

Chapter 8

MLD Overview

The Multicast Listener Discovery (MLD) protocol manages the membership of hosts and routers in multicast groups. IP version 6 (IPv6) multicast routers use MLD to learn, for each of their attached physical networks, which groups have interested listeners. Each router maintains a list of host multicast addresses that have listeners for each subnet, as well as a timer for each address. However, the router does not need to know the address of the listeners—just the address of the hosts. The router provides addresses to the multicast routing protocol it uses; this ensures that multicast packets are delivered to all subnets where there are interested listeners. In this way, MLD is used as the transport for the Protocol Independent Multicast (PIM) protocol.

MLD is an integral part of IPv6 and must be enabled on all IPv6 routers and hosts that want to receive IP multicasts. The JUNOS software supports MLD versions 1 and 2. Version 2 is supported for source-specific multicast (SSM) include mode only.

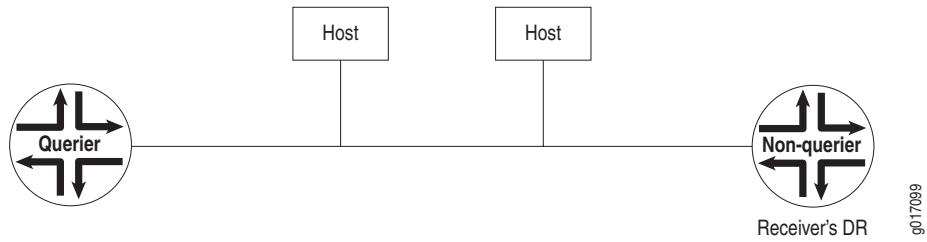
For information about supported standards for MLD, see “IP Multicast Standards” on page 20.

MLD Operation

For each attached network, a multicast router can be either a querier or a nonquerier. A querier router, usually one per subnet, solicits group membership information by transmitting MLD queries. When a host reports to the querier router that it has interested listeners, the querier router forwards the membership information to the rendezvous point (RP) router by means of the receiver’s (host’s) designated router (DR). This builds the rendezvous-point tree (RPT) connecting the host with interested listeners to the RP router. The RPT is the initial path used by the sender to transmit information to the interested listeners. For more information about PIM distribution trees, see “PIM Sparse Mode” on page 186. Nonquerier routers do not transmit MLD queries on a subnet but can do so if the querier router goes down.

All MLD-configured routers start up as querier routers on each attached subnet (see Figure 3 on page 72). The querier router on the right is the receiver’s DR.

Figure 3: Routers Start Up on a Subnet

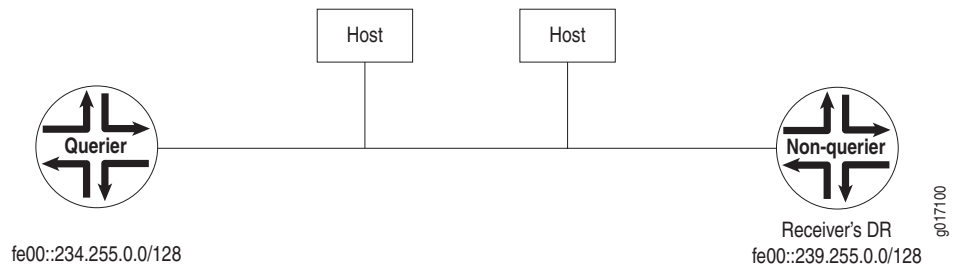


To elect the querier router, the routers exchange query messages containing their IPv6 source addresses. If a router hears a query message whose IPv6 source address is numerically lower than its own selected address, it becomes a nonquerier. In Figure 4, the router on the left has a source address numerically lower than the one on the right and therefore becomes the querier router.



