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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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[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.

This data model follows the Guidelines for YANG Module Authors

NMDA) [[draft-dsdt-nmda-guidelines-01](#)]. 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. There is very information that is designated as "mandatory", providing freedom for vendors to adapt this data model to their respective 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 instances definition, instance references in the scenario of BRIDGE, VPLS. The module also includes the RPC methods for clearing the specified IGMP and MLD Snooping.

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 and MLD Snooping Instances

The YANG module defines IGMP and MLD Snooping instance. The instance will be referenced in all kinds of scenarios to configure IGMP and MLD Snooping. The attribute who could be read and written shows configuration data. The read-only attribute shows state data. The key attribute is name.

module: ietf-igmp-mld-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}
```

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```
    |   +--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
```

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```
|      +---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
+++rw mld-snooping-instances		
	+++rw mld-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: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-ref

|      +---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	
	+	--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:ipv6-address	
	+	--ro	host*	[host-address]	{explicit-tracking}?
	+	--ro	host-address	inet:ipv6-address	
	+	--ro	host-filter-mode?	Enumeration	

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

The IGMP and MLD Snooping instance could be referenced in the scenario of bridge, L2VPN to configure the IGMP and MLD Snooping. The name of the instance is the key attribute.

```

+--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
```

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

Augment /if:interfaces/if:interface then add the IGMP MLD SNOOPING related attributes under it. It includes enable, version, static-mrouter-interface, etc.

```
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 bridgename?          string
|
|      |  +---rw bridge-group-v4* [address]
|
|      |  |  +---rw address      inet:ipv4-address
|
|      |  |  +---rw source*      inet:ipv4-address
|
|      |  |  +---rw vlan-id*     uint32
|
|      |  +---rw bridge-group-v6* [address]

```

```

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

```

[2.5.](#) 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-mlld-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-mld-snooping@2018-02-26.yang"
module ietf-igmp-mld-snooping {
  namespace "urn:ietf:params:xml:ns:yang:ietf-igmp-mld-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/>
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```

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";

```

description
    "The module defines a collection of YANG definitions common for
    IGMP and MLD Snooping.";

revision 2018-02-26 {
    description
        "augment /if:interfaces/if:interface";
    reference
        "RFC XXXX: A YANG Data Model for IGMP and MLD Snooping";
}

revision 2017-10-24 {
    description
        "Change model definition to fit NMDA standard.";
    reference
        "RFC XXXX: A YANG Data Model for IGMP and MLD Snooping";
}

revision 2017-08-14 {
    description
        "using profile to cooperate with ieee-dot1Q-bridge module";
    reference
        "RFC XXXX: A YANG Data Model for IGMP and MLD Snooping";
}

revision 2017-06-28 {
    description
        "augment /rt:routing/rt:control-plane-protocols
        augment /rt:routing-state/rt:control-plane-protocols";
    reference
        "RFC XXXX: A YANG Data Model for IGMP and MLD Snooping";
}

revision 2017-02-05 {
    description
        "Initial revision.";
    reference
        "RFC XXXX: A YANG Data Model for IGMP and MLD Snooping";
}

/*

```



```

*/

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/l2vp

    }
    description "l2vpn-instance-ac-ref";
}

typedef l2vpn-instance-pw-ref {
    type leafref {
        path "/ni:network-instances/ni:network-instance/l2vpn:endpoint/l2vpn:n

    }
    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 IP 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 IP address type.";
} // source-ipv6-addr-type

```

```

/*
 * Identities
 */

/*
 * Groupings
 */

grouping general-state-attributes {
  description "General State attributes";

  container received {
    config false;
    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 IP 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).";
    }

```

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```

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

    leaf source-addr {
        type source-ipv4-addr-type;
        description
            "Multicast source IP 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;
        description "Outgoing pw in l2vpn forwarding";
    }

} // static-l2-multicast-group

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

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

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

```

```

    leaf forwarding-mode {
        type enumeration {
            enum "mac" {
                description
                    "";
            }
            enum "ip" {
                description
                    "";
            }
        }
        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;
        description "Tracks IGMP & MLD Snooping v3 membership reports
from individual hosts for each port of each VLAN or VSI.";
    }

    leaf exclude-lite {
        if-feature exclude-lite;
        type boolean;
        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 exists in the IP head
of IGMP or MLD packet.";
}

```



```

    leaf robustness-variable {
        type uint8 {
            range "2..7";
        }
        default 2;
        description
            "Querier's Robustness Variable allows tuning for the
expected
            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 IP 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 IP address";  
    }
```

```
    leaf source-addr {  
        type source-ipv6-addr-type;  
        description  
            "Multicast source IP 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;
        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 after 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 IP address";
    }

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

    leaf last-reporter {
        type inet:ipv4-address;
        description
            "The last host address which has sent the
report to join the multicast group.";
    }

    list source {
        key "address";
        description "Source IP address for multicast stream";
        leaf address {
            type inet:ipv4-address;
            description "Source IP address for multicast stream";
        }

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

    leaf last-reporter {
        type inet:ipv4-address;

```

```

        description
            "The last host address which has sent the
            report to join the multicast source and 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-mld-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 {
```

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

```
    }
```

```
    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 IP address";
    }

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

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

```

```

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

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

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

leaf last-reporter {
    type inet:ipv6-address;
    description

```

```

        "The last host address which has sent the report to join
the multicast source and 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-ml-d-snooping

grouping instance-state-source-attributes-igmp-ml-d-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 after 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-mld-snooping {
  description "interface endpoint attributes mld 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: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

```

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```

        "IGMP Snooping instance to configure the igmp-
snooping.";

    leaf name {
        type string;
        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";

```

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```

    }
    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;
            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
                    "bridge name.";
            }

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

    }

    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 bridgename {
                type string;
                description
                    "bridge name.";
            }
        }

        list bridge-group-v4 {

            key "address";

            description "";

            leaf address {
```

```
type inet:ipv4-address;
description
"Multicast group IPV4 address";
```

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```
    }

    leaf-list source {
      type inet:ipv4-address;
      description "Source IPV4 address for multicast
stream";
    }

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

  list bridge-group-v6 {
    key "address";
    description "";
    leaf address {
      type inet:ipv6-address;
      description
        "Multicast group IPv6 address";
    }

    leaf-list source {
      type inet:ipv6-address;
      description "Source IPv6 address for multicast
stream";
    }

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

```

case l2vpn {

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

    list l2vpn-group-v4 {

```

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```

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

        leaf-list source {
            type inet:ipv4-address;
            description "Source IP address for multicast
stream";
        }

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

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

        leaf-list source {

```

```

        type inet:ipv6-address;
        description "Source IP address for multicast
stream";
    }

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

} //choice static-l2-multicast-group

```

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```

    } // 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;
  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 data model defined does not create any security implications.

[5. IANA Considerations](#)

This draft does not request any IANA action.

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