafref {
```

```
    path "/ni:network-instances/ni:network-instance/l2vpn:endpoint/l2vpn:nam  
    }  
    description "l2vpn-instance-pw-ref";  
}
```

```
typedef source-ipv4-addr-type {  
    type union {  
        type enumeration {  
            enum '*' {  
                description  
                    "Any source address.";  
            }  
        }  
        type inet:ipv4-address;  
    }  
    description  
        "Multicast source IPV4 address type.";  
} // source-ipv4-addr-type
```

```
typedef source-ipv6-addr-type {  
    type union {  
        type enumeration {  
            enum '*' {  
                description  
                    "Any source address.";  
            }  
        }  
        type inet:ipv6-address;  
    }  
    description  
        "Multicast source IPV6 address type.";  
} // source-ipv6-addr-type
```

```
/*  
 * Identities  
 */
```

```
/*  
 * Groupings
```

\*/

```
grouping general-state-attributes {  
  
    description "General State attributes";  
  
    container received {  
        config false;  
    }
```

Zhao & Liu, etc

Expires November 13, 2018

[Page 17]

---

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```
        description "Statistics of received IGMP and MLD Snooping  
related packets.";  
        uses general-statistics-sent-received;  
    }  
    container sent {  
        config false;  
        description "Statistics of sent IGMP and MLD Snooping related  
packets.";  
        uses general-statistics-sent-received;  
    }  
  
} // general-state-attributes
```

```
grouping instance-config-attributes-igmp-snooping {  
    description "IGMP snooping configuration for each VLAN or l2vpn  
instance or EVPN instance.";  
  
    uses instance-config-attributes-igmp-mld-snooping;  
  
    leaf querier-source {  
        type inet:ipv4-address;  
        description "Use the IGMP snooping querier to support IGMP  
snooping in a VLAN where PIM and IGMP are not configured.  
The IPV4 address is used as the source address in  
messages.";  
    }  
  
    list static-l2-multicast-group {  
        if-feature static-l2-multicast-group;  
        key "group source-addr";  
        description
```

```

        "A static multicast route, (*,G) or (S,G).";

leaf group {
    type inet:ipv4-address;
    description
        "Multicast group IPV4 address";
}

leaf source-addr {
    type source-ipv4-addr-type;
    description
        "Multicast source IPV4 address.";
}

leaf-list bridge-outgoing-interface {
    when "../.. /type = 'bridge'";

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 18]

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

    type if:interface-ref;
    description "Outgoing interface in bridge forwarding";
}

leaf-list l2vpn-outgoing-ac {
    when "../.. /type = 'l2vpn'";
    type l2vpn-instance-ac-ref;
    description "Outgoing AC in L2VPN forwarding";
}

leaf-list l2vpn-outgoing-pw {
    when "../.. /type = 'l2vpn'";
    type l2vpn-instance-pw-ref;
    description "Outgoing PW in L2VPN forwarding";
}

} // static-l2-multicast-group

} // instance-config-attributes-igmp-snooping

grouping instance-config-attributes-igmp-ml-d-snooping {
    description
        "IGMP and MLD Snooping configuration of each VLAN.";

```

```

    leaf enable {
        if-feature admin-enable;
        type boolean;
        default false;
        description
            "Set the value to true to enable IGMP and MLD Snooping in
the VLAN instance.";
    }

    leaf forwarding-mode {
        type enumeration {
            enum "mac" {
                description
                    "MAC-based lookup mode";
            }
            enum "ip" {
                description
                    "IP-based lookup mode";
            }
        }
        default "ip";
    }

```

```

        description "The default forwarding mode for IGMP and MLD
Snooping is ip.
        cisco command is as below
        Router(config-vlan-config)# multicast snooping lookup
{ ip | mac }  ";
    }

    leaf explicit-tracking {
        if-feature explicit-tracking;
        type boolean;
        default false;
        description "Tracks IGMP & MLD Snooping v3 membership reports
from individual hosts.
        It contributes to saving network resources and
shortening leave latency.";
    }

    leaf exclude-lite {
        if-feature exclude-lite;
    }

```

```

        type boolean;
        default false;
        description
            "lightweight IGMPv3 and MLDv2 protocols, which simplify the
            standard versions of IGMPv3 and MLDv2.";
        reference "RFC5790";
    }

    leaf send-query {
        type boolean;
        default true;
        description "Enable quick response for topo changes.
            To support IGMP snooping in a VLAN where PIM and IGMP are
            not configured.
            It cooperates with param querier-source. ";
    }

    /**
    leaf mrouter-aging-time {
        type uint16 ;
        default 180;
        description "Aging time for mrouter interface";
    }
    **/

    leaf immediate-leave {
        if-feature immediate-leave;
        type empty;
        description