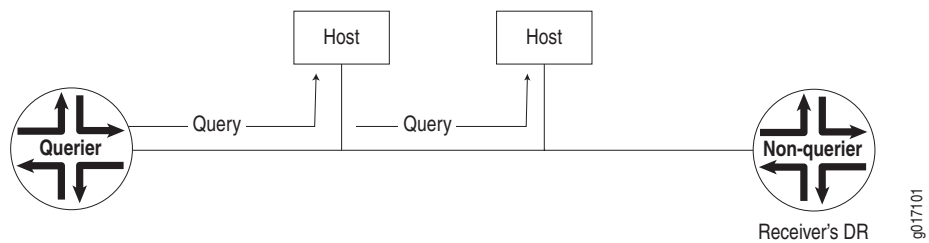
NOTE: In the practical application of MLD, several routers on a subnet are nonqueriers. If the elected querier router goes down, query messages are exchanged among the remaining routers. The router with the lowest IPv6 source address then becomes the new querier router.

Figure 4: Querier Router Is Determined



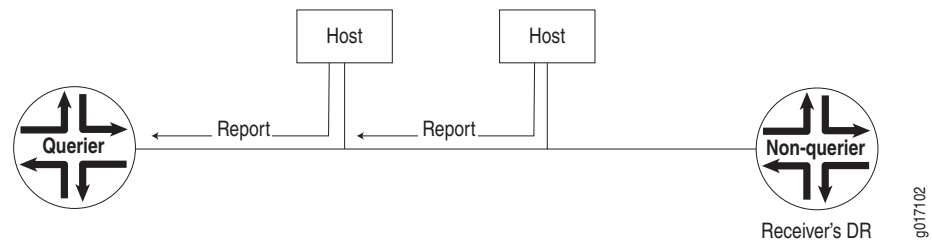
The querier router sends general MLD queries on the link-scope all-nodes multicast address FF02::1 at short intervals to all attached subnets to solicit group membership information (see Figure 5). Within the query message is the *maximum response delay* value, specifying the maximum allowed delay for the host to respond with a report message.

Figure 5: General Query Message Is Issued



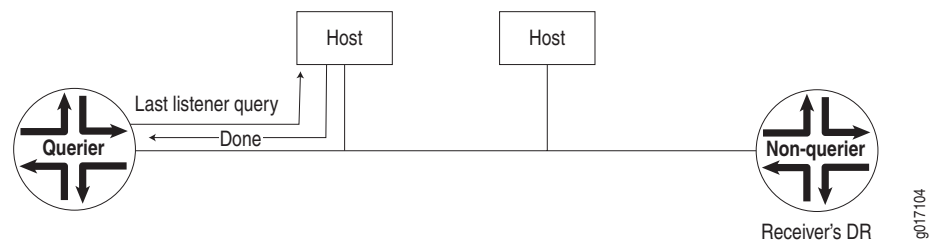
If interested listeners are attached to the host receiving the query, the host sends a report containing the host's IPv6 address to the router (see Figure 6). If the reported address is not yet in the router's list of multicast addresses with interested listeners, the address is added to the list and a timer is set for the address. If the address is already on the list, the timer is reset. The host's address is transmitted to the RP in the PIM domain.

Figure 6: Reports Are Received by the Querier Router



If the host has no interested multicast listeners, it sends a done message to the querier router. On receipt, the querier router issues a multicast-address-specific query containing the last listener query interval value to the multicast address of the host. If the router does not receive a report from the multicast address, it removes the multicast address from the list and notifies the RP in the PIM domain of its removal (see Figure 7).

Figure 7: Host Has No Interested Receivers and Sends a Done Message to Router



If a done message is not received by the querier router, the querier router continues to send multicast-address-specific queries. If the timer set for the address on receipt of the last report expires, the querier router assumes there are no longer interested listeners present on that subnet, removes the multicast address from the list, and notifies the RP in the PIM domain of its removal (see Figure 8 on page 74).

Figure 8: Host Address Timer Expires and Address Is Removed from Multicast Address List

