Associated Channel over IPv6

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Motivation

IPv6 provides connectivity in many use cases, including Cloud-Network convergence, DCI, DCN, mobile backhaul, metro/core networks etc.

- IP services requires high quality of SLA guarantee
- SR over IPv6 provides optimized route for service via routing programming
- Concept of ACH is proposed, identify the service’s path, and provide control and management capabilities, e.g. OAM, protection switchover, etc., to fulfill the SLA requirement
ACH Architecture

- A control channel
- An associated channel to an IP forwarding path
- Carries messages of control and management protocols
- To provide control and management functions
ACH TLV

<table>
<thead>
<tr>
<th>Type (ACH)</th>
<th>Length</th>
<th>Channel-Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Associated Channel ID</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fixed Message (per application)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>zero or more TLVs (optional)</td>
</tr>
</tbody>
</table>

- A TLV format
- Type: specify the control channel for one specific IP path
- Length: length of value field
- Channel-Type: one specific type of control/management protocol
- Associated Channel ID:
  - path ID of the associated channel
  - map with the path ID of data forwarding path, with which the associated channel is associated
- Carried Message: messages of the specific control/management protocol
- ACH TLV can be encapsulated in IPv6 extension headers (DoH/HbH/SRH) or payload
- Two types of applications: E2E and HbH
Applicability

case 1: unified OAM

Ping
- L2
- IP
- NH
- ICMP

BFD
- L2
- IP
- UDP
- BFD

TWAMP
- L2
- IP
- UDP
- TWAMP

Problem:
- Different protocols fulfill different OAM functions
- Repeated functions, e.g. CV
- Independent session identifiers, e.g. discriminator, 5 tuple
- Deep encapsulation, not friendly to control plane
- Intermediate node is not sensed in E2E session

Solution:
- ACH carries different OAM messages in a uniform way
- Reduce the number of OAM protocols and sessions
- Unified session identifier

IPv6 header
IPv6 E2E
ACH TLV: DM
ACH ID =1
Timestamps

IPv6 header
IPv6 E2E
ACH TLV: DM
ACH ID =1
Timestamps

① R1 generates E2E performance management probe

② R4 receives ACH to measure the packet delay
Applicability

case 2: signal degrade trigger protection

① R1 generates HbH fault management probe

② R3 sets flag to positive to indicate link signal degrade

③ R4 receives signal degrade indication, generates E2E protection switch request to R1

④ R1 receives protection switch request, and trigger switchover
Feedback to comments

• Take reference of MPLS G-ACh
• IPv6 ingress node encapsulates ACH TLV to obey RFC8200
• Design it for IPv6, may focus on SRv6 at the beginning stage
• Options used in IPv6 Extension Header
• ACH is designed for and encapsulated in IP layer
Next Step

1. Refine ACH over IPv6
2. Specifically define ACH over SRv6
3. Specify the applications in different drafts
   • OAM over ACH
   • Linear protection over ACH
   • Others

As always, comments and suggestions are greatly welcome!
Seek for collaborations!
Thanks