

# TE Topology and Tunnel Modeling for Transport Networks

draft-bryskin-teas-te-topo-and-tunnel-modeling

Igor Bryskin (Huawei Technologies)

Xufeng Liu (Jabil)

Vishnu Pavan Beeram (Juniper Networks)

Tarek Saad (Cisco)

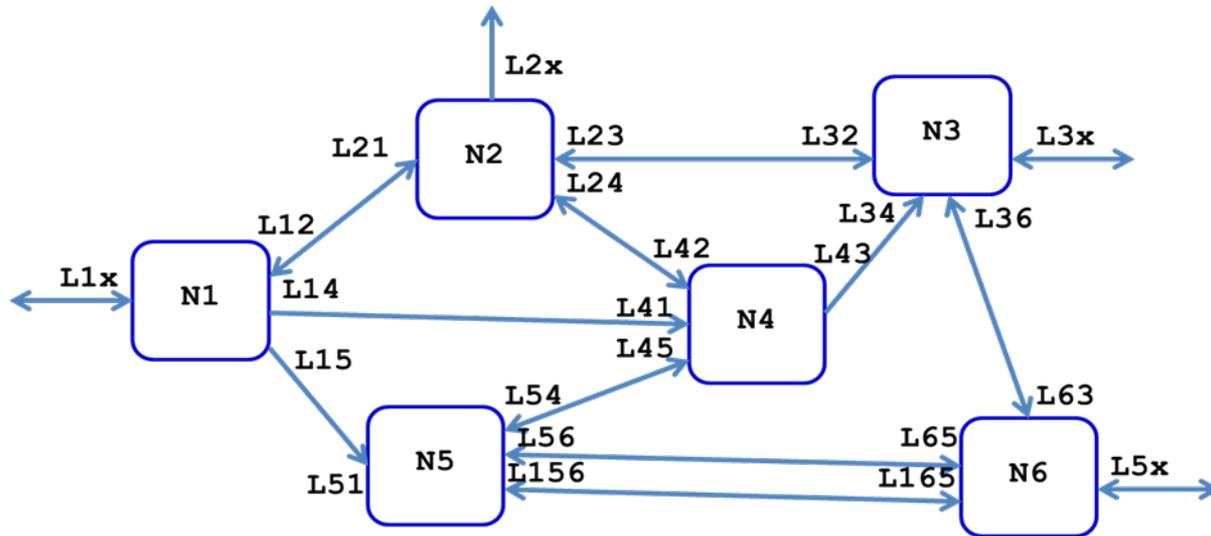
# Includes:

- TE topology modeling constructs and attributes
- TE Tunnel modeling constructs and attributes
- Use cases explaining use of TE topology and tunnel models

# Changes from IETF100 presentation

- Introduced new concepts/features:
  - shared protection
  - protection commands/actions
- On- and off-line discussions
- Editorial changes

