

# Generalized IPv6 Tunnel

draft-li-rtgwg-generalized-ipv6-tunnel-04  
draft-li-rtgwg-gip6-protocol-ext-requirements-02

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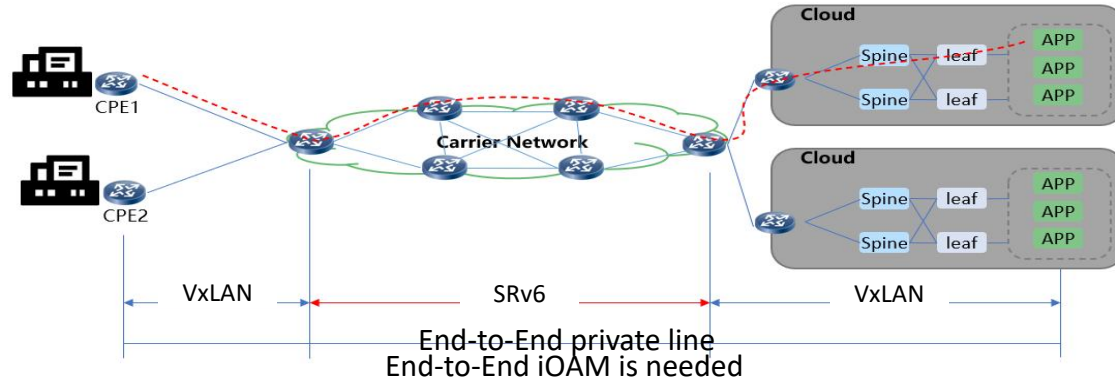
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# Reminder

- This work had some discussion in previous IETF meetings
- For this meeting, we intend to
  - Emphasize on scenarios & requirements discussion
  - and to solicit opinions of moving forward the work

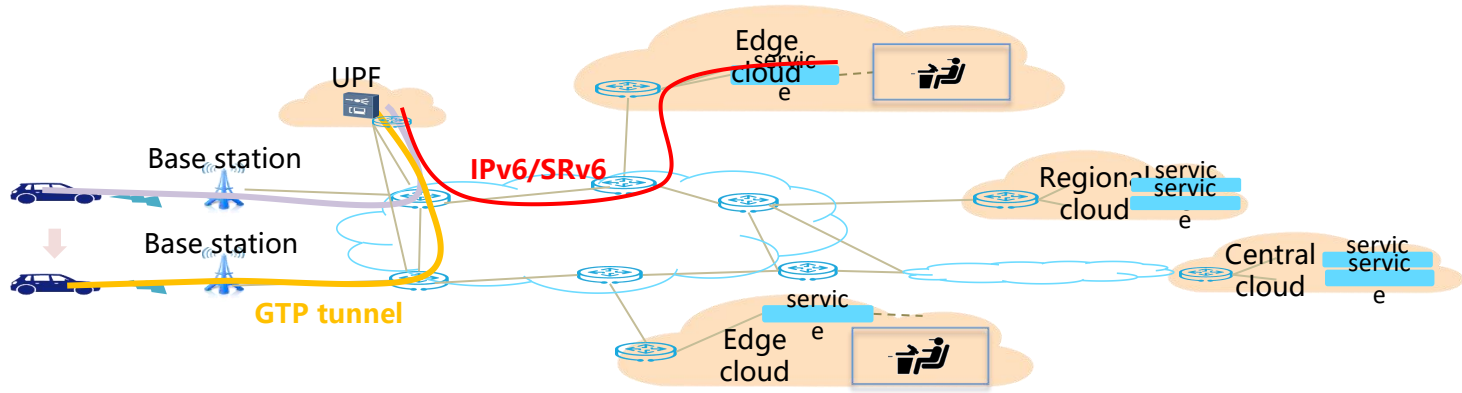
# Typical Scenario & Problems-1: Private line E2E iOAM



