Associated Channel over IPv6

draft-yang-rtgwg-ipv6-associated-channel-00
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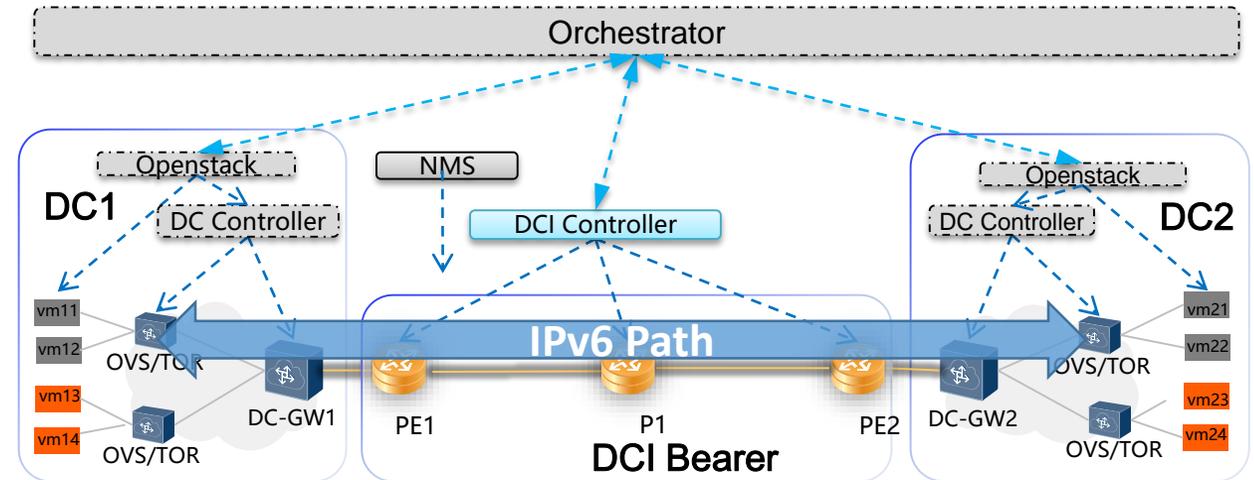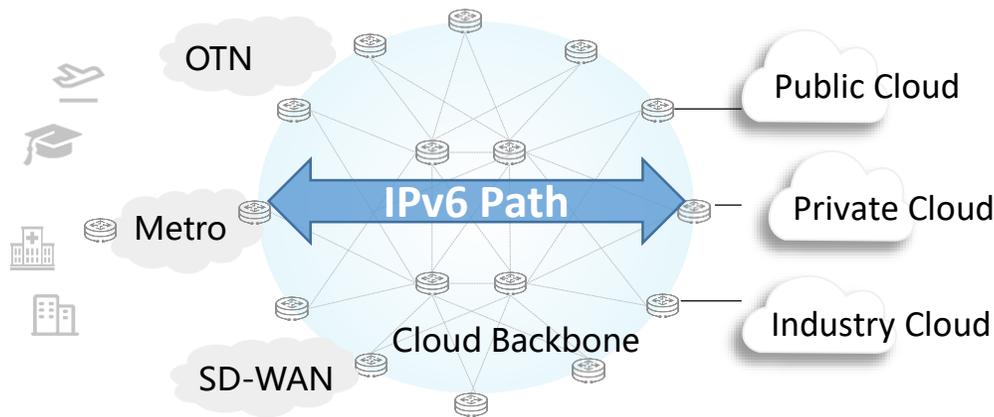
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Motivation

