

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

draft-dong-lsr-sr-enhanced-vpn-00

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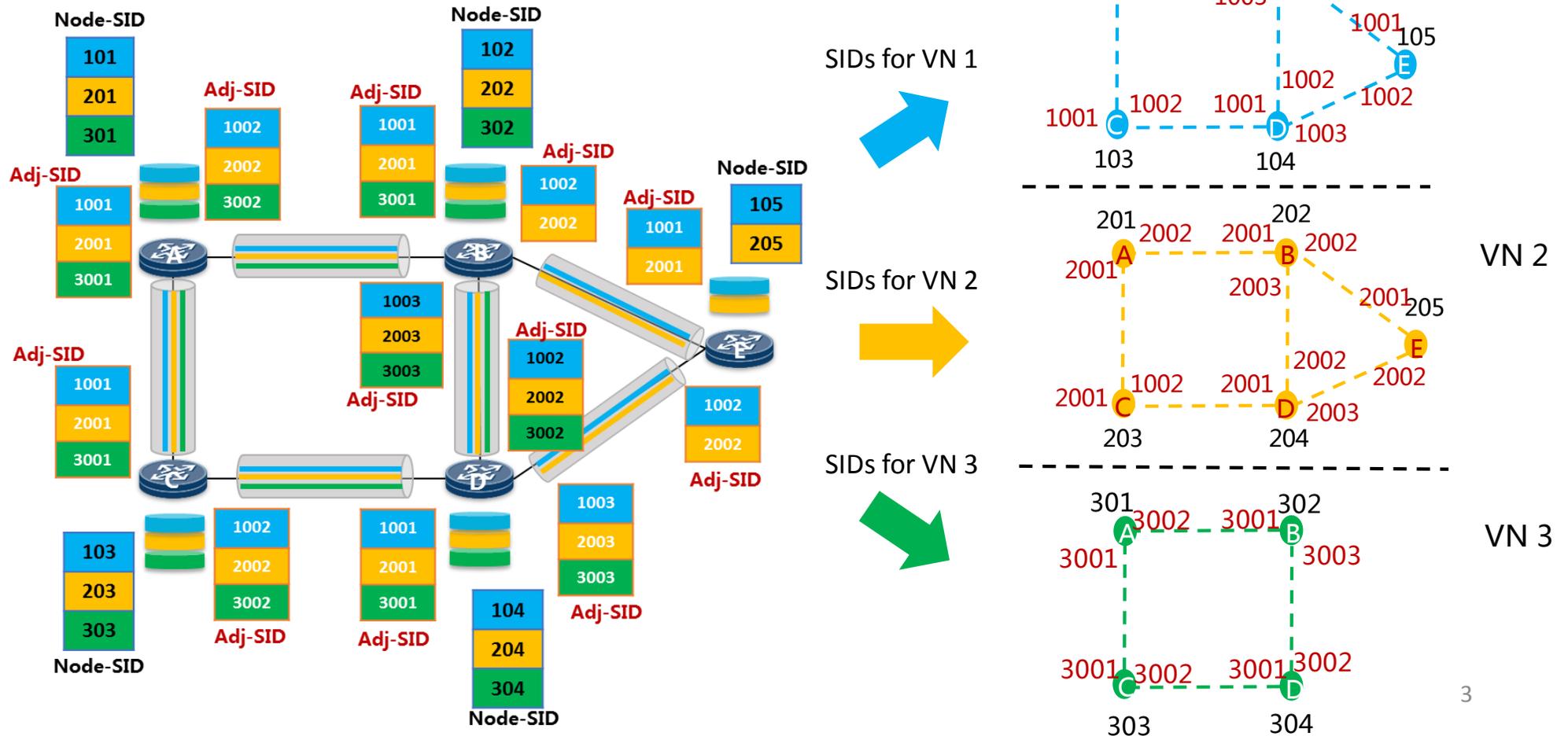
LSR @ IETF 102, Montreal

Background

- Enhanced VPN framework is defined in *draft-dong-teas-enhanced-vpn*
 - To meet the requirements of network slicing and similar scenarios
 - Architecture and candidate technologies for resource isolation and integration
 - Will be presented in TEAS on Wednesday
- SR based enhanced VPN is defined in *draft-dong-spring-sr-for-enhanced-vpn*
 - Extend SR to identify partitioned network resources and create resource isolated virtual networks
 - Please read the document and comment on SPRING list
- IGP extensions for SR based enhanced VPN belongs to LSR
 - Distribution of the “network slice” information to both controller and network nodes
 - Current design: reuse MTR+SR with necessary extensions
 - Mechanism applicable to both SR-MPLS and SRv6

