

A Yang Data Model for Optical Impairment-aware Topology

[draft-ietf-ccamp-optical-impairment-topology-yang-11](#)

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Updates Since IETF 114

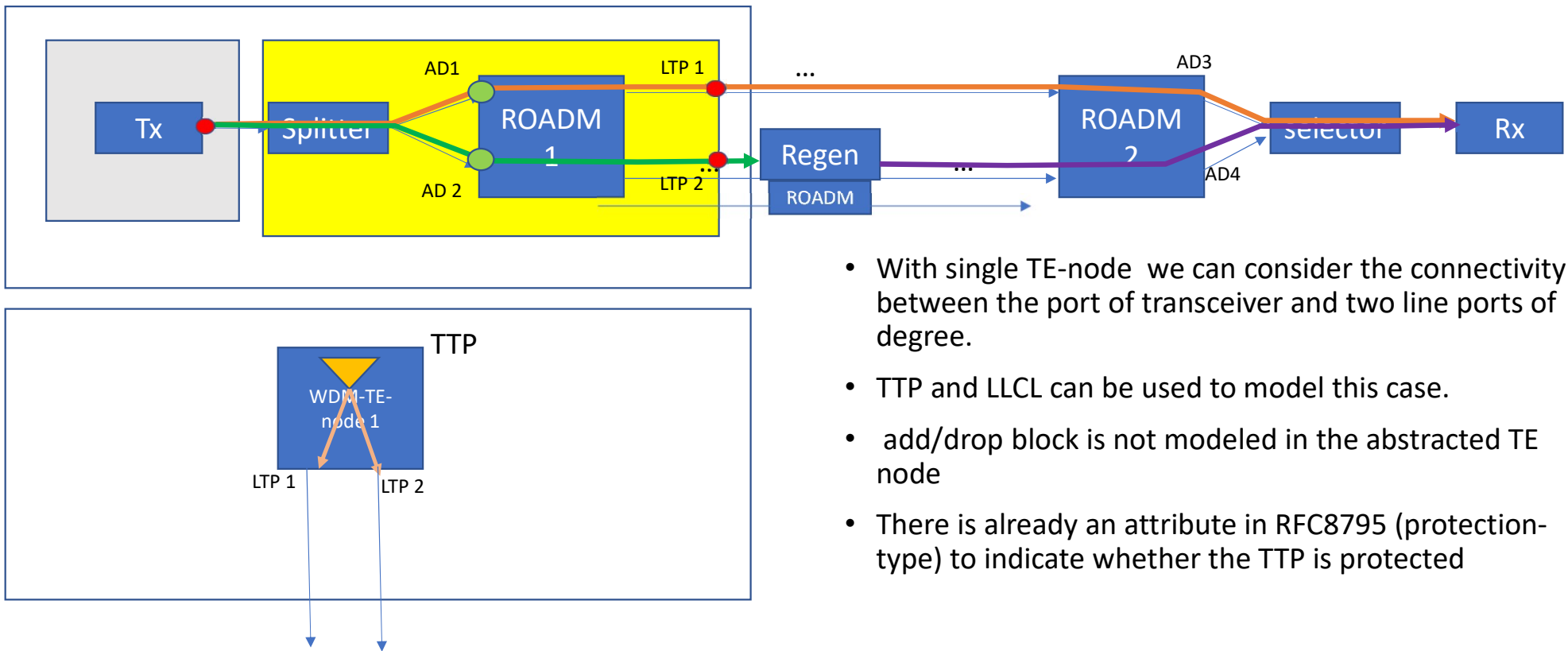
- Draft text update
 - We complete section 2.10 on Optical Protection Architecture related to issue [#107](#) adding individual sub-sections for all the 3 OTSi protection use cases with related figures:
 - OT and OTSi protection function are an integral part of the WDM-TE-node
 - OT and OTSi protection/ROADM functions are in two adjacent WDM-TE-node (remote OT)
 - OT and OTSi protection function are both in an adjacent WDM-TE-node (protected remote OT)
- Optical Impairments YANG model update:
 - OPS capability reporting: fix [#107](#)
 - possibility to configure the OPS protection for the **new** OTSi(s) when setting up a WDM tunnel
 - fix augmentation when statements from absolute to relative path

