GRE-in-UDP Tunnels
Discussion
draft-yong-tsvwg-gre-in-udp-4-encap-02

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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:

```
+-----------------------------------------------+
<table>
<thead>
<tr>
<th>Version</th>
<th>IHL</th>
<th>Type of Service</th>
<th>Total Length</th>
</tr>
</thead>
</table>
+-----------------------------------------------+
| Identification | Flags| Fragment Offset |
+-----------------------------------------------+
| Time to Live | Protocol=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