IETF Network Slice Topology YANG Data Model

draft-liu-teas-transport-network-slice-yang-07

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Motivation of a customer for expressing topology intents

- Build the logical view of the desired slice service (and its parts)
  - Impact on realization -> hints for the NSC on how to instantiate the slice service

- Operate the slice service according to the expressed topology
  - Impact on control of the slice -> control of slice is out of scope
Similar Requirements in ACTN VN Type 2 for Using Customized Topologies

• ACTN VN was considered as an equivalent concept to network slicing
  • WG decided to define new concept for network slices similar to the terms defined in ACTN VN
  • However, similar requirements would be posted against network slicing

• Similar debates under ACTN VN development for using topologies to express VN requests, which resulted in the definition of two types of VNs
  • Type 1 VN is connectivity-based VN, where a VN is defined as a set of edge-to-edge abstract links (VN members) == network slice with connectivity constructs
  • Type 2 VN is topology-based VN, where a topology is used to express actual paths for VN members == topology defined by this draft
    • Type 1 VN is actually a special case of Type 2 VN
    • A customized topology can be created a priori (i.e. agreed mutually between CNC and MDSC)
    • A customized topology can also be created “on the fly” by the MDSC as part of VN instantiation
    • TE topology model is used for defining customized topologies
      • Diff for this draft: gaps in TE topology with missing SLO/SLE definitions
Feedbacks received on NS Topology

• Proposed use case is not convincing to explore using topologies for network slicing
  • Presenting additional use case from a provider’s perspective

• There are still concerns in the concept of a customized topology
  • Whether building a customized topology require prior topology information from the provider
  • How the NSC may map a customized topology to an internal realization, e.g. an NRP
  • Whether the constraints expressed by a customized topology can be instead expressed by the connectivity constructs
  • Whether existing models are sufficient to express a customized topology
Addressing WG Concerns

• Whether building a customized topology require prior topology information from the provider
  • It’s not mandatory but a customized topology may be built using e.g. offline negotiation or online with a SAP topology exposed by the provider (RFC9408)

• How the NSC may map a customized topology to an internal realization, e.g. an NRP
  • Edge node – PE node attached to a SAP
  • Edge TP – SDP
  • Transit node (P-node) – a virtual node that can be translated to resource sharing constraints
  • Link – reserved resources

• Whether the constraints expressed by a customized topology can be instead expressed by the connectivity constructs
  • We show by the use case that in some scenarios it is more efficient to use topologies to express the constraints, e.g. diversities, resource sharing

• Whether existing models are sufficient to express a customized topology
  • Base model exists (RFC8345 network topology)
  • No suitable model exist to express topology + SLO/SLE
RFCXXXX Network Slice Service (NS1) consist of four Connectivity constructs with 4 different SLAs Blue, Orange, Red and Green

Modelling as NS framework definition

- This is what is currently in the framework draft!
- Multiple connectivity constructs
- SLO of each connection is different
- Each CC is one entry (i.e., connection)
  - CC Blue: Src\{1,2,6\} Dst\{1,2,6\} with SLO Blue
  - CC Orange: Src\{3\} Dst\{7\} with SLO Orange
  - CC Red: Src\{7\} Dst\{6\} with SLO Red
  - CC Green: Src\{5\} Dst\{9,10\} with SLO Green
- Connectivity construct Key = \{new connectivity-construct-id\} (i.e. Blue, Orange, Red, Green)
  - Note: connection type is not part of the key
Example

- Resources may be allocated in the same NRP w/o information about desired customer topology
  - Toy example, all in the same VRF
- Adding new nodes / SDPs could affect / imply reconfiguration in all connections

- Resource isolation and resource reservation between different set of nodes / SDPs based on network planning using forecast of demand traffic matrix
  - Toy example, separated blue and orange VRFs
- On-demand addition of nodes /SDPs connections based on planning do not imply reconfiguring all set of connections
Next Steps

• Address pending and new comments / questions
• Request for WG adoption

* GitHub Repo

https://github.com/aguoiietf/ietf-network-slice-topology
Thank You!