```

```

        "When fast leave is enabled, the IGMP software assumes that
        no more than one host is present on each VLAN port.";
    }

```

```

    leaf last-member-query-interval {
        type uint16 {
            range "1..65535";
        }
        units seconds;
        default 1;
        description
            "Last Member Query Interval, which may be tuned to modify
            the

```

```

        leave latency of the network.";
        reference "RFC3376. Sec. 8.8.";
    }

    leaf query-interval {

        type uint16;
        units seconds;
        default 125;
        description
            "The Query Interval is the interval between General
Queries
            sent by the Querier.";
        reference "RFC3376. Sec. 4.1.7, 8.2, 8.14.2.";
    }

    leaf query-max-response-time {

        type uint16;
        units seconds;
        default 10;
        description
            "Query maximum response time specifies the maximum time
            allowed before sending a responding report.";
        reference "RFC3376. Sec. 4.1.1, 8.3, 8.14.3.";
    }

    leaf require-router-alert {
        if-feature require-router-alert;
        type boolean;
        default false;
        description
            "When the value is true, router alert should exist in the IP
head of IGMP or MLD packet.";
    }

```

```

    leaf robustness-variable {
        type uint8 {
            range "1..7";
        }
        default 2;
        description

```

expected                   "Querier's Robustness Variable allows tuning for the

```
        packet loss on a network.";
        reference "RFC3376. Sec. 4.1.6, 8.1, 8.14.1.";
    }
```

```
    leaf version {
        type uint8 {
            range "1..3";
        }
        description "IGMP and MLD Snooping version.";
    }
```

```
leaf-list static-bridge-mrouter-interface {

    when "../type = 'bridge'";
    if-feature static-mrouter-interface;
    type if:interface-ref;
    description "static mrouter interface in bridge forwarding";

}
```

```
leaf-list static-l2vpn-mrouter-interface-ac {

    when "../type = 'l2vpn'";
    if-feature static-mrouter-interface;
    type if:interface-ref;
    description "static mrouter interface whose type is interface
in l2vpn forwarding";

}
```

```
leaf-list static-l2vpn-mrouter-interface-pw {

    when "../type = 'l2vpn'";
    if-feature static-mrouter-interface;
    type l2vpn-instance-pw-ref;
    description "static mrouter interface whose type is pw in l2vpn
forwarding";

}
```

```

} // instance-config-attributes-igmp-mld-snooping

grouping instance-config-attributes-mld-snooping {
    description "MLD snooping configuration of each VLAN.";

    uses instance-config-attributes-igmp-mld-snooping;

    leaf querier-source {
        type inet:ipv6-address;
        description
            "Use the MLD snooping querier to support MLD snooping where PIM
and MLD are not configured.
            The IPV6 address is used as the source address in messages.";
    }

    list static-l2-multicast-group {
        if-feature static-l2-multicast-group;
        key "group source-addr";
        description
            "A static multicast route, (*,G) or (S,G).";

        leaf group {
            type inet:ipv6-address;
            description
                "Multicast group IPV6 address";
        }

        leaf source-addr {
            type source-ipv6-addr-type;
            description
                "Multicast source IPV6 address.";
        }
    }

    leaf-list bridge-outgoing-interface {
        when "../.. /type = 'bridge'";
        type if:interface-ref;
        description "Outgoing interface in bridge forwarding";
    }

    leaf-list l2vpn-outgoing-ac {
        when "../.. /type = 'l2vpn'";
        type l2vpn-instance-ac-ref;
        description "Outgoing AC in L2VPN forwarding";
    }

    leaf-list l2vpn-outgoing-pw {
        when "../.. /type = 'l2vpn'";
        type l2vpn-instance-pw-ref;
    }

