IGP Extensions for Segment Routing based Enhanced VPN (VPN+)

draft-dong-lsr-sr-enhanced-vpn-02

Jie Dong, Zhibo Hu @Huawei
Stewart Bryant @Futurewei

LSR WG  IETF 106@Singapore  Nov. 2019
Background

• VPN+ framework is described in `draft-ietf-teas-enhanced-vpn`
  • A layered architecture and candidate technologies in each layer & plane
  • To meet the requirements of 5G network slicing and other generic scenarios

• SR based VPN+ is defined in `draft-dong-spring-sr-for-enhanced-vpn`
  • Extend SR to identify the network topology and network resources allocated to a virtual network
  • Provide the SR data plane mechanisms for transport network slice

• This document defines the IGP mechanism and extensions for SR VPN+
  • Distribution of the required information to both the controller and network nodes
  • Taking control plane scalability into consideration
    • Detailed analysis please refer to `draft-dong-teas-enhanced-vpn-control-plane`
Methodology

- IGP functionality for VPN+
  - Advertise/collect the attributes of different virtual networks
  - Compute routing/forwarding entries for each virtual network
- Flexibility and scalability is important
  - To support network slicing deployment in different scenarios and phases
  - A consistent solution for 10s, 100s, and 1000s+ network slices
- Multi-dimension network slice definition
  - A network slice is defined as a combination of several key attributes
    - Topology
    - Resource
    - ...
  - Decouple the advertisement and processing of different attributes
1. Reuse MT/Flex-Algo to define different topologies

2. Use ResIDs to define different groups of network resources

3. Combination of topology and resource
Advertisement of TNS Definition

• A new sub-TLV: Transport Network Slice Definition (TNSD)

• Transport Network Slice Identifier: 32-bit global significant

• Optional Sub-TLVs
  • Network Topology sub-TLV
  • Network Resource sub-TLV
More on sub-TLVs

• Network Topology sub-TLV
  • Use MT/Flex-Algo to identify the topology

• Network Resource sub-TLV
  • Use a new 32-bit global-significant identifier to identify the group of resources
Advertisement of Topology Attributes

• Multi-topology based topology advertisement
  • MTR can be used with SR to define network topologies
    • Applicable to both SR-MPLS and SRv6
    • Topology-specific SIDs and SRv6 Locators
    • Topology-specific attributes

• Flex-Algo based topology advertisement
  • Flex-Algo can be used to define the topological constraints
    • Applicable to both SR-MPLS and SRv6
    • Algorithm-specific SIDs and SRv6 Locators

• Both are considered as options for topology advertisement
Advertisement of Resource Attributes

• Reuse and extend the IGP L2bundle mechanism (ISIS TLV 25)
  • A subset of link resource is described as physical or virtual member link
  • A new Flag “Virtual (V)” is used to indicate whether the member links are virtual or physical

• A new Resource Identifier (ResID) sub-TLV in the L2 Bundle Member Attributes
  • Advertised together with other TE attributes of the member links
Next Steps

• Solicit feedbacks and comments

• Refine the document accordingly
Thank You