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

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

Jie Dong, Stewart Bryant @Huawei

LSR @ IETF 102, Montreal

Background

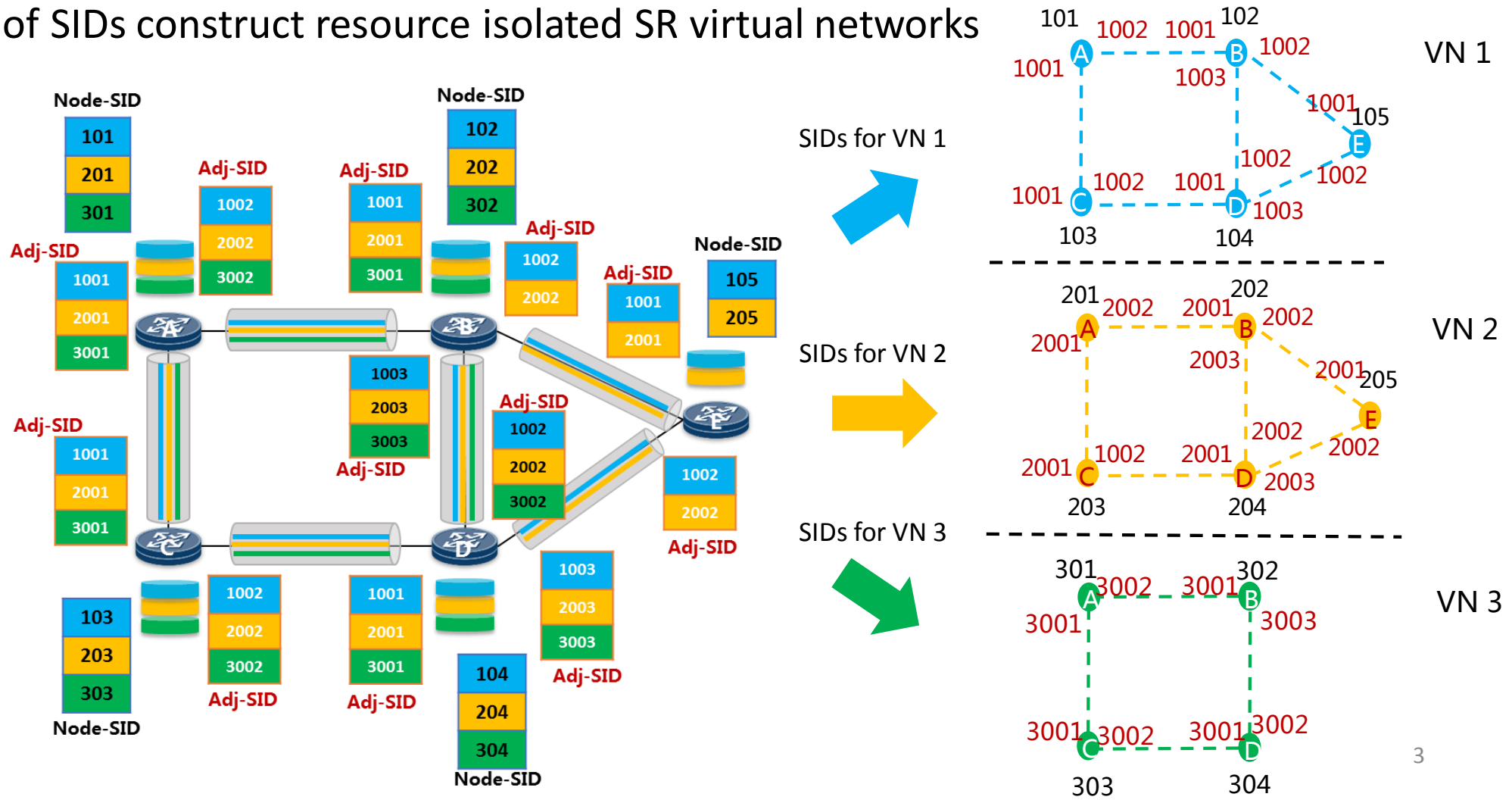
- Enhanced VPN framework is defined in *draft-dong-teas-enhanced-vpn*
  - To meet the requirements of network slicing and similar scenarios
  - Architecture and candidate technologies for resource isolation and integration
  - Will be presented in TEAS on Wednesday

