NVGRE and VXLAN Encapsulation for L3 Overlay

draft-yong-l3vpn-nvgre-vxlan-encap-03

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Nov. 2013   Vancouver BC

Problem Statement

• Both NVGRE (draft-sridharan-virtualization-nvgre-03) and VXLAN (draft-mahalingam-dutt-dcops-vxlan-05) are originally specified for L2 vitalization overlay data encapsulation

• Network Virtualization Overlay (NVO3) states the need of the L2 and L3 virtualization overlays

• Simple NVGRE and VXLAN enhancement can achieve the L3 virtualization overlay

About this draft

- Propose NVGRE enhancement for L3 virtualization overlay data encapsulation

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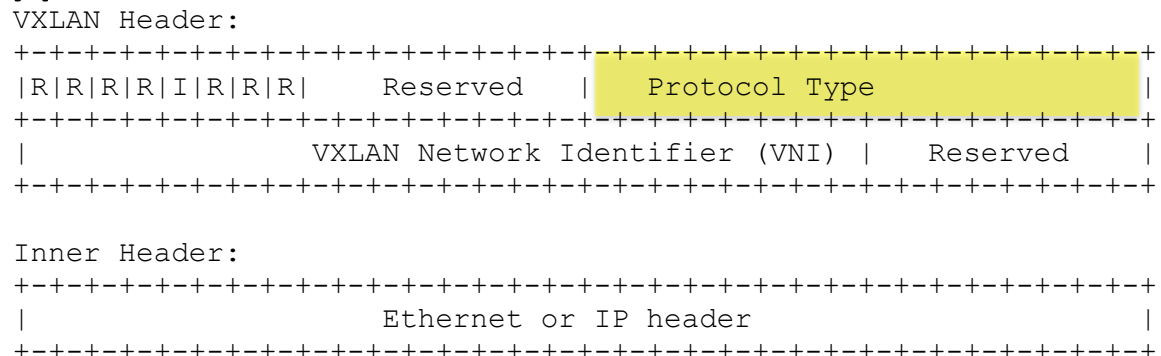
NVGRE Enhancement

- Propose 0x0800/0x86dd as the protocol type for IPv4/v6 payload in NVGRE header

  – 0x6558 is the protocol type for Ethernet payload [NVGRE]

- No change to other fields in NVGRE header

  – The usage of other fields remains the same too

- No change to outer header

- MUST be IP payload in the inner header if 0x800/086dd in the protocol type

```
GRE Header:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|0| |1|0|  Reserved         | Ver | Prot Type=0x6558/0x0800/0x86dd|
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|              Virtual Subnet ID (VSID)        |    Reserved   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
Inner Header
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                     IP Header                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

VXLAN Enhancement

- Use 16 reserved bits in VXLAN header as protocol type field
  - 0x0800/0x86dd for IPv4/v6 payload and 0x6558 as Ethernet payload
  - For the backward compatibility, value 0x0000 is treated as 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:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|R|R|R|R|I|R|R|R|      Reserved      |        Protocol Type        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                VXLAN Network Identifier (VNI) |   Reserved    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+

Inner Header:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                  Ethernet or IP header                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Others in Draft

- Backward compatibility in both methods
  - i.e. if tunnel egress only supports original method
- Benefit of these enhancements
  - Enable both encapsulation methods to support L3 virtualization overlay
  - To be a generalized network virtualization overlay data plane encapsulation format
    - The application for other payload type is for future study

Open Discussion

- Do we need two network virtualization overlay data encapsulation methods?
  - This draft and draft-yong-tsvwg-gre-in-udp make the enhanced NVGRE and VXLAN encapsulations very similar in the formats, the difference between two:
    - Use different standard UDP port number
    - Use different bit (3 or 5) to indicate overlay header existence

- Should IETF standardizes one or both?
  - √ One: no need interworking or supporting both
  - √ Both: used in industry already, if two are very similar, hardware supports both at no cost

Next Step

- Welcome comment and feedback on this
- Ready for the WG adoption