```

Internet-Draft

IGMP &amp; MLD Snooping Yang Model

May 2018

```
        description "Outgoing PW in L2VPN forwarding";
    }

    } // static-l2-multicast-group

} // instance-config-attributes-ml-d-snooping

grouping instance-state-group-attributes-igmp-ml-d-snooping {
    description
        "Attributes for both IGMP and MLD snooping groups.";

    leaf mac-address {
        type yang:phys-address;
        description "Destination MAC address for L2 multicast
forwarding.";
    }

    leaf expire {
        type uint32;
        units seconds;
        description
            "The time left before multicast group timeout.";
    }

    leaf up-time {
        type uint32;
        units seconds;
        description
            "The time elapsed since the device created L2 multicast
record.";
    }

} // instance-state-group-attributes-igmp-ml-d-snooping

grouping instance-state-attributes-igmp-snooping {

    description
        "State attributes for IGMP snooping for each VLAN or l2vpn
instance or EVPN instance.";
```

```
uses instance-state-attributes-igmp-mld-snooping;
```

```
list group {
```

```
key "address";
```

```
config false;
```

```
description "IGMP snooping information";
```

```
leaf address {
```

```
type inet:ipv4-address;
```

```
description
```

```
"Multicast group IPV4 address";
```

```
}
```

```
uses instance-state-group-attributes-igmp-mld-snooping;
```

```
leaf last-reporter {
```

```
type inet:ipv4-address;
```

```
description
```

```
"Address of the last host which has sent report to join  
the multicast group.";
```

```
}
```

```
list source {
```

```
key "address";
```

```
description "Source IPV4 address for multicast stream";
```

```
leaf address {
```

```
type inet:ipv4-address;
```

```
description "Source IPV4 address for multicast stream";
```

```
}
```

```
uses instance-state-source-attributes-igmp-mld-snooping;
```

```
leaf last-reporter {
```

```
type inet:ipv4-address;
```

```
description
```

```
"Address of the last host which has sent report to join  
the multicast group.";
```

```
}
```

```

list host {
    if-feature explicit-tracking;
    key "host-address";
    description
        "List of multicast membership hosts
        of the specific multicast source-group.";

    leaf host-address {
        type inet:ipv4-address;
        description
            "Multicast membership host address.";
    }
    leaf host-filter-mode {
        type enumeration {

```

```

        enum "include" {
            description
                "In include mode";
        }
        enum "exclude" {
            description
                "In exclude mode.";
        }
    }
    description
        "Filter mode for a multicast membership
        host may be either include or exclude.";
}
} // list host

} // list source
} // list group

} // instance-state-attributes-igmp-snooping

grouping instance-state-attributes-igmp-ml-d-snooping {

    description
        "State attributes for both IGMP and MLD Snooping of each
        VLAN or l2vpn instance or EVPN instance.";

    leaf entries-count {
        type uint32;
        config false;

```

```

        description
            "The number of L2 multicast entries in IGMP and MLD
Snooping.";
    }

```

```

leaf-list bridge-mrouter-interface {

    when "../type = 'bridge'";
    type if:interface-ref;
    config false;
    description " mrouter interface in bridge fowarding";

}

leaf-list l2vpn-mrouter-interface-ac {

    when "../type = 'l2vpn'";
    type if:interface-ref;
    config false;
    description " mrouter interface whose type is interface in
l2vpn fowarding";

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 26]

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

    }

leaf-list l2vpn-mrouter-interface-pw {

    when "../type = 'l2vpn'";
    type l2vpn-instance-pw-ref;
    config false;
    description " mrouter interface whose type is pw in l2vpn
fowarding";

}

} // instance-config-attributes-igmp-mld-snooping

grouping instance-state-attributes-mld-snooping {
    description
        "State attributes for MLD snooping of each VLAN.";

    uses instance-state-attributes-igmp-mld-snooping;

```

```

list group {
  key "address";
  config false;

  description "MLD snooping statistics information";

  leaf address {
    type inet:ipv6-address;
    description
      "Multicast group IPV6 address";
  }

  uses instance-state-group-attributes-igmp-mld-snooping;

  leaf last-reporter {
    type inet:ipv6-address;
    description
      "Address of the last host which has sent report to join
the multicast group.";
  }

  list source {
    key "address";
    description "Source IPV6 address for multicast stream";
  }

```

```

  leaf address {
    type inet:ipv6-address;
    description "Source IPV6 address for multicast stream";
  }

  uses instance-state-source-attributes-igmp-mld-snooping;

  leaf last-reporter {
    type inet:ipv6-address;
    description
      "Address of the last host which has sent report to join
the multicast group.";
  }

  list host {

```

```

if-feature explicit-tracking;
key "host-address";
description
    "List of multicast membership hosts
    of the specific multicast source-group.";

leaf host-address {
    type inet:ipv6-address;
    description
        "Multicast membership host address.";
}
leaf host-filter-mode {
    type enumeration {
        enum "include" {
            description
                "In include mode";
        }
        enum "exclude" {
            description
                "In exclude mode.";
        }
    }
    description
        "Filter mode for a multicast membership
        host may be either include or exclude.";
}
} // list host

} // list source
} // list group

} // instance-state-attributes-mld-snooping

grouping instance-state-source-attributes-igmp-mld-snooping {
    description

```

"State attributes for both IGMP and MLD Snooping of each VLAN or l2vpn instance or EVPN instance.";

```

leaf-list bridge-outgoing-interface {
    when "../..../type = 'bridge'";
    type if:interface-ref;
    description "Outgoing interface in bridge forwarding";
}

