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Chapter 1 EPON Multicast Settings

1.1 OLT Multicast Introduction

The task of IGMP/MLD snooping is to maintain the correlation of VLAN and group address and to keep up with the change of the multicast group. The main functions of IGMP/MLD snooping include listening the IGMP/MLD packets, maintaining the map of group address and VLAN, and keeping the state of host's IGMP/MLD entity identical with that of the router's IGMP/MLD entity.

When the layer-2 device does not run IGMP/MLD snooping, the multicast data will be broadcasted at the second layer; when the layer-2 device does run IGMP/MLD snooping, the multicast data in the known multicast group will not be broadcast at the second layer, but be transmitted to a designated receiver in the second layer and the unknown multicast data will be discarded.

On the PON port, OLT will over the broadcast LLID channel transmit the multicast data to all ONUs in SCB mode.

OLTs and ONUs of support the multicast VLAN. If the multicast services need be isolated from other services on OLT, you have to plan private VLANs on OLT for multicast to make one multicast VLAN corresponds to one multicast channel or a multicast channel group (a set of multicast channels solely managed by one permission). A multicast channel is designed only for a specific multicast VLAN. The multicast flows being transmitted in the SCN channel all have carried the multicast VLAN tag. Other data flows of a user (including unicast flows and uplink IGMP/MLD packets) are destined to be transmitted to the unicast VLAN/CVLAN.

ONU establishes on the basis of the Add/Del Multicast VLAN OAM message the correlation of the UNI port and the multicast VLAN, and on the basis of IGMP/MLD snooping multicast forward-table the correlation of the UNI port and the specific multicast group.

If ONU receives the following two types of IGMP/MLD general/specific group query packets, it will drop them:

One is the IGMP/MLD general/specific group query packets without VLAN tag;

The other is the IGMP/MLD general/specific group query packets that have carried the VLAN tag but whose VLAN IDs does not belong to the configured multicast VLAN ID set of ONU.

When IEP3310/3314 receives the IGMP report packets after IGMP/MLD snooping is enabled, the VLAN in the multicast forward table is the PVID of the multicast router's port. After the router's port receives the multicast packet, IEP3310/3314 will first check the multicast forward table to confirm which member ports will be forwarded and then change the packet's VLAN tag to the multicast VLAN tag.

Additionally, ONU should under the control of OLT remove/reserve the multicast VLAN tag of the IGMP query packets. As to IGMP/MLD Group-Specific Query packets, OLT should add the multicast VLAN tag to these packets according to the multicast VLAN. As to IGMP/MLD General Query packets, they will be distributed to all multicast VLANs in the EPON system, that is, OLT will copy multiple copies of

each IGMP/MLD General Query packet, add different multicast VLAN tags and at last distribute these copies to all ONUs over the broadcast LLID.

The IGMP/MLD Proxying allows the VLAN where the multicast user is located to receive the multicast source from other VLANs. The IGMP/MLD Proxying runs on layer 2 independently without other multicast routing protocols. IGMP/MLD Proxying will be transmitted by the IGMP/MLD packets of the proxied VLAN to the proxying VLAN and maintain the hardware forward table of the multicast user of the agent VLAN according to these IGMP/MLD packets. IGMP/MLD Proxying divides different VLANs into two kinds: proxied VLANs and proxying VLANs. The downstream multicast VLANs can be set to the proxied VLANs, while the upstream multicast VLANs can be set to the proxying VLANs.

Note:

1. It is to be noted that IGMP/MLD snooping can functions normally only if there is multicast router existing for only by listening the query or report packets can IGMP/MLD snooping realize its functions. That is, a switch has to receive the IGMP/MLD query packets periodically and therefore the router age timer of IGMP/MLD snooping must be set to be bigger than the group query period of the multicast router which connects the switch. You can run **show ip mcst** command to browse the information about the multicast router in each VLAN.
2. The transmitted multicast packets must carry the VLAN tag and the VLAN tag must be same to PVID of the port which connects the multicast router.

Although IGMP/MLD Proxying is based on IGMP/MLD snooping, two are independent in application; IGMP/MLD Snooping will not be affected when IGMP/MLD Proxying is enabled or disabled, while IGMP/MLD Proxying can run only when IGMP/MLD Snooping is enabled.

1.2 OLT IGMP Multicast Configuration Tasks

- Enabling/Disabling DGMP Snooping
- Adding/Removing the Correlation of Multicast VLAN and Multicast IP Group
- Adding/Canceling the Static Multicast Address of VLAN
- Setting the Router Age Timer of IGMP Snooping
- Setting the Response Time Timer of IGMP Snooping
- Setting the Port of the Static Multicast Router
- Monitoring and Maintaining IGMP Snooping
- Enabling/Disabling IGMP-Proxy
- Setting the Querier Address of IGMP Proxy
- Setting the Query Counts and Period of the Special IGMP Proxy Group
- Monitoring and Maintaining DHCP-Proxy
- Setting the Multicast Mode
- Allocating the Multicast Permission for the UNI Port of ONU

1.2.1 Enabling/Disabling IGMP Multicast

Run the following commands in global configuration mode.

| Command | Purpose |
|---------------------------------------|-------------------------------|
| ip mcst enable | Enables the multicast. |
| {no ip mcst ip mcst disable} | Resumes the default settings. |

Note:

After IGMP snooping is enabled, when DLF occurs on multicast packets (that is, the destination address is not registered in the swap chip through the igmp-snooping), all multicast packets whose destination addresses are not registered on any port will be dropped.

1.2.2 Adding/Removing the Correlation of Multicast VLAN and Multicast IP Group

This command has two functions: one is that only the Report and Leave packets whose destination IP addresses have been added to a multicast VLAN can be received by IGMP snooping; the other one is that the VLAN tag which transforms the next multicast flow is the multicast VLAN tag. One multicast VLAN can include multiple continuous or discontinuous multicast IP addresses, while one multicast IP address can only belong to one multicast VLAN.

Run the following commands in global configuration mode.

| Command | Purpose |
|--|---|
| ip mcst mc-vlan <i>vlan_id</i> range <i>A.B.C.D</i><1-n> | Adds the correlation of multicast VLAN and multicast IP address. |
| no ip mcst mc-vlan <i>vlan_id</i> [<i>range A.B.C.D</i><1-n>] | Deletes the correlation of multicast VLAN and multicast IP address. |

1.2.3 Adding/Canceling the Static Multicast Address of VLAN

The static multicast address can make some IGMP-incompatible hosts receive the corresponding multicast packets.

Run the following commands in global configuration mode.

| Command | Purpose |
|---|---|
| ip mcst vlan <i>vlan_id</i> static <i>A.B.C.D</i> interface <i>intf</i> | Adds the static multicast address of VLAN. |
| no ip mcst vlan <i>vlan_id</i> static <i>A.B.C.D</i> interface <i>intf</i> | Removes the static multicast address of VLAN. |

Note:

1. To make the adding of the static multicast address successful, you have to set A.B.C.D in the correlation of configured multicast VLAN and multicast IP address.
2. On IEP3310/3314 OLT, you have to set the VLAN parameter in this command to be the same as the VLAN tag of the downlink multicast data.

1.2.4 Setting the Router Age Timer of IGMP Snooping

The router age timer is used to monitor whether the IGMP querier exists or not; the IGMP querier maintenance is used to maintain and manage the multicast address by sending the query packets and IGMP snooping works by independence on the communication between IGMP querier and host.

Run the following commands in global configuration mode.

| Command | Purpose |
|--|---|
| ip mcst timer router-age <i>timer_value</i> | Sets the value of the router age of IGMP Snooping. |
| no ip mcst timer router-age | Resumes the default value of the router age of IGMP Snooping. |

Note:

The settings of the timer requires to refer to the query period settings of the IGMP querier for it cannot be smaller than the query period; you are recommended to set the router age timer to the triple of the query period.

By default the router age timer is set to be 260 seconds of IGMP snooping.

1.2.5 Setting the Response Timer of IGMP Snooping

The response time timer means the threshold time for the host to report the multicast after IGMP querier sends the query packets; if this report packet is not received after the timer ages, the switch will delete this multicast address.

Run the following commands in global configuration mode.

| Command | Purpose |
|---|--|
| ip mcst timer response-time <i>timer_value</i> | Sets the value of the response time of IGMP Snooping. |
| no ip mcst timer response-time | Resumes the default value of the response time of IGMP Snooping. |

Note:

The value of the timer cannot be set too small, or the multicast communication may be unstable.

By default the response time is set to be 15 seconds of IGMP snooping.

1.2.6 Setting the Port of the Static Multicast Router

After a port is set to be a static multicast port, all the IGMP report packets and leave packets, received by OLT, will be transmitted to this port.

Run the following commands in global configuration mode.

| Command | Purpose |
|--|---|
| ip mcst mrouter interface <i>inft_name</i> | Sets the port of the static multicast router of IGMP snooping. |
| no ip mcst mrouter interface <i>inft_name</i> | Deletes the port of the static multicast router of IGMP snooping. |

1.2.7 Enabling/Disabling IGMP-Proxy

Run the following commands in global configuration mode.

| Command | Purpose |
|---|-------------------------------|
| ip igmp-proxy enable | Enables IGMP proxy. |
| {no ip igmp-proxy ip igmp-proxy disable} | Resumes the default settings. |

1.2.8 Setting Querier Port of OLT

Run the following commands in global configuration mode.

| Command | Purpose |
|--|---|
| ip mcst querier { <i>enable/disable</i> } | Sets the querier port of OLT to regularly transmit the query packets outward automatically. |
| {no ip mcst querier ip mcst querier disable} | Resumes the default settings of the querier port of OLT. |

1.2.9 Setting the Querier Address of IGMP Proxy

Run the following commands in global configuration mode.

| Command |
|--|
| [no] ip mcst querier address [<i>ip_addr</i>] |

The default source IP address of the query packet is 10.0.0.200.

1.2.10 Setting the Query Counts and Period of the Special IGMP Proxy Group

Run the following commands in global configuration mode.

| Command | Purpose |
|--|---|
| [no] ip igmp-proxy last-member-query {count <i>value1</i> interval <i>value2</i>} | Sets the query counts and period of the special IGMP proxy group. |

The default query times of the query group is 2 and its default period is also 2.

1.2.11 Setting the Multicast-Incompatible Mode of OLT

Run the following commands in global configuration mode.

| Command | Purpose |
|---|--|
| ip mcst compatible enable | Enables the multicast-compatible function. |
| {no ip mcst compatible ip mcst compatible disable} | Resumes the default settings. |

Note:

After the multicast compatible function of OLT is enabled, OLT can take the LLID port as the minimum unit and at the same time support IGMP snooping and dynamic controllable multicast.

1.2.12 Switching over the IGMP Multicast Mode

Run the following commands in global configuration mode.

| Command | Purpose |
|--|-----------------------------------|
| ip mcst mode {igmp-snooping dynamic-controllable} | Switches over the multicast mode. |
| {no ip mcst mode ip mcst igmp-snooping} | Resumes the default settings. |

Note:

After the OLT multicast mode is switched over, the multicast modes of all ONUs will be automatically switched over to the same mode. The users therefore are free of the trouble of setting ONUs one by one.

1.2.13 Setting the Multicast Preview Time

Run the following commands in global configuration mode.

| Command | Purpose |
|---------|---------|
|---------|---------|

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