# YANG Data Models for fine grain Optical Transport Network

**CCAMP WG, IETF121**

**draft-tan-ccamp-fgotn-yang-01**


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# Motivation

- ITU-T SG15 has consented fgOTN data plane standard in Dec. 2023.
- Draft for applicability of GMPLS for fine grain OTN was presented at IETF 120, and people agreed that fgOTN should be right in the scope of CCAMP. But the study on the northbound interface of fgOTN is still missing in IETF, so this draft will focus on this missing point.
- To harmonize with the existing study in CCAMP, we propose to define YANG data models augmenting to the existing topology and tunnel model for fgOTN.
- **Main changes from -00 to -01**
  - Retrieve Server Tunnel Scenario
  - Protection Scenario
  - Hitless Resizing Scenario
  - Added Xing Zhao (CAICT) as co-author

# Model Relationship

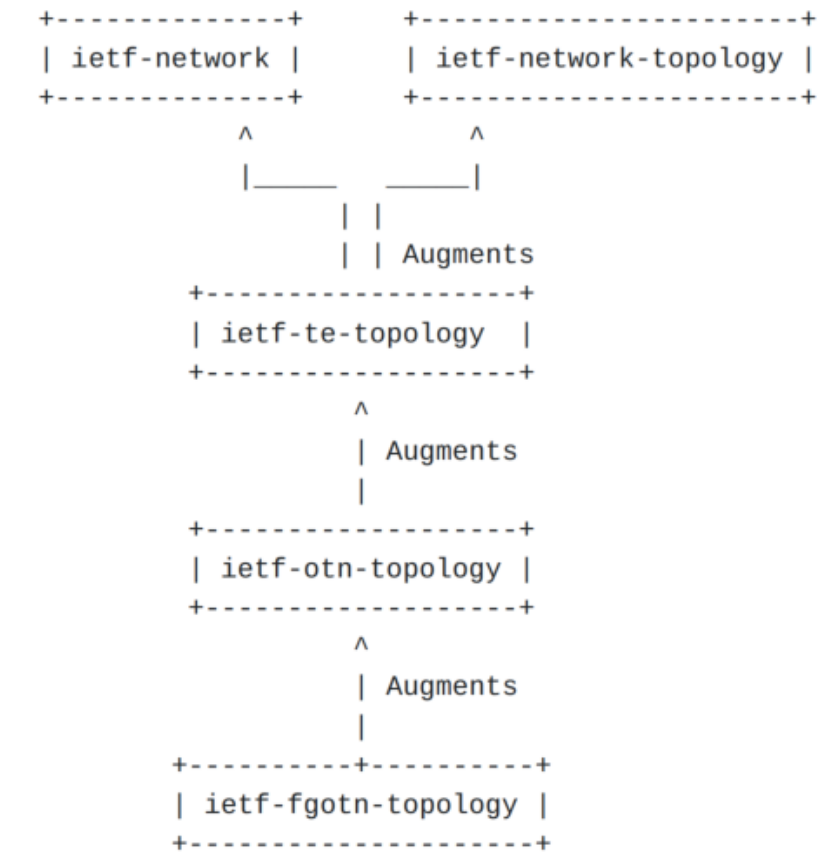



Figure 1: Relationship between fgOTN topology and OTN topology model

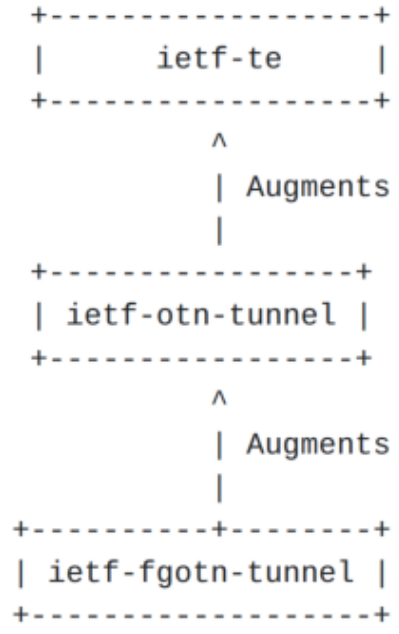



Figure 2: Relationship between fgOTN and OTN tunnel model

The YANG models presented in this document augments from OTN topology data model and OTN tunnel data model

# What to be Extended in OTN Topology YANG Model?

- Considered that ITU-T suggests to define fgOTN as a new ODU type, so we prefer not to define a new network layer for fgOTN but reuse the OTN network topology.
- An attribute to indicate whether the TP can support fgOTN

```
augment /nw:networks/nw:network/nw:node/nt:termination-point
          /tet:te:
  +--rw supported-fgotn-tp?   boolean
```

- Bandwidth Augmentation
  - max-link-bandwidth
    - If a link can support traditional OTN switching and fgOTN switching at the same time, we need to know the maximum bandwidth allocated for different switching.

```
augment /nw:networks/nw:network/nt:link/tet:te
          /tet:te-link-attributes/tet:max-link-bandwidth
          /tet:te-bandwidth/otnt:otn-bandwidth/otnt:odulist:
  +--rw fgotn-bandwidth?   string
```

