IETF Network Slice Topology YANG Data Model

draft-liu-teas-transport-network-slice-yang-09

Co-authors:

Xufeng Liu (Alef Edge)  
Jeff Tantsura (Microsoft)  
Igor Bryskin (Individual)  
Luis M. Contreras (Telefonica)  
Qin Wu (Huawei)

Sergio Belotti (Nokia)  
Reza Rokui (Ciena)  
Aihua Guo (Futurewei)  
Italo Busi (Huawei)
Updates since IETF-118 (1)

- Changed customized topologies into customer intent topology
  - Represent a better way to express resource reservation preference
  - The topology intent is provided by customer not exposed by service provider

- Clarified relationship with TE-based Topology
  - Using multi-inheritance the model can be combined with other TE topology models even technology-specific, allowing the creation of customer intent topology tailored to specific requirements

- Clarified relationship with SAP Topology — 2 distinct purposes
  - SAP model is exposing to customer an abstract view of the provider NW including a list of Service Attachment Point (SAP) where customer service can be connected.
  - In contrast customer intent topology captures a customer's intentions and provider act as the recipient of these intents
Updates since IETF-118 (2)

• Described relationship with ACTN VN (see next slide)
  • [I-D.ietf-teas-ietf-network-slices] defining IETF NS as collection of connectivity-constructs strictly recall the VN type 1 definition of VN
  • [I-D.ietf-teas-ietf-network-slice-nbi-yang] adding a reference to a customer intent topology strictly recall the VN type 2 but without specifying the explicit use of the underlay topology
  • This model is complementing what described in [I-D.ietf-teas-ietf-network-slice-nbi-yang] adding the possibility to customer to define intent topology tailored for their network slices
Relationship between VN and NS

Approaches to express customer intent

<table>
<thead>
<tr>
<th>Requirements</th>
<th>VN Solution Set</th>
<th>NS Solution Set</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity Intent</td>
<td>VN Type 1 Model</td>
<td>NS Service Model</td>
</tr>
<tr>
<td>Connectivity Constraints</td>
<td>VN Type 2 Model</td>
<td></td>
</tr>
<tr>
<td>Topology Intent</td>
<td>TE Topology Model (underlay)</td>
<td></td>
</tr>
</tbody>
</table>

See Appendix D of draft-ietf-teas-ietf-network-slice-nbi-yang-09
Open Issue: how many models/drafts?

<table>
<thead>
<tr>
<th>Requirements</th>
<th>Option 1 (Current status)</th>
<th>Option 2</th>
<th>Option 3</th>
<th>Option 4</th>
<th>Option 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connectivity Intent</td>
<td>NS Service Model (NS NBI I-D)</td>
<td>NS Service Model (NS NBI I-D)</td>
<td>NS Service Model (NS NBI I-D)</td>
<td>NS Service Model (NS NBI I-D)</td>
<td>NS Service Model (NS NBI I-D)</td>
</tr>
<tr>
<td>Connectivity Constraints (*)</td>
<td>NS Topology Model (This I-D)</td>
<td>NS Path Constraints (NS NBI I-D)</td>
<td>NS Path Constraints (This I-D)</td>
<td>NS Path Constraints (New I-D)</td>
<td></td>
</tr>
<tr>
<td>Topology Intent</td>
<td>Two models Two I-Ds</td>
<td>NS Topology Model (This I-D)</td>
<td>NS Topology Model (This I-D)</td>
<td>NS Topology Model (This I-D)</td>
<td>NS Topology Model (This I-D)</td>
</tr>
</tbody>
</table>

(*) Constraints to be provided for each connectivity-construct
Next Steps

• Address comments / questions
• Request for WG adoption

* GitHub Repo
  https://github.com/aguoiietf/ietf-network-slice-topology
Thank You!
Backup Slides
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 -> out of scope
IETF Network Slice Service (NS1) consist of four Connectivity constructs with 4 different SLAs Blue, Orange, Red and Green.

- **Type Any-to-any**
  - connectivity-construct-id = Blue
  - Key = Blue

- **Type P2P**
  - connectivity-construct-id = Orange
  - Key = Orange

- **Type P2P**
  - Connectivity-construct-id = Red
  - Key = Red

- **Type P2MP**
  - connectivity-construct-id = Green
  - Key = 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 customer topology
- Adding DU nodes could affect the CU-UPF connections

• Resource isolation and resource reservation between DU-CU and CU-UPF based on network planning using forecast of demand traffic matrix
• On-demand addition of DU-CU connections based on planning
**NS Current Solution (topology)**

SDPs: \{X, Y, Z\}
connectivity-constructs: \{X-Y, X-Z\}

**NS Service #1 (with SLOs/SLEs)**

**TE Topology #1 (with TE metrics/OFs)**

LTPs: \{X, Y, Z\}
CM entries: \{X-Y, X-Z\}

undelay-path \{A, B, C\}

**TE Topology #2 (with TE metrics/OFs)**

undelay-path \{E, G, H\}

**TE Topology #3 (with TE metrics/OFs)**
Alternative solution

- **NS Service #1** (with SLOs/SLEs)
  - SDPs: {X, Y, Z}
  - Connectivity-constructs: {X-Y, X-Z} with SLO/SLE
  - Path-constraints: {A, B, C}

- **TE Topology #2** (with TE metrics/OFs)
  - Path-constraints: {X, Y, Z}
  - Path-constraints: {E, G, H}

- **TE Topology #3** (with TE metrics/OFs)
  - Path-constraints: {X, Y, Z}
  - Path-constraints: {E, G, H}
Proposed solution

NS Service #1 (with SLOs/SLEs)

Proposed solution

NS Topology #2 (with SLOs/SLEs)

SDPs: {X, Y, Z}
connectivity-constucts: {X-Y, X-Z} with SLO/SLE

path-constraints {A, B, C}

SDPs: {X, Y, Z}
connectivity-constucts: {X-Y, X-Z} with SLO/SLE

path-constraints {E, G, H}

NS Topology #3 (with SLOs/SLEs)
VN Solution

TE Topology #1 (with TE metrics/OFs)

undelay-path {A, B, C}

VNAPs: {X, Y, Z}
CM entries: {X-Y, X-Z}

TE Topology #2 (with TE metrics/OFs)

TE Topology #3 (with TE metrics/OFs)

undelay-path {E, G, H}