SRv6 Underlay tunnel Programming

draft-han-spring-srv6-underlay-tunnel-programming-02

Presenter： Liuyan Han

Co-author： Liuyan Han (China Mobile)

Minxue Wang (China Mobile)

Ran Chen (ZTE)

Aihua Liu (ZTE)

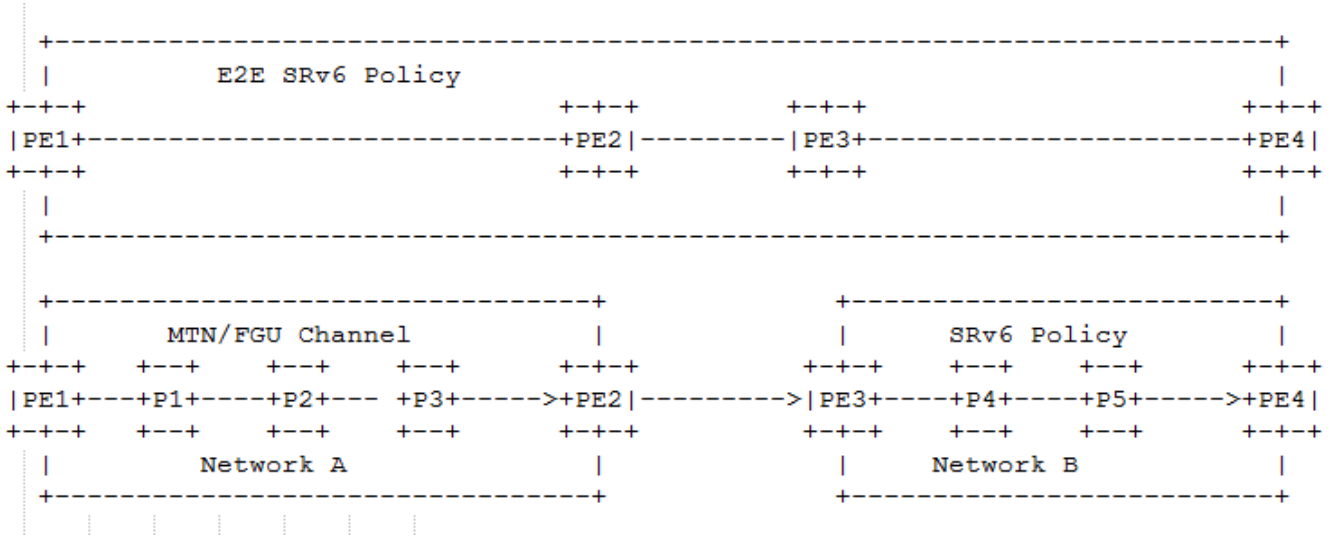
SPRING WG IETF-116 Meeting, March 2023

Introduction

- RFC 8986 has defined a set of well-known SRv6 Endpoint behaviors that do not consider the heterogeneous network segments under the IP layer.

- This document defines a new SRv6 Endpoint behavior which can be used for SRv6 heterogeneous underlay tunnel (e.g.L1 channel) Programming, called END.BXC, this behavior are used to bind an underlay tunnel.
  - The underlay tunnel can be programmed into an end-to-end list using the end behavior defined in this draft.

Problem Statement



Note: MTN (ITU-T Metro Transport Network), FGU (CMCC MTN Fine-Granularity Unit)

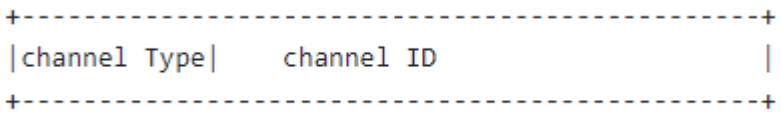
- The operator need to deploy E2E SRv6 Policy across network A (Metro) and network B (Core).
- The forwarding nodes (supporting L1 MTN/FGU channel capabilities) of Network A may bind the end-to-end SRv6 tunnels for LOW-LATENCY traffic to the L1 MTN/FGU channels to mimimize the forwarding latency. Currently these L1 channels are invisible to the end-to-end SRv6 controller, so they cannot be directly programmed into the end-to-end SRv6 Policy.
- Since the controller of Network A has all the information about the binding operation between end-to-end SRv6 policy and L1 MTN/FGU channel, it can program the binding behavior into SRv6 policy through the END.BXC behavior proposed by this draft.
- The edge nodes(support both MTN and SRv6) of Network A will execute the END.BXC behavior, binding and unbinding the end-to-end SRv6 policy to the L1 channel in PE1 and PE2 for uplink direction as an example.