# What to be Extended in OTN Topology YANG Model?

- Bandwidth Augmentation
  - unreserved-bandwidth
    - odu-type
    - odu-ts-number
    - fgotn-bandwidth

```
augment /nw:networks/nw:network/nt:link/tet:te
          /tet:te-link-attributes/tet:unreserved-bandwidth
          /tet:te-bandwidth/otnt:otn-bandwidth:
  +--rw fgotnlist* [odu-type odu-ts-number]
     +--rw odu-type           identityref
     +--rw odu-ts-number      uint16
     +--rw fgotn-bandwidth?   string
```

- Label Augmentation
  - fgOTN label specific information needs to augment to the existing OTN label-restriction structure.

```
augment /nw:networks/tet:te/tet:templates/tet:link-template
          /tet:te-link-attributes/tet:label-restrictions
          /tet:label-restriction/otnt:otn-label-range:
  +--rw fgts-range* [odu-type odu-ts-number]
     +--rw odu-type           identityref
     +--rw odu-ts-number      string
     +--rw fgts-reserved?     string
     +--rw fgts-unreserved?   string
```

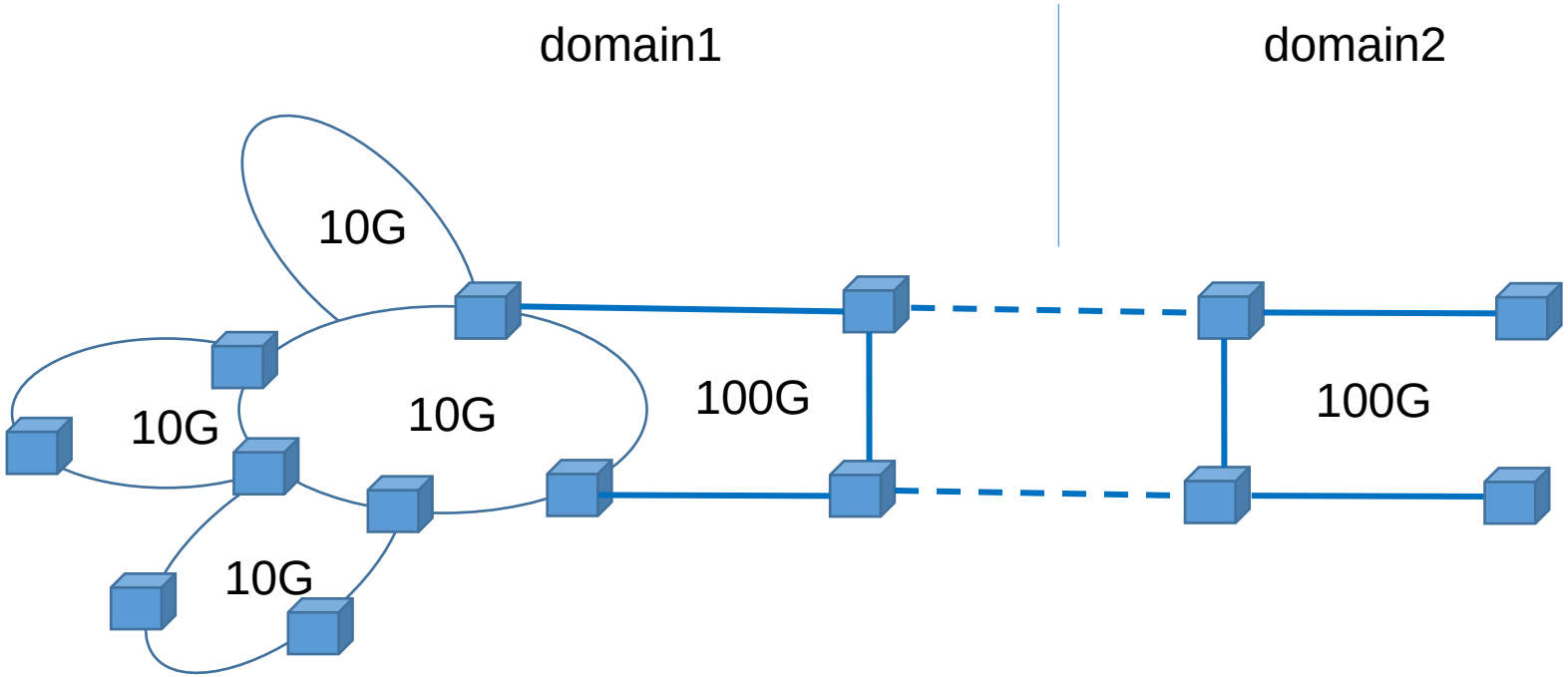
# What to be Extended in OTN Tunnel YANG Model?

