

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

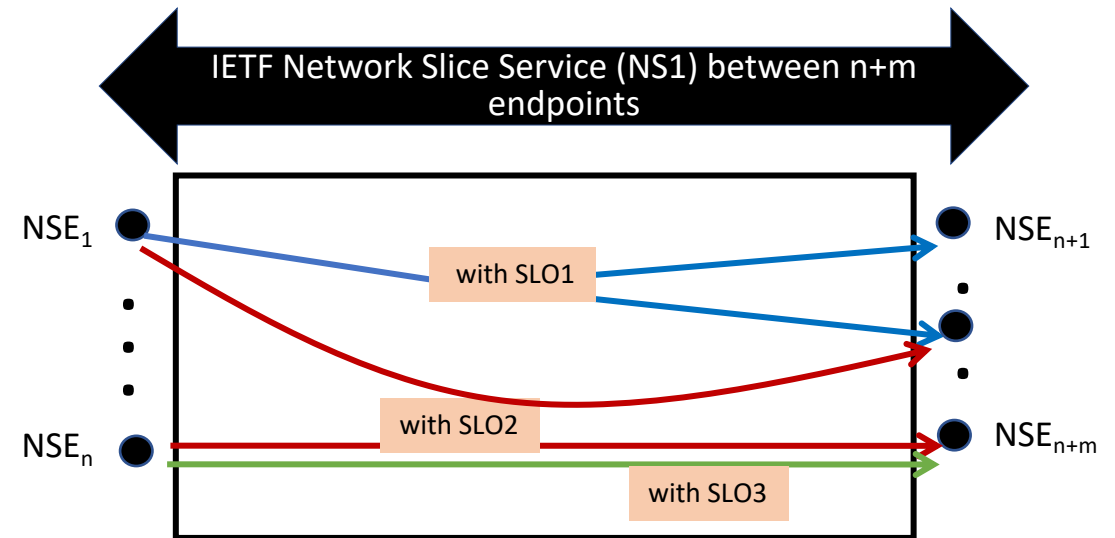
- IETF Network Slice Connectivity Matrix (CM)
 - **5 types: P2P, P2MP, MP2P, MP2MP, A2A** 
- **CM ