A Yang Data Model for Optical Impairment-aware Topology

draft-ietf-ccamp-optical-impairment-topology-yang-06

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Major Activities since November IETF 109 Meeting

- Weekly CCAMP WebEx meetings (Tue, 2-3pm CET)
- Text in section 2.5 related to the transponder model has been updated based on the resolution of some github issues (see following slides)
- YANG model update due to the support of C+L band amplifiers
  - On going activity to extend the ROADM model to also support C+L band (see https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-optical-impairment-topology-yang/issues/51)
- YANG tree simplification
  - The tree part related to “OMS” contained redundant information that was eliminated
  - See github PR#50 https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-optical-impairment-topology-yang/pull/50

Transceiver modes clarifications : text in introduction and section 2.5

- A poll has been held on November 27 regarding the “modes” used in our model to describe the transceiver capabilities.
- The result of the poll was to maintain the model as is (with the 3 modes) and to add text clarifying which use cases are supported in the model and in particular “to identify the cases that are outside the scope of the solution proposed”
- **Text in the introduction clarified that:**
  - **Optical data plane interoperability is outside the scope of this draft**
  - **The YANG model provides sufficient information to support optical impairment-aware path computation**
- Following the comment in github https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-optical-impairment-topology-yang/issues/29# and issue #43, **the text in section 2.5.2 “Organizational Modes” has been modified:**
  - **New text provides clarification regarding interoperability**
  - **It also clarifies what shall take precedence in case explicit information is provided in addition to implicit information describing optical power and carrier frequency capabilities.**
- Section 2.5.1 : A standard mode is related to an optical specification developed by an SDO organization. Application code defined in this context together with line system matching constraints, can guarantee data plane interoperability.

Amplifier model for C+L band

- C+L band amplifiers are physically 2 amplifiers, both part of the same type of amplifiers but characterized by different band, gain, noise figures attributes values.
- For any amplifier element in OMS link, characterized by a type-variety attribute, the model has a list of amplifiers in parallel with all the attributes and the frequency range of operation, to provide band information (C/L).
- We have used a list and not just a pair of amplifiers as would be sufficient in this case, to be more future-safe for possible evolution for band amplifiers.

```
+--ro OMS-elements* [elt-index]
      +--ro elt-index              uint16
      +--ro oms-element-uid?       string
      +--ro (element)
        +--:(amplifier)
        |  +--ro amplifier
        |     +--ro type-variety    string
        |     +--ro operational
        |        +--ro amplifier-element* []
        |           +--ro name?
        |           |      string
        |           +--ro frequency-range
        |           |  +--ro lower-frequency?
        |           |  |      l0-types-ext:frequency-thz
        |           |  +--ro upper-frequency?
        |           |         l0-types-ext:frequency-thz
        |           +--ro actual-gain
        |           |      decimal64
        <snip>
        +--:(fiber)
        |  +--ro fiber
        |     +--ro type-variety    string
        <snip>
        +--:(concentratedloss)
        |  +--ro concentratedloss
        |     +--ro loss    decimal64
```

Yang Tree simplifications and element naming improvement

- Within the OMS-element list, the model supports multiple "types" or "classes" of elements -- amplifiers, fiber spans and attenuators.
- The redundancy in the YANG model regarding “element type” was removed.

1. Remove the “type” since the name of the container is explicitly giving the type,
2. Remove the extra “element” encapsultation to simplify the tree
3. Added oms-element-uid to better clarify context of the attribute

```
+--ro OMS-elements* [elt-index]
       +  ro elt-index    uint16
      +--ro uid?         string
      +--ro type         identityref
      +--ro element
        +--ro (element)?
          +--:(amplifier)
          +--ro amplifier
          <snip>
        +--:(fiber)
          |  +--ro fiber
          <snip>
        +--:(concentratedloss)
            +--ro concentratedloss
              +--ro loss?   decimal64
```