End.BXC Behavior

- The End.BXC behavior is a variant of the End behavior defined in [RFC8986].
- An End.BXC SID is associated with an underlay tunnel(e.g.L1 channel), Typical types of the L1 channel include MTN [ITU-T_G.8310], and OTN, others could be added in the future.
- End.BXC can support ARG identifying different channel types and channel ID spaces, it is up to the controller to decide whether if the ARG to use.

Processing of End. BXC Behavior

- End. BXC Behavior with ARG:
  - Extend the ARG to encode the channel type and channel ID.



  - When N receives a packet destined to S and S is a local End.BXC SID, the line S15 of the End processing defined in RFC8986 is replaced by the following：

    S14. Get the channel type and channel ID from the lower bit of S.

    S15. Find channel X based on channel type and channel ID

    S16. Update IPv6 DA with Segment List[Segments Left]

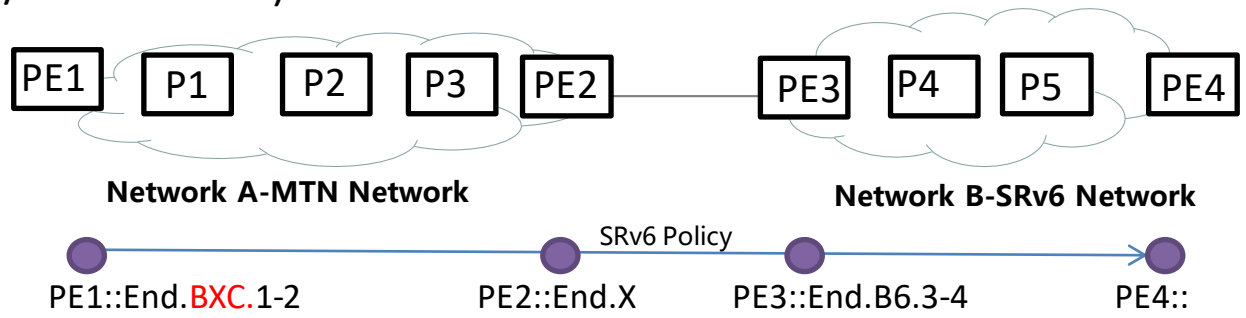
    S17. Forward the packet to the new destination via channel X.

- End. BXC Behavior without ARG:
  - An End.BXC SID S is associated with an underlay tunnel(e.g.L1 channel).
  - When N receives a packet destined to S and S is a local End.BXC SID, the line S15 of the End processing defined in RFC8986 is replaced by the following：

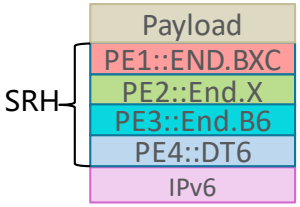
    S15 Forward the packet to the new destination via channel X.

Typical Application Scenarios

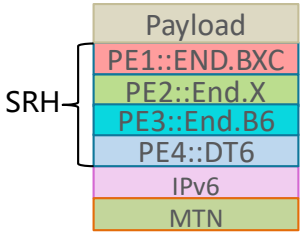
- Mainly used to steer end-to-end SRv6 traffic forwarding through the associated underlay tunnel by binding the heterogeneous tunnels composing a seamless SRv6 tunnel in the unified SRv6 programming architecture.
- By using the End.BXC SID and other types of SRv6 SIDs to build its segment list for an end-to-end SRv6 tunnel even across an underlay connection (such as L1 MTN/FGU channel).



End-to-end SRv6 packets



SRv6 packets in network A



Deployment Status

- The SRv6 END.BXC Function mechanism has been implemented by ZTE, and China Mobile has successfully completed the field verification.
  - For example, In August 2022, China Mobile successfully validated SRv6 END.BXC Function in field trail.
  - In March 2023, China Mobile successfully validated the orchestrates end-to-end SRv6 path (include END.BXC) functions across multi-domains in field trail.

Next Step

- Comments welcome.

Thank you!