SRv6 for Inter-Layer Network Programming

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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 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