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Tuning the Behavior of IGMP and MLD for Routers in Mobile and Wireless Networks

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Summary

- This document describes the ways of IGMPv3 and MLDv2 protocol optimization for mobility, and aims to become a guideline for query and other timers and values tuning.
- Potential tuning values are clarified
 - Query Interval
 - Query Response Interval
 - Last Member Query Timer (LMQT) / Last Listener Query Timer (LLQT)
 - Startup Query Interval
 - Robustness Variable

Changes

- Explicit tracking function
 - Normative reference -> Informative reference
 - SHOULD -> recommend
- Editorial changes

Query Interval (125 sec.)

- 150 sec.
 - For a wireless link having a number of nodes (e.g., 200 nodes)
 - Pro.
 - Minimizing traffic of Report messages and battery power consumption for mobile hosts
- 60 to 90 sec.
 - For a wireless link having a higher capacity of the resource
 - Pro.
 - Quick synchronization of the membership information tracked by the router

Query Response Interval (10 sec.)

- 10 to 20 sec.
 - For a wireless link having a lower capacity of network resource (e.g., a bursty IEEE 802.11b link) or for a lossy link
 - Pro.
 - Reduce congestion of the Current-State Report messages on a link
 - Con.
 - Increase join latency and leave latency when the unsolicited messages (State-Change Record) are lost on the router
- 5 to 10 sec.
 - For a wireless link having enough capacity (e.g., an IEEE 802.16e link) or reliable condition for IGMP/MLD message transmission
 - Pro.
 - Quick discover of non-tracked member hosts and synchronization the membership information

LMQT and LLQT (2 sec.)

- $\text{LMQT} (= \text{LMQC} (\text{Rob. Var.}) * \text{LMQI} (1))$
- 1 sec.
 - $\text{LMQC}=1, \text{LMQI}=1$
 - For a reliable link, LMQI can be smaller, e.g. 0.5, then $\text{LMQT}=0.5$ sec.
 - Pro.
 - Shortening leave latency
 - Con.
 - There is a risk that a router misses Report messages from remaining members if the router adopts small LMQC/LLQC
 - However the wrong expectation would be lower happened for the router enabling the explicit tracking function.
- 2 sec.
 - $\text{LMQC}=2, \text{LMQI}=1$
 - For a wireless link being lossy (e.g., due to a large number of attached hosts or limited resources)

Startup Query Interval ($1/4$ of [Query Interval] (e.g. 25 sec.))

- 1 sec. (or shorter than 1 sec.)
 - Time to discover members when link is up
 - Shortening handover latency

Robustness Variable (2)

- 2
 - In the regular case
- 1
 - For a wireless link having higher capacity of the resource or reliable condition
- Note
 - SHOULD NOT be bigger than 2 in a wireless env.

Tuning Scenarios for Various Mobile IP Networks

- Three deployment scenarios
 - IGMP/MLD running directly between host and access router on a wireless network
 - Base condition
 - IGMP/MLD running between host and home router through a tunnel link
 - Shorter [Query Interval] and [Query Response Interval], and two or more [Robustness Variable] value
 - Because message transmission depends on the condition of the tunnel link
 - IGMP/MLD running between home router and foreign router through a tunnel link (e.g. RFC6224)
 - [Query Response Interval] on the home router or local mobility anchor could be set to the smaller value
 - Because the number of foreign router is much smaller than usual

Next Step

- WGLC?
 - Intended status: Informational?