Root initiated routing state in RPL

draft-ietf-roll-dao-projection

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Changes Highlights

- New flag in the RPI to indicate projected route
  - Needed for error processing
- Text on RFC 8138, Need for compression & RPI update
Updating the RPI (RFC 6550 & RFC 6553)

<table>
<thead>
<tr>
<th>Option Type</th>
<th>Opt Data Len</th>
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<tbody>
<tr>
<td>P</td>
<td></td>
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<tr>
<td>0</td>
<td>1</td>
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<tr>
<td>0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1</td>
<td>+--------------------------</td>
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<td></td>
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<td>O</td>
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</table>

Figure 6: RPL Option

New fields:

**P:** 1-bit flag; indicates that the packet is routed along a projected route.
On RFC 8138 usage: ERPI

• RPI flags and Rank are useless along the projected route.
• On the other hand, we could use a new flag in the RPI to indicated that the route is a projected route in the non-storing case.
• Introduced an additional ERPI encoding that:
  • Is inspired from the existing RPI compression but is Elective
  • Does not contain a Rank information nor the flags
  • May Indicate projected route, another thread on that
On RFC 8138 usage: RPI (cont.)

Figure 5: A ERPI-6LoRH carrying a RPLInstanceID
On RFC 8138 usage: IP in IP

• An implementation is used to
  • IP in IP with SRH from the root to the last node indicated in the SRH or
  • IP in IP with no SRH from the node indicated as encapsulator to
    (implicitly) the root.
• For DAO projection we will use an SRH from the node indicated as
  encapsulator to the last node indicated in the SRH, which is a mix
  of the above. It is compatible with RFC8138 but possibly untried
  with existing code.
• Provided an example packet that has IP in IP and SRH and none of
  the outer IPs is the root
On RFC 8138 usage: IP in IP (cont.)

Figure 3: Example Compressed Packet with SRH.
Discussions needed to progress

How is the topology known to the root?
  Could use external management or Non-Storing DAO
  Time to do the RPL control plane compression
  Suggestion to add a peer info option similar to transit info option
  Suggestion to use connected dominating set of RPL parent (Cisco IPR)

How are the node capabilities known to the root?
  Suggestion to add a node capability option (in mop ext? ref mop ext?)

Complexity of mixed modes and route concatenation

MOP saturation: addressed by draft-rahul-roll-mop-ext

Compression of the Via Info option (so far full addresses)
  Time to do the RPL control plane compression
Discussions needed to progress

How is the topology known to the root?
   Could use external management or Non-Storing DAO
Suggestion to add a peer info option similar to transit info option
Suggestion to use connected dominating set of RPL parent (Cisco IPR)
Time to do the RPL topology description draft
   (in ROLL, in RAW?)
How are the node capabilities known to the root?
   Suggestion to add a node capability option
   (in mop ext? or in this draft with a ref/dependency on mop ext?)

Complexity of mixed modes and route concatenation

MOP saturation: addressed by draft-rahul-roll-mop-ext

Compression of the Via Info option (so far full addresses)
   Time to do the RPL control plane compression