GRE-in-UDP Tunnels Discussion

draft-yong-tsvwg-gre-in-udp-4-encap-02

Edward Crabbe

Lucy Yong

Xiaohu Xu

Nov. 2013   Vancouver BC

GRE in Network Environments Today

- Increasingly common tunneling protocol

- Increasingly high traffic volumes

- Many devices unable to use GRE key field for input to LB hashing functions and

  - use GRE key field for input to LB hashing may cause a problem for some tunneled applications because of the key field usage

- High volume GRE source or GRE aggregator NEs problematic as a result

Goals

- GRE encapsulated traffic takes the ECMP capability provided in underlying network

- Make use of lowest common denominator field available as input across broad range of LB hash functions

- Provide a general purpose entropy-shim for use in a variety of environments

- minimize packet overhead

- conserve UDP ports

- Preserve GRE Key Field for other uses
  - NVGRE uses key filed for VN ID
  - Other may use key field for payload encryption

GRE-in-UDP Encapsulation

```
IPv4 Header:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Version|  IHL  |Type of Service|          Total Length         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|         Identification        |Flags|      Fragment Offset    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Time to Live |Protcol=17[UDP]|         Header Checksum       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                      Source IPv4 Address                      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    Destination IPv4 Address                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+


UDP Header:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|        Source Port = XXXX     |        Dest Port = TBD        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|           UDP Length          |         UDP Checksum          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+


GRE Header:
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|C|  |K|S| Reserved0       | Ver |         Protocol Type        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|       Checksum (optional)      |      Reserved1 (Optional)     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                         Key (optional)                        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                   Sequence Number (Optional)                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Advantages

- Works in most deployments
  - Almost all deployed NE's can use UDP src/dest as input to hash function
  - does not require support of additional excaps or signaling protocol in environments where they are otherwise not used
- Adds 16 bits of flow entropy
- Retains flexibility in use of GRE Key Field
- Minimal packet overhead
- Preserves UDP ports

Open Discussions

- Do we need two network virtualization overlay data encapsulation methods?
  - This draft and draft-yong-l3vpn-nvgre-vxlan-encap make enhanced NVGRE and VXLAN encapsulations very similar in the format, 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