

A Yang Data Model for Optical Impairment-aware Topology

draft-lee-ccamp-optical-impairment-topology-yang-00

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Introduction

- ▶ The intent of this document is to provide a Yang data model, which can be utilized by an Multi Domain Service Coordinator (MDSC) to collect states of WSON impairment data from the Transport PNCs to enable impairment-aware optical path computation according to the ACTN Architecture [RFC8453].
- ▶ The draft is built upon [RFC6566] and supports both WSON and Flexi-grid (SSON) optical networks.
- ▶ This document augments the generic TE topology draft [TE-TOPO] and [WSON-topo] and [Flex-grid-topo] where possible and make use of ietf-layer0-types for common groupings.

Model

```
module: ietf-optical-impairment-topology
```

```
augment /nw:networks/nw:network/nw:network-types/tet:te-topology:
```

```
  +--rw optical-impairment-topology!
```

```
augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-attributes:
```

```
  +--ro fiber-type?  fiber-type
```

```
  +--ro power?      int32
```

```
  +--ro pmd?        decimal64
```

```
  +--ro cd?         decimal64
```

```
  +--ro osnr?       decimal64
```

Model (to be moved to impairment-tunnel model)

```
augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-attributes/tet:underlay/tet:primary-path/tet:path-element/tet:type/tet:label/tet:label-hop/tet:te-label/tet:technology:
```

```
+--:(optical-imp-topo)
  +--rw (grid-type)?
  | +--:(flexi-grid)
  | | +--ro central-channel-freq? decimal64
  | | +--ro slot-width?          decimal64
  | +--:(dwdm)
  | | +--ro channel-freq?        decimal64
  | +--:(cwdm)
  | +--ro channel-wavelength?    uint32
  +--ro bit-rate?                decimal64
  +--ro BER?                     decimal64
  +--ro pmd?                     decimal64
  +--ro cd?                      decimal64
  +--ro osnr?                    decimal64
  +--ro q-factor?                decimal64
```


Model

augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-termination-point:

+--rw available-operational-mode* layer0-types:operational-mode

+--rw operational-mode? layer0-types:operational-mode

+--rw vendor-identifier? layer0-types:vendor-identifier

+--rw transponder-id? uint32

+--ro available-modulation* identityref

+--rw modulation-enabled? boolean

+--rw modulation-type? identityref

+--ro available-FEC* identityref

+--rw FEC-enabled? boolean

+--rw FEC-type? identityref

+--ro FEC-code-rate? decimal64

+--rw FEC-threshold? decimal64

+--ro power? int32

+--ro power-min? int32

+--ro power-max? int32

augment /nw:networks/nw:network/nw:node/tet:te/tet:tunnel-termination-point:

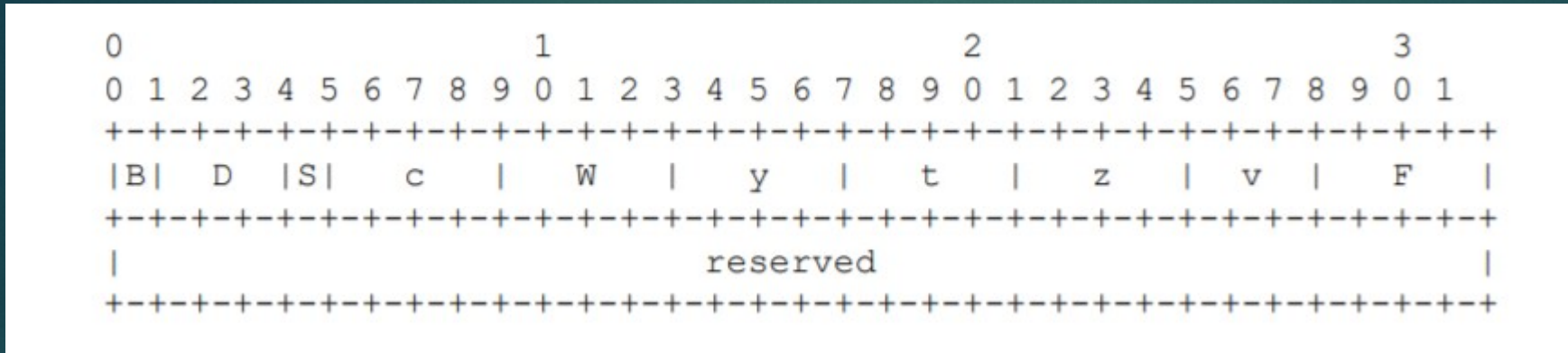
+--ro transponder-list* [carrier-id]

