SRv6 for Inter-Layer Network Programming

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Jie Dong @Huawei

Liuyan Han, Zongpeng Du, Minxue Wang@ China Mobile

Presenter Liuyan Han

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Background

- Operators usually have a multi-layered network, the layer-3 is normally IP-based, while different technologies could be used in in the underlying layers

  - Cross-layer network planning and optimization is expected while complicated

- SRv6 enables network programming by encoding network instructions in IP packet header

  - Currently only the network instructions related to IP layer are defined

  - SRv6 can be further extended to achieve inter-layer network integration

- This document describes the use cases of inter-layer network programming, and a new SRv6 function is proposed for this purpose

Use Cases of Inter-layer Programming

- IP and Optical network integration

  - Redundant optical paths may not be fully used by IP layer

  - Optical paths may exist between non-adjacent IP nodes, thus not visible in the L3 topology

- IP and MTN integration

  - The MTN architecture is defined in ITU-T G.8310

    - MTN nodes can support both per-hop IP forwarding and MTN Path (MTNP) cross-connect

    - An MTN path can be set up between two remote MTN nodes

  - Traffic can be carried using IP path, MTN path or the combination of the two

- Traffic steering to L2 bundle member link

  - Each member link is a layer-2 connection without L3 adjacency

SRv6 End.XU

- Endpoint with Underlay Cross-Connect

  - A variant of the End.X Behavior

  - An End.XU SID S is associated with an underlay interface, which connects to one or more underlay links or connections.

  - The line S15 from the pseudocode of SRv6 End processing in RFC 8986 is replaced by the following

  S15. Forward the packet through the underlay interface

   associated with SID S

End.XU in IP Optical Integration

- For packet transmission from P7 to P8

  - The SID list in IP network is

    {P7, P1, P2, P3, P8}

  - Assume an optical path {O1, O2, O3} exists

    in the optical network

    - An End.XU SID can be allocated by P1 to

      steer traffic to this underlay path

  - An IP-optical inter-layer path can be

    created with SID list

    {P7, P1, End.XU (O1, O2, O3), P3, P8}
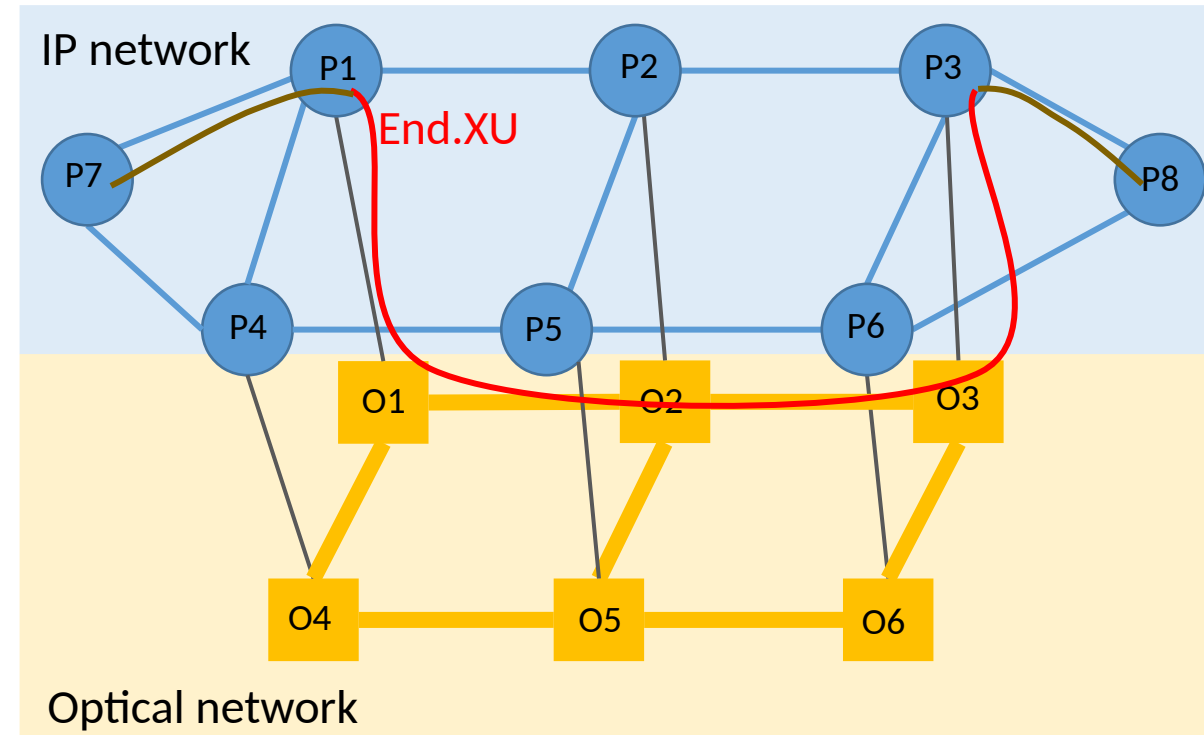
End.XU in IP MTN Integration