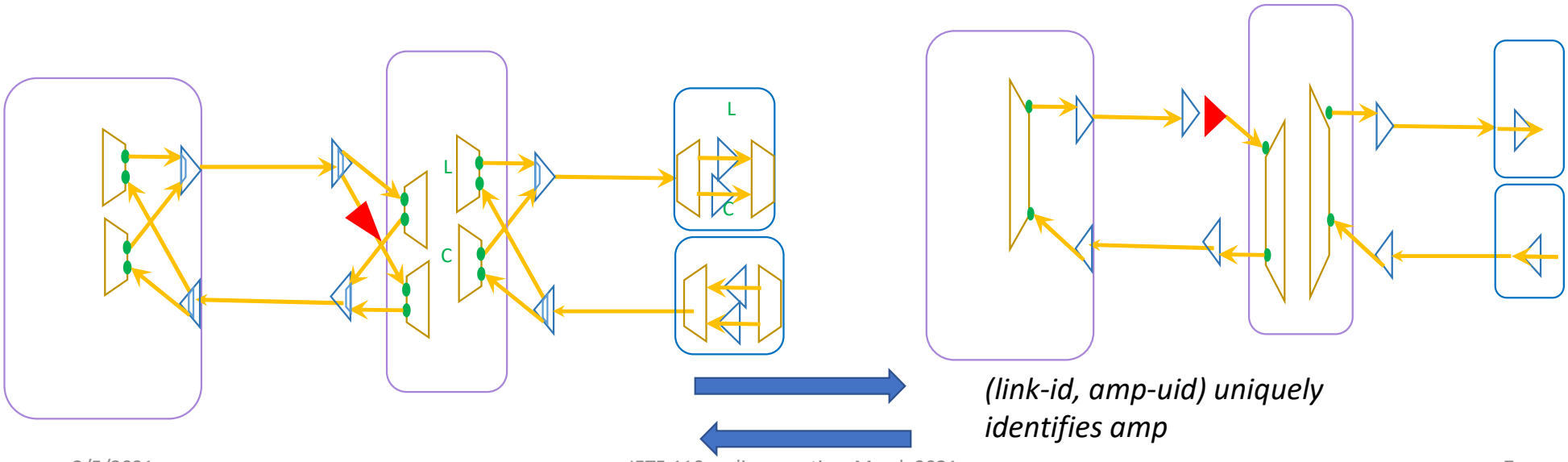
```
+--ro OMS-elements* [elt-index]
      +--ro elt-index              uint16
      +--ro oms-element-uid?       string
      +--ro (element)
        +--:(amplifier)
        |  +--ro amplifier

       <snip>
        +--:(fiber)
        |  +--ro fiber
        <snip>
        +--:(concentratedloss)
        |  +--ro concentratedloss
        |     +--ro loss    decimal64
```

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:
- 10 issues closed from the last IETF meeting
- Still 17 open issues
  - 4 of them have an identified resolution and will be addressed with the next YANG model commit (issues #64, #58, #42, #41)
  - 2 editorial (review terminology and ITU-T G.807 alignment)
  - 3 are “questions” for clarifications only (#39, 38, 37)
  - 3 are request to remove “unused” groupings to be investigated against real needs
  - Only 3 are real YANG enhancement
  - https://github.com/ietf-ccamp-wg

Open Issues #51

- Following the optical amplifier model extensions to support C+L band amplifiers, model extensions shall be added for all the other network components in the topology model where L-band extensions are needed (e.g. ROADM model extensions).
- Related to C+L band extension for ROADM there is a potential issue due to the fact that C+L booster or pre-amplifiers may have multiple input/output ports from/to ROADM ports.
- The topology model is already providing an abstracted view of the physical implementation.
- Is a standardized rule needed to map between the topological ports and the physical ROADM ports ?
- The issue can be resolved by adding additional attribute(s) or defining naming rules for existing attributes.



Next Steps

- Address the other open issues on GitHub
- Extend the ROADM model to support C+L band
- Specify 3R regenerators based on optical transponder model
- Be ready for YANG doctor review