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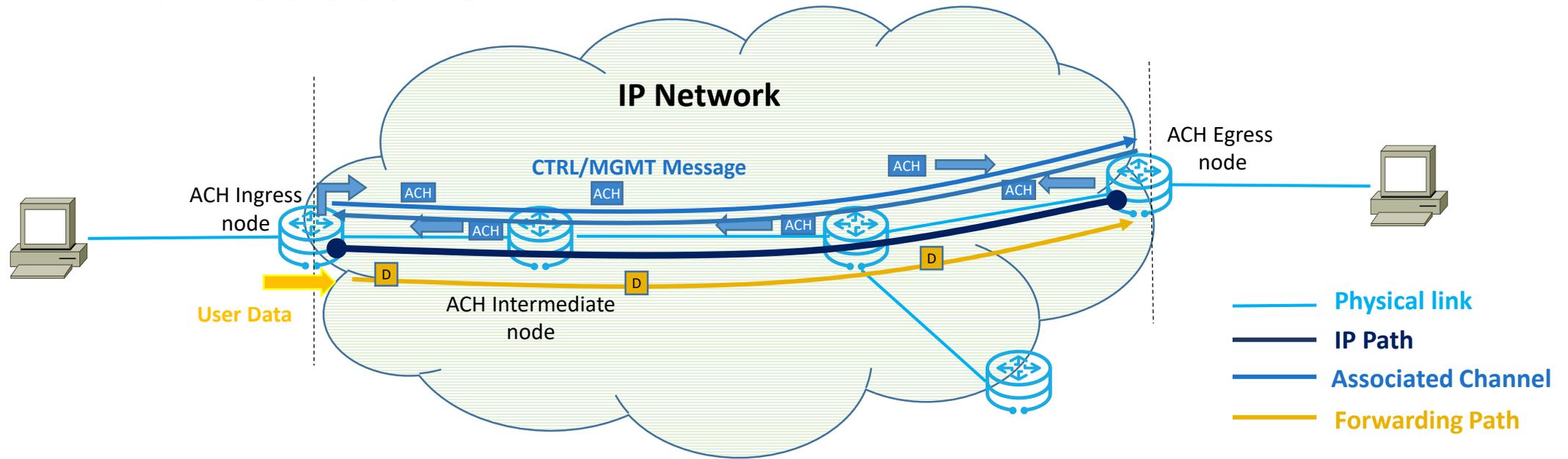
- A control channel
- An associated channel to an IP forwarding path
- Carries messages of control and management protocols
- To provide control and management functions
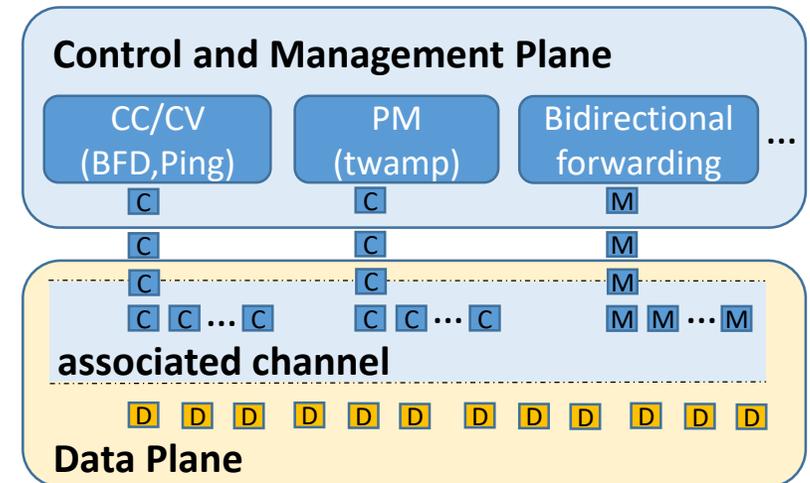
ACH TLV

Type (ACH)	Length	Channel-Type
Associated Channel ID		
Fixed Message (per application)		
zero or more TLVs (optional)		

