

A Yang Data Model for Optical Impairment-aware Topology

draft-ietf-ccamp-optical-impairment-topology-yang-12

Co-authors (frontpage):

- Dieter Beller (Nokia)
- Esther Le Rouzic (Orange)
- Italo Busi (Huawei)
- Gabriele Galimberti (Cisco)
- [Sergio Belotti \(Nokia\)](#)

Co-authors:

- Haomian Zheng (Huawei)
- Nicola Sambo (Scuola Superiore S.Anna)
- Julien Meuric (Orange)
- Enrico Griseri (Nokia)
- Gert Grammel (Juniper)
- Jean Luc Auge (Orange)
- Young Lee (Samsung)
- Victor Lopez (Nokia)

Contributors

- Jonas Martenson (Smartoptics)
- Aihua Guo (Futurewei)

Updates Since IETF 115

- Draft text update
 - Align the text with ITU-T G.807 terminology (issue [#25](#) in github)
 - Add an Appendix to the draft describing how the YANG model supports remote optical transponders connected to a WDM-node (issue [#108](#))
 - Added JSON example for Optical Transponders in a Remote Shelf
 - Added new section (2.10.2) on OMS MCG protection (issue [#119](#))
 - Introduced definition of end-to-end Media Channel (e2e-MC) (issue [#122](#))
- Optical Impairments YANG model update:
 - Remove key from media channel list, making the flexi-n attribute optional. (issue [#124](#))
 - Optical Impairment profile: to use a sub-set of the OI topology model for other applications. (issue [#126](#))
 - Updated min-OSNR, added rx-ref-channel-power attribute and rx-channel-power-penalty (issue [#66](#)) (rfc9093-bis)

OVS MCG protection

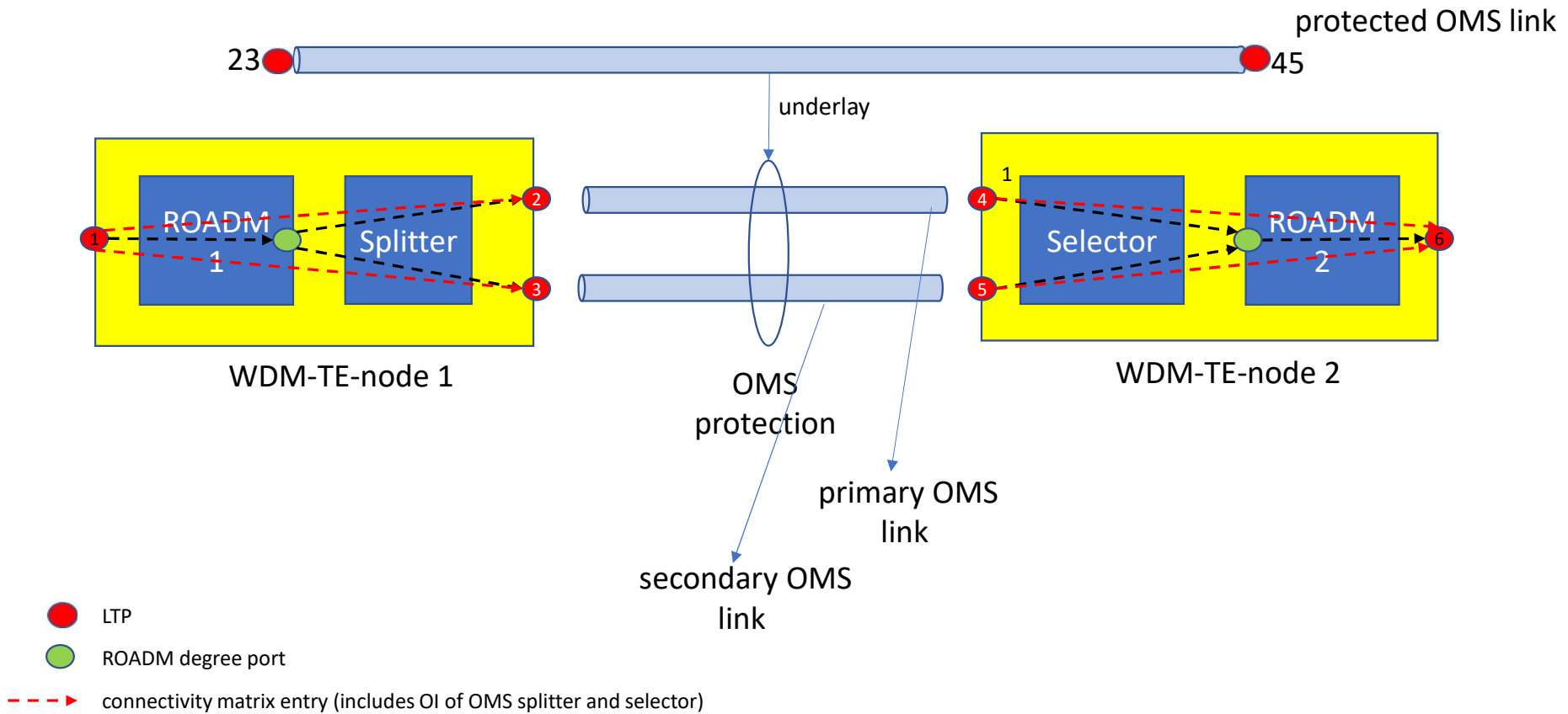
- 1+1 OVS MCG protection is a local protection which can be modeled based on TE-link properties already defined in [RFC8795]
- Since OI model is augmenting teas-topo module, there is no impact on the YANG model, RFC8795 already provides the needed YANG code.
- 2 approaches:
 - Protected TE-link with underlying TE-links
 - Single protected TE-link

```
augment /nw:networks/nw:network/nt:link:
+--rw te!
| .....
+--rw te-link-attributes
| .....
| +--rw underlay {te-topology-hierarchy}?
| | +--rw enabled? boolean
| | +--rw primary-path
| | | .....
| | +--rw backup-path* [index]
| | | +--rw index uint32
| | | .....
| +--rw link-protection-type? identityref
| .....
| .....
```