- We tend to define a new layer for fgOTN tunnel (a new odu-type is needed).
- Bandwidth augmentation for fgOTN tunnel

```
augment /te:te/te:tunnels/te:tunnel/te:te-bandwidth/te:technology
          /otn-tnl:otn:
  +--rw fgoduflex-bandwidth?   string
```

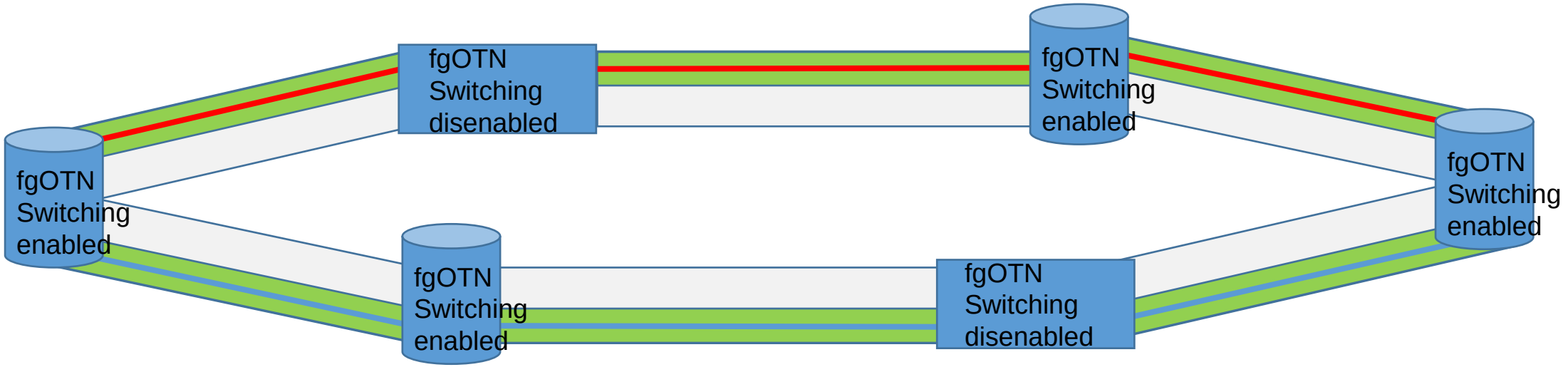
- FgOTN label (fgts-numbers) information is needed to augment to all the TE label-hop, including：
  - Explicit route objects included&excluded
  - LSP

# The Scenario to Retrieve Server Tunnels



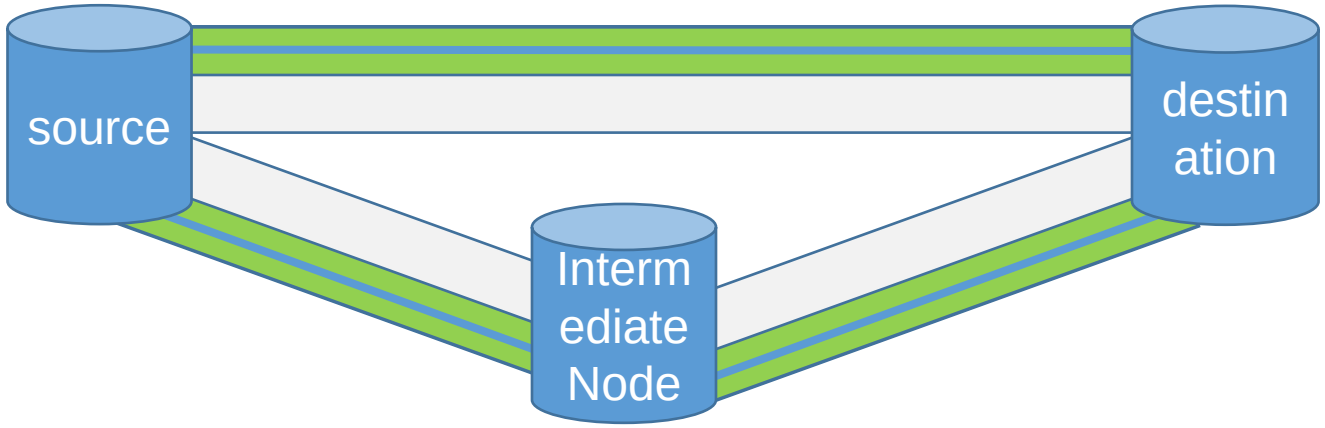

- Some small bandwidth fgOTN service are aggregated by the access ring (10G), and then aggregated into a bigger bandwidth in metro ring (100G).
- The allocation of TS maybe different in access ring and metro ring. E.g. there could be 3 timeslots allocated in the access ring while there could be 3 ODU2 are allocated in the metro ring.

# A New Protection Scenario of fgOTN




- The protection of fgOTN service should rely on the protection of fgOTN tunnel.
- The server should provide all the hops of fgOTN tunnel, if the nodes cannot support fgOTN switching, the fg-ts in the LSP can be empty.

# The Range of fgOTN service's BOD




- The range of fgOTN service's BOD cannot exceed its server layer's bandwidth;
- The client needs to know how many bandwidth of a link is allocated for fgOTN.

# Next Step

- More detail research on the fgOTN models and scenarios.
- Evaluate how to add new identities for the encoding and switching-capability defined in [I-D.ccamp-teas-te-types-update].

- Call for interest

Github: https://github.com/YuChaode/draft-tan-ccamp-fgotn-yang

Bi-weekly call will be applied after IETF121.

# Thank You