IGMP/MLD-Based Explicit Membership Tracking Function for Multicast Routers

draft-ietf-pim-explicit-tracking-00

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Objectives

- The explicit tracking function on routers works for:
  - Per-host accounting
  - Reducing the number of transmitted Query and Report messages
  - Shortening leave latencies
  - Maintaining multicast channel characteristics (or statistics)

Objective 1: the Number of Messages Transmission

- Whenever a router (querier) receives the State-Change Report, it sends the corresponding Group-Specific or Group-and-Source Specific Query messages to confirm whether the Report sender is the last member host or not.

Lowering Specific Query Transmission

- A router (querier) enabling the explicit tracking function does not need to always ask Current-State Report message transmission to the member hosts whenever it receives the State-Change Report

  - Because the router can expect whether the State-Change Report sender is the last remaining member of the channel or not

Objective 2: Leave Latency

- [Last Member Query Interval] (LMQI) and [Last Listener Query Interval] (LLQI)
  - The maximum time allowed before sending a responding Report
- [Last Member Query Count] (LMQC) and [Last Listener Query Count] (LLQC)
  - The number of Group-Specific Queries or Group-and-Source Specific Queries sent before the router assumes there are no local members
- [Last Member Query Time] (LMQT) and [Last Listener Query Time] (LLQT)
  - Total time the router should wait for a report, after the Querier has sent the first query

Shortening Leave Latencies

- [Last Member Query Timer (LMQT)] and [Last Listener Query Timer (LLQT)]
  - Default: LMQI * LMQC (= 2 sec.)
  - Shorter value contributes to shortening leave latency
  - Example:
    - LMQC = 1, then LMQT = 1 sec.
    - LMQI can be shorter, e.g., 0.5 sec.
- Note
  - 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.

Membership State Information

- Membership state information
  - (S, G, Number of receivers, (Receiver records))
  - Receiver records
    - (IGMP/MLD Membership/Listener Report sender's addresses)
- ASM
  - "S" is with "Null"
- EXCLUDE mode (S,G) join
  - Integrate (*,G) join into the state information

Compatibility

- Not work for IGMPv1/v2 and MLDv1
  - Because of the Report suppression mechanism
  - Tracking router keeps the current state as is
- Not work for IGMPv3/MLDv2 router changing its compatibility mode to the older version
  - The router keeps the current state as is

Non-supported/Disabled Routers

querier   enables exp. tracking but non-
  querier(s) do not support or disable it
  – Querier
    it knows there are other members), but non-querier (when
    does not query to confirm the last member (who
    is a forwarder but does not know other members) prunes

the state

  • Possible solutions

                              DoS
  – Preferably, new IGMP/MLD message for informing that
    querier/non-querier(s) enables/disables exp. tracking and
    synchronizing the behavior is defined?

Next Step

- Informational RFC

- Document improvement

- Comments?