Protected TE-link with underlying TE-links

- In this case 3 links are exposed in the model: 1 OMS protected link and 2 OMS links representing the primary and secondary OMS MCGs
 - The “link-protection-type” data node of the OMS protected link will be set to one of the protection type defined in the identities in RFC8776
 - The “underlay” container is instantiated in teas-topo and references the underlying primary and secondary OMS links and the “link-protection-type” is set
- The primary and secondary OMS links report the OI parameters of the primary and secondary OMS MCGs
 - Alternatively, it is possible to report the worst case of the 2 set of OI parameters in the protected TE-link.

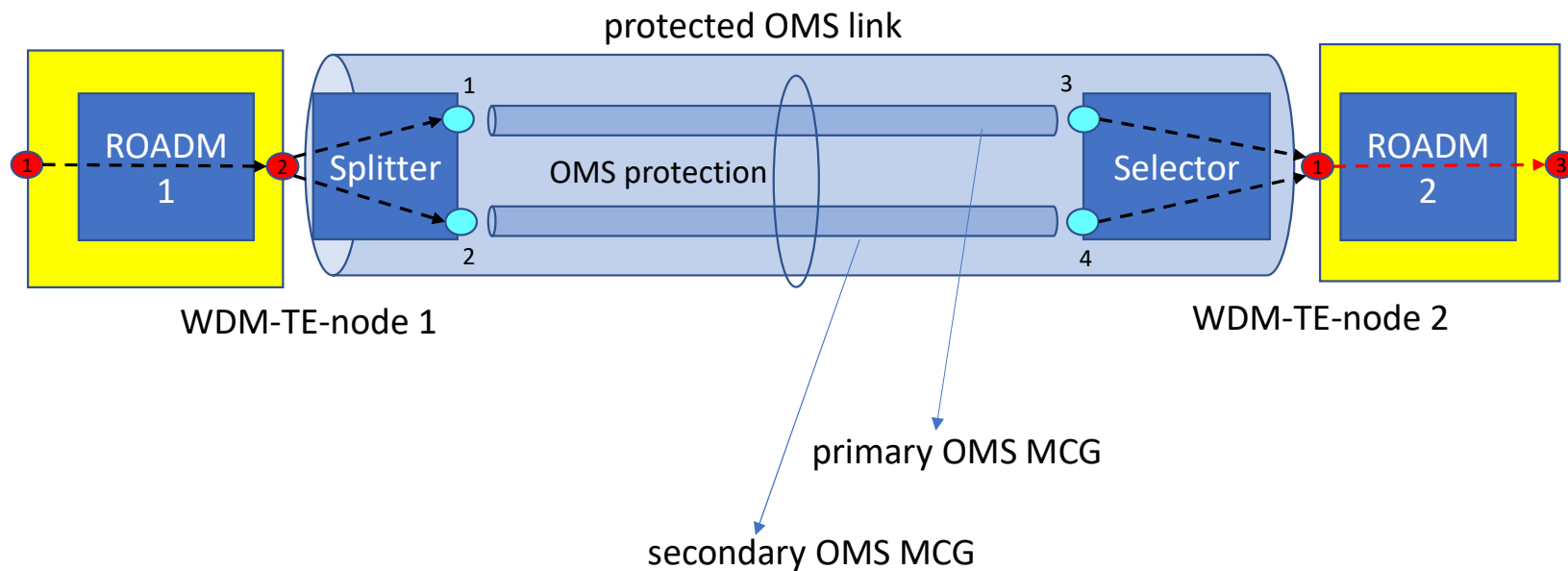
Primary and secondary OMS links



Single protected TE-link

