Extension of the MLD proxy functionality to support multiple upstream interfaces

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Problem statement

• General application:
  • sharing of a common network access infrastructure among different multicast content providers

• Advantages
  • Subscribers can get their preferred contents from different multicast content providers without network constraints and without requiring PIM routing on the access / aggregation device

• Redundancy
Other potential benefits

• Specific application to PMIPv6:
  • The support of multiple upstream interfaces on an MLD proxy has been identified as an opportunity for system optimization

• Advantages:
  • Traffic routing optimization within the PMIPv6 domain
  • Simultaneous support of remote and local multicast subscription
  • Avoidance of multiple MLD proxy instances on MAG
Draft Motivation

• Solution Complexity
  • Handling of control messages for/from multiple upstreams
  • Efficient handling of data traffic for/from multiple upstreams

• Purpose
  • Focus on multicast distribution within PMIPv6
    • However general applicability can be expected
  • Requirements identification for supporting multiple upstreams
  • Specification of the needed MLD proxy extensions
Scenarios of applicability for MULTIMOB

• Listener mobility
  ✓ Single MLD proxy instance on MAG
  ✓ Remote and local multicast subscription
  ✓ Dual subscription to multicast groups during handover

• Source mobility
  ✓ Support of remote and direct subscription in basic source mobility
  ✓ Direct communication between source and listener associated with distinct LMAs but on the same MAG
  ✓ Route optimization support in source mobility for remote subscribers
## Summary of needed functionality per scenario

<table>
<thead>
<tr>
<th>Functionality</th>
<th>Multicast Listener</th>
<th>Multicast Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Single MLD proxy  (4.1.1)</td>
<td>Remote &amp; Local Subscr. (4.1.2)</td>
</tr>
<tr>
<td>Upstream Control Delivery</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Downstream Control Delivery</td>
<td>✗</td>
<td>✗</td>
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<tr>
<td>Upstream Data Delivery</td>
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<tr>
<td>Downstream Data Delivery</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>1:1 MN to Upstream Association</td>
<td>✗</td>
<td></td>
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<tr>
<td>1:N MN to Upstream Association</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>Upstream i/f selection per mcast group</td>
<td></td>
<td>✗</td>
</tr>
<tr>
<td>Upstream i/f selection for all groups</td>
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<tr>
<td>Upstream traffic replication</td>
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Backup slides

Applicability Scenarios for MULTIMOB
Listener mobility

Single MLD proxy instance on MAG

Orange LMA

Green LMA

Orange MLD proxy

Green MLD proxy

MAG

Orange MNs

Green MNs

Orange LMA

Green LMA

MLD proxy with multiple upstreams

Orange MNs

Green MNs
Listener mobility

Remote and local multicast subscription

\( (S_{\text{remote}}, G_1) \)

\( (S_{\text{local}}, G_2) \)

PMIPv6 domain

MTMA

MAG

MLD proxy with multiple upstreams

Multicast Router
Listenern mobility

Dual subscription to multicast groups during handover

Handover assisted by some adaptation of FPMIPv6 protocol for multicast traffic (e.g., draft-schmidt-multimob-fmipv6-pfmipv6-multicast)
Source mobility

Support of remote and direct subscription in basic source mobility

(LMA, Ga)

PMIPv6 domain

(MN)

(S,MN, Ga)

Multicast Router

MLD proxy with multiple upstreams
Source mobility

Route optimization support in source mobility for remote subscribers
Source mobility

Direct communication between source and listener associated with distinct LMAs but on the same MAG

\[(S_{MN}, G_a)\]