Framework and Data Model for OTN Network Slicing

draft-ietf-ccamp-yang-otn-slicing-03

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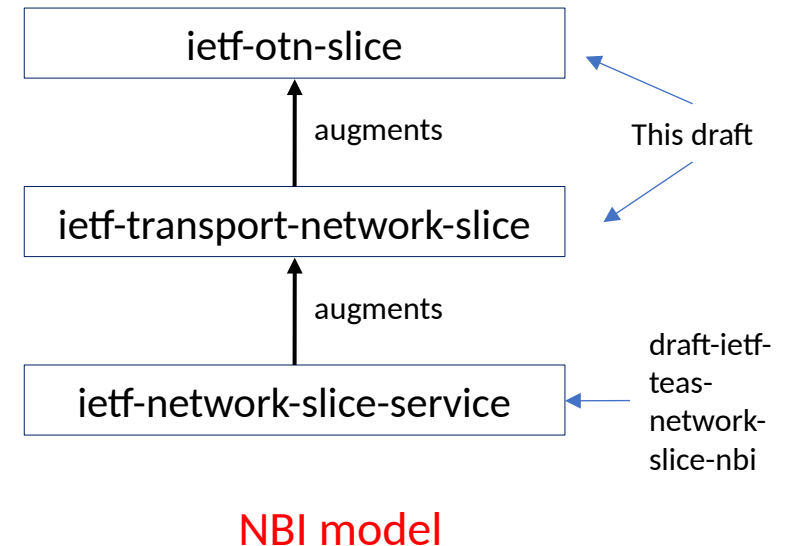Italo Busi (Huawei)

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Updates Since IETF 114

- Text Updates
  - Clarified the use of NRP in that multiple OTN slices may be mapped to the same NRP, and resources within the NRP are shared across those slices.
  - Added description for the technology-specific model for OTN-SC NBI

- YANG Model Updates for OTN-SC NBI
  - Added common SLO/SLE augments in ietf-transport-network-slice; aligned the augments with Network Slice NBI YANG
  - Introduced 1st revision of ietf-otn-slice.yang with OTN technology-specific SLO/SLE augments

- Resolving open issues

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                   augments                     │
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        │  ietf-transport-network-slice   │ ◄──┘
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        ┌─────────────────────────────────┐  teas-
        │   ietf-network-slice-service    │ ◄─ network-
        └─────────────────────────────────┘  slice-nbi
```

NBI model

Update: Use of NRP for OTN Slicing

- Multiple OTN slices may be mapped to the same NRP, and resources within the NRP are shared across those slices.

- Use of NRP is not mandatory for OTN slicing

  - NRP represents logical resource reservation to given slices.

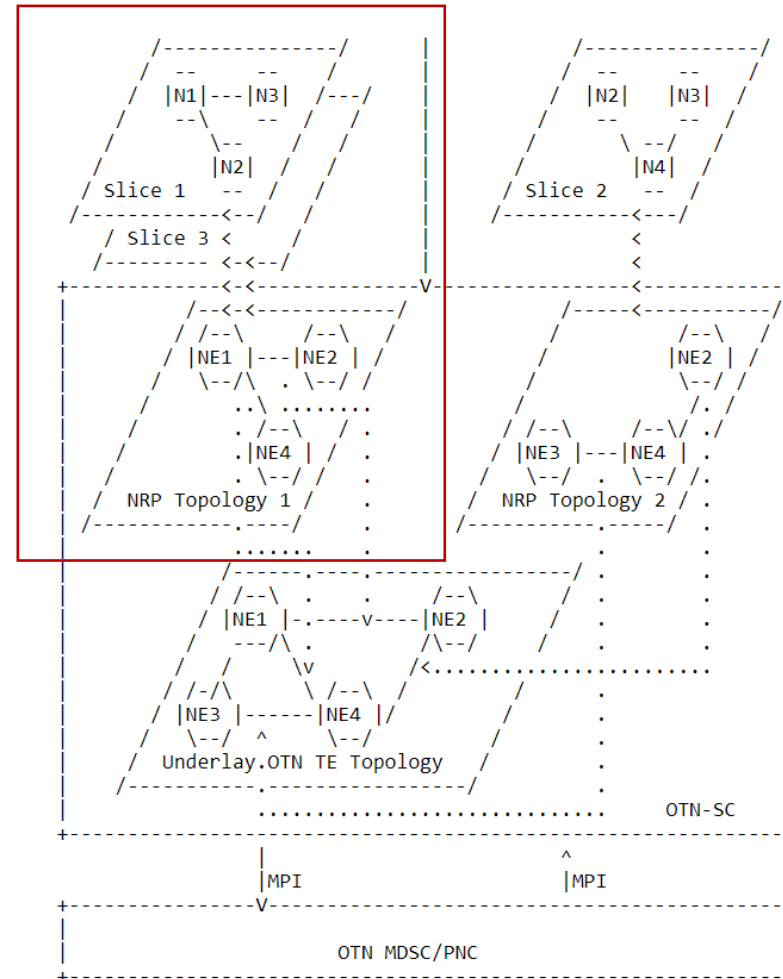 - For OTN NRP does not require the programming of data plane

Figure 4: Mapping OTN Slices to NRP

Model Updates for ietf-transport-network-slice

- Added SLO/SLE augments for connections and topology
  - Applies to customized SLO/SLE policy for top-level objects like network slice, connection-group and topology, as well as sub-level objects, such as connectivity constructs, nodes, links, LTPs etc.
  - Common attributes for transport network slices that may be considered also for IETF network slice

```
+--rw service-slo-sle-policy
   +--rw policy-description?        string
   +--rw metric-bounds
   |  +--rw metric-bound* [metric-type]
   |     +--rw metric-type          identityref
   |     +--rw metric-unit          string
   |     +--rw value-description?    string
   |     +--rw bound?               uint64
   +--rw security*                  identityref
   +--rw isolation?                 identityref
   +--rw max-occupancy-level?       uint8
   +--rw mtu?                       uint16
   +--rw steering-constraints
   |  +--rw path-constraints
   |  +--rw service-function
   |  +--rw disjointness?
   |  |       te-types:te-path-disjointness
   |  +--rw service-info?        string
   +--rw optimization-criterion?   identityref
   +--rw delay-tolerance?          boolean
   +--rw periodicity*              uint64
   +--rw resize-requirement?       identityref
   +--rw service-info?             string
```

Model Updates for ietf-otn-slice

- Augments ietf-transport-network-slice with additional SLO/SLE for OTN
  - ODU signal quality
  - Slice bandwidth objective in terms of number and type of ODU containers

```
+--rw otn
   +--rw odu-signal-quality
   |   +--rw odu-pm-objective* [duration pm-type]
   |       +--rw duration        identityref
   |       +--rw pm-type          identityref
   |       +--rw pm-threshold?   union
   +--rw odulist* [odu-type]
      +--rw odu-type      identityref
      +--rw number?       uint16
```

Open Issue: defining technology-specific attributes

- ietf-network-slice-nbi defines NS SLO/SLE attributes as a flat, opaque list
  - See https://github.com/lana-wu/ietf-ns-nbi/issues/23
  - May cause interoperability issues and requires additional implementation agreement for full interoperability
  - Cannot benefit from explicit YANG validation
  - Cannot be used to characterize complex attribute structures (e.g. ODU container)
- ietf-transport-network-slice and ietf-otn-slice choose to instead explicitly define the attributes
- Is there guideline on defining / using opaque attributes in YANG?

Open Issue: Network Slice with Topology

- ietf-transport-network-slice defines a top-level topology to support resource-based slicing
  - Customer can define a slice with customized topology
  - Connectivity constructs can have an underlay path from within the customized topology
- ietf-network-slice-nbi also intends to add reference to a customized underlay topology reference for network slices
  - TE topology based, exposed by the NSC
- Is topology a customer's intent, or a provider's constraint?
- Is TE topology the right model for network slicing NBI?
  - Underlying network may or may not be TE enabled
  - TE topology not an intent-oriented model
  - The TE topology model can be used as a model at the MPI for realization of network slices
- Shall we merge ietf-transport-network-slice with ietf-network-slice-nbi?

Next Steps

- Address open issues
- Continue working with draft-ietf-teas-ietf-network-slice-nbi-yang-02 to align the two models
- Define OTN technology-specific model based on ietf-transport-network-slice (which augments ietf-network-slice-service)
  - Technology-specific SLO/SLE for OTN
  - Multi technology links (non-OTN access links and OTN links)
- Add a few examples for various types of OTN slices which combines the use of network-slice-nbi and otn-slice

* GitHub Repo
  https://github.com/ietf-ccamp-wg/ietf-ccamp-yang-otn-slicing

* CCAMP Weekly Call: Thu 10-11am EST
  https://mailarchive.ietf.org/arch/msg/ccamp/Dr3HWPlmP9LyA6NmabWJvx7hWIc/

Thank You!