```

```

}

leaf-list l2vpn-outgoing-ac {
    when "../..../type = 'l2vpn'";
    type l2vpn-instance-ac-ref;
    description "Outgoing AC in L2VPN forwarding";
}

leaf-list l2vpn-outgoing-pw {
    when "../..../type = 'l2vpn'";
    type l2vpn-instance-pw-ref;
    description "Outgoing PW in L2VPN forwarding";
}

leaf up-time {
    type uint32;
    units seconds;
    description "The time elapsed since the device created L2
multicast record";
}

leaf expire {
    type uint32;
    units seconds;
    description
        "The time left before multicast group timeout.";
}

leaf host-count {
    if-feature explicit-tracking;
    type uint32;
    description
        "The number of host addresses.";
}

} // instance-state-source-attributes-igmp-mld-snooping

grouping general-statistics-error {
    description
        "A grouping defining statistics attributes for errors.";
}

```

```

leaf checksum {
    type yang:counter64;
    description
        "The number of checksum errors.";
}
leaf too-short {
    type yang:counter64;
    description
        "The number of messages that are too short.";
}
} // general-statistics-error

grouping general-statistics-sent-received {
    description
        "A grouping defining statistics attributes.";

    leaf query {
        type yang:counter64;
        description
            "The number of query messages.";
    }
    leaf membership-report-v1 {
        type yang:counter64;
        description
            "The number of membership report v1 messages.";
    }
    leaf membership-report-v2 {
        type yang:counter64;
        description
            "The number of membership report v2 messages.";
    }
    leaf membership-report-v3 {
        type yang:counter64;
        description
            "The number of membership report v3 messages.";
    }
    leaf leave {
        type yang:counter64;
        description
            "The number of leave messages.";
    }
    leaf non-member-leave {
        type yang:counter64;
        description
            "The number of non member leave messages.";
    }
    leaf pim {
        type yang:counter64;
        description

```

---

```
        "The number of pim hello messages.";
    }
} // general-statistics-sent-received

grouping interface-endpoint-attributes-igmp-snooping {
    description "interface attributes for igmp snooping";

    list host {

        if-feature explicit-tracking;

        key "host-address";

        config false;

        description
            "List of multicast membership hosts
            of the specific multicast source-group.";

        leaf host-address {
            type inet:ipv4-address;
            description
                "Multicast membership host address.";
        }
        leaf host-filter-mode {
            type enumeration {
                enum "include" {
                    description
                        "In include mode";
                }
                enum "exclude" {
                    description
                        "In exclude mode.";
                }
            }
            description
                "Filter mode for a multicast membership
                host may be either include or exclude.";
        }
    } // list host
} // interface-endpoint-attributes-igmp-snooping

grouping interface-endpoint-attributes-mls-snooping {
```

```
description "interface endpoint attributes mld snooping";
```

```
list host {
```

Zhao & Liu, etc

Expires November 13, 2018

[Page 31]

---

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```
if-feature explicit-tracking;
```

```
key "host-address";
```

```
config false;
```

```
description
```

```
  "List of multicast membership hosts  
  of the specific multicast source-group.";
```

```
leaf host-address {
```

```
  type inet:ipv6-address;
```

```
  description
```

```
  "Multicast membership host address.";
```

```
}
```

```
leaf host-filter-mode {
```

```
  type enumeration {
```

```
    enum "include" {
```

```
      description
```

```
      "In include mode";
```

```
    }
```

```
    enum "exclude" {
```

```
      description
```

```
      "In exclude mode.";
```

```
    }
```

```
  }
```

```
  description
```

```
  "Filter mode for a multicast membership  
  host may be either include or exclude.";
```

```
}
```

```
} // list host
```

```
} // interface-endpoint-attributes-mld-snooping
```

```
/*
```

```
 * igmp-snooping-instance
```

```
*/
```

```
container igmp-snooping-instances {
```

```
  description
```

```

    "igmp-snooping-instance list";

    list igmp-snooping-instance {
        key "name";
        description
            "IGMP Snooping instance to configure the igmp-
snooping.";

        leaf name {
            type string;

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 32]

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Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

        description
            "Name of the igmp-snooping-instance to configure the igmp
snooping.";
    }

    leaf type {
        type enumeration {
            enum "bridge" {
                description "bridge";
            }
            enum "l2vpn" {
                description "l2vpn";
            }
        }
        description "The type indicates bridge or l2vpn.";
    }
}

uses instance-config-attributes-igmp-snooping {
    if-feature per-instance-config;
}

uses instance-state-attributes-igmp-snooping;

} //igmp-snooping-instance
} //igmp-snooping-instances

/*
 * mld-snooping-instance

```

```

    */
    container mld-snooping-instances {
        description
            "mld-snooping-instance list";

        list mld-snooping-instance {
            key "name";
            description
                "MLD Snooping instance to configure the mld-snooping.";

            leaf name {
                type string;
                description
                    "Name of the mld-snooping-instance to configure the mld
snooping.";
            }
        }
    }

```

