

IGMP and MLD Optimizations in Wireless and Mobile Networks

draft-ietf-pim-igmp-ml-d-wireless-mobile-00

Liu Hui Mike McBride Hitoshi Asaeda

Aims

- * Optimize IGMP and MLD to meet wireless/mobile multicast network requirements:
 - * Adaptive to link conditions
 - * Minimizing group join/leave latency
 - * Robust to packet loss
 - * Reducing packet exchange
 - * Avoiding packet burst
- * Limit the changes within the protocol framework without introducing interoperability issues
- * Possibly used in wired network where efficiency and robustness are required

Option List

- * Switching between unicast and multicast Queries
- * General Query supplemented with unicast Query
- * Retransmission of General Query
- * General Query suppression with no receiver
- * Tuning response delay according to link type/status
- * Triggering report and query quickly during handover

Switching Between Unicast and Multicast General Queries

- * Switch between unicast and multicast General Queries according to actual network conditions
 - * Unicast query each receiver when number of receivers is small; multicast query all receivers when the number is large
 - * A switching threshold should be predefined
 - * Explicit tracking is required to know the reception status
- * Benefits
 - * Take advantages of both unicast and multicast Queries
 - * Unicast Query has less effect on non-members and helps to improve battery-saving

General Query Supplemented with Unicast General Query

- * Send unicast Query to each non-respondent valid receivers after a round of General Query, presumably the number of non-respondent receivers is small
- * Triggered at the end of the [Maximum Response Delay] after General Query, transmitted for [Last Member Query Count] times spaced by [Last Member Query Interval]
- * Require explicit tracking to track reception status
- * Benefits:
 - * Improve robustness without influencing other receivers

Retransmission of General Query

- * If after a General Query no response can be collected from all valid receivers, for the reasons e.g.:
 - * All valid receivers leave the group silently
 - * All responses of the receivers happen to be lost
 - * The query fails to reach the other side of link to the receivers.
- * Retransmit General Queries for [Last Member Query Count] times spaced by [Last Member Query Interval] before deciding to stop General Query totally
- * Require explicit tracking to acquire the reception status
- * Benefits
 - * Improve robustness of General Query if there are valid members
 - * Realize fast leave if all receivers quit.

General Query Suppression with no Receiver

- * Suppress General Query if there is no valid multicast receiver on an interface:
 - * When the last member reports its leave, by an explicit-tracking router checking its membership database, or by a non-explicit-tracking router getting no response after sending Group-(and-Source-) Specific Queries
 - * When the (only) member on a PTP link leaves
 - * When a router after retransmitting General Queries on startup fails to get any response
 - * When a router previously has valid members but fails to get any response after several rounds of General Queries.
- * Benefits
 - * Eliminating unnecessary continuous General Queries has benefit for all terminal on the link for battery saving

Tuning Response Delay according to link type and status

- * Tuning Maximum Response Delay according to link type and status, according to the expected number of responders, and link type/status:
 - * If the expected number of reporters is large and/or the link condition is bad, select larger [Maximum Response Delay]
 - * If the expected number of reporters is small and/or the link condition is good, select smaller Delay
 - * If link mode is PTP, choose smaller Delay; or if link mode is PTMP or broadcast, configure larger Delay
- * Benefits
 - * By making balance between reducing message burst and leave latency to improve overall protocol performance

Triggering Reports and Queries during handover

- * Access router triggers a multicast or unicast General Query as soon as it detects a new terminal on its link
- * Terminal triggers a Report as soon as it detects its connection to a new network, if it is just in multicast reception state
- * Benefits
 - * Enable new access network acquire terminal's membership and deliver the content quickly, to help reducing disruption or performance deterioration