

BGP-LS Extensions for Segment Routing based Enhanced VPN

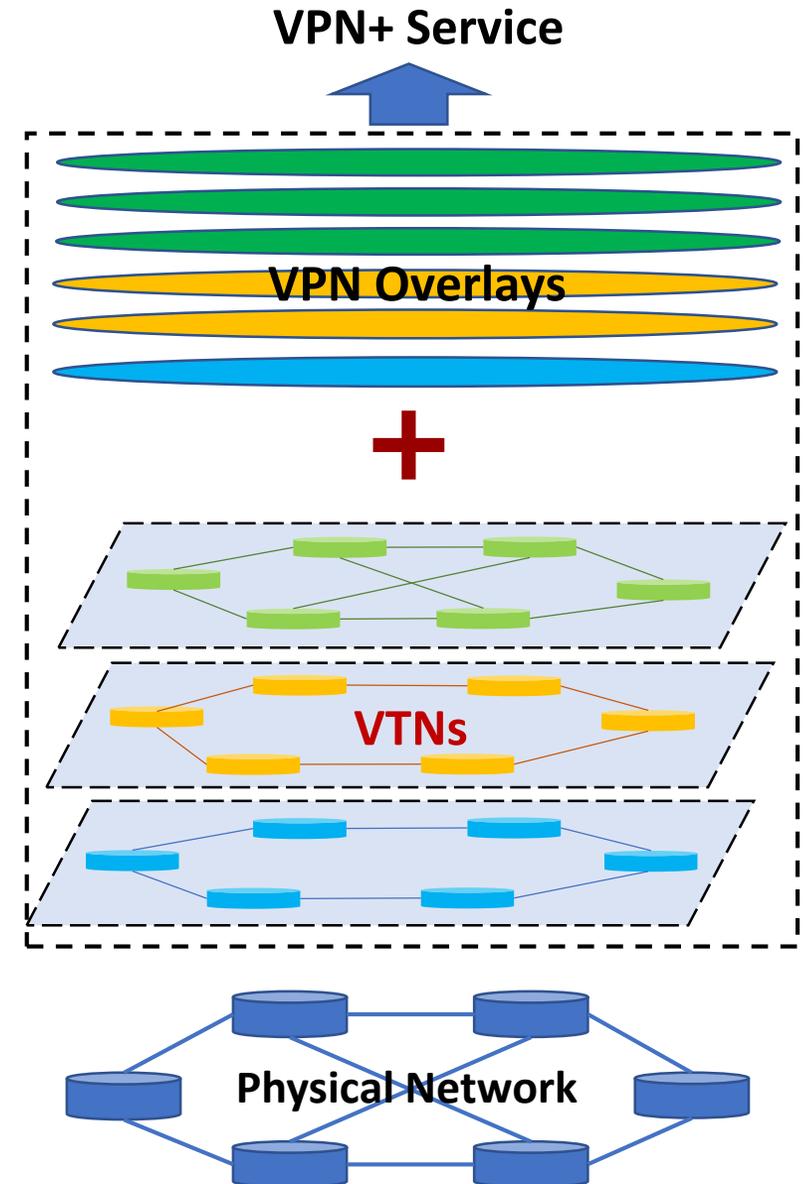
draft-dong-idr-bgpls-sr-enhanced-vpn-03

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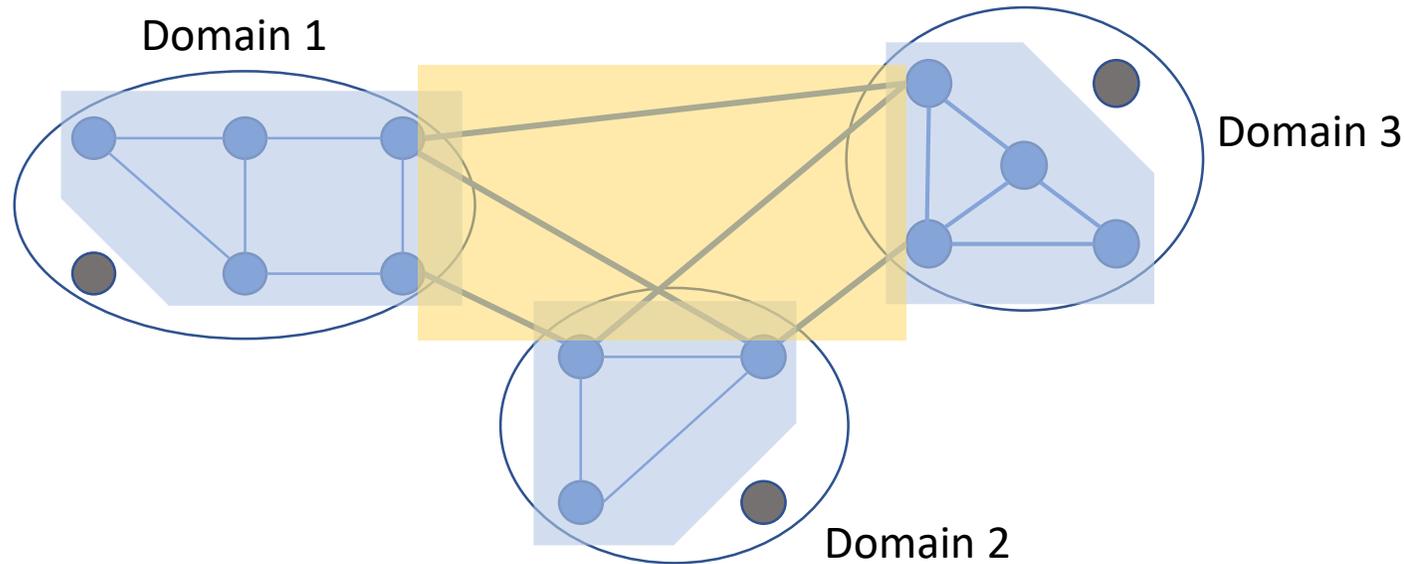
Background

- VPN+ framework is described in *draft-ietf-teas-enhanced-vpn*
 - A layered architecture and technologies to provide VPN+ service, such as network slices
 - VPN+ service is enabled by integrating overlay VPN and underlay VTN
- SR based VTN is described in *draft-ietf-spring-sr-for-enhanced-vpn*