+--ro carrier-id uint32



Application Code
e.g., ITU-T G.698.2

Application Code: G.698.2: B-DScW-ytz(v)



- B: means Bidirectional
- D: means a DWDM application
- S: takes values N (narrow spectral excursion) or W (wide spectral excursion)
- c: Channel Spacing (GHz)
- W: takes values C (link is dispersion compensated) or U (link is dispersion uncompensated)
- y: takes values 1 (NRZ 2.5G) or 2 (NRZ 10G)
- t: takes value A (link may contains optical amplifier)
- z: takes values 2 ([G.652] fibre), 3 ([G.653] fibre), or 5 ([G.655] fibre)
- v: takes values S (Short wavelength), C (Conventional), or L (Long wavelength) An optional
- F can be added to indicate a FEC encoding

Issues: Application Codes

- ❑ RFC 7581 defines ITU-T application codes and leaves room for vendor specific codes as a future work.
 - ❑ [G.698.2] application code
- ❑ Current Application Code [G.698.2] is limited to 2.5G and 10G and only supports limited fiber types/FECs/Modulations; does not support coherent optics.
- ❑ But draft revised G.698.2 for consent (10/2018) added DP-DQPSK 100G (optical tributary signal, y value)
- ❑ How to model ITU-T application codes vs. Vendor Specific codes?
- ❑ Terminology: Vendor Specific or something else to specify non ITU-T codes? E.g., Organization Specific, etc.
- ❑ Modify Application codes vs. Explicit Model for each attributes

Issues: modeling issue

- ▶ Need to augment WSON and Flexi-grid topology model for “Channel” availability of the link.
- ▶ Link: fiber link between two transponders at both end
 - ▶ OLA (Optical Line Amplifier) span is not currently included
- ▶ How to deal with advanced FEC/Modulation:
 - ▶ Open ROADM MSA (100G DP-QPSK with Staircase FEC) and
 - ▶ Upcoming OIF 400ZR (400G DP-16QAM with Hamming SD-FEC + Staircase HD-FEC)?

