IETF Network Slice Service YANG Model

draft-ietf-teas-ietf-network-slice-nbi-yang-00

TEAS WG

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Major open issues

• Connectivity matrix modelling
  • What is the purpose of having multiple connectivity matrix?
  • Various options to model Connectivity Matrix?
• “ns-connection-groups”
• “tag” is needed, aside from “customer-list”
• Underlay relationship
Connectivity Matrix modelling consideration

• What is the purpose of multiple connectivity matrices?
• Network Slice framework draft updates definition of NS service using connection matrix
• IETF network slice service model needs to support multiple connectivity matrices
• Authors consider there are several modeling options

- IETF Network Slice Connectivity Matrix (CM)
  - 5 types: P2P, P2MP, MP2P, MP2MP, A2A
  - CM ID: connectivity-matrix-id

See framework document for more details
- For a P2P connectivity matrix, there is one sender, one receiver
- For a P2MP connectivity matrix, there is only one sender, multiple receiver
- For MP2P, like a set of P2P
- For MP2MP, like a set of P2MP
- For A2A, special case of MP2MP where all senders are receivers as well
Why multiple Connectivity Matrices?

1. A single NSE belong to multiple traffic types with potentially different SLOs.
   - NES1 belong to traffic types Blue and Red
2. Multiple SLO between same NSEs such as different class of services, ...
   - Connections Red and Green
IETF Network Slice Connectivity Matrix- Option 1
Modelling as NS framework definition

- This is what is currently in the framework draft!
- Multiple connection matrices
- SLO of each connection is different
- Each CM is one entry (i.e., connection)
  - CM Blue: Src{1,2,6} Dst{1,2,6} with SLO Blue
  - CM Orange: Src{3} Dst{7} with SLO Orange
  - CM Red: Src{7} Dst{6} with SLO Red
  - CM Green: Src{5} Dst {9,10} with SLO Green
- Connectivity matrix Key = {new connectivity-matrix-id} (i.e. Blue, Orange, Red, Green)
  - Note: connection type is not part of the key
Multiple connection matrix
- Every matrix has multiple entries
- Connection type is part of the key
  - connectivity matrix Key = {connectivity-matrix-id, connection-type}
- Connection list
  - Each connection has its own SLO
  - Each connection with a list of senders and receivers
    - CM Blue: Src{1,2,6} Dst{1,2,6} with SLO Blue
    - CM Red: Src{3} Dst{7} with SLO Red
    - CM Red: Src{4} Dst{8} with SLO Red
    - CM Red: Src{4} Dst{8} with SLO Black
    - CM Green: Src{5} Dst {9,10} with SLO Green
- Connection type P2P, P2MP
  - MP2P, A2A (are special case of p2p)
  - MP2MP (is special case of p2mp)

Note:
The “connectivity-matrix-id” could be: string, integer, traffic class etc.
Introducing `ns-connection-groups`

• IETF network slice may have multiple (e.g.) P2P connections. Each connection:
  • is unidirectional between two NSEs
  • has its own set of SLOs (e.g. Max BW$_1$, Max BW$_2$, Max BW$_3$)

• The group of (e.g. P2P) IETF network slice connections MAY share a common SLO (e.g., Group Max BW). For example:
  • The sum of all connection ‘Max BW(s)’ not to exceed the Group Max BW at anytime

  Max BW$_1$+ Max BW$_2$+ Max BW$_3$ <= Max BW

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5G slice might specify SLO requirements per group:

NSE$_1$ $\rightarrow$ NSE$_2$: guaranteed BW: 1G, maximum BW 2G
NSE$_1$ $\rightarrow$ NSE$_3$: guaranteed BW: 1.5G, maximum BW 2G
NSE$_1$ $\rightarrow$ NSE$_4$: guaranteed BW: 1.5G, maximum BW 3G

And additionally per groups of connections, i.e.:

NSE$_1$ $\rightarrow$ <NSE$_1$, NSE$_2$, NSE$_3$>: guaranteed BW: 4G, maximum BW 4G
IETF Network Slice Multiple SLOs support

• I-D. ietf-teas-ietf-network-slices defines BW SLO as:

  Guaranteed Minimum Bandwidth

  Minimum guaranteed bandwidth between two endpoints at any time.
  The bandwidth is measured in data rate units of bits per second
  and is measured unidirectionally.

  • Strictly IP data rate or can be MPLS data rate (e.g. CsC)
  • This is analogous with CIR - Should this include other parameters like PIR (Max
    Bandwidth), CBS, EIR, etc.

• A IETF network slice may implement QoS to allow multiple classes of
  service/traffic on same IETF network slice. This mandates SLO:
  • Classification rules: to identify a class of service
  • QoS profiles - e.g. for each class of service:
    guaranteed amount of bandwidth, latency, jitter, rate-limit
Network Slice Tags

- IETF network slice customer (e.g., E2E network slice orchestrator) MAY use tags to associate a single e2e service with multiple IETF network slices and other services
- The NSC MAY use the tags to associate multiple IETF network slice services together, e.g.:
  - The tags can be used by the NSC during the realization of the IETF network slice
- Tags may have a ‘description’ and ‘value’ to define a generic semantic
Associating IETF Network Slice Service to Underlay Network Resource Partition

- The NSC MAY aggregate and group multiple IETF network slice services (e.g., that share common SLOs) and map them on an underlay “Network Resource Partition”

- In some scenarios, the “Network Resource Partition” MAY have been created in advance and known to the network slice Orchestrator

- The network slice Orchestrator can pass the NRP-ID to explicitly indicate to the NSC that the IETF Network Slice service should be steered over the specific “Network Resource Partition”
Next step

• Resolve the open issues
• Make consistent with the terms of draft NS framework, e.g. SLE, NSE using slice customer edge and slice provider edge instead of CE and PE
• VN discussion: based on last month meeting, we are still listening and welcome suggested text to make it clearer