

# IGMP and MLD Optimizations in Wireless and Mobile Networks

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draft-liu-multimob-igmp-mld-wireless-mobile-02

Liu Hui   Mike McBride

# Aims

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- \* 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

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- \* 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

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- \* 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

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- \* 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

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- \* 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

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- \* 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

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- \* 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

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- \* 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

# Changes to ver-01

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- \* Complete the 'Security Considerations' section
- \* Delete 'leaving the network without notification (sec.3.2)' and 'moving out of range (sec. 3.3)' as the reasons for additional querying
- \* Remove 'prolonged interval method' for not introducing big changes to protocol manner
- \* Others be mostly editorial changes, including improving description and updating references