Carrying VTN-ID in IPv6 Extension Header

draft-dong-6man-enhanced-vpn-vtn-id-04

Jie Dong, Zhenbin Li @Huawei

Chongfeng Xie, Chenhao Ma @China Telecom

Gyan Mishra @Verizon

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Background

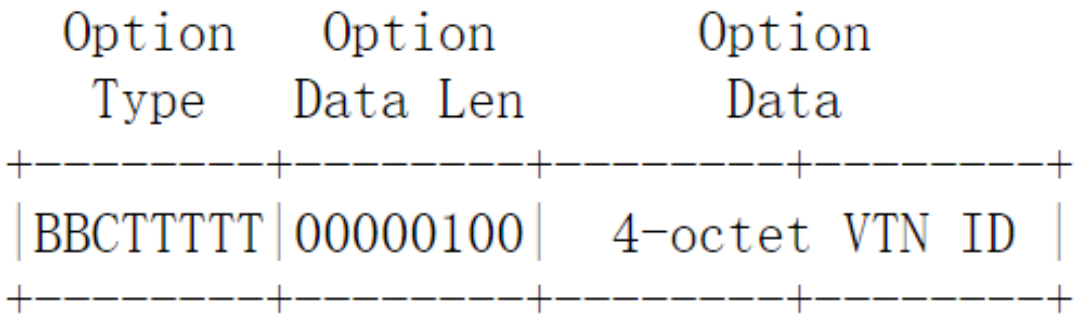
- A VTN is a virtual underlay network with the topology and network resources required by one or a group of services
  - Introduced in *draft-ietf-teas-enhanced-vpn*
- The identifier of the VTN needs to be carried in data packet
  - To steer packet to use the set of network resource allocated to the VTN for packet processing
  - The VTN information needs to be parsed on each hop along the path in packet forwarding
- This document proposes a mechanism to carry VTN information in IPv6 HBH extension header
  - Applicable to both IPv6 and SRv6 networks

Options of Carrying VTN information in IPv6 Packet

- IPv6 destination address
  - Used to determine the next-hop and outgoing interface
  - Need to allocate different IPv6 addresses/SRv6 SIDs per node per VTN
    - May increase the complexity of address management and the amount of forwarding entries
- Traffic Class
  - Used for Diff-Serv QoS treatment and ECN
  - May be used to further specify different traffic classes within a VTN
- Flow label
  - Used for load distribution across ECMP or LAG paths
  - Only limited number of bits may be borrowed for other use
- IPv6 HBH header
  - Designed for per-hop processing in packet forwarding
  - A new option type can be defined to carry VTN information

Proposed Mechanism

- A new HBH option type is defined to carry VTN ID in HBH extension header



- **BB**: set to 00, if unrecognized, skip and continue processing
- **C**: set to 0, can not change en route
- **VTN ID**: 4-octet identifier of a VTN
  - match the length of 5G network slice ID (S-NSSAI) defined in 3GPP

Procedures

- Based on the classification/mapping policy, the ingress node of IPv6 domain encapsulates a data packet with an outer IPv6 header, in which the VTN option carries the VTN-ID the packet maps to
- On each node along the forwarding path which can parse the VTN option
  - IPv6 destination address is used to determine the next-hop and the outgoing interface
  - VTN-ID in the VTN option is used to further determine the set of local resources allocated on the outgoing interface for processing and sending the packets of the VTN
  - Traffic Class may be used to provide Diff-Serv treatment for packets of the same VTN
- The egress node of IPv6 domain decapsulates the outer IPv6 header, including the VTN option in the HBH header

Updates in -03/04 version

- Gyan Mishra joined as co-author
- Clarifies that the VTN option is a Hop-by-Hop option
- Clarifies the packet forwarding procedure
  - VTN ID is only used to determine the local resources for packet processing
    - Perhaps it could be renamed “VTN resource ID” to better reflect this
- The operational considerations section is updated
  - Add reference to draft-hinden-6man-hbh-processing
  - The nodes involved in a VTN should either process the HBH header in fast path, or ignore the HBH header

Next Steps

- This document proposes a HBH option for per-hop forwarding treatment
- The content of the document has become stable
- Does this work belong to 6man?
- WG adoption?

Thank You