- 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

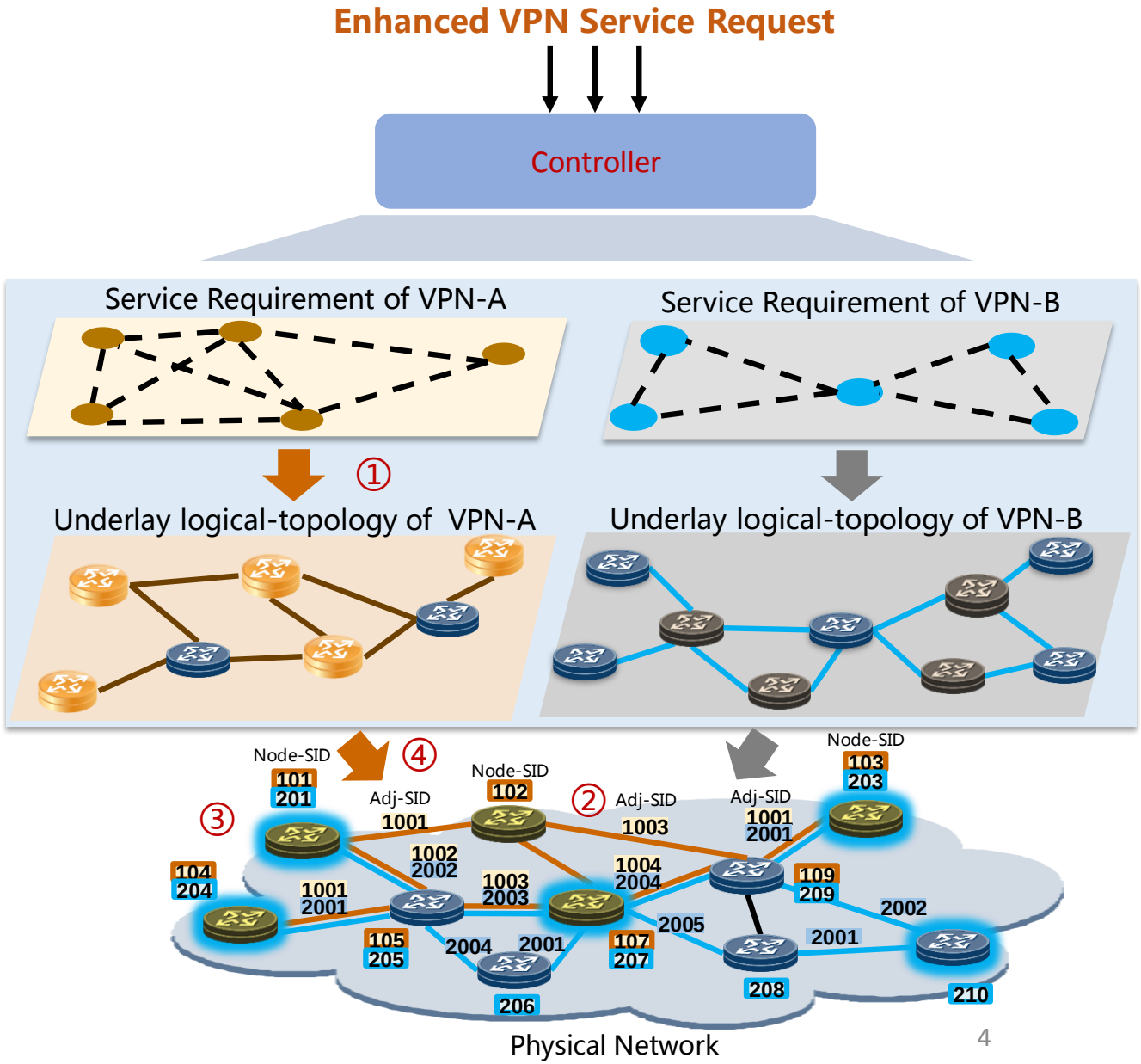
Extend SR for Resource Identification

- 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