```

    leaf type {
        type enumeration {
            enum "bridge" {
                description "bridge";
            }
            enum "l2vpn" {
                description "l2vpn";
            }
        }
        description "The type indicates bridge or l2vpn.";
    }

    uses instance-config-attributes-mld-snooping {
        if-feature per-instance-config;
    }

    uses instance-state-attributes-mld-snooping;

} //mld-snooping-instance
} //mld-snooping-instances

```

```

container bridges {
  description
    "Apply igmp-mld-snooping instance in the bridge scenario";

  list bridge {
    key name;

    description
      "bridge list";

    leaf name {
      type name-type;
      description
        "bridge name";
    }

    leaf igmp-snooping-instance {
      type igmp-snooping-instance-ref;
      description "Configure igmp-snooping instance under the
bridge view";
    }

    leaf mld-snooping-instance {
      type mld-snooping-instance-ref;
      description "Configure mld-snooping instance under the
bridge view";
    }
  }
}

```

```

}
list component {
  key "name";
  description
    " ";

  leaf name {
    type string;
    description
      "The name of the Component.";
  }

  container bridge-vlan {
    description "bridge vlan";
    list vlan {
      key "vid";
      description
        "";
    }
  }
}

```

```

        leaf vid {
            type vlan-index-type;
            description
                "The VLAN identifier to which this entry
applies.";
        }
        leaf igmp-snooping-instance {
            type igmp-snooping-instance-ref;
            description "Configure igmp-snooping instance
under the vlan view";
        }
        leaf mld-snooping-instance {
            type mld-snooping-instance-ref;
            description "Configure mld-snooping instance
under the vlan view";
        }
    } //vlan
} //bridge-vlan
} //component
} //bridge
} //bridges

```

```

    container l2vpn-instances {
        description "Apply igmp-mld-snooping instance in the l2vpn
scenario";
    }

```

```

    list l2vpn-instance {

```

```

        key "name";
        description "An l2vpn service instance";

        leaf name {
            type string;
            description "Name of l2vpn service instance";
        }

        leaf igmp-snooping-instance {
            type igmp-snooping-instance-ref;
            description "Configure igmp-snooping instance under the

```

```

l2vpn-instance view";
    }
    leaf mld-snooping-instance {
        type mld-snooping-instance-ref;
        description "Configure mld-snooping instance under the
l2vpn-instance view";
    }

    }
    }

/* augments */

augment "/if:interfaces/if:interface" {
    description "Augment interface for referencing attributes which
only fit for interface view.";

    container igmp-mld-snooping {
        description
            "igmp-mld-snooping related attributes under interface view";

        leaf enable {
            if-feature admin-enable;
            type boolean;
            default false;
            description
                "Set the value to true to enable IGMP and MLD Snooping in
the VLAN instance.";
        }

        leaf version {
            type uint8 {
                range "1..3";
            }
            description "IGMP and MLD Snooping version.";
        }

        leaf type {
            type enumeration {

```

```

enum "bridge" {
    description "bridge";
}
enum "l2vpn" {

```

```

        description "l2vpn";
    }
}
description "The type indicates bridge or l2vpn.";
}

container static-mrouter-interface {
    description
        "Container for choice static-mrouter-interface";

    choice static-mrouter-interface {
        description
            "Configure static multicast router interface under the
interface view";

        case bridge {
            when "../type = 'bridge'" {
                description
                    "Applies to bridge scenario.";
            }
            description
                "Applies to bridge scenario.";

            leaf bridge-name {
                type string;
                description
                    "The name for a bridge. Each interface
belongs to only one bridge.";
            }

            leaf-list vlan-id {
                type uint32;
                description
                    "The vlan ids for bridge. If you don't
specify vlan id here, the interface serves as the mrouter interface for
all the vlans in this bridge.";
            }
        }
    }

    case l2vpn {
        when "../type = 'l2vpn'" {
            description
                "Applies to l2vpn scenario.";
        }
        description

```

```
        "Applies to l2vpn scenario.";

        leaf l2vpn-instance-name {
            type string;
            description
                "The l2vpn instance name applied in the
interface";
        }
    }