- 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 $_{DP}$	BFD

TWAMP

L2	IP	UDP $_{DP}$	TWAMP

IP ACH

L2	IP $_T$	TLV
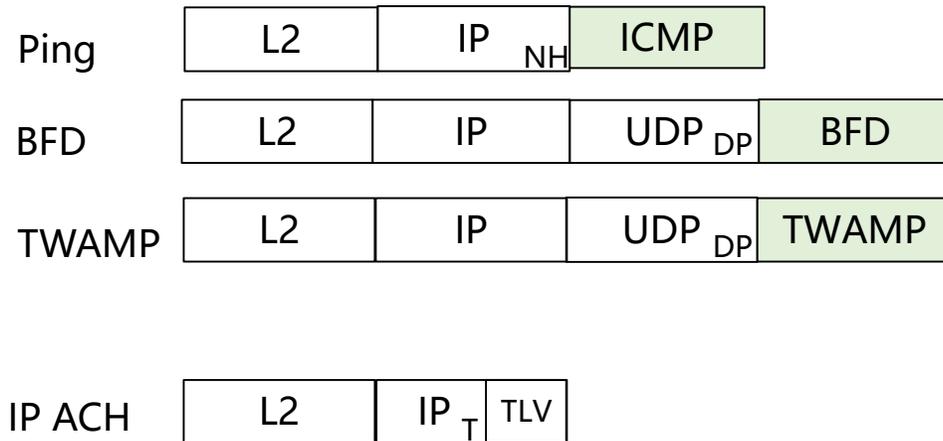
Problem：
- Different protocols fulfill different OAM functions
- Repeated functions， e.g. CV
- Independent session identifiers, e.g. discriminator, 5 tuple
- Deep encapsulation, not friendly to control plane
- Intermediate node is not sensed in E2E session

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

① R1 generates E2E performance management probe

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

② R4 receives ACH to measure the packet delay

ACH ID=1

R1   R2   R3   R4
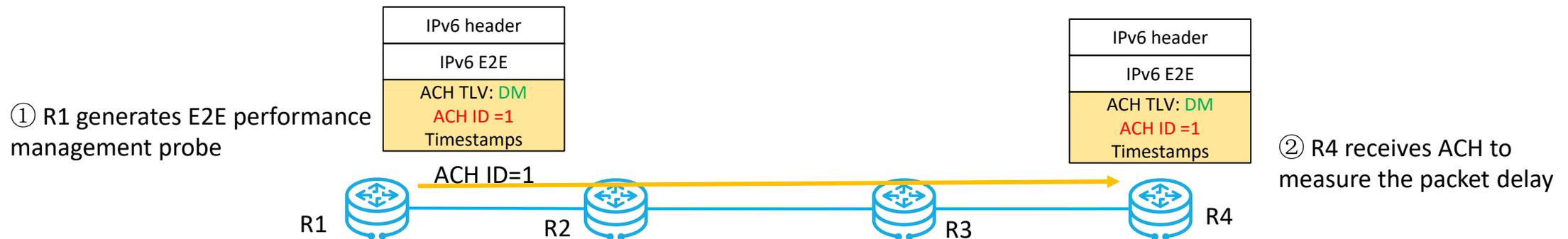
Applicability

case 2: signal degrade trigger protection

② R3 sets flag to positive to indicate link signal degrade

IPv6 header
IPv6 HbH
ACH TLV: FM
ACH ID =1
Error indication flag:0

IPv6 header
IPv6 HbH
ACH TLV: FM
ACH ID =1
Error indication flag:0

IPv6 header
IPv6 HbH
ACH TLV: FM
ACH ID =1
Error indication flag:1

① R1 generates HbH fault management probe

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

ACH ID=1

ACH ID=2

R1 R2 Error R3 R4

IPv6 header
IPv6 E2E
ACH TLV: Protection
ACH ID =2
Protection switch request
(ACH ID=1, switch to backup)

IPv6 header
IPv6 E2E
ACH TLV: Protection
ACH ID =2
Protection switch request
(ACH ID=1, switch to backup)

R5 R6

④ R1 receives protection switch request, and trigger switchover

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!