 - Provides the mechanism and procedures to build SR based VTN using resource-aware SIDs
- IGP extensions for SR VTN is under discussion in LSR WG
 - Multi-Topology or Flex-Algo can be reused/combined with necessary specification/extensions
- This documents define the BGP-LS extensions for SR VPN+
 - To of intra-domain and inter-domain VTN attributes to the network controller



Design Principle Overview

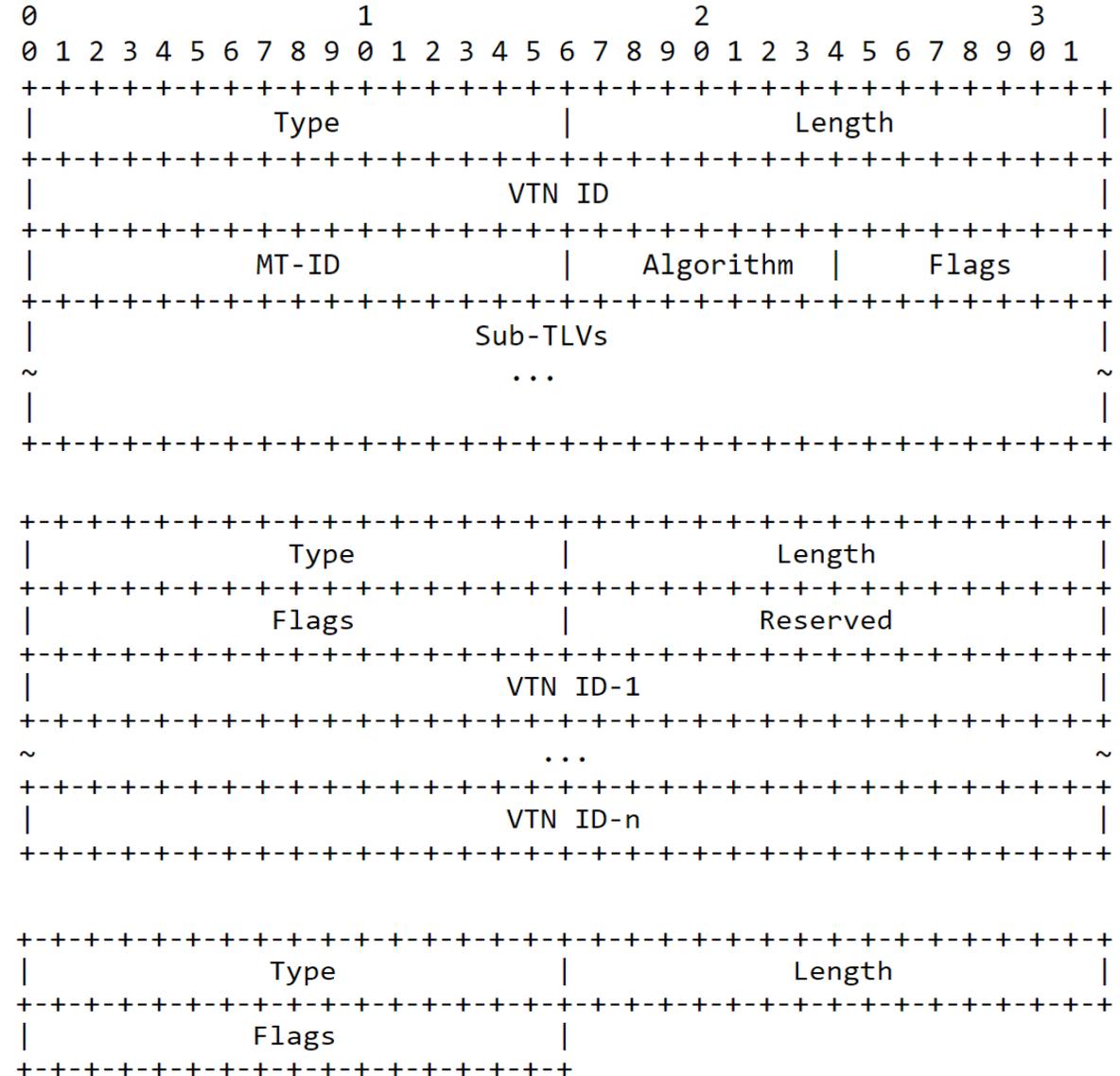
- A VTN may cover one or multiple areas/domains and the inter-domain links