OPS protection model finalization

- For OPS protection we need to model :
 1. How to represent the existing OTSi already there in the network in case of protection, to determine the OI impact of the existing OTSi on the optical feasibility of a new OTSi and viceversa
→ version 10 of the draft
 2. The “OPS capability reporting” so the possibility to configure the OPS protection for the new OTSi(s) when setting up a WDM tunnel
→ version 11 of the draft

Single TE Node – OPS capability in the TTP

WDM-TE-node 1



- With single TE-node we can consider the connectivity between the port of transceiver and two line ports of degree.
- TTP and LLCL can be used to model this case.
- add/drop block is not modeled in the abstracted TE node
- There is already an attribute in RFC8795 (protection-type) to indicate whether the TTP is protected

Model solution

- How to split traffic using LLCL that has a TP as key in the list only 1 TP per entry

Solution

LLCL has been augmented with a list of additional LTP

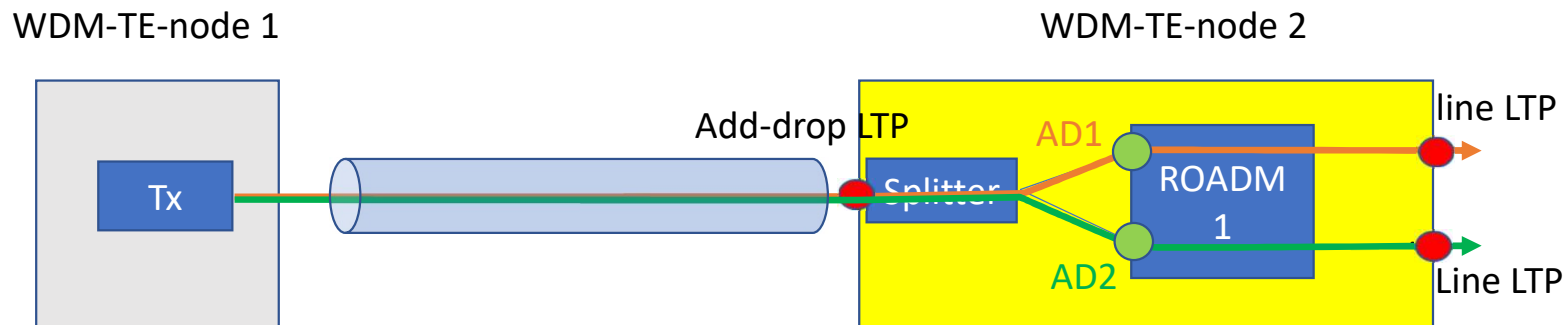
- Different add/drop usage implications: the path toward LTP belonging to the protection, can be different depending on the add-drop ports chosen

Solution

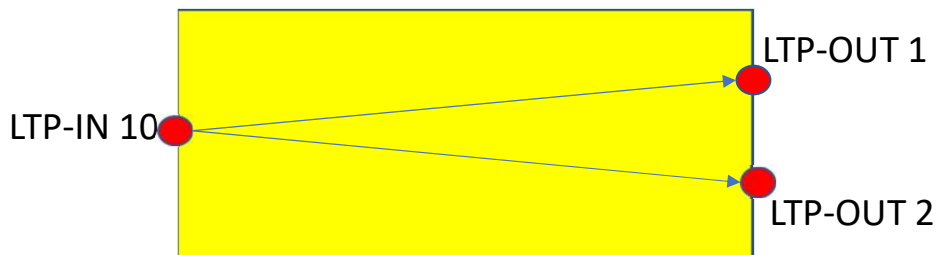
Adding to the new list the OI related to the paths towards the additional LTP, in case they are different with respect the OI of working LTP.