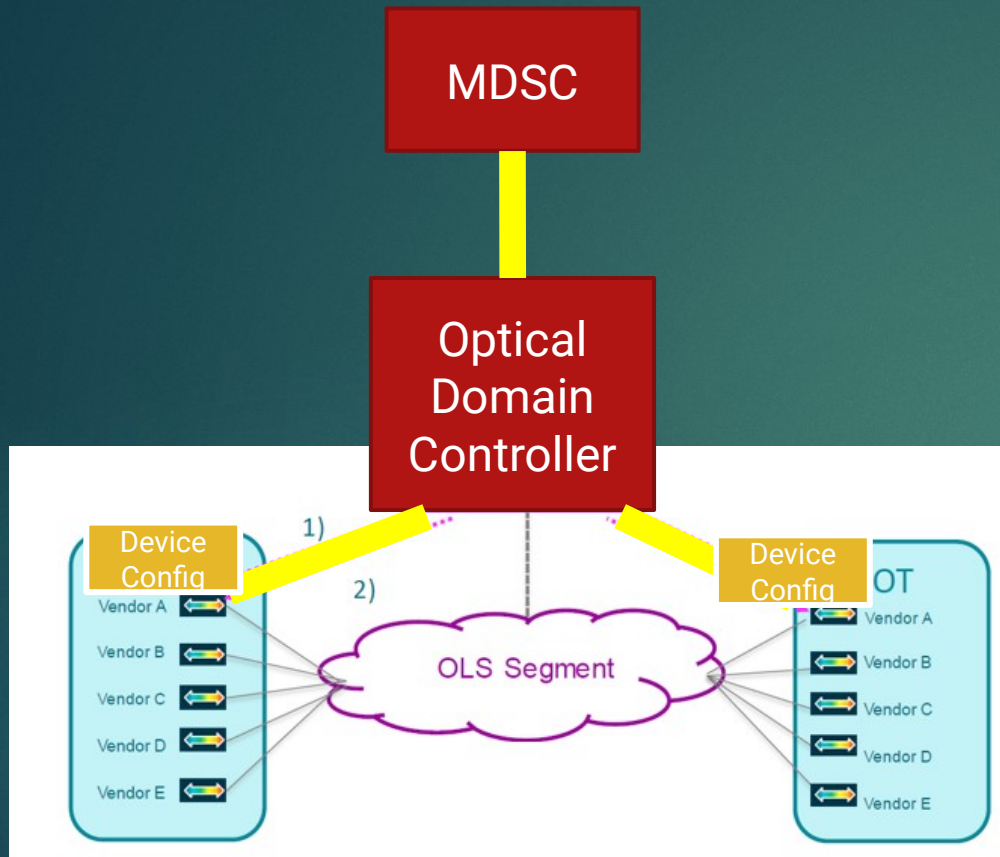
Next Steps

- ▶ Harmonize with other drafts with similar scope.
- ▶ Continue to refine the model.
- ▶ Is this a WG scope?

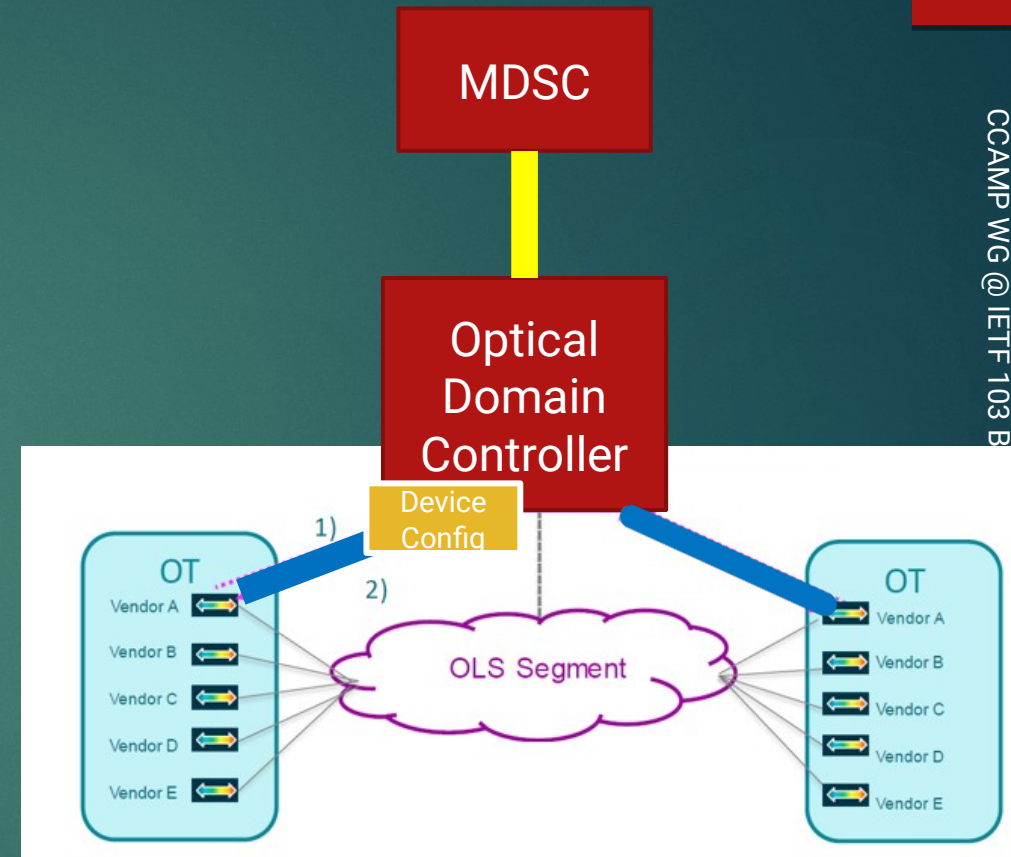
Two Modes of Operation

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Option 1:
Operational Mode by the Domain
Controller (Device Configuration is outside
of the Domain Controller)

