

# Carrying VTN Information in IPv6 Extension Header

*draft-ietf-6man-enhanced-vpn-vtn-id-02*

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# Background and Current Status

- This document introduces a new IPv6 HBH option to carry VTN information in IPv6 packets
  - Used by network nodes to identify the VTN a packet belongs to
  - So that VTN specific processing and forwarding can be performed on the packet by every transit node
- The VTN option can be used to support IETF network slices, and could also be used in other scenarios
  - One basic semantic of VTN is a set of network resources allocated in the underlay
  - The term VTN is generic to cover various aspects of a virtual underlay network
- It seems there are interests in the generalization of the VTN option
  - A new section “Considerations about Generalization” is added in the latest (-02) version

# Generalization of IETF Network Slice

- In TEAS WG, draft-li-teas-generalized-ietf-network-slicing discusses the generalization of the concept IETF network slice and NRP
  - IETF network slice can be applied not only in carrier network, but can also be introduced to data centers and campus networks
  - NRP is currently defined as a collection of network resources
  - While NRP can also be associated with other network attributes, e.g. topology and network functions
  - An NRP may be used to support different types of slice connectivity constructs
- That discussion can also have impact to the generalization of VTN option for IPv6

# Generalization of the VTN Semantics (1)

- A virtual network which is associated with a set of **network-wide attributes** and states maintained on the participating network nodes
  - Network resource attributes
    - link bandwidth, bufferage and queueing resources, etc.
  - Network topology attributes
    - P2P, P2MP, MP2P, MP2MP
  - Network function attributes
    - Both packet forwarding actions and other types of network actions
- It is important to identify the boundary of generalization
  - An attribute of VTN needs to be network-wide rather than node-specific

# Generalization of the VTN Semantics (2)

- Topology ID
  - Currently described in draft-li-6man-topology-id
  - If VTN can also include topology attribute, maybe dedicated Topology ID is not necessary?
  - The question is whether it can be used to represent logical topology without network resources (non-NRP case)
- Path ID
  - Currently defined in draft-ietf-spring-path-segment for SR networks
  - For P2P slice connectivity constructs, a VTN can be instantiated as a path
  - While for semantics consistency among P2P, P2MP, MP2MP connectivity, the VTN ID is considered different from a Path ID
- Multiple VTN IDs
  - Currently described in draft-li-6man-e2e-ietf-network-slicing
  - Global VTN ID and intra-domain VTN ID has different scope in IETF network slicing, they may need to be defined as separate identifiers

# Generalization in VTN Option Encoding

- The current format of VTN option leaves room for future extensions
  - Flags field: can be used to indicate the semantics of the ID or additional forwarding behavior
  - Reserved field: May be used to carry additional ID or information
  - ID field: The length could be variable according to the flags and reserved field
    - While fixed length is recommended to facilitate hardware process
- VTN option needs to be processed in the fast path
  - The capability of network devices need to be considered when new extensions are introduced
  - Suggests to follow the guidelines in draft-ietf-6man-hbh-processing

# Next Steps

- Collect feedbacks from WG
- Produce a stable base document to facilitate the implementation and inter-operation for IETF network slicing
- Merge draft-li-6man-topology-id into draft-ietf-6man-enhanced-vpn-vtn-id?
- Leave the mechanisms for end-to-end IETF network slicing in draft-li-6man-e2e-ietf-network-slicing
  - Need to reach consensus on the solution first
- Future extensions can be done according to the use cases and requirements

Thank You