    } // choice static-mrouter-interface
} // container static-mrouter-interface

container static-l2-multicast-group {
    description
        "Container for static-l2-multicast-group";

    choice static-l2-multicast-group {
        description
            "Configure static l2 multicast group under the
interface view";

        case bridge {
            when "../type = 'bridge'" {
                description
                    "Applies to bridge scenario.";
            }
            description
                "Applies to bridge scenario.";

            leaf bridge-name {
                type string;
                description
                    "bridge name.";
            }
        }

        list bridge-group-v4 {

            key "group source-addr";
            description
                "A static multicast route, (*,G) or (S,G).";

            leaf group {
                type inet:ipv4-address;
```

```

        description
        "Multicast group IPV4 address";
    }

```

```

    leaf source-addr {
        type source-ipv4-addr-type;
        description
            "Multicast source IPV4 address.";
    }

    leaf-list vlan-id {
        type uint32;
        description
            "vlan id.";
    }
}

list bridge-group-v6 {
    key "group source-addr";
    description
        "A static multicast route, (*,G) or (S,G).";

    leaf group {
        type inet:ipv6-address;
        description
            "Multicast group IPV6 address";
    }

    leaf source-addr {
        type source-ipv6-addr-type;
        description
            "Multicast source IPV6 address.";
    }

    leaf-list vlan-id {
        type uint32;
        description
            "vlan id.";
    }
}

```

```

}
case l2vpn {

    when "../type = 'l2vpn'" {
        description
            "Applies to l2vpn scenario.";
    }
    description
        "Applies to l2vpn scenario.";
}

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 39]

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

list l2vpn-group-v4 {
    key "group source-addr";
    description "A static multicast route, (*,G) or
(S,G).";

    leaf group {
        type inet:ipv4-address;
        description
            "Multicast group IPV4 address";
    }

    leaf source-addr {
        type source-ipv4-addr-type;
        description
            "Multicast source IPV4 address.";
    }

    leaf l2vpn-instance-name {
        type string;
        description
            "The l2vpn instance name applied in the
interface";
    }
}
list l2vpn-group-v6 {

    key "group source-addr";

    description
        "A static multicast route, (*,G) or (S,G).";

    leaf group {

```

```

        type inet:ipv6-address;
        description
        "Multicast group IPV6 address";
    }

    leaf source-addr {
        type source-ipv6-addr-type;
        description
            "Multicast source IPV6 address.";
    }

    leaf l2vpn-instance-name {
        type string;
        description
            "The l2vpn instance name applied in the
interface";

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 40]

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Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

    }
}
}

} //choice static-l2-multicast-group
} // container static-l2-multicast-group

container statistics {
    config false;
    description
        "A collection of interface-related statistics objects.";

    uses general-state-attributes;
}

}

}

/*  RPCs  */

```

```

rpc clear-igmp-snooping-groups {
    if-feature rpc-clear-groups;
    description
        "Clears the specified IGMP Snooping cache tables.";

    input {

        leaf name {
            type string;
            description
                "Name of the igmp-snooping-instance";
        }

        leaf group {
            type inet:ipv4-address;
            description
                "Multicast group IPv4 address.
                If it is not specified, all IGMP snooping group tables
are
                cleared.";
        }

        leaf source {
            type inet:ipv4-address;

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 41]

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

        description
            "Multicast source IPv4 address.
            If it is not specified, all IGMP snooping source-group
tables are
            cleared.";
    }
}
} // rpc clear-igmp-snooping-groups

rpc clear-mld-snooping-groups {
    if-feature rpc-clear-groups;
    description
        "Clears the specified MLD Snooping cache tables.";

    input {
        leaf name {
            type string;
            description
                "Name of the mld-snooping-instance";

```

```

    }

    leaf group {
        type inet:ipv6-address;
        description
            "Multicast group IPv6 address.
            If it is not specified, all MLD snooping group tables are
            cleared.";
    }