A YANG Data Model for Layer 0 Types - Extension

draft-esdih-ccamp-layer0-types-ext-00

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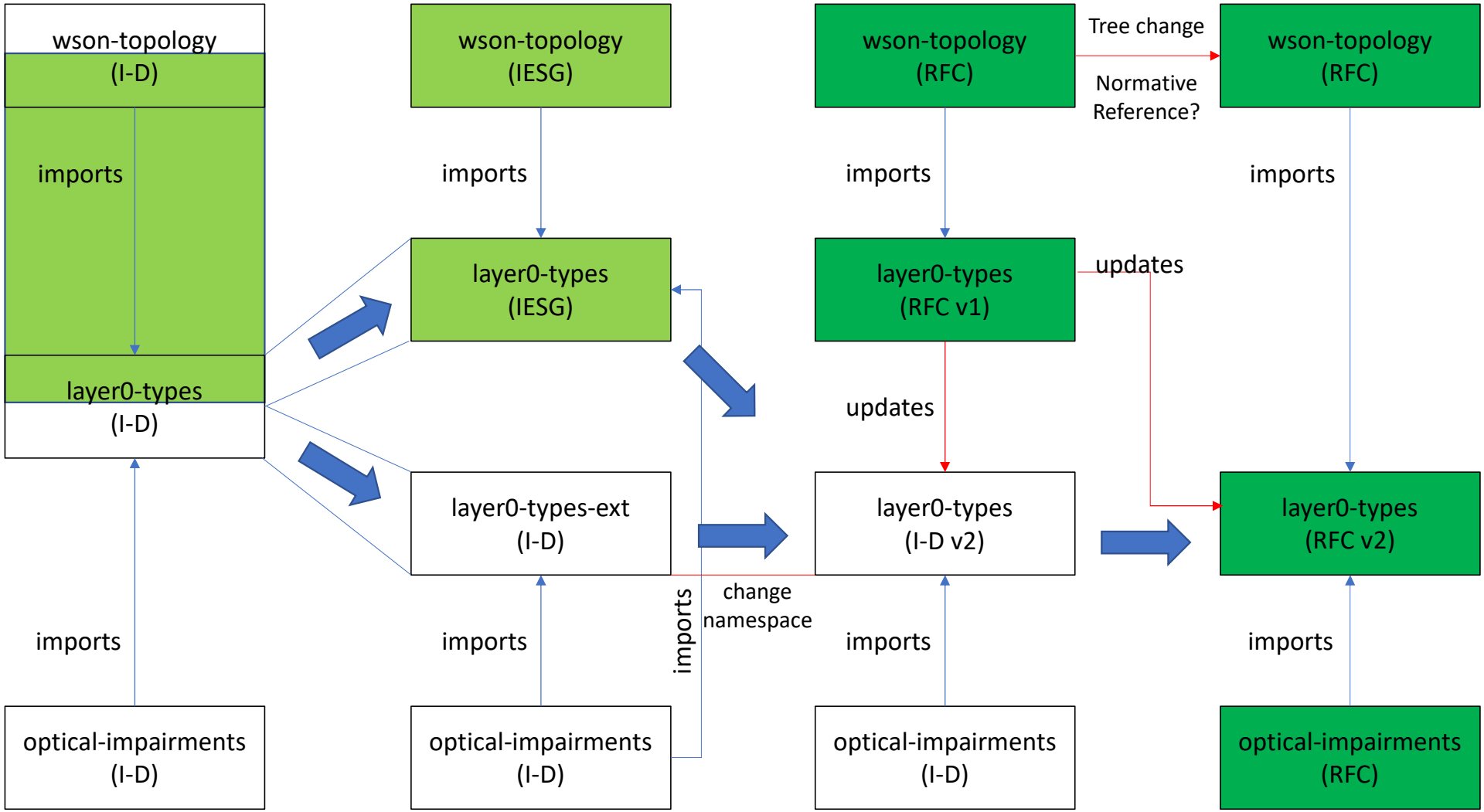
Scope of the new document

- draft-ietf-ccamp-layer0-types-09 has been reduced in scope, before publication, to only cover spectrum management related aspects required for the YANG module ietf-wson-topology defined in draft-ietf-ccamp-wson-yang.
- This document complements the content of “layer0-type” reconciling the different transponder models (WSON, flexgrid, dwdm-if-param, optical impairments) present in CCAMP using common YANG structures and definitions (typedefs, identities, groupings).
- The life cycle of this draft will be in parallel of draft-ietf-ccamp-layer0-types and will be updated with the content of layer0-type as soon as it will reach publication as well as wson-topology draft, changing the name as layer0-type . (see next slide for reference)


wson-topology
(I-D)
imports
layer0-types
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imports
optical-impairments
(I-D)
Tree change
Normative
Reference?
wson-topology
(RFC)
imports
updates
layer0-types
(RFC v2)
imports
optical-impairments
(RFC)
imports
change
namespace

What can happen for other L0 drafts

- Other L0 drafts can follow the same path as wson-topology and optical-impairment-topology
- Flexgrid-topology (draft-ietf-ccamp-flexigrid-yang-09) is a pretty stable version we can think that it could follow the same path as wson-topology , using layer0-type-v1 in the process to become RFC
- Flexgrid-tunnel (draft-ietf-ccamp-flexigrid-media-channel-yang-03), wson-tunnel (draft-ietf-ccamp-wson-tunnel-model-05) and interface-model (draft-ietf-ccamp-dwdm-if-param-yang.05) are not yet in the IESG process, so we could envisage for them a process with layer0-type-ext and layer0-type V2 .
- Nothing prevent to introduce a layer0-type v3 in case some time discrepancy can happen among different drafts in the RFC process.

Next Steps

- WG adoption
- Add other YANG structures (grouping, identities, etc) as needed by other L0 YANG models in CCAMP


Thank You!