PMIPv6 Multicast Routing Optimization with PIM-SM

draft-asaeda-multimob-pmip6-ropt-with-pim-00

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Overview

• Draft based on;
  – draft-asaeda-multimob-pmip6-extension-11
• Multicast route optimization using PIM-SM routing protocol running on both LMA and MAG in PMIPv6
  – Source and/or RP addresses selected by the RPF lookup algorithm
    • No tunnel convergence problem
    • Optimized routing
  – Both ASM and SSM supported
• Localized routing and direct routing friendly
• Mobility support
  – Works with most of handover scenarios such as SIAL, CXTP-extension
  – Only handover using MN’s policy profile mentioned
Basic Data Flow – Example

• MAG and LMA act as PIM-SM routers
  – Upstream IF for (S1,G1) is MAG’s M-Tunnel IF
  – Upstream IF for (S2,G2) is MAG’s physical IF (i.e., direct routing without any tunnel)
M-Tunnel (GRE Tunnel)

• M-Tunnel is a GRE tunnel set up between MAG and LMA
  • Dedicated for multicast packet transmission
    – Independent from LMA-MAG bi-directional tunnel for unicast
  • GRE key is manually configured by operation, or dynamically negotiated with RFC5845
  • Tunnel end points can be;
    – LMA
    – Other MAG (for localized routing)
    – PIM-SM routers in a local domain (for direct routing via tunneling)

• Multicast routes with M-Tunnel are configured in MRIB
  – One upstream interface per channel is selected by RPF
M-Tunnel Configuration
(Basic operation)

• MAG uses an M-Tunnel (attached to LMA) as an upstream link for external multicast packets
  — E.g., ip mroute 0.0.0.0 0.0.0.0 gre0
Example 1: Basic Operation

Fixed Internet

LMA1

LMA2

PMIPv6-Domain

MAG1

MAG2

Src

PIM-SM router

M-Tunnel

PIM Join

ip mroute 0.0.0.0 0.0.0.0 gre0

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M-Tunnel Configuration
(Advanced operation)

• Operators may want to set up multiple upstream interfaces at MAG to support different scenarios;
  – Case 1: Remote contents from a single LMA and local contents via direct routes (static or dynamic)
  – Case 2: Remote contents from different LMAs for different source prefixes
  – Case 3: Remote contents from different LMAs managed by ECMP (not for load balancing, but for load split)
Advanced Operation – 1: M-Tunnel + Direct Routing

ip mroute 0.0.0.0 0.0.0.0 gre0
ip mroute 1.1.0.0 255.255.0.0 fas1
Advanced Operation – 2: Multiple M-Tunnels for Different Prefixes

- Fixed Internet
- LMA1
- LMA2
- MAG1
- MAG2
- Src
- 11.1.1.10
- 11.1/16
- 20/8
- PIM-SM router
- M-Tunnel
- PIM Join
- ip mroute 0.0.0.0 0.0.0.0 gre0
- ip mroute 11.1.0.0 255.255.0.0 gre1
- ip mroute 20.0.0.0 255.0.0.0 gre1

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Advanced Operation – 3: Multiple M-Tunnels by ECMP

PIM-SM router

M-Tunnel

PIM Join

ip multicast multipath s-g-hash next-hop-based

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Mobility Support

• Mobility support (i.e. seamless handover)
  – Ex. 1: With Policy Profile
    • When MN’s subscribing channel list is always maintained
  – Ex. 2: With multicast extended PBU/PBA
    • draft-ietf-multimob-handover-optimization-02
  – Ex. 3: With multicast extended CXTP
    • draft-vonhugo-multimob-cxtp-extension-03
Conclusion

• This draft provides “Multicast Routing Optimization with PIM-SM”
• WG item?