    leaf source {
        type inet:ipv6-address;
        description
            "Multicast source IPv6 address.
            If it is not specified, all MLD snooping source-group
tables are
            cleared.";
    }
} // rpc clear-mls-snooping-groups
}
<CODE ENDS>

```

#### 4. Security Considerations

The YANG module specified in this document defines a schema for data that is designed to be accessed via network management protocols such as NETCONF [[RFC6241](#)] or RESTCONF [[RFC8040](#)]. The lowest NETCONF layer

is the secure transport layer, and the mandatory-to-implement secure transport is Secure Shell (SSH) [[RFC6242](#)]. The lowest RESTCONF layer is HTTPS, and the mandatory-to-implement secure transport is TLS [[RFC5246](#)].

The NETCONF access control model [[RFC6536](#)] provides the means to restrict access for particular NETCONF or RESTCONF users to a preconfigured subset of all available NETCONF or RESTCONF protocol operations and content.

There are a number of data nodes defined in this YANG module that are writable/creatable/deletable (i.e., config true, which is the

default). These data nodes may be considered sensitive or vulnerable in some network environments. Write operations (e.g., edit-config) to these data nodes without proper protection can have a negative effect on network operations. These are the subtrees and data nodes and their sensitivity/vulnerability:

/ims:igmp-snooping-instances/ims:igmp-snooping-instance

/ims:mld-snooping-instances/ims:mld-snooping-instance

/if:interfaces/if:interface/ims:igmp-mld-snooping

Unauthorized access to any data node of these subtrees can adversely affect the IGMP & MLD Snooping subsystem of both the local device and the network. This may lead to network malfunctions, delivery of packets to inappropriate destinations, and other problems.

Some of the readable data nodes in this YANG module may be considered sensitive or vulnerable in some network environments. It is thus important to control read access (e.g., via get, get-config, or notification) to these data nodes. These are the subtrees and data nodes and their sensitivity/vulnerability:

/ims:igmp-snooping-instances/ims:igmp-snooping-instance

/ims:mld-snooping-instances/ims:mld-snooping-instance

/if:interfaces/if:interface/ims:igmp-mld-snooping

Unauthorized access to any data node of these subtrees can disclose the operational state information of IGMP & MLD Snooping on this device.

Some of the RPC operations in this YANG module may be considered sensitive or vulnerable in some network environments. It is thus important to control access to these operations. The IGMP & MLD Snooping Yang module support the "clear-igmp-snooping-groups" and "clear-mld-snooping-groups" RPCs. If it meets unauthorized RPC

operation invocation, the IGMP and MLD Snooping group tables will be cleared unexpectedly.

## 5. IANA Considerations

RFC Ed.: In this section, replace all occurrences of 'XXXX' with the actual RFC number (and remove this note).

This document registers the following namespace URIs in the IETF XML registry [[RFC3688](#)]:

-----  
URI: urn:ietf:params:xml:ns:yang:ietf-igmp-mld-snooping

Registrant Contact: The IESG.

XML: N/A, the requested URI is an XML namespace.  
-----

This document registers the following YANG modules in the YANG Module Names registry [[RFC7950](#)]:

-----  
name: ietf-igmp-mld-snooping

namespace: urn:ietf:params:xml:ns:yang:ietf-igmp-mld-snooping

prefix: ims

reference: RFC XXXX  
-----

## 6. Normative References

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Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

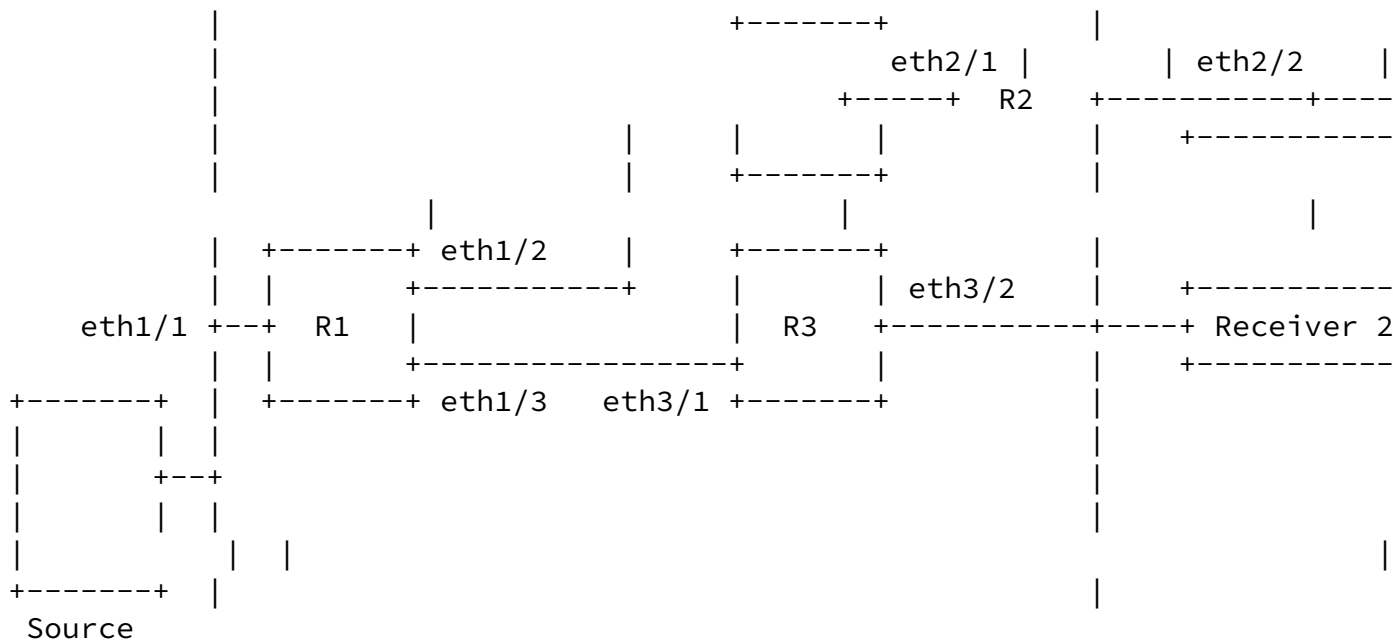
[[draft-ietf-netmod-revised-datastores-03](#)] M. Bjorklund, J. Schoenwaelder, P. Shafer, K. Watsen, R. Wilton, "Network Management Datastore Architecture", [draft-ietf-netmod-revised-datastores-03](#), July 3, 2017

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## [Appendix A](#). Data Tree Example

This section contains an example of an instance data tree in the JSON encoding [[RFC7951](#)], containing both configuration and state data.



The configuration instance data tree for R1 in the above figure could be as follows:

```
{
  "ietf-igmp-ml-d-snooping:igmp-snooping-instances": {
    "igmp-snooping-instance": [
      {
        "name": "ins101",
        "type": "bridge",
        "enable": true
      }
    ]
  },
  "ietf-igmp-ml-d-snooping:mld-snooping-instances": {
    "mld-snooping-instance": [
      {
        "name": "ins102",
        "type": "bridge",
        "enable": true
      }
    ]
  }
}
```

```

    },
    "ietf-igmp-mld-snooping:bridges": {
        "bridge": [
            {
                "name": "isp",
                "component": [

```

Zhao & Liu, etc

Expires November 13, 2018

[Page 47]

---

Internet-Draft

IGMP & MLD Snooping Yang Model

May 2018

```

    {
        "name": "comp1",
        "bridge-vlan": {
            "vlan": [
                {
                    "vid": 101,
                    "igmp-snooping-instance": "ins101"
                },
                {
                    "vid": 102,
                    "mld-snooping-instance": "ins102"
                }
            ]
        }
    }
]

```

```

    }
  ]
}
}

```

The corresponding operational state data for R1 could be as follows:

```

{
  "ietf-igmp-mld-snooping:igmp-snooping-instances": {
    "igmp-snooping-instance": [
      {
        "name": "ins101",

```

```

    "type": "bridge",
    "enable": true,
      "forwarding-mode": "ip",
      "explicit-tracking": false,
      "exclude-lite": false,
      "send-query": true,
      "immediate-leave": [null],
      "last-member-query-interval": 1,
      "query-interval": 125,
      "query-max-response-time": 10,
      "require-router-alert": false,
      "robustness-variable": 2,

```

```

        "entries-count": 1,
        "bridge-mrouter-interface": ["1/1"],
        "group": [
{
    "address": "223.0.0.1",
    "mac-address": "01:00:5e:00:00:01",
        "expire": 120,
        "up-time": 180,
        "last-reporter": "100.0.0.1",
        "source": [
{
    "address": "192.168.0.1",
    "bridge-outgoing-interface": ["1/2"],
        "up-time": 180,
        "last-reporter": "100.0.0.1"
    }
        ]
    }
}
]
]

```

```

    },
    "ietf-igmp-mld-snooping:mld-snooping-instances": {
        "mld-snooping-instance": [
            {
                "name": "ins102",
                "type": "bridge",
                "enable": true,
                "forwarding-mode": "ip",
                "explicit-tracking": false,
                "exclude-lite": false,
                "send-query": true,
                "immediate-leave": [null],
                "last-member-query-interval": 1,
                "query-interval": 125,
                "query-max-response-time": 10,
                "require-router-alert": false,
                "robustness-variable": 2,
                "entries-count": 1,

```

```

        "bridge-mrouter-interface": ["1/1"],
        "group": [
            {
                "address": "FF0E::1",

```

```

    "mac-address": "01:00:5e:00:00:01",

    "expire": 120,

    "up-time": 180,

    "last-reporter": "2001::1",

    "source": [
    {
        "address": "3001::1",
        "bridge-outgoing-interface": ["1/2"],
        "up-time": 180,
        "expire": 120,
        "last-reporter": "2001::1"
    }
    ]
}
]
}
]
}
]
}

```

## Authors' Addresses

Hongji Zhao  
Ericsson (China) Communications Company Ltd.  
Ericsson Tower, No. 5 Lize East Street,  
Chaoyang District Beijing 100102, P.R. China

Email: hongji.zhao@ericsson.com

Xufeng Liu  
Jabil  
8281 Greensboro Drive, Suite 200  
McLean VA 22102  
USA

EMail: Xufeng.liu.ietf@gmail.com

Yisong Liu  
Huawei Technologies  
Huawei Bld., No.156 Beiqing Rd.  
Beijing 100095  
China

Email: liuyisong@huawei.com

Anish Peter  
Individual

EMail: anish.ietf@gmail.com

Mahesh Sivakumar  
Cisco Systems  
510 McCarthy Boulevard  
Milpitas, California  
USA

EMail: sivakumar.mahesh@gmail.com

