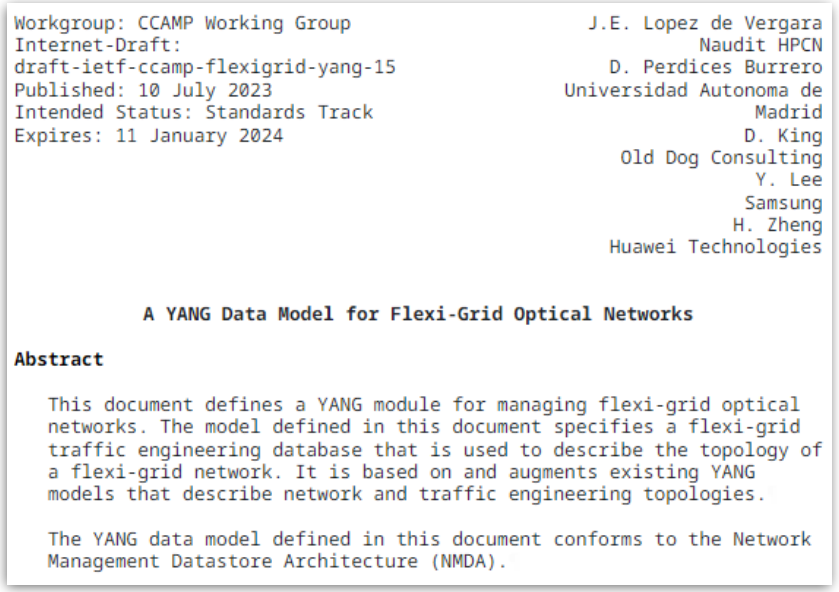
Flexi-Grid
YANG Models Update

CCAMP Working Group
IETF 117

A YANG Data Model for Flexi-Grid Optical Networks



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A YANG Data Model for Flexi-Grid Optical Networks

Abstract

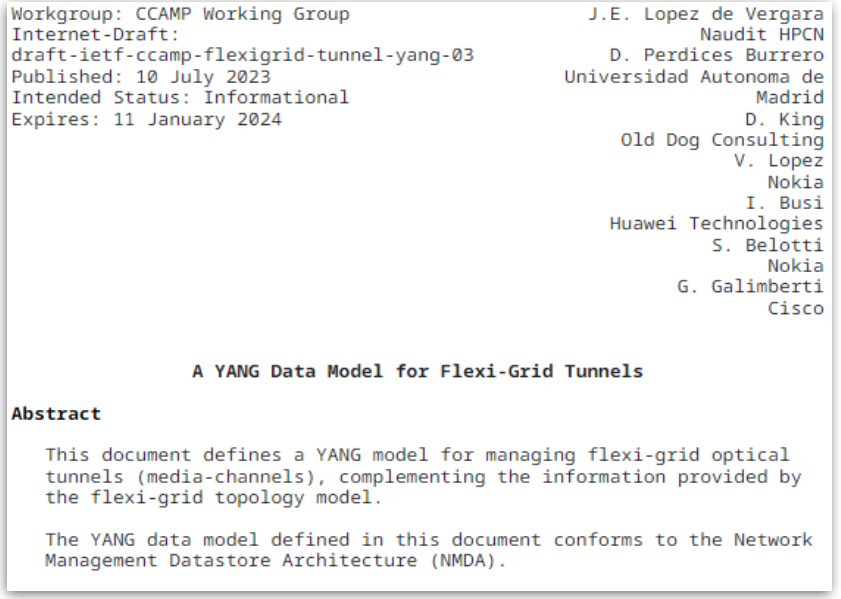
This document defines a YANG module for managing flexi-grid optical networks. The model defined in this document specifies a flexi-grid traffic engineering database that is used to describe the topology of a flexi-grid network. It is based on and augments existing YANG models that describe network and traffic engineering topologies.

The YANG data model defined in this document conforms to the Network Management Datastore Architecture (NMDA).

https://datatracker.ietf.org/doc/html/draft-ietf-ccamp-flexigrid-yang

https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-flexigrid-yang

A YANG Data Model for Flexi-Grid Tunnels



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A YANG Data Model for Flexi-Grid Tunnels

Abstract

This document defines a YANG model for managing flexi-grid optical tunnels (media-channels), complementing the information provided by the flexi-grid topology model.

