IGMP and MLD Optimization for Mobile Hosts and Routers

draft-asaeda-multimob-igmp-mld-optimization-01

Hitoshi Asaeda (Keio University)
Overview

• This draft aims to describe the ways of IGMP/MLD protocol optimization for mobility

• Discussion
  – Various timer values IGMP/MLD use
  – Router and host behaviors for IGMP/MLD
    • Note this may be excluded from draft

• Concept
  – Minimize mobile node’s power consumption, and maximize the available wireless resource
    • By limiting the number of transmitted IGMP/MLD messages
    • But does not lead additional join and leave latency
Optimization

• What is the “optimization”?  
  – Need to provide definitive static timer values that could fit for any kinds of dynamic network conditions?  
  – Need to find the best fit timer value for any kind of situation?
Proposals

• Tracking of membership status
• IGMP/MLD Query processing
• IGMP/MLD Report processing
• Multicast source filter
• Explicit membership notification
Tracking of Membership Status

• Explicit tracking function is the standard function defined in [RFC3376][RFC3810]

• Pros.
  – Reduces the number of solicited membership reports requested by periodical IGMP/MLD Queries
  – Possibly beneficial for shorter leave latency

• Cons.
  – Router needs processing capability and large memory
  – (Not con) IGMP/MLD Queries still needed for missing nodes or old nodes and to be robust from lost packets

• No timer change, no behavior change
IGMP/MLD Query Processing

• IGMP/MLD General Query is unicast to recorded members and multicasted to refresh membership info. with longer interval

• Pros.
  – Make only the active nodes that have been receiving multicast contents respond the IGMP/MLD General Queries

• Cons.
  – Longer [Multicast Query Interval] may introduce longer join/leave latency
  – (Not con) IGMP/MLD Queries still needed for missing nodes or old nodes, to be robust from lost packets

• New timer values
  – [Query Interval] is common, but [Multicast Query Interval] is defined as a new timer value
  – Moved to the extension draft?
IGMP/MLD Report Processing

• Describe the attention of 0.0.0.0 or unspecified address (::) as the source address of IGMP/MLD Report

• Explicit tracking function should be disabled for the node whose destination address is all 0

• No special consideration for mobility
  – Will merge to the section describing explicit tracking function
Multicast Source Filter

- Recommendation of LW-IGMPv3/LW-MLDv2
- Pros.
  - No possible applications using EXCLUDE (S,G) join
  - Both host-side and router-side implementations of LW-IGMPv3/LW-MLDv2 are much simpler
  - EXCLUDE (S,G) just breaks SSM communication
    - And forwards many unneeded data (which only needed (?) by EXCLUDE join requester)
- Cons.
  - Nothing

- This draft does not deny to support the full version IGMPv3 [RFC3376] /MLDv2 [RFC3810]
Explicit Membership Notification

• IGMP/MLD Notification operation
  – Mobile host periodically sends Current-State Record messages expressing which multicast sessions the host is joining

• Pros.
  – For both [Multicast Query Interval] and [Query Interval], much longer intervals can be set up
    • Reduce the total number of Queries and Reports

• Cons.
  – Due to additional timer value, it requires additional complexity to adjust dynamic network condition

• New timer value and new behavior
  – [Notification Interval]
  – Moved to the extension draft
Revised Plan

• Tracking of membership status
• IGMP/MLD Query processing
  – Moved to extension draft
• IGMP/MLD Report processing
  – Merge into sect. describing explicit tracking function
• Multicast source filter
  – Including LW-IGMPv3/MLDv2 recommendation
• Explicit membership notification
  – Moved to extension draft

• Other conditions that should be discussed?
Conclusion

• This draft aims to describe the ways of IGMP/MLD protocol optimization for mobility
  – Definitive static timer values may or may not be provided in this draft

• Next step
  – Revise the draft?
    • Intended status: Informational or BCP
  – Or, new requirement draft and extension draft?

• Comment?