Carrying VTN-ID in IPv6 Extension Header

draft-dong-6man-enhanced-vpn-vtn-id-02

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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

- The information of the associated VTN needs to be carried in data packet
  - To steer packet to the set of local network resource allocated to the VTN for packet processing
  - The VTN information needs to be processed on each hop along the path in packet forwarding

- This document proposes a mechanism to carry VTN information in IPv6 extension headers
  - Applicable to both IPv6 and SRv6 networks
Options of Carrying VTN ID in IPv6 Packet

- IPv6 destination address
  - Need to allocate different IPv6 addresses/SRv6 SIDs per node per VTN
    - May increase complexity in address management, and the amount of forwarding entries

- Traffic Class
  - Designed for differentiated QoS treatment and ECN
  - Value of the TC bits may be changed during packet forwarding
  - Within a VTN, may still need to use TC to specify different traffic classes

- Flow label
  - Designed for load distribution among ECMP paths or LAGs
  - While the steering of packet to VTN-specific resource needs to be deterministic

- Extension headers
  - Can be processed hop-by-hop in data plane (HBH options header)
  - A dedicated option type can be defined to carry VTN information
Mechanisms in this draft

- A new IPv6 option type is defined to carry VTN ID

```
+-----------------+----------------+-----------------+
| Option Type     | Option Data Len| Option Data     |
+-----------------+----------------+-----------------+
| BBCTTTTTT | 00000100 | 4-octet VTN ID |
```

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

- The VTN option SHOULD be carried in IPv6 Hop-by-Hop options header
  - Per-hop forwarding behavior is based on both the destination IP and the VTN option
Updates in -02 version

• Clarify that HBH options header is used to carry the VTN option
  • The VTN ID needs to be processed on each hop along the path

• Remove the reference to RFC 8754 (SRH)
  • The processing of VTN option is independent from SRH

• Update the operational considerations
  • The processing behavior of network nodes on HBH header needs to be considered
  • VTN option SHOULD either be processed or ignored in packet forwarding
  • Need to avoid packet drop due to the existence of HBH header
Next Steps

• Comments and feedbacks are welcome

• Revise the draft accordingly
Thank You