- In this case only 1 OMS protected link is exposed in the model
 - The “link-protection-type” data node of the OMS protected link will be set to one of the protection type defined in the identities in RFC8776
 - The “underlay” container is not instantiated
- The optical impairments exposed for this 1+1 protected TE-link are typically based on the optical impairments of the worse of the two underlying physical OMS links
 - Client path computation engine is working on path feasibility based on the abstract OI parameters of the protected OMS link provided by server controller

Protected OMS links (abstraction)



LTP



ROADM degree port



OMS splitter and selector port



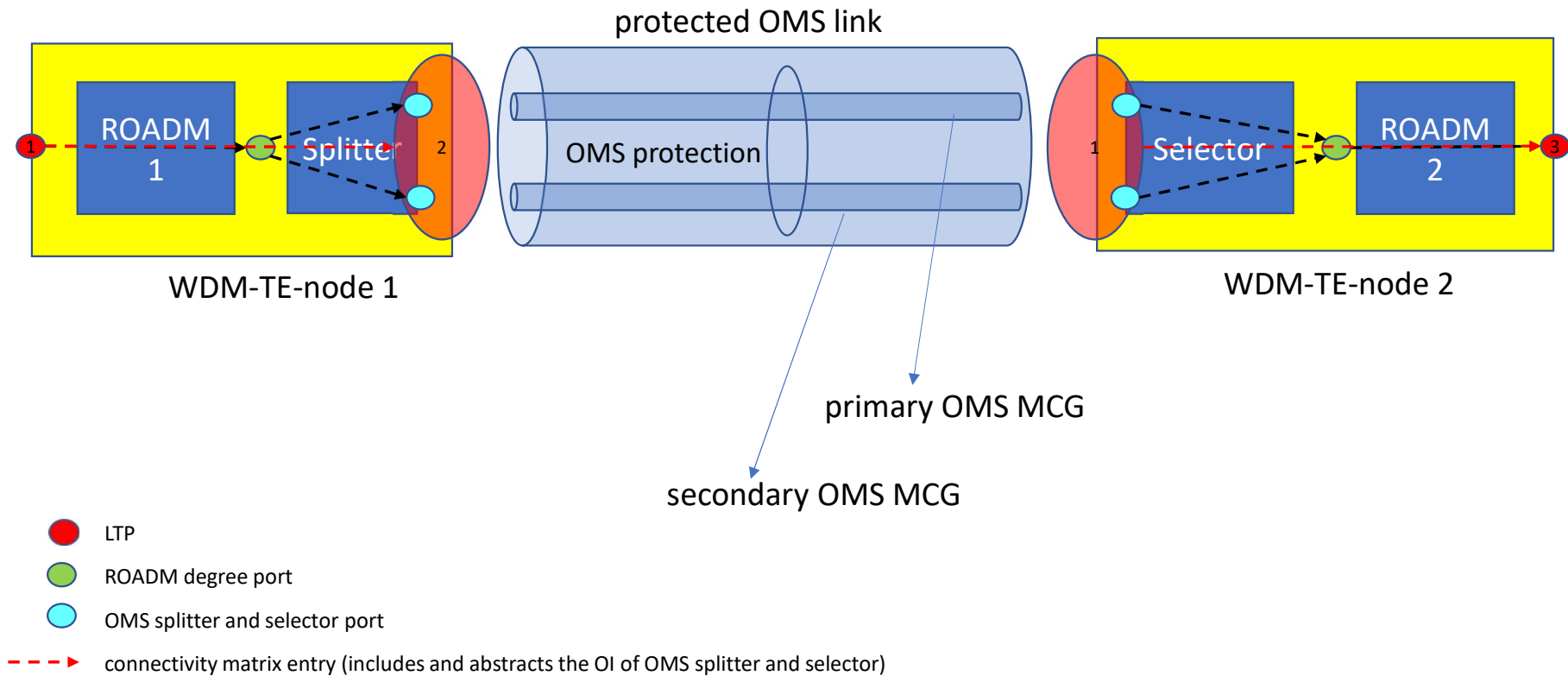
connectivity matrix entry (does not include OI of OMS splitter and combiner)

