NVGRE and VXLAN Encapsulation for L3VPN Extension

draft-yong-l3vpn-nvgre-vxlan-encap-00

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Problem Statement

• Both NVGRE (draft-sridharan-virtualization-nvgre-01) and VXLAN (draft-mahalingam-dutt-dcops-vxlan-02) are originally specified for layer 2 vitalization overlay data encapsulation

• Several drafts propose to extend L3VPN into Data Center as layer 3 virtualization overlay
  – draft-fang-l3vpn-end-system-requirements-01
  – draft-fang-l3vpn-virtual-pe-framework-01
  – draft-drao-bgp-l3vpn-virtual-network-overlays-00
  – draft-fang-l3vpn-virtual-pe-01
  – draft-rfernando-l3vpn-service-chaining-01

• The above drafts also suggest using existing NVGRE or VXLAN data formats for layer 3 virtualization overlay beside MPLS based solution
  – carry an unnecessary inner Ethernet header per packet
  – an L3 overlay edge may interwork with an L2 overlay edge directly, where it prunes an error easily
About this draft

• Propose NVGRE enhancement for L3 virtualization overlay data encapsulation
• Propose VXLAN enhancement for L3 virtualization overlay data encapsulation
NVGRE Enhancement

• Proposed 0x0800 as the protocol type for IP payload
  – 0x6558 is the protocol type for Ethernet payload [NVGRE]
  – the version field in inner IP header can further differentiate IPv4 or IPv6 payload

• No change to other fields in NVGRE header
  – The usage of other field remains the same too

• No change to outer header

• Only IP header in the inner header if the protocol type value is 0x0800

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
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VXLAN Enhancement

- 16 reserved bits in VXLAN header as protocol type field
  - Specify 0x0800 for IP payload and 0x6558 as Ethernet payload
  - To support backward compatibility, value 0x0000 is also for Ethernet payload

- No change to other fields in VXLAN header
  - The usage of other fields remains the same too

- No change to outer header

- Inner header may be Ethernet or IP depending on the value in protocol type

| VXLAN Header: | +--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------+--------|
Benefit of the Enhancements

- Maintain L3VPN implementation natively and decouple it completely from L2 overlay implementation
- Interwork with existing L3VPN customers
- Seamless support L2 and L3 overlay interworking
- BGP control plane works consistently with the data plane in term of multi-protocols support
  - the inner header on a data packet matches the address family being advertised by BGP
- Save 14 bytes in each packet for a native L3 overlay
  - lower the probability of the packet fragmentation
  - eliminate the unnecessary packet process
Next Step

- Welcome comment and feedback on this
- Update the draft