- Nodes in the MTN domain supports both layer-3 packet forwarding and MTN path cross-connect

  - A set of MTN paths are provisioned between selected MTN nodes

  - End.XU SID is allocated for each MTN path

- A SID list with End.XU can be used to create an end-to-end path with layer-3 and MTN segments
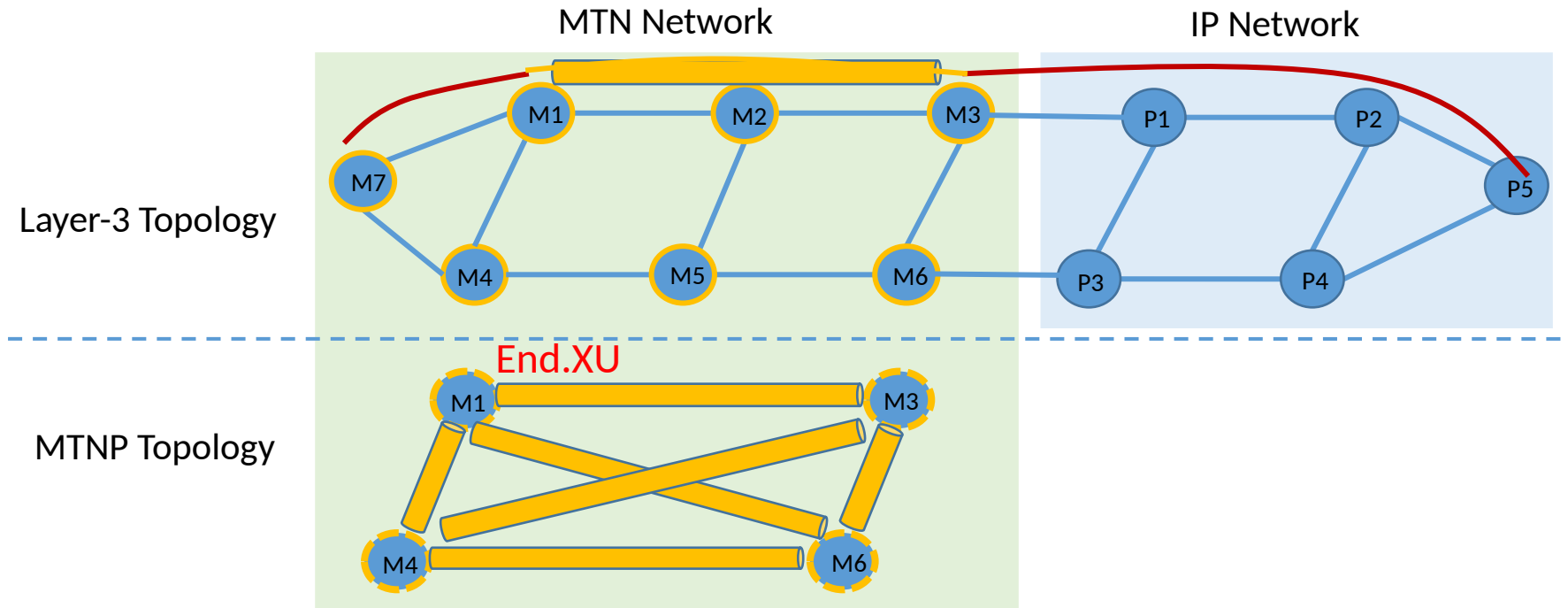
Next Steps

- Comments and feedbacks are welcome

- Revise the document accordingly

Thank You