PMIPv6 Extensions for Multicast

draft-asaeda-multimob-pmip6-extension-00

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Introduction

- Target
  - This document describes PMIPv6 extensions and solutions to support IP multicast communication for mobile nodes in PMIPv6-Domain
- Conditions
  - Base requirements are defined in [draft-deng-multimob-pmip6-requirement-01].
  - MLD related extensions are not discussed in this draft
    - See [draft-asaeda-multimob-igmp-mld-mobility-extensions-01]
  - Unicast communication methods or protocols assuming in [RFC5213] are not modified.
  - Seamless handover scenario is considered.
    - CXTP [RFC4067] is used in some situations.

Outline
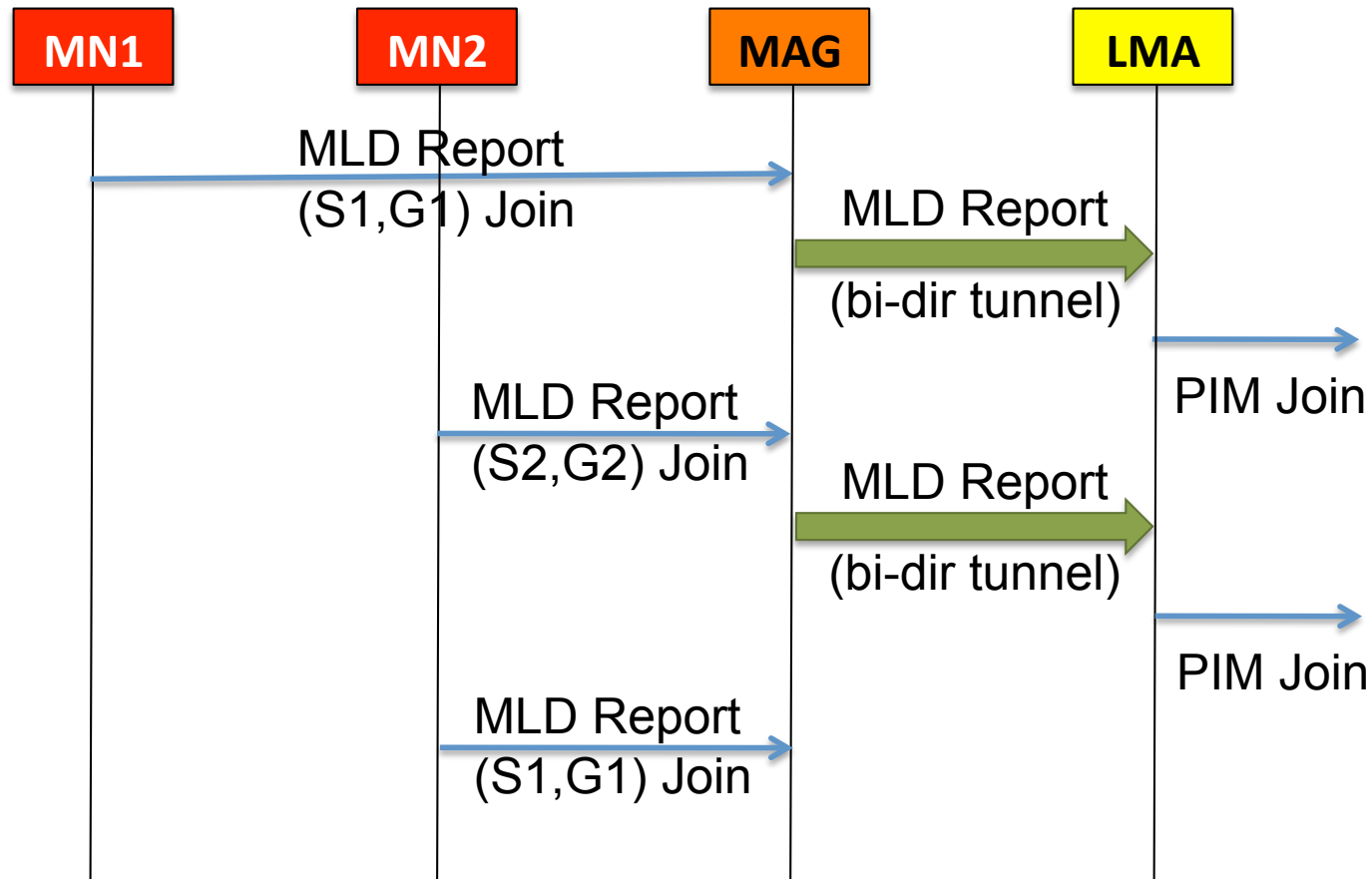
- Local Mobility Anchor operation
  - LMA is PIM-SM router / MLD proxy / AMT relay
- Mobile Access Gateway operation
  - MAG is PIM-SM router / MLD proxy / AMT gateway
- Mobile Node operation
- Dual-Mode (i.e. both router and MLD proxy) implementation
- Handover process
- IPv4-Only and Dual-Stack Node support