The YANG data model defined in this document conforms to the Network Management Datastore Architecture (NMDA).

https://datatracker.ietf.org/doc/html/draft-ietf-ccamp-flexigrid-tunnel-yang

https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-flexigrid-tunnel-yang

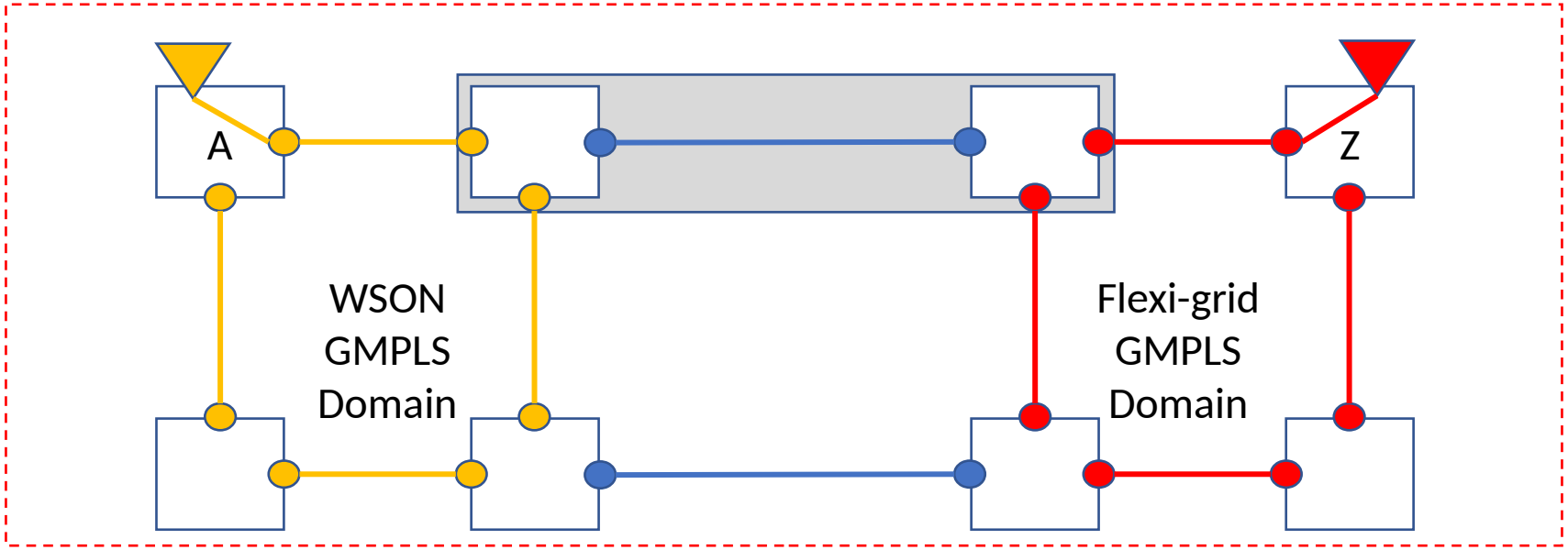
Update provided by Daniel King

Current Situation

- CCAMP YANG Topology progress has been paused while we considered the impact of multi-technology in a single instance
  - How to address the requirements and new scenarios?
  - Documents impacted
  - What do we intend to do with the affected documents?

New Requirements have Emerged

- Current optical models are single technology specific
  - WSON, Flexi-Grid, OTN, Ethernet, Et al.
- Growing requirements
  - Operators want a single model that can show multi-technology topologies
  - Previous models do not support mixed technology environments



Updates to Topo Model Provide

- Modular Optical Data Model to Support Different Technologies
  - YANG Container specifies node and link type
    - Description
    - Attributes
    - (Flexi-Grid & OTN) Label Range
    - Bandwidth
  - This modular approach would support
    - A single view of a multi-technology optical network
    - Show multi-technology information and interface association
    - Provide multiple views of multi-technology optical network

Which Documents are Affected?