- In each area/domain, use MT/Flex-Algo to advertise the topology attributes of VTNs
 - The same or different topology/algorithm IDs may be used in different domains
 - Multiple VTNs may share the same topology/algorithm in one area/domain
- For each link, use L2 bundle to advertise the link TE attributes associated with VTN

BGP-LS Extensions

- VTN Definition TLV
 - Specifies the association of VTN and topology/algorithm
 - Multiple VTNs could refer to the same topology/algorithm
 - Can be further extended for other attributes
- VTN ID TLV
 - Identifies the set of VTNs an intra-domain or inter-domain link belongs to
- Link Attribute Flags TLV
 - Correspond to the IS-IS link attribute sub-TLV
 - A new flag V is defined to indicate whether a link is a virtual link



Intra-domain Topology Advertisement

- Option 1: BGP-LS with multi-topology
 - Use MT-ID TLV in BGP-LS Link NLRI and Prefix NLRI to identify the link-state information of different topologies
 - Topology-specific SR prefix-SIDs and adj-SIDs carried in BGP-LS attribute
 - The SRv6 Locators and SIDs are also topology-specific
- Option 2: BGP-LS with Flex-Algo
 - Use BGP-LS FAD to advertise the topological constraints on a particular topology
 - Algorithm-specific SR prefix-SIDs are carried in BGP-LS attribute
 - The SRv6 Locators and SIDs are also algorithm-specific
- With either option, the collected topology information and the topology-specific SPF computation can be shared by multiple VTNs

VTN Inter-domain Topology advertisement

- BGP-LS EPE with the VTN ID TLV is used to specify the VTN specific inter-domain topology
- Multi-domain VTNs can have different inter-domain connectivity, and may use different inter-domain physical/virtual links on a shared BGP peering
 - Different BGP Peer-Adj-SIDs can be allocated to identify the inter-domain links for different VTNs
 - Different BGP Peer-Node-SIDs may be allocated to identify the BGP peers for different VTNs
 - Different BGP Peer-Set-SIDs may be allocated to identify the BGP peer groups for different VTNs

VTN TE/Resource Attribute Advertisement

- The BGP-LS L2 bundle mechanism is extended for VTN-specific link attribute advertisement
- An L2 bundle can be a bundle of physical member links, or it can represent a set of virtual member links, each with a separate set of TE link attributes
 - The V flag in the Link Attribute Flags TLV is used to distinguish the two cases
- For each L2 bundle member link, a VTN-ID TLV is used to describe the associated VTNs
 - A member link may be associated with one or multiple VTNs
- The TE attributes of an L2 bundle member link will be used as the link attributes of the associated VTN

Advertisement of VTN-specific Data Plane IDs

- Used to steer packets to the set of network resources allocated to the VTN
- SR-MPLS
 - New TLVs for VTN-specific SR-MPLS Prefix and Adj SIDs
- SRv6
 - New TLVs for VTN-specific SRv6 Locators
- Dedicated VTN-IDs in data plane
 - No new TLV needed in control plane
 - The options of data plane encapsulation are under discussion

Next Steps

- Solicit feedbacks and comments
- Refine the document accordingly

Thank You