E.g the OI of the path towards LTP2 through AD2

2 TE nodes – OT and OTSi protection/ROADM functions are in two adjacent WDM-TE-node (remote OT)

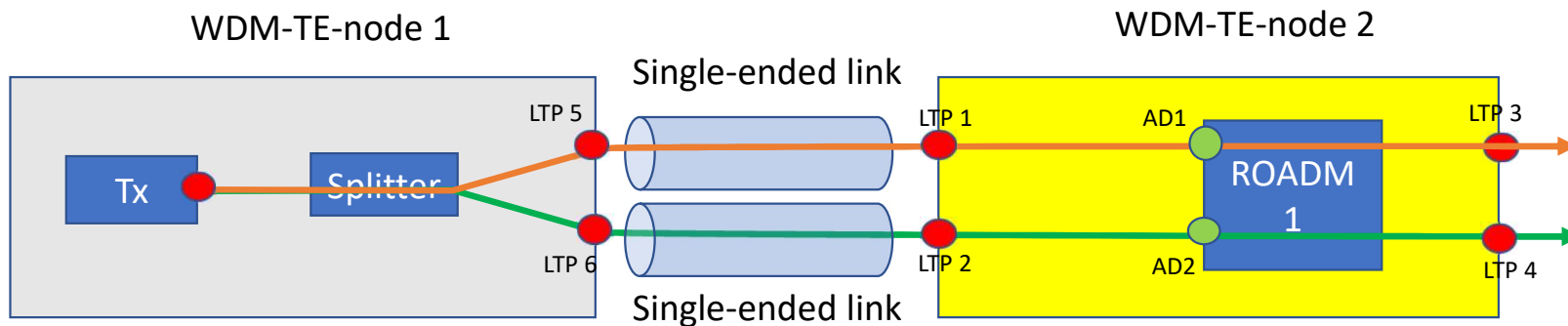


Connectivity matrix



- With this architecture the two nodes are interconnected via a TE-link only carrying a single OTSi
- A new protection-type leaf is added to indicate whether the add-drop LTP is connected to a protection function and then to two line LTPs via the ROADM function inside WDM-TE-Node-2
- The connectivity matrix is augmented to describe the potential connectivity to additional line LTPs and related OI

2 TE nodes – OT and protection function are both in an adjacent WDM-TE-node (protected remote OT)



OT and protection function (splitter/selector) in WDM-TE-node 1

- WDM-TE-Node-1 and WDM-TE-Node-2 are interconnected via two separate TE-links, each carrying a single OTSi signal
- The protection configuration for the protected TTP in WDM-TE-Node-1 can be described in the same way as for use case in slide 4 using the local-link-connectivity list

YANG model (single node case and protected remote OT case)

```
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:tunnel-termination-point
  /tet:local-link-connectivities
  /tet:local-link-connectivity:
+--ro add-path-impairments? leafref
+--ro drop-path-impairments? leafref
+--ro llc-transceiver* [ttp-transponder-ref ttp-transceiver-
ref]
| +--ro ttp-transponder-ref
| |   -> ../../../../../../ttp-transceiver/transponder-ref
| +--ro ttp-transceiver-ref
| |   -> ../../../../../../ttp-transceiver/transceiver-ref
| +--ro is-allowed?        boolean
| +--ro add-path-impairments? leafref
| +--ro drop-path-impairments? leafref
+--ro additional-ltp* [ltp-ref]
  +--ro ltp-ref
  |   -> ../../../../../../nt:termination-point/tp-id
  +--ro add-path-impairments? leafref
  +--ro drop-path-impairments? leafref
```


YANG model (2WDM-TE-nodes case) (1)

```
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes/tet:connectivity-matrices
  /tet:connectivity-matrix/tet:from:
```

```
+--ro additional-ltp* [ltp-ref]
```

```
+--ro ltp-ref
```

```
|   -> ../../../../nt:termination-point/tp-id
```

```
+--ro roadm-path-impairments? leafref
```

```
augment /nw:networks/nw:network/nw:node/tet:te
  /tet:te-node-attributes/tet:connectivity-matrices
  /tet:connectivity-matrix/tet:to:
```

```
+--ro additional-ltp* [ltp-ref]
```

```
+--ro ltp-ref
```

```
|   -> ../../../../nt:termination-point/tp-id
```

```
augment /nw:networks/nw:network/nw:node/nt:termination-
point:
```

```
+--rw protection-type? identityref
```


Open issues

- Tracking Open Issues, discussions and resolutions linked to YANG model <https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-optical-impairment-topology-yang/issues>:
- 2 issues closed since IETF-114 but complex
 - [#107](#), Optical protection switching
 - [#79](#): related to relative xpath in leafref vs. using “ancestor” function of Xpath was clarified and relative xpath is still the chosen solution.
- Still 5 open issues
 - [#108](#) : the model already support remote optical transponder connected to a WDM-node but we need to add an appendix describing how the model support different scenarios.
 - [#25](#): Review terminology has been partially addressed now for IETF-114. A general review of all the text in the draft is still needed before to close it.
 - [#95](#): “Boundary between Layer 0 and Layer 1” is on going. We need to add text description in the draft to clarify the boundary between what is in the scope (layer 0) and what is out of scope (layer 1)
 - E.g. inverse multiplexing and FEC are layer 1 functionality of the transponders which are in the scope of this document
 - [#71](#): YANG model development process improvement on github: would it be possible to issue tags to have read only states of the yang? revision date may not ensure several versions with the same date
 - [#110](#): YANG model possible issue: to analyze the usage of “container” as immediate parent of a “list” in the model.
- <https://github.com/ietf-ccamp-wg>

Next Steps

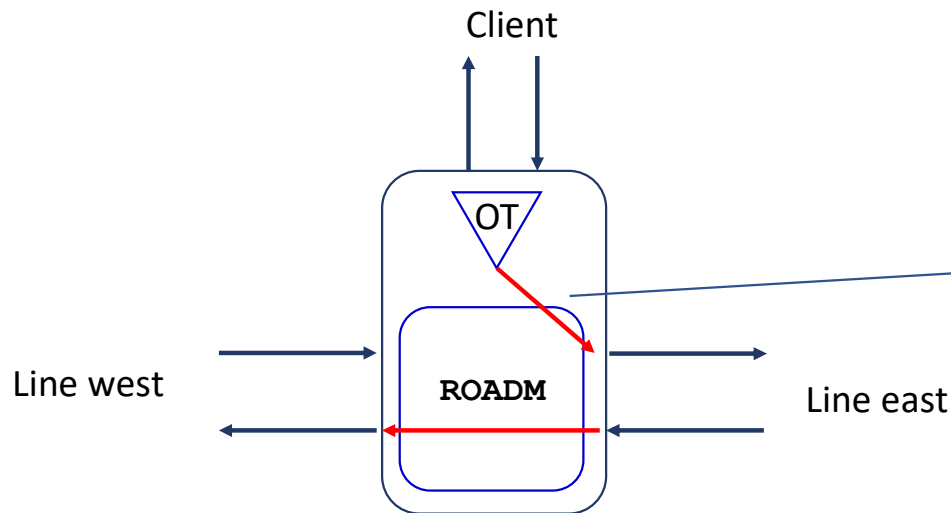
- OMS MCG protection
- Addressing the issues still on the list
- Be ready for an early YANG doctor review

There is an official weekly CCAMP WebEx meetings (Tue, 2-3pm CET) on the subject

- <https://mailarchive.ietf.org/arch/browse/ccamp/?q=optical%20impairments%20invitation>

backup

Impairments attributes on LLCL



TTP local link connectivity would provide the impairments of the ROADM add/drop paths towards the 3R.

```

• +-rw tunnel-termination-point* [tunnel-tp-id]
•   +-rw tunnel-tp-id                binary
•   .....
•   +-rw local-link-connectivities
•   | +-rw number-of-entries?        uint16
•   | .....
•   | +-rw is-allowed?                boolean
•   | .....
•   | +-ro path-properties
•   | | .....
• /* ADD (Start) */
•   | +-ro add-path-impairments      leafref
•   | +-ro drop-path-impairments    leafref
• /* ADD (End) */
•   | +-rw local-link-connectivity* [link-tp-ref]
•   | +-rw link-tp-ref
•   | | -> ../../../../nt:termination-point/tp-id
•   | .....
•   | +-rw is-allowed?                boolean
•   | .....
•   | +-ro path-properties
•   | | .....
• /* ADD (Start) */
•   | +-ro add-path-impairments      leafref
•   | +-ro drop-path-impairments    leafref
• /* ADD (End) */

```