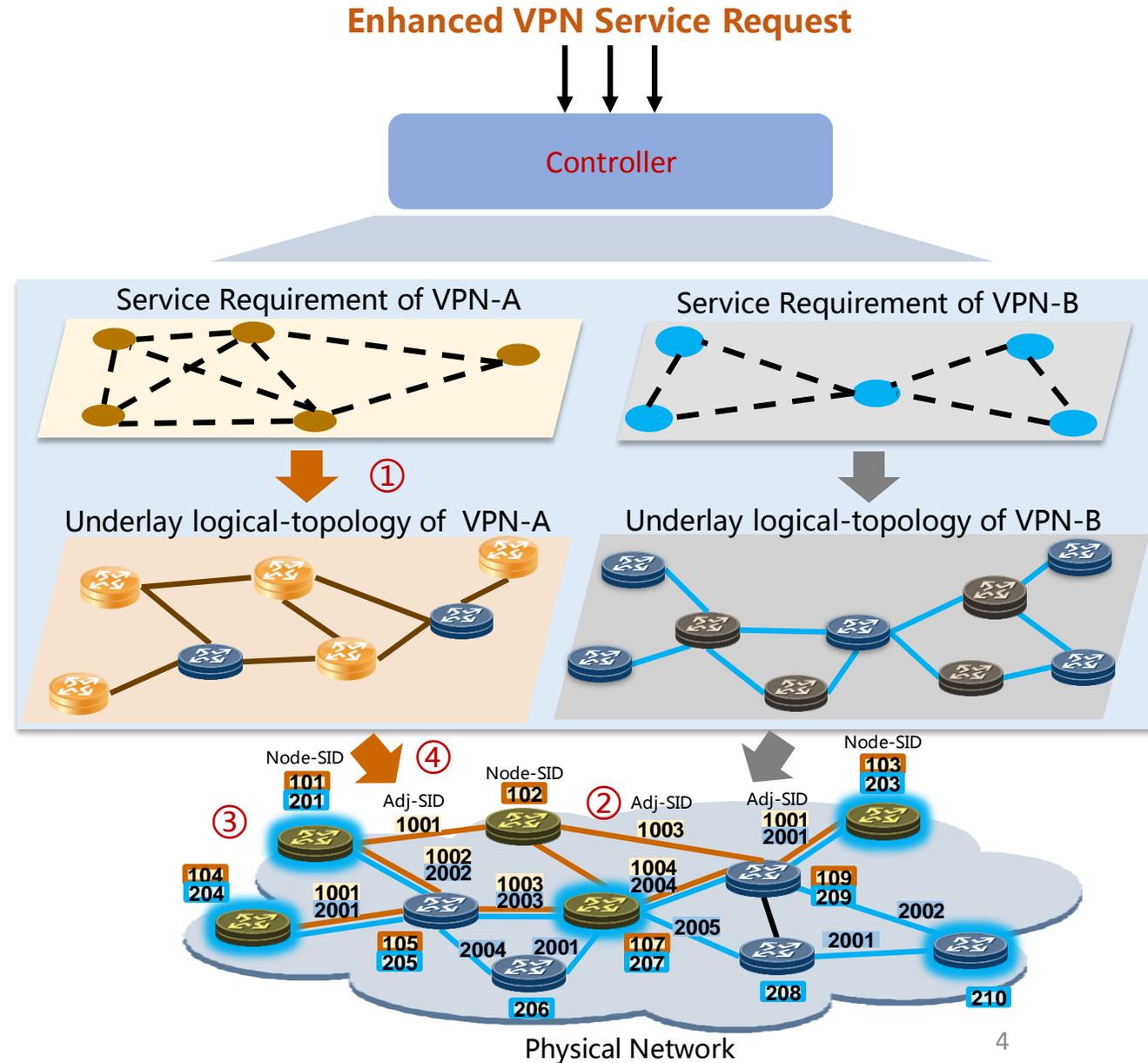
Extend SR for Resource Identification

- Dedicated adj/node-SIDs represent partitioned resources of each link/node
- SIDs associate with virtual networks (network slice)
- Different groups of SIDs construct resource isolated SR virtual networks



Overall Mechanism

- Controller maintains underlay network states and receives service request
 - Controller computes the logical topology and the resources need to allocate
 - Nodes allocate the resources and the associated adj/node SIDs for the logical topology
- IGP is used to distribute the mapping between (SID, resource, logical topology)
 - Used to build SR forwarding entries for each logical topology



MTR and SR

- MTR was designed to create multiple logical topologies
 - Limited use cases: IPv4/IPv6 topology, unicast/multicast topology
 - Limitation in data plane forwarding
 - Does not support sharing of link/IP address between topologies
- MTR with SR
 - MTR is supported in the IGP extensions for SR-MPLS
 - Allows distribution of topology-specific adj-SIDs and node-SIDs
 - Multiple topologies can be enabled with the same interface/IP address
 - Adj-SIDs as discriminator of different topologies on the same link
 - Node-SIDs as discriminator of different topologies on the same node
- However, neither MTR nor SR support resource isolation/identification
 - SR needs to be extended to identify the forwarding resources allocated

Proposed Mechanism

- MT + SR + Resource Identification
 - Node/interface participates in multiple logical topologies
 - Node/interface resources are partitioned and allocated to each topology
 - Each partition of resource is associated with the adj-SIDs/node-SIDs allocated for a particular topology
 - These SIDs are used to constrain the traffic to the allocated resources
 - Advertise the mapping between (SID, allocated resource) in each topology
 - Support both strict and loose SR path forwarding with topology constraints

Proposed Extensions (IS-IS based)

- SR bandwidth Sub-TLV
 - Describe the link bandwidth associated with a particular adj-SID, for the use in a particular topology
 - Can appear in IS-IS TLV 22, 23, 141, 222, 223
- Multi-topology support in SRv6
 - This document proposes a new MT-ID sub-TLV under the SRv6 node-SID TLV
 - The newly updated draft-bashandy-isis-srv6-extensions-03 also introduces the support of multi-topology with SRv6

Next Steps

- Solicit feedbacks on the proposed IS-IS extensions for enhanced VPN/network slicing
- Extend this work to OSPF

Thank You

Backup Slides

Relationship with SR Flex-Algo

- SR Flex-Algo is topology independent
 - Used for distributed computation of different paths for different services types
 - Network resource is shared by all Flex-Algo
- Multiple SR algorithms/Flex-Algos may be used within a topology