- **Problem:**

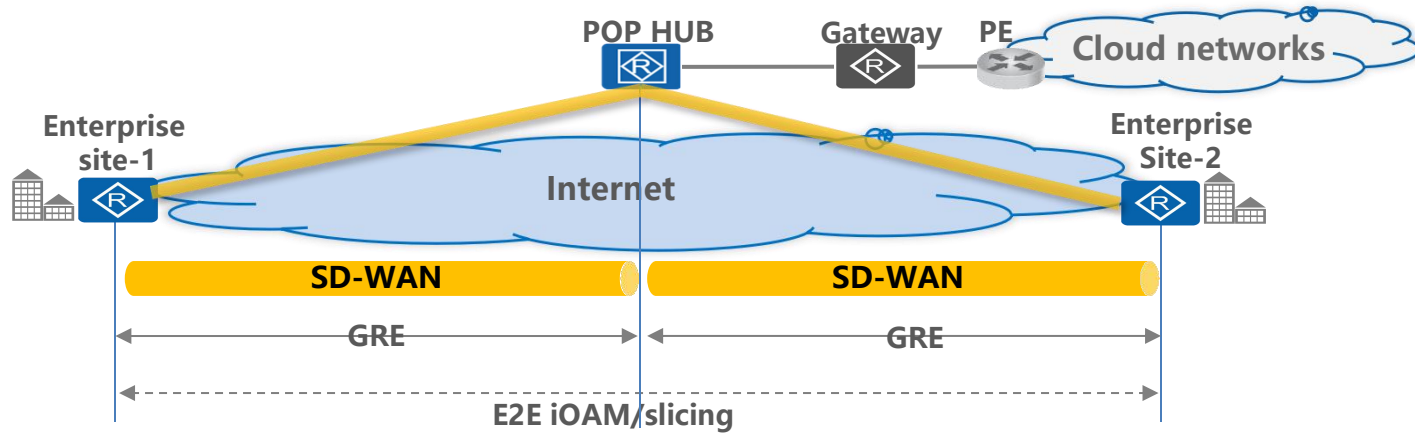
- An enterprise might need End-to-End iOAM across the whole private line (which combines WAN and the DCN) for measurement/trouble-shooting
  - Especially in SFC scenarios, a path might in/out the cloud multiple times, which makes trouble shouting extremely challenging
- WAN and DCN probably use different VPN technologies (e.g. SRv6 for WAN, VxLAN for DCN)
- The DCN segment (as well as the access segment in some cases) of the private line doesn't support iOAM due to the lack of such feature in VxLAN

## Typical Scenario & Problems-2: IoV iOAM/slicing



- Problem:
  - The IoV also needs End-to-End iOAM across the whole connection, which combines RAN and WAN for measurement and performance optimization
  - The IoV might also need network slicing to distinguish flows (e.g. media streaming flow vs. remote driving signaling flow)
  - GTP is the standard encapsulation in the RAN, while in WAN it is IPv6 or SRv6
  - The GTP tunnel doesn't support advanced features such as iOAM/slicing