- These documents have passed WG LC, but were paused for the multi-technology single instance requirement
  - YANG Data Model for Flexi-Grid Topology
    - https://datatracker.ietf.org/doc/draft-ietf-ccamp-flexigrid-yang/
  - YANG Data Model for Optical Transport Network Topology
    - https://datatracker.ietf.org/doc/draft-ietf-ccamp-otn-topo-yang/

Updated for IETF 117

- In the future we will also need to update:
  - YANG Data Model for Microwave Topology
    - https://datatracker.ietf.org/doc/draft-ietf-ccamp-mw-topo-yang/
  - YANG Data Model for Ethernet TE Topology
    - https://datatracker.ietf.org/doc/draft-ietf-ccamp-eth-client-te-topo-yang/
  - YANG Data Model for MPLS-TE (TEAS document)
    - https://datatracker.ietf.org/doc/draft-ietf-teas-yang-te-mpls/

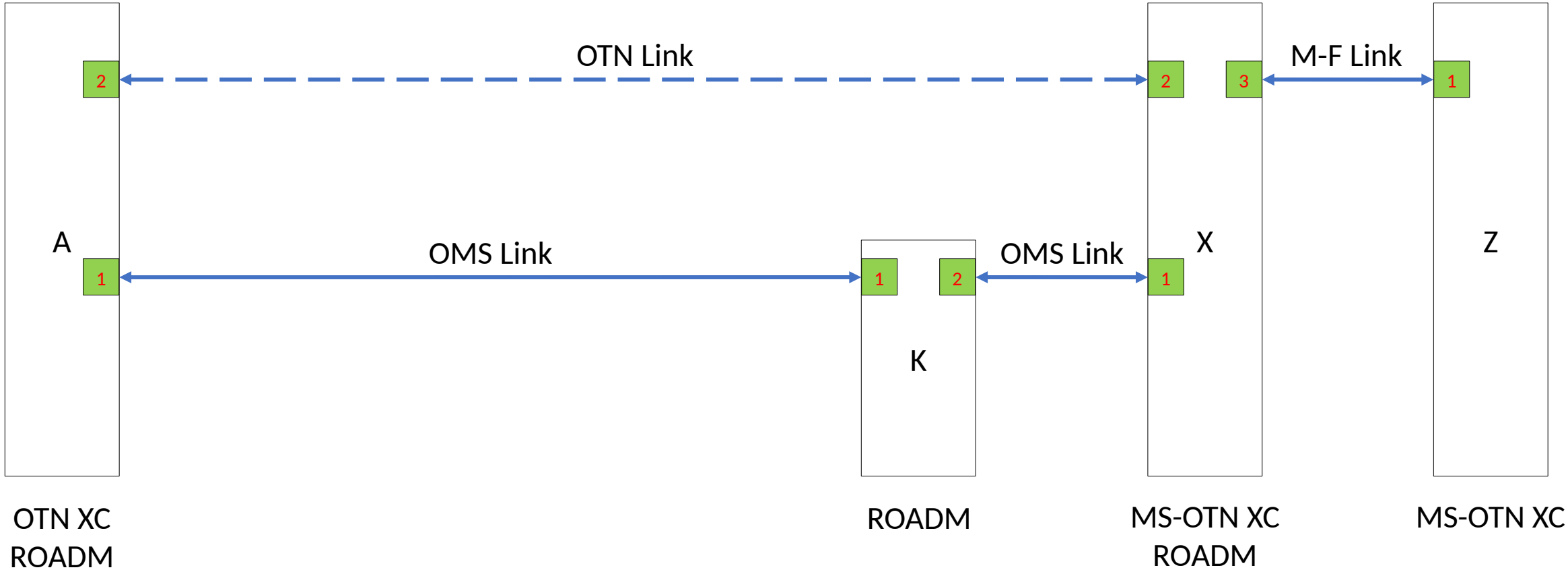
Conclusion

- Any feedback on the updates to the model from the WG or Chairs?
- Next Steps
  - Should we add our “YANG Guidelines” to the CCAMP Wiki?
  - We will continue to work on other associated I-Ds
- Continue our weekly Calls
  - What will be working on during our weekly calls?
    - Agreeing applicability text and model usage examples
    - Continue work on Path Computation YANG model
    - Restart work on WSON Tunnel and Flexi-Grid Tunnel
  - Call Info
    - Thursday, 14:00 (CET)
    - CCAMP WebEx Details
      - https://ietf.webex.com/ietf/j.php?MTID=ma1ca3bcec716fe1ff93e0a28b3558294
      - Join by meeting number
        - Meeting number (access code): 2422 698 1495
        - Meeting password: 6UbM2tEJJd6

Backup Slides

- Multi-technology instance example
- YANG Guidelines
  - Network type
  - Node type
  - Link type
  - Termination point type
  - Label range
  - Bandwidth

Multi-technology Single Topology Instance Example



M-F Link: multi-function Link (OTN + ETH + client Link)