PMIPv6-Domain
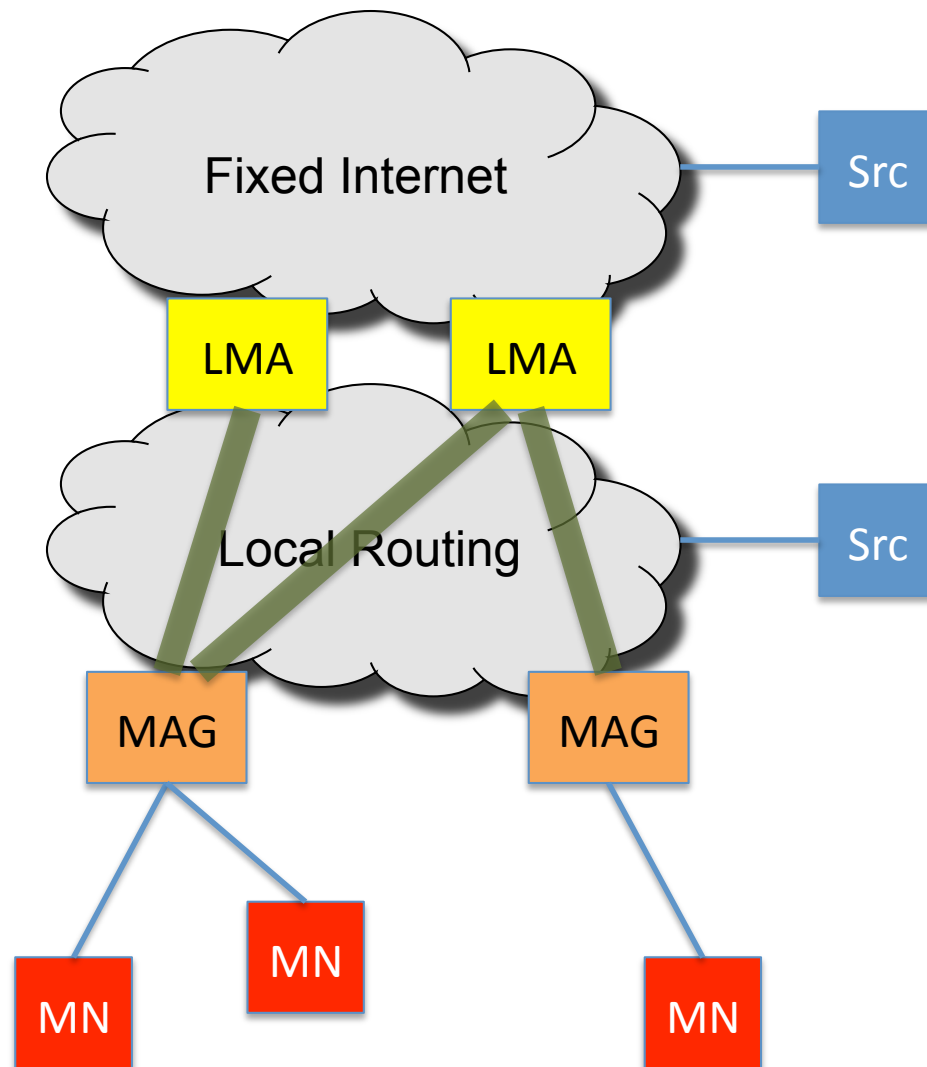
Basic Protocol Sequence

Note: MAG=MLD proxy, LMA=PIM router

LMA and MAG Operations

- When LMA is PIM-SM router
 - MAG MUST be MLD proxy or PIM-SM router
- When LMA is MLD proxy
  - MAG MUST be MLD proxy
- When LMA is AMT relay
  - LMA MUST also work as PIM-SM router
    - Therefore, MAG MUST be MLD proxy or PIM-SM router
  - In addition, MAG MAY be AMT gateway
    - AMT data SHOULD not be transmitted through bi-directional tunnel between LMA and MAG, but forwarded toward LMA (i.e. AMT relay) hop-by-hop

MN Operation

- MN usually acts as a receiver host
  - Source mobility is out of scope of this draft
- When MN is MLD proxy
  - MAG MUST be MLD proxy or PIM-SM router
- When MN is PIM-SM router
  - MAG MUST be PIM-SM router
- Recommendation
  - [RFC5213] allows a mobile node is a router. However, to avoid complexity, this document recommends MN should not be a PIM-SM router but an MLD proxy, when MN needs to forward multicast data to its downstream nodes. Reasonable?

Dual-Mode Implementation

- Enabling LMA/MAG to support both PIM-SM and MLD proxy simultaneously
  - To avoid handover's complexity, p-MAG and n-MAG MUST behave the same operation for the same MN.
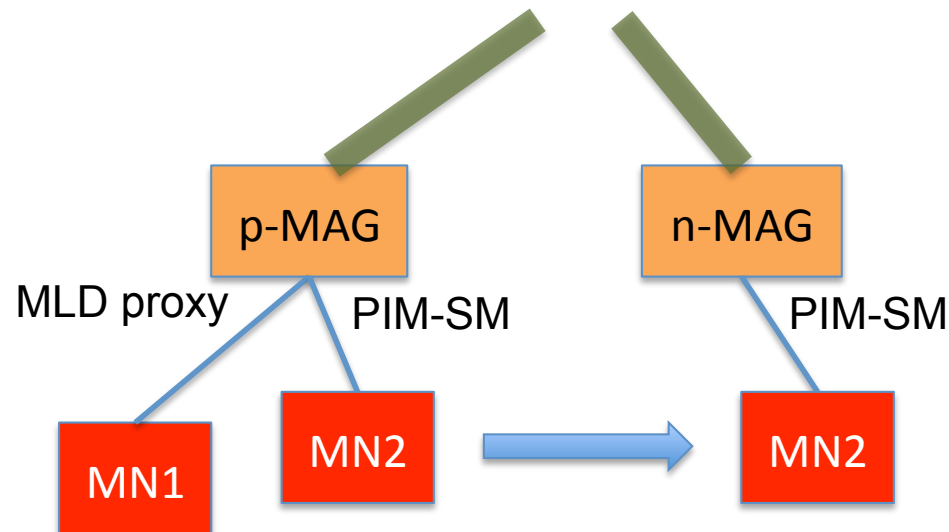
Handover Scenarios

- MAG operating as MLD proxy
  - MLD listener handover with CXTP
  - MLD listener handover with MN's Policy Profile
- MAG operating as PIM-SM router
  - MLD listener handover with CXTP
  - MLD listener handover with MN's Policy Profile

Multicast Context Transfer Data Format (M-CTD)

- Receiver address (128 bits)
  - Address of a receiver host sending the Current-State Report
- Mobility option in PBU-M (following slide)
  - Filter mode
    - INCLUDE or EXCLUDE as defined in [RFC3810]
  - Source addresses and multicast address pair the receiver has joined

Proxy Binding Update with Multicast Extension (PBU-M)

