A Yang Data Model for Optical Impairment-aware Topology

draft-ietf-ccamp-optical-impairment-topology-yang-07

Co-authors (frontpage):
• Young Lee (SKKU)
• Jean Luc Auge (Orange)
• Victor Lopez (Nokia)
• Gabriele Galimberti (Cisco)
• Dieter Beller (Nokia)

Co-authors:
• Haomian Zheng (Huawei)
• Italo Busi (Huawei)
• Nicola Sambo (Scuola superior S.Anna)
• Julien Meuric (Orange)
• Esther Le Rouzic (Orange)
• Sergio Belotti (Nokia)
• Enrico Griseri (Nokia)
• Gert Grammel (Juniper)

Contributors
• Jonas Martenson (RISE)
• Aihua Guo (Futurewei)
Major Activities since IETF 110 Meeting

• Continuation of weekly CCAMP WebEx meetings (Tue, 2-3pm CET)

• Added section 2.6 related to the introduction of 3R regenerator in the model
  • General description of 3R functionality
  • Typical realization of 3R functionality (see following slide)
  • 2 options discussed to address 3R function model (see slide 5)
  • Still pending related issue #83

• YANG model update to extend the ROADM model to also support C+L band (addressing issue https://github.com/ietf-ccamp-wg/draft-ietf-ccamp-optical-impairment-topology-yang/issues/51)
Bidir back-to-back and unidir (with internal loop) 3R configuration

2 OTs can only be used as 3R regenerators

2 OTs can be used as 3R regenerators or as service end-point OT (flexibility!)

Colored OT Line Interfaces (single channel)
Option 1: present in the updated model

• Starting from the consideration that 3R functionality are composed of an optical transponder pair
  • the capability whether an optical transceiver can be used as a 3R regenerator it is added to the transceiver capabilities.
  • Same physical layer attributes, no additional optical impairment attributes need to be defined, the ROADM model already provides in terms of optical impairment what is needed for 3R regens
  • No needs for new model construct: LLCL can already provides the capability to regenerate when coming from one degree (LTP) and needed TE metric info

• From a functional point of view a regenerator is a kind of lightpath signal termination so having a reference to a regen in a TTP can work.

• Seamless description of 3R functionality with respect transponder model
  • managing 3R with a few augmentations from transponders model will ease implementers task and understanding of the model also from users.

• Not a big deal to change role of one transceiver from regen or back to transceiver
• No additional YANG model dependency
• More natural approach for a bottom-up approach (device)
Impairments attributes on LLCL

TTP local link connectivity would provide the impairments of the ROADM add/drop paths towards the 3R.
module: ietf-optical-impairment-topology

augment /nw:networks/nw:network/nw:network-types/tet:te-topology:
  +--rw optical-impairment-topology!
  +--ro transponder* [transponder-id]
    +--ro transponder-id uint32
  +--ro transceiver* [transceiver-id]
    +--ro transceiver-id uint32
    +--ro supported-3r-mode? enumeration
    +--ro configured-termination-type? enumeration
    +--ro supported-modes
      +--ro supported-mode* [mode-id]
        +--ro mode-id string
        +--ro (mode)
        +--:(G.698.2)

augment /nw:networks/nw:network/nw:node/tet:te-
tunnel-termination-point:
  +--ro otsi-group* [otsi-group-id]
    +--ro otsi-group-id int16
    +--ro otsi* [otsi-carrier-id]
    +--ro otsi-carrier-id int16
    +--ro configured-mode? leafref
    +--ro configured-mode?
      -> ../../../../../transponder/transponder-id
    +--ro configured-mode?
      -> ../../../../transponder/transponder-id
    +--ro configured-mode?
      -> ../../../transponder/transponder-id
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Option 2: discussed during our weekly call

- Use the service function topology model, introducing a new topology entity, “service-function 3R”
- From path computation application TTP is a path computation input $\rightarrow$ no subject to path selection and constraints, while 3R is the output of path computation $\rightarrow$ subject to selection, optimization and constraints (e.g. incl/excl some 3R elements), requires advertised info that TTP does not need necessarily
  - From path computation application behavior no changes regarding TTP management with this option
  - In the actual option L0 path computation should manage the TTPs differently depending on whether they support only L0 tunnel termination or 3R functionality
- More natural for a top-down approach (abstraction)
- 3R function as SF is client friendly
  - topological unique identification
  - indication of whether a particular instance of the 3R function is feasible, taken by another service or available (and at what priority level)
  - TE metric for selecting instance of 3R function
- SF is inherently modeling layer violations (3R realization is outside of L0)
  - Protection against potential layer violation concerns
ROADM model support for C+L band

- Following the optical amplifier model extensions to support C+L band amplifiers, model extensions have been added for ROADM

- Link-id and amp-uid can identify uniquely amplifiers solving issue to have more amp on one band (ILA or booster/preamp)

- The model can support already more than 2 bands for possible future extensions

- The mapping between abstract view in our model of ROADM and the possibility to have multiple input/output ports of the pre-ampl and booster, should not be exposed at NBI interface and the mapping should be inside domain controller, based on device model.
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 from the last IETF meeting

• Still 21 open issues
  • 2 out of them are real YANG general issues that specifically for this draft and should require
    NETMOD specific clarifications (issues #79, #84)
  • 5 have an identified resolution and will be addressed with the next YANG model commit
    (issues #26, #69, #72, #76, #75)
  • 2 editorial for review terminology (#24, #25)
  • 3 are request to remove “unused” groupings to be investigated against real needs (#55, #56, #57)
  • Pending enhancement of the model (#8, #70)
  • 1 pending issue related to 3R (#83, #23)
  • Clarifications are required (#77, #74, #42, #38)
  • Admin integration (#71)
  • https://github.com/ietf-ccamp-wg
Issue #83: How to connect transceivers in 3R

how the transceivers used in a 3R configuration can be associated, especially in case of multi-carrier (OTSiG with >1 OTSi) cases.
Issue #83: How to connect transceivers in 3R- back-to-back configuration

1x400 GE

digital

Pool of transceivers

3R @OTSi

3R @OTSiG

7/23/2021
IETF-111 on line meeting, July 2021
3R unidir configuration

digital

1x 400 GE

OTSi-1
OTSi-2
OTSi-3
OTSi-4

3R @OTSiG

3R @OTSi
Next Steps

- Finalizing 3R, with solving issue #83
- Addressing the issues with already a discussed solution (both model enhancement and editorial)
- Be ready for YANG doctor review for November meeting
- Stable version by end of the year