Note: the OI of the OMS splitter and selector are included in the OI abstraction for the OMS protected link

Splitter/Selector OI

- The splitter and selector functions are not represented as separate entities in the model.
- Splitter and Selector OI are taken into account either in:
 - 1) OI of the 1+1 protected TE-link
 - 2) OI of the ROADM paths in the two adjacent WDM-TE-Nodes (connectivity matrix and LLCL respectively)

Protected OMS links (abstraction)



Optical Impairment model profile

- Based on previous discussion and comments from IETF-114, an issue has been raised about the possibility to use a sub-set of the OI topology model for other applications.
- One option is allowing to profile the model (in the similar way as in [draft-busi-teas-te-topology-profiles](#))
 - A summary of the modifications done in the model to obtain the profile is on github <https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-optical-impairment-topology-yang/issues/126>
- To document the mandatory profile for OI application to foster interoperability, a new issue ([#130](#)) has been added with the target to indicate the attributes which are optional in the model because not needed for non-OI applications but are required to support the OI applications.

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>:
- 6 issues closed since IETF-115
 - [#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. **CLOSED**
 - [#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. **CLOSED**
- Still 7 open issues but some of them partially closed already.
 - [#132](#): OMS text/figure refinement based on slide deck "[optical protection switching](#)"
 - [#130](#) : as reported in the previous slide need to document mandatory profile for OI applications
 - [#124](#): remove key from media channel list. The YANG has been already updated but we need to check a YANG statement (e.g. unique statement) avoiding to have more elements in the list with the same flexi-n. (we cannot have 2 media-channel with the same flexi-n)
 - [#110](#): YANG model possible issue: to analyze the usage of "container" as immediate parent of a "list" in the model. Some of the proposed changes to YANG related to profile are partially addressing also this issue.
 - [#123](#): "Boundary between Layer 0 and Layer 1" is on going. We need to clarify the boundary between what is in the scope (layer 0) and what is out of scope (layer 1). To be discussed in the context of flexible grid meeting.
 - E.g. inverse multiplexing and FEC are layer 1 functionality of the transponders which are in the scope of this document
 - [#120](#) : see issue [#56](#) in flexible grid repository . The issue is taken open till there are no feedback from discussion in flexible grid context.
 - [#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
- <https://github.com/ietf-ccamp-wg>

Next Steps

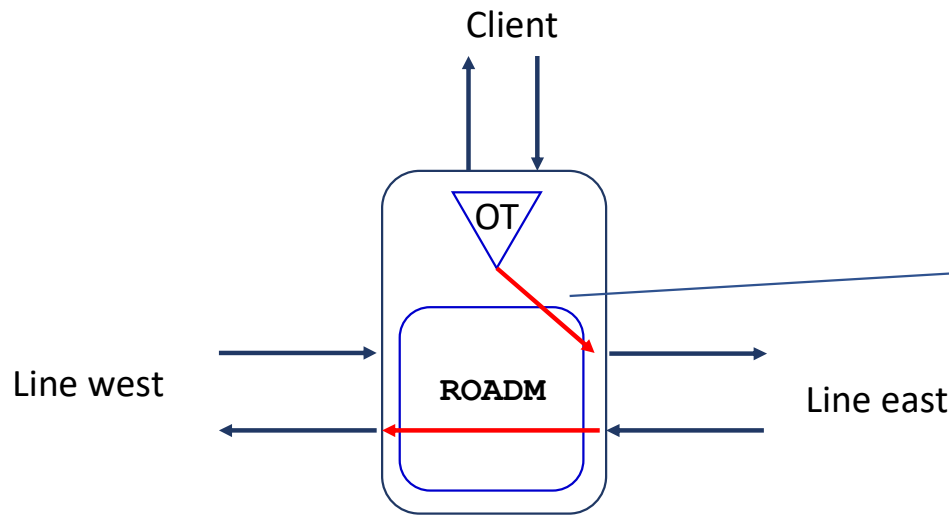
- Ready for YANG doctor review
- Addressing the issues still on the list
- The draft is stable, no other new features to be added, target is to ask for Last Call WG by IETF-117

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

- <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) */
    
```