Network Type

- Use multi-inheritance to expose a single topology instance for multiple technologies (e.g., WSON, flexi-grid, OTN and ETH networks)

```
+--rw nw:nw:network-types
   +--rw tet:te-topology!
      +--rw wsont:wson-topology!
      +--rw flexigt:flexi-grid-topology!
      +--rw otnt:otn-topology!
      +--rw eth-tet:eth-tran-topology!
```

Node Type

- Use presence container(s)
  - Presence container(s) can be inside or outside the `te` presence container (RFC8795)
    - Choice depends on whether the `te` presence container MUST be instantiated or MAY NOT be instantiated together with the technology-specific node type presence container

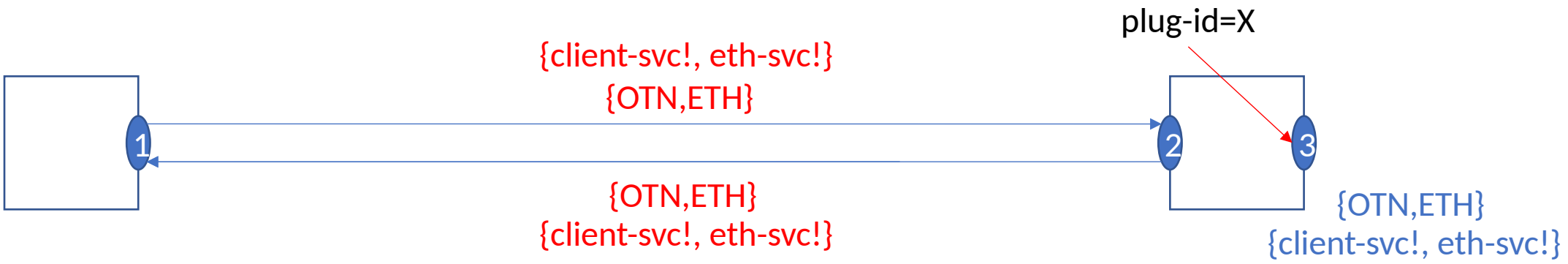
```
+--rw node* [node-id]
   +--rw tet:te!
      +--rw te-node-attributes
         +--rw wsont:wson-node!
         +--rw flexigt:flexi-grid-node!
         +--rw otnt:otn-node!
```

Link Type

- Depends on whether the technology has an associated interface and switching capability
  - When possible, use the `interface-switching-capability` list (RFC8795);
    - Use non-presence container(s) for technology-specific attributes
  - Otherwise, use presence container(s) to describe the technologies of a link (link type)
    - Presence container(s) can be inside or outside the `te` presence container

```
+--rw nt:link* [link-id]
   +--rw otnt:client-svc!
   +--rw tet:te!
      +--rw te-link-attributes
         +--rw interface-switching-capability*
         |       [switching-capability encoding]
         +--rw otnt:otn-link
```

Termination Point Type



- Legend
  - {xxx!, yyy!} presence containers for specific layer technologies supported by links
  - {OTN,ETH} interface switching capabilities supported by links
  - {xxx!, yyy!} presence containers for specific layer technologies supported by links
  - {OTN,ETH} the interface switching capabilities supported by LTP

Termination Point Type

- Depends on whether the termination point terminates or not link(s)
  - Same type as the terminated link(s), if any
  - Use the same approach used for the link type when the termination point is not terminating a link

```
+--rw nt:termination-point* [tp-id]
   +--rw otnt:client-svc!
   +--rw tet:te!
      +--rw interface-switching-capability*
      |       [switching-capability encoding]
      +--rw otnt:otn-link-tp
```

Label Range Type

- Use presence container(s) to describe the label range type
  - Note: the label range type is the only way to distinguish between WSON and flexi-grid capable links since they share the same interface switching capability
    - Note: to avoid NBC changes to RFC9094, as a special case, the presence of the RFC9094 `grid-type` could be sufficient to indicate that the label range type is WSON

```
+--rw tet:label-restrictions
   +--rw label-restriction* [index]
      +--rw otnt:otn-label-range!
      +--rw flexi-grid-label-range!
      +--rw wsont:grid-type?   identityref
```

TE Link Bandwidth

- Use non-presence containers with technology-specific TE bandwidth definitions insice the RFC8795 `te-bandwidth` container <u>but</u> outside the `technology` choice to descrive the bandwidth of multi-technology links

```
+--rw tet:max-link-bandwidth
   +--rw tet:te-bandwidth
      +--rw (technology)?
      +--rw otnt:otn-bandwidth
```