# Typical Scenario & Problems-3: SD-WAN E2E iOAM/slicing

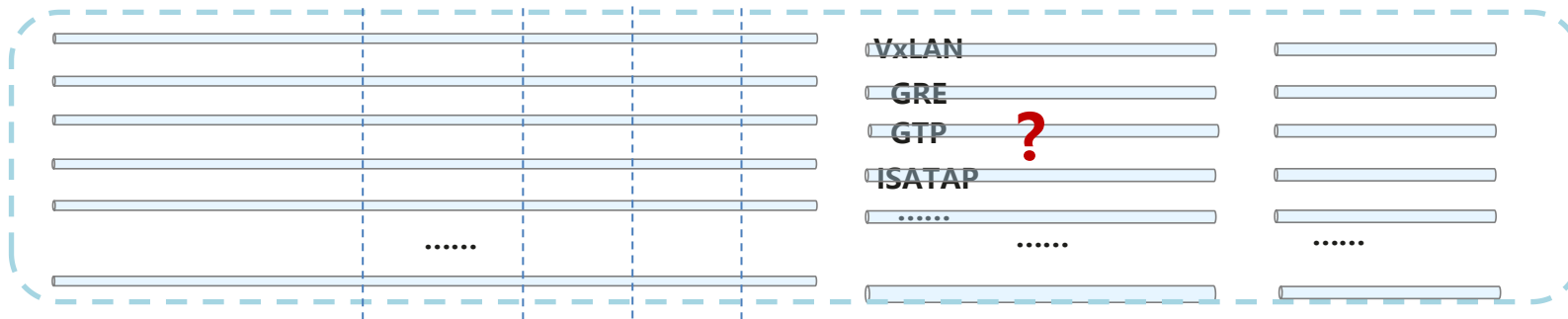


- Problem:
  - Same story, GRE (which is widely adopted in SD-WAN) doesn't support iOAM/slicing features

# Problems in summary and abstraction



New features enabled in IPv6 networks, such as iOAM/alter marking/slicing etc. ; while legacy IP tunnels don't support these features



## There has been many IP tunnels defined

- 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].

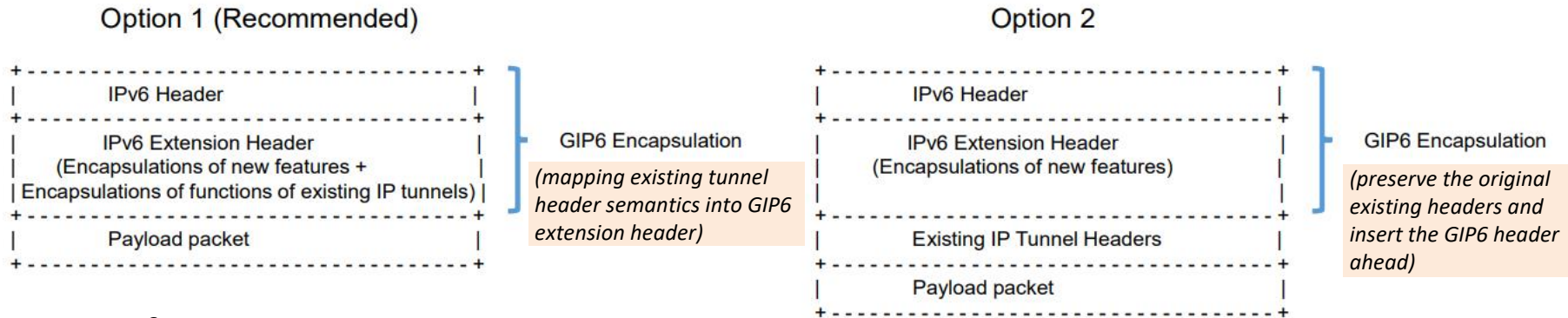


## How to enable advanced features in legacy IP tunnels?

- **Option-1:** extend all these legacy IP tunnels one by one with new features support (massive low-efficient work)
- **Option-2:** define a common IPv6-based tunnel for much better future-proof extensions?

# The proposed GIP6 Tunnel

- The GIP6 (Generalized IPv6 tunnel) is defined to use the IPv6 header and IPv6 extension header to support new features while preserving legacy IP tunnels functions.
- A GIP6 encapsulated packet has the following format:



- Benefits:
  - ✓ **Scalability:** any new functionality in the subsequent IPv6 Header extensions can be inherited by the various tunnels without having to define them separately.
  - ✓ **Efficient encapsulation:** remove duplicate fields, e.g. VxLAN tunnels can be encapsulated without UDP encapsulation
  - ✓ **Flexibility:** native compatibility with IPv6/SRv6, flexible programming of E2E paths with future new features

# Clarification & Next step

- GIP6 is not to:
  - Re-do all the work in active tunnel technologies that already support plenty of advanced features (e.g. MPLS related)
- But to:
  - Create a common future-proof vessel for scenarios that utilizing legacy IP tunnels but need to enable modern/future capabilities
- Next steps
  - Move forward the scenario & requirement work in RTGWG
    - ✓ Consider adoption of the requirement draft?
  - Encapsulation specification in 6man



Thank you!