- Multicast Channel Subscription Flag (add "C" flag to RFC5213)

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
                                +-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
                                |            Sequence #          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|A|H|L|K|M|R|P|C|    Reserved   |            Lifetime           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
.                                                               .
.                       Mobility options                        .
.                                                               .
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Mobility Option in PBU-M

```
0                   1                   2                   3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
| Num of Mcast Address Records |          Reserved             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
.                                                               .
.                Multicast Address Record [1]                   .
.                                                               .
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                              .                                |
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|                              .                                |
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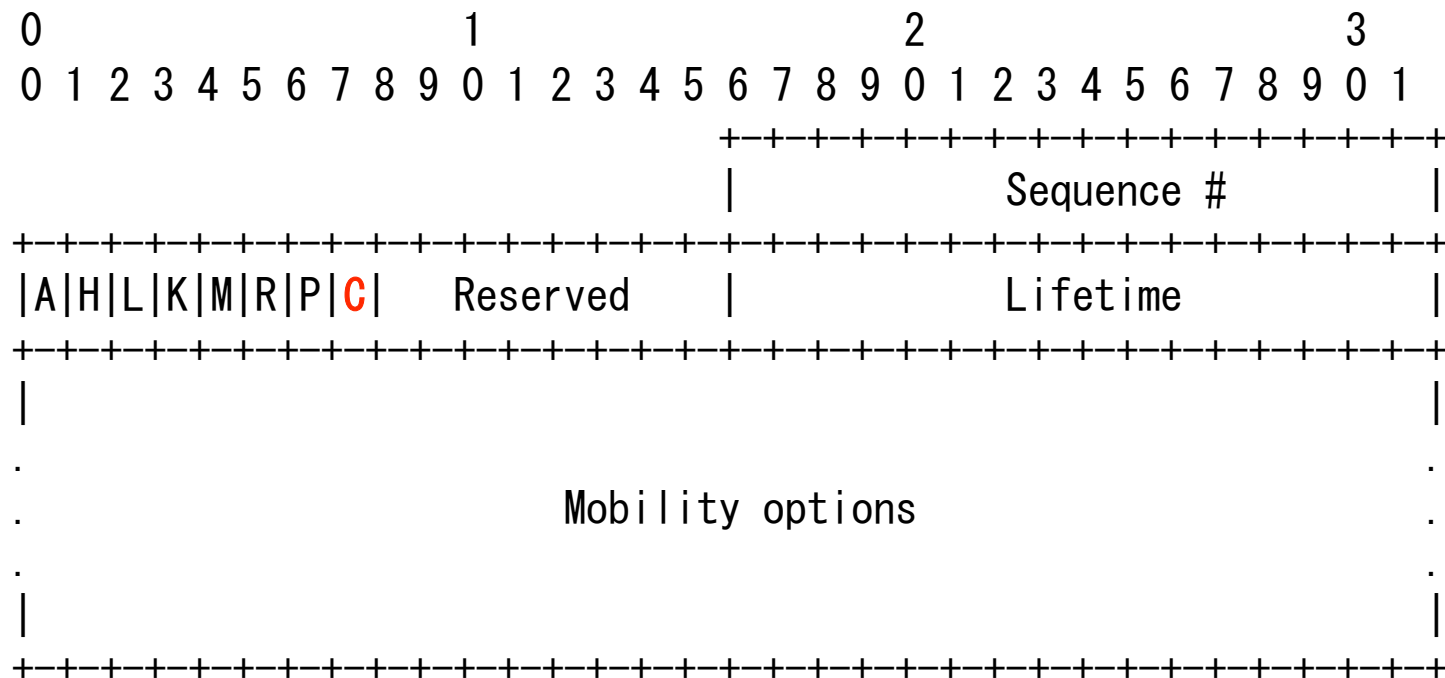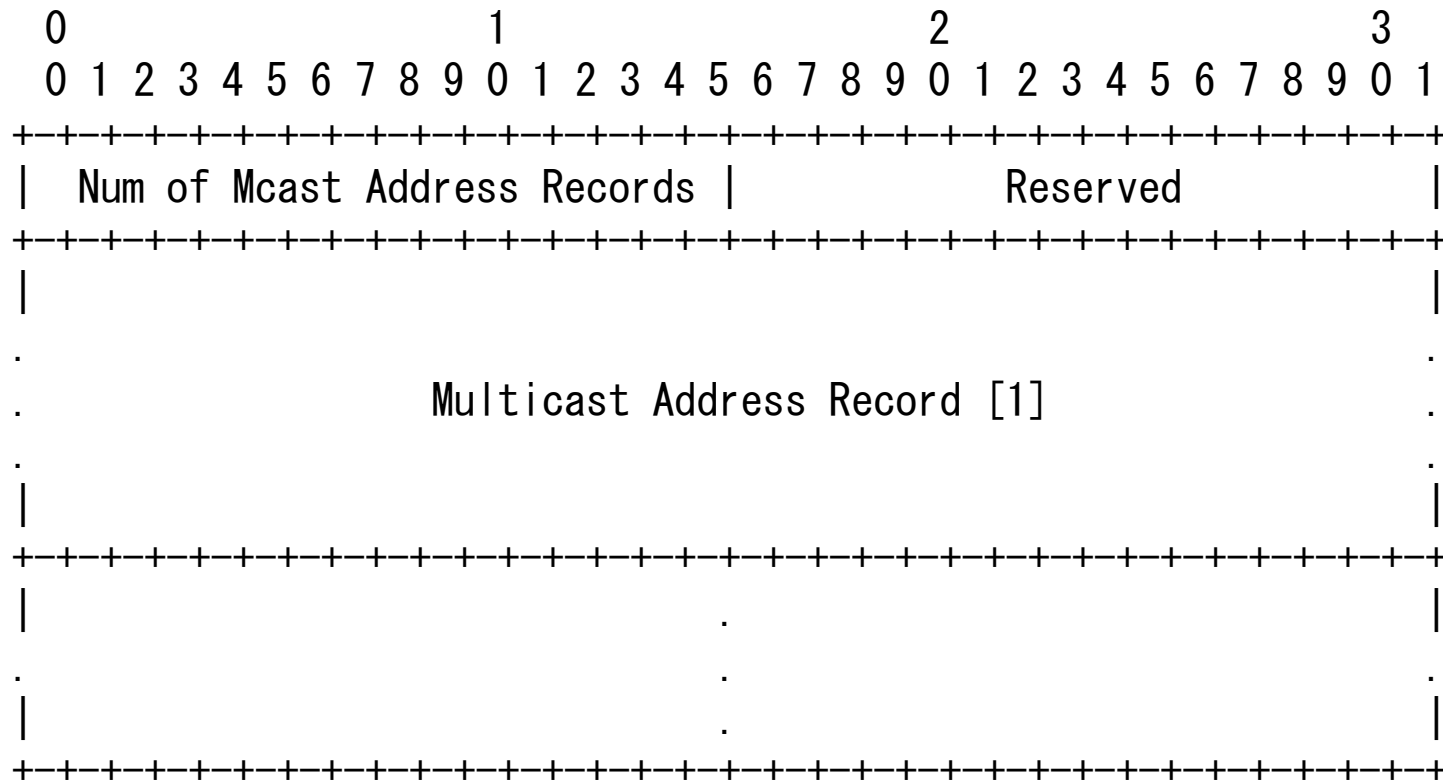
- When (C) flag is specified in PBU-M message, the mobility options field includes the "Multicast Address Record (i.e. (S,G) pair etc.)" inherited from MLDv2 Report format

IPv4-Only and Dual-Stack Node Support

- Use AMT
  - AMT data SHOULD not be transmitted through bi-directional tunnel between LMA and MAG, but forwarded toward LMA (i.e. AMT relay) hop-by-hop
  - Other requirements ?

Next Step

- Just improve the documentation
- Add security consideration