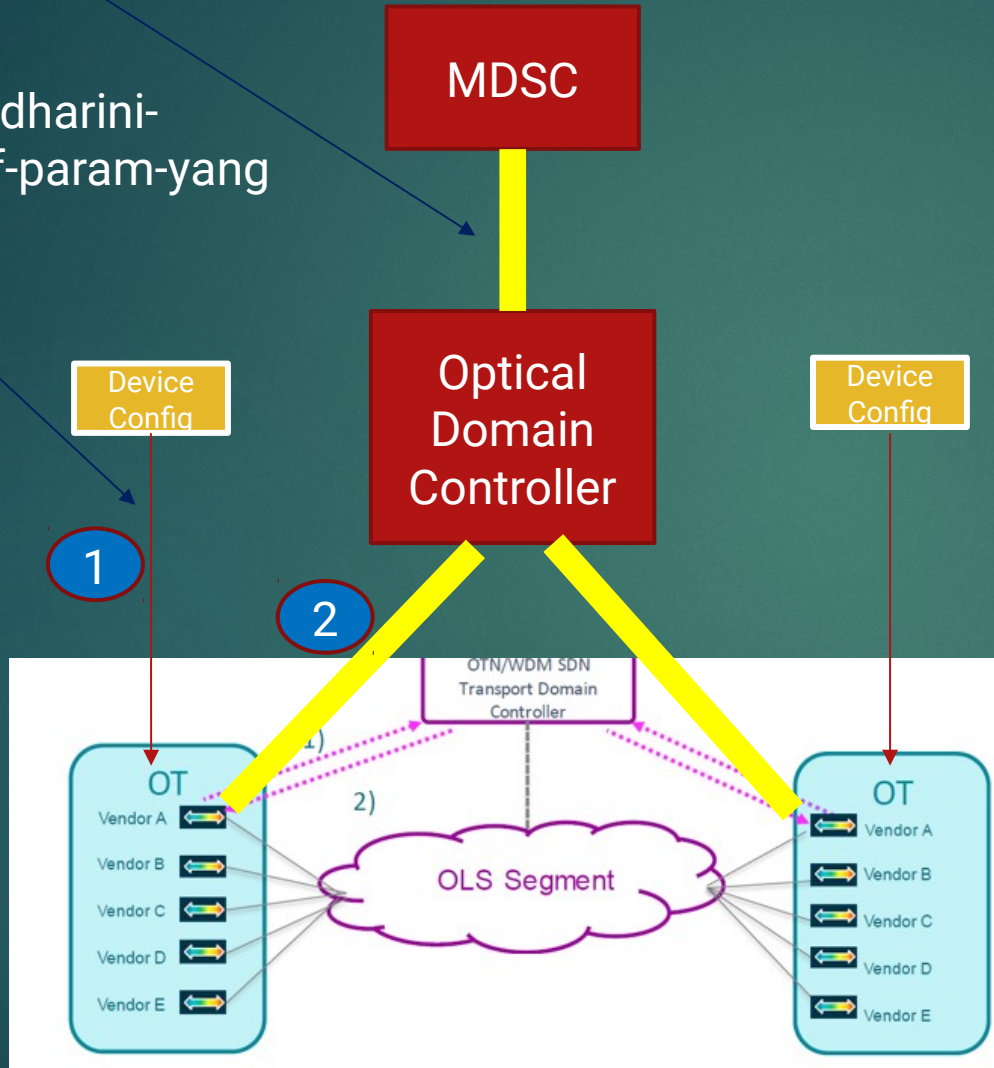


Option 2:
Explicit Configuration by the Domain
Controller (Device Configuration Function
Is embedded in the Domain Controller)

Configuration vs Operations

Scope of this ID

Scope of: draft-dharini-ccamp-dwdm-if-param-yang



Option 1:
Both 1 and 2 need to include fully detailed configuration parameters

Option 2:
1 needs to include fully detailed configuration parameters while 2 can be application code based (+ some explicit parameters)

Option 3:
Both 1 and 2 can be application code based (+ some explicit parameters)

Thank You!