# TE Topology Modeling

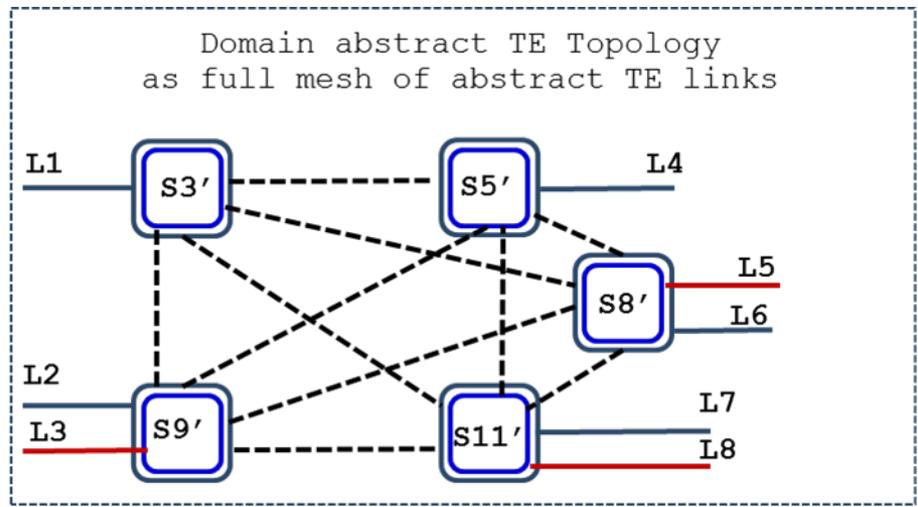
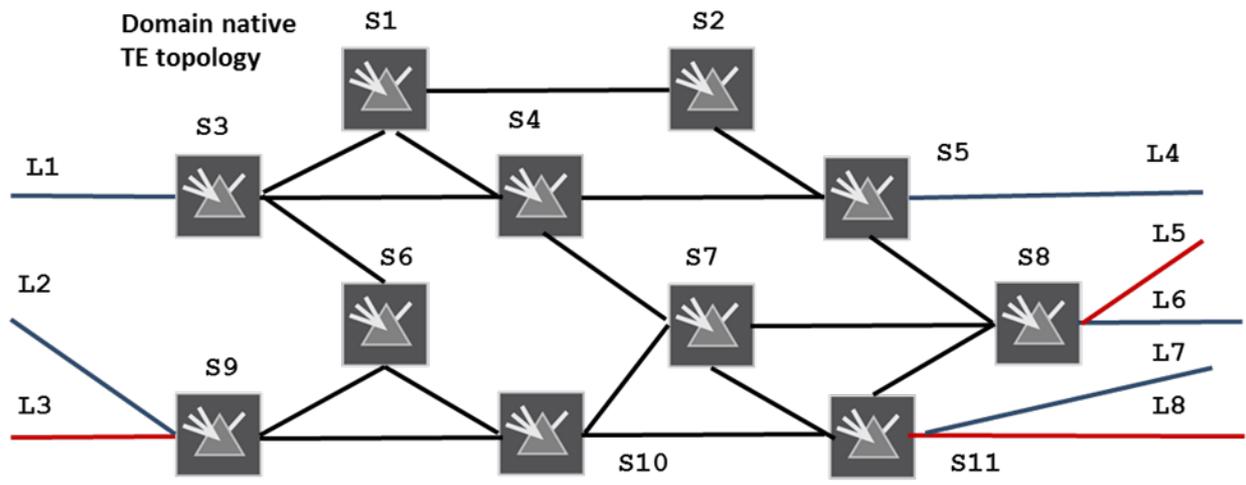


**TE topology** – traffic engineering representation of a network domain resources

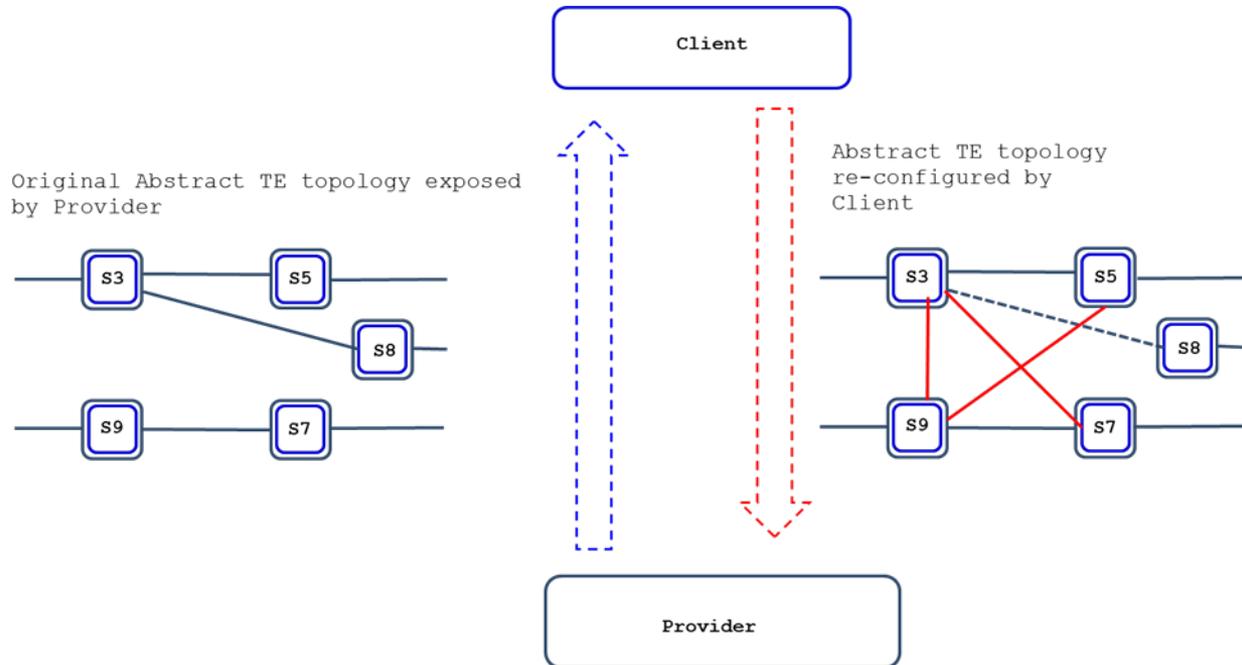
# TE Topology Elements

- **TE node** (vertex on TE topology graph)
  - represents network's flexibility (switching capabilities and limitations)
- **TE link** (edge on TE topology graph)
  - represents network's forwarding capability (bandwidth)
- **TE link termination point**
  - represents a point of connection of a TE node to one of TE links it terminates
- **TE tunnel termination point**
  - represents network's client-server layer adaptation capability

