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# UDP Encapsulation for IP Tunneling

draft-yong-tsvwg-udp-4-ip-tunneling-01

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# Background

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- IP Infrastructure Networks carry tunneled traffic
  - Transit nodes are not aware of tunneled traffic/protocols
  - Tunneled traffic may be IP or non-IP packets
- IP Networks are built on parallelized capacity
  - Operator's desire to use all the paths carrying the tunneled traffic
- IP Networks already support ECMP and LAG
  - Hashing based load distribution is the common practice
    - IP header and TCP/UDP header are used for ECMP load distribution
    - packets with the same five tuple is carried on the same path, which ensures no packet re-ordering
    - UDP src and dst ports are used as entropy in the load distribution

# Problem Statement

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- Tunneled traffic may be carried over IP network where ECMP/LAG is required
  - To avoid tunneled flow packets re-ordering, IP network MUST keep a tunneled flow in the same path
    - The way to address this is to have an entropy field in packets for IP network with ECMP, in which a tunneled flow packets is assigned to the same entropy value
- Existing solution weakness for IP network with ECMP
  - IP-in-IP [RFC2003] does not have a place for entropy info
  - GRE [RFC2784] has an entropy field but requires transit router special processing
  - L2TPv3 [RFC3931] has the same capability and problem as GRE

# What is in this draft?

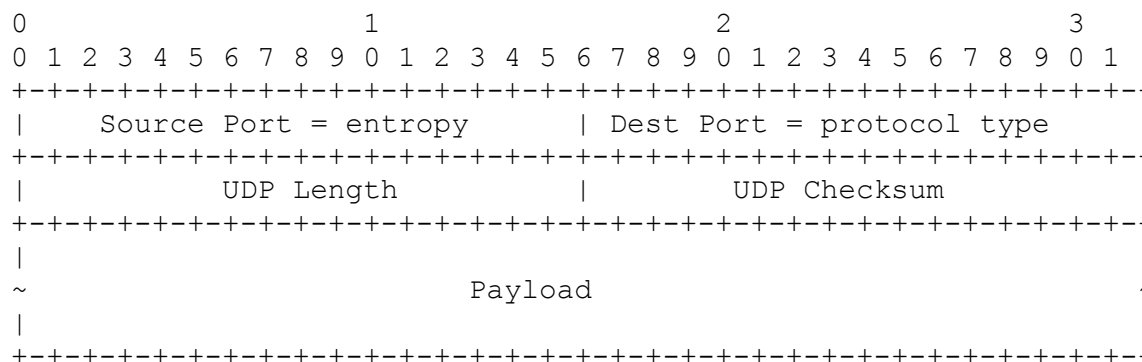
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- Specify a generic UDP encapsulation method for any tunneled layer protocol over IP networks w/ ECMP
  - Achieve it w/o any change in IP network transit nodes
    - the same LB method for both host based apps. and tunneled apps.
  - Have a flow entropy field in UDP header
    - UDP src and dst ports are commonly used as entropy in IP network
    - tunneled packets w/ the same entropy value carried through the same path in IP network
    - may map one or more tunneled flows to the same value
  - Have a way to identify tunneled protocol in the UDP header
    - needed in order to support any tunneled layer protocol
- Specify tunnel endpoint process procedures and error handling

# UDP Encapsulation for IP Tunneling

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- UDP source port is used as the flow entropy field
  - may be set to any value by the tunnel ingress
  - Varying the value according to the payload flow will enable load balancing within IP networks
- UDP destination port is set to indicate the tunneled layer protocol that is registered under IANA
- Other UDP header fields remain the same as in [RFC768]
- RECOMMEND that the UDP checksum field is set to zero.



# UDP Header Usage in this draft

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- UDP port usage here is different from before
  - Not for demultiplexing transport connection at end point
  - Nor identifying an upper layer service
- Header does not provide transport function for any upper layer application
- UDP ports are to provide flow entropy and indication of tunneled protocol type
  - the ports have been used as entropy in IP network
  - the latter is necessary for egress

*Note: VXLAN have been implemented in this way*

# Next Steps

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- Welcome comment and feedback on this
- Address comments and feedback
- Upload next version