Summary of Generalized IPv6 Tunnel (GIP6) Side Meeting at IETF116

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https://github.com/Generalized-IPv6-Tunnel/IETF116-Sidemeeting

Why Need GIP6

➢ Currently there are many types of IP tunnels, such as VXLAN and GRE. On IPv6 networks, it is hard to define extensions for all these tunnels to support new features. On the other hand it is not recommended to extend new features based on the IPv4 data plane for these tunnels

There have been many types of IP tunnels	New Features
- GRE Tunnels: defined in [RFC2784]. - IP in IP Tunnels: defined in [RFC1853]. - L2TPv3 Tunnels: defined in [RFC3931]. - ISATAP Tunnels: defined in [RFC4214]. - IPv4/IPv6 over IPv6 (4over6) Tunnels: defined in [RFC2473]. - VXLAN Tunnels: defined in [RFC7348]. - NVGRE Tunnels: defined in [RFC7637]. - MPLS over UDP: defined in [RFC7510]. - VXLAN-GPE (Generic Protocol Extension for VXLAN) Tunnels: defined in [I-D.ietf-nvo3-vxlan-gpe].	- [I-D.dong-6man-enhanced-vpn-vtn-id] defines the IPv6 encapsulation used to determine resource isolation. - [I-D.li-apn-ipv6-encap] defines the IPv6 encapsulation of an APN. - [I-D.ietf-6man-ipv6-alt-mark] defines IPv6 encapsulation for Alternate Marking. - [I-D.ietf-ippm-ioam-ipv6-options] defines IPv6 encapsulation for IOAM.

Challenges

If the existing IP tunnels need to support new features such as Alternate Marking, IOAM, resource isolation, and APN, the following problems exist:

1. **A Lot Of Standardization work:** All of the IP tunnels mentioned above need to be extended accordingly, resulting in a lot of standardization work.

2. **Functions Redundant:** IPv6 can directly support some functions of these IP tunnels which cannot be done over the IPv4. This means such functions becomes redundant over the IPv6. For example, VXLAN takes use of the UDP to support ECMP. However for the IPv6 VXLAN, the Flow Label in the IPv6 header can also be used to support ECMP.

3. **Difficult to extend based on the existing format:** Some IP tunnels such as VXLAN and GRE have their own headers. If these tunnels need to support new features over the IPv6, there will face the challenge of the choice between reusing the exiting IPv6 encapsulations for these new features based on the IPv6 extension header and define new extensions based on their own tunnel headers.

Summary

- 40+ IETFers participated in the side meeting on Tuesday morning.

- We discussed three use cases in data center network and leased line and some preliminary thoughts about the solution.

- During the meeting, we mainly discussed
  - the relationship between GIP6 and Geneve
  - considerations on whether to extend existing IP tunnels to support new functionalities based on IPv4
  - whether it makes sense for GIP6 to support MPLS
  - whether GIP6 is necessary if SRv6 is deployed to campus and data center network.

- The participants had rough consensus on the use cases.

- Welcome more contributions to the solutions from community.

Thank You

Appendix: Discussion List

- VXLAN/GRE
  - Does GIP6 make sense? Or will VxLAN define its own extensions?
  - Is it necessary to extend VxLAN to support new functionalities?

- IPv6 Transition Tunnels
  - Is there requirements on extensions?
  - There are many IPv6 transition tunnels. Whether all of them need to le extend? What is the priority?

- MPLS:
  - Is MPLS ISD/PSD late?
  - Can the existing MPLS data plane be compatible to MPLS ISD/PSD ?
  - What should we choose between MPLS ISD/PSD and GIP6 for MPLS?

- GTP(GPRS Tunnelling Protocol)
  - Take it into account?

- Open discussion
  - Opinions on convergence to GIP6?
  - Opinions on IPv4's extend to support new functionalities?
  - If SRv6 on everything, is GIP6 still required?