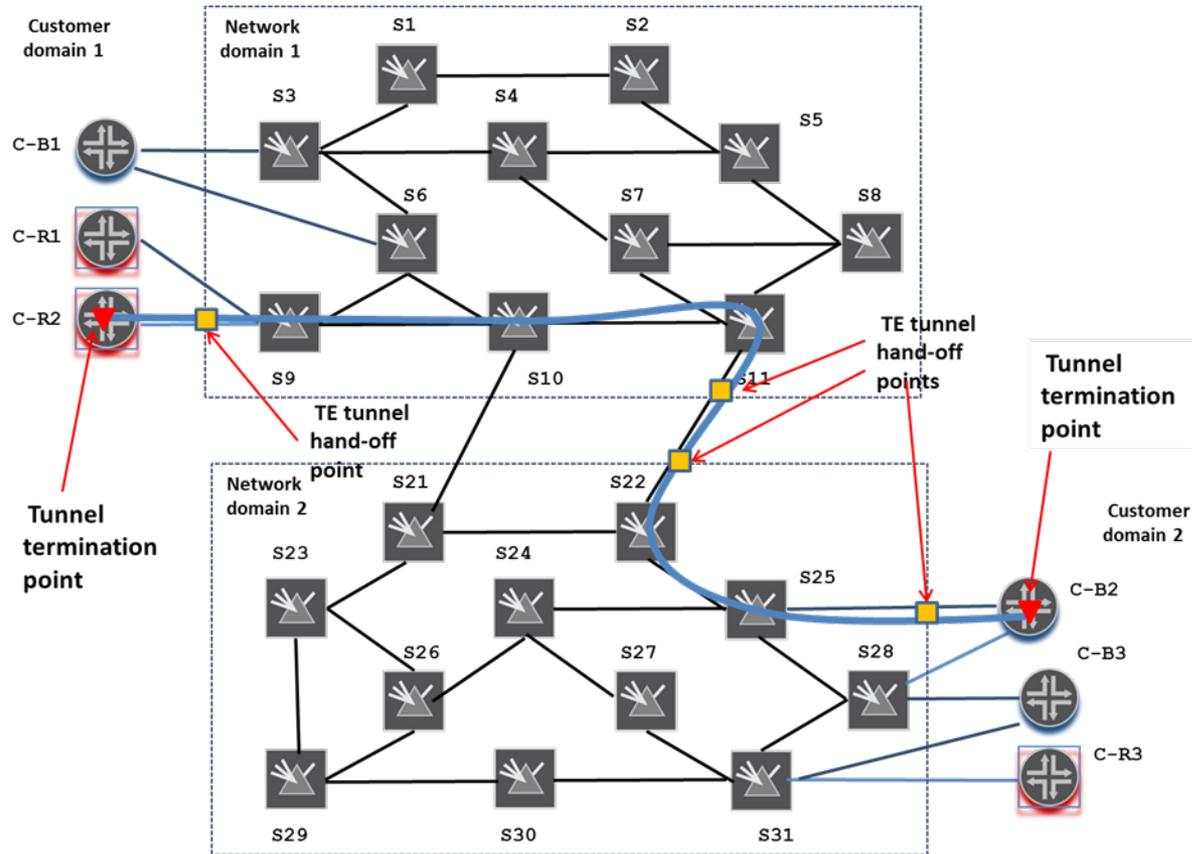
# TE Topology Types: native/abstract, underlay/overlay



# TE Topology Negotiation, Customization, (Re-)configuration



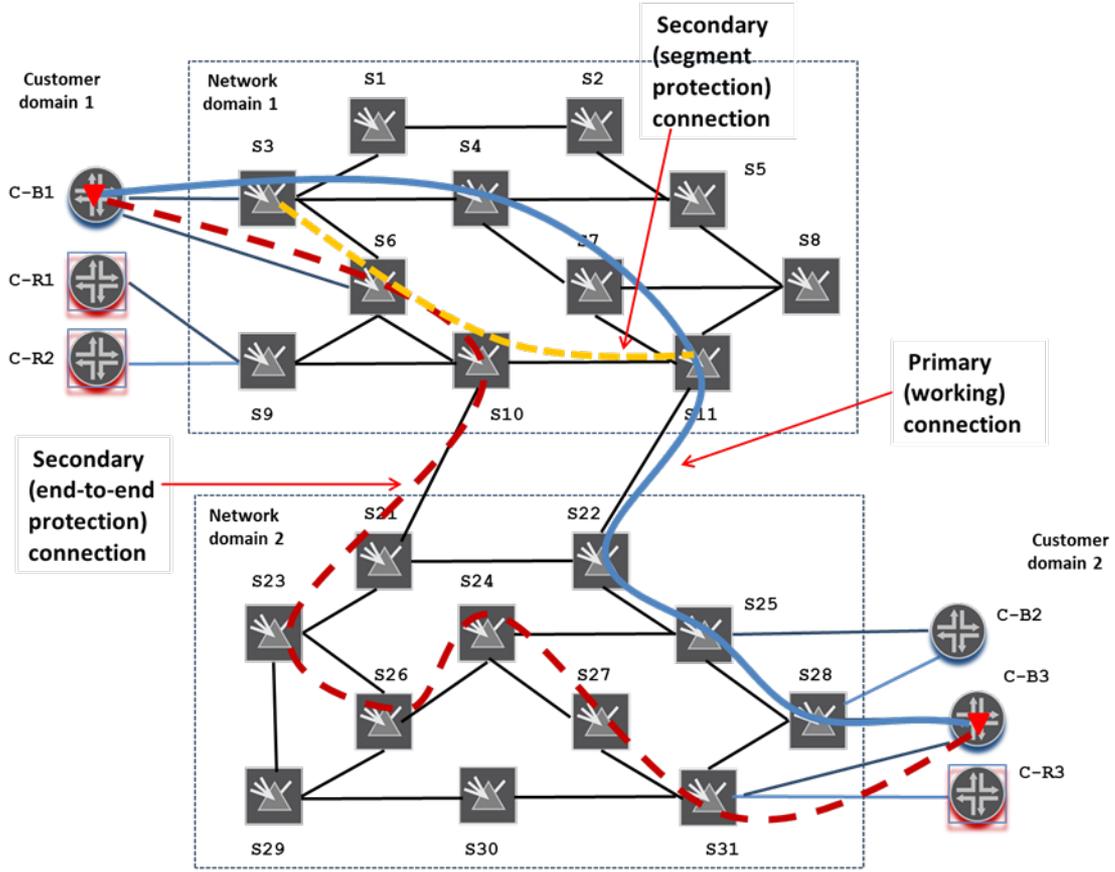
# TE Tunnel Modeling



# TE Tunnel Modeling

- **TE tunnel** - a connection-oriented service provided by a layer network of delivery of a client's data between source and destination tunnel termination points
- **Tunnel termination point (TTP)** - a physical device inside a given node/switch realizing a TE tunnel termination function in a given layer network, as well as the TE tunnel's adaptation function provided for client layer network(s)
- **TE tunnel hand-off point** - an access link or inter-domain link by which a multi-domain TE tunnel enters or exits a given network domain
- **TE tunnel segment** - a part of a multi-domain TE tunnel that spans a given network domain and is directly and fully controlled by the domain's controller
- **Hierarchy TE tunnel** - a server layer TE tunnel that supports a dynamically created TE link in the client layer network topology
- **Potential TE tunnel/segment** - a TE tunnel/segment configured in COMPUTE\_ONLY mode.

# TE Tunnel Components



# Use Cases

- **Use Case 1.** Access link to access link TE tunnel control on a single layer multi-domain transport network
- **Use Case 2.** End-to-end TE tunnel control on a single layer multi-domain transport network
- **Use Case 3.** TE Tunnel control on a ODUk/Och multi-domain transport network with Ethernet access links
- **Use Case 4.** TE Tunnel control on a ODUk/Och multi-domain transport network with multi-function access links
- **Use Case 5.** Real time updates of IP/MPLS layer TE link attributes that depend on supporting transport TE tunnel (e.g. transport SRLGs, propagation delay, etc.)
- **Use Case 6.** Virtual Network Service support

# Next steps

- Aligning with the latest TE topology and tunnel models
- Providing missing definitions and guidances
- Adding more use cases
- Soliciting more feedback from WG