Framework and Data Model for OTN Network Slicing

draft-zheng-ccamp-yang-otn-slicing-03

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Major Updates Since IETF 111

• Expanded list of authors and contributors
• Continuous alignment with draft-ietf-teas-ietf-network-slices
  • Endpoints, connectivity matrix
• Added text describing the design of NBI YANG modeling
• Included an initial revision of the NBI YANG model
  • Common model for transport network slicing
• Minor updates to MPI YANG model
OTN-SC NBI Modeling

- Building on a common model which is technology-agnostic and supports both connectivity-based slices and resource-based slices. The common model allows customer to
  - Use connectivity matrix to express intended connectivity between endpoints
  - Use topology to reserve resources for the slice and express detailed path for each connection
  - Reserve the resources first and create connections later as needed

- The common model can be used to support slicing for any transport layer, e.g., OTN, WDM (WSON/Flex-grid), MPLS-TP
  - OTN-SC NBI = common model + augments

- Reusing concepts and model definitions from existing drafts
  - draft-liu-teas-transport-network-slice-yang
    - Network topology for resource-based slicing and technology-agnostic SLOs
  - draft-ietf-teas-actn-vn-yang
    - CMI model that supports both type 1 (connectivity-based) and type 2(resource-based) VN
    - Entangled with ACTN and TE topology
  - draft-ietf-teas-ietf-network-slice-nbi-yang
    - Common definition for endpoints, SLOs etc.
    - Supports only connectivity-based slicing
    - IP technology specific, does not apply to transport
Proposed Common Model for Transport Network Slicing (TNS)

module: ietf-transport-network-slice
  |--rw network-slices
    |--rw network-slice* [ns-id]
      |--rw ns-id string
      | ...
      |--rw slo ...
    |--rw endpoints
      |--rw endpoint* [endpoint-id]
        |--rw endpoint-id string
    |--rw network-topologies
      |--rw network-topology* [topology-id]
        |--rw topology-id string
        |--rw node* [node-id]
          | ...
          |--rw slo ...
          |--rw termination-point* [tp-id]
          |--rw link* [link-id]
            |--rw ...
      |--rw connectivity-matrices
        |--rw connectivity-matrix* [connectivity-matrix-id]
          |--rw connectivity-matrix-id uint32
          |--rw topology-id? leafref
          |--rw src-endpoint?
            | -> ../../endpoints/endpoint/endpoint-id
          |--rw dst-endpoint?
            | -> ../../endpoints/endpoint/endpoint-id
          |--rw slo
          |--rw explicit-path* [tp-id]
            |--rw tp-id leafref
Updates to MPI YANG Model

- Added option to color ODU resources in terms of number and type of ODU containers

```yang
module: ietf-otn-slice

augment /nw:networks/nw:network/nt:link/tet:te/tet:te-link-attributes:
  +--rw (otn-slice-granularity)?
    +--rw (link)
      | +--rw slice-id?  uint32
    +--:(link-resource)
      +--rw slices* [slice-id]
        +--rw slice-id                  uint32
        +--rw (technology)?
          +--rw (slice-bandwidth)?
            +--rw (containers)
              | +--rw odulist* [odu-type]
              |   +--rw odu-type    identityref
              |   +--rw number?     uint16
              | +--:(time-slots)
              |   +--rw otn-ts-num?  uint32
          +--ro sliced-link-ref?          -> ../../../../../nt:link/link-id
```
Open Issues

• Whether schema mount can be used to import network topology definitions from draft-liu-teas-transport-network-slice-yang (which augments ietf-network/ietf-network-topology defined in RFC8345)
  • RFC8528 (https://datatracker.ietf.org/doc/html/rfc8528) defines schema mount as used for implementation and run-time mounting of models. Further investigation is needed for design-time schema mount
  • Need examples of schema mount for implementation time mounting

• Whether to model connectivity matrix as single-node topology or as a list of intended connections
Next Steps

• Develop OTN augmentation based on Transport Network Slice
• Address slicing for non-OTN external links (access and inter-domain)
• Address the open issues
• Address comments and reviews from the WG

• The authors believe the draft is ready for WG adoption
  • Consensus on definition & scope
  • Good interest within the WG and expanding list of participants
  • Developed models for NBI and MPI

• Weekly discussion
  • Meeting slot: Thu 10-11am EST
  • GitHub: https://github.com/aguoiietf/ietf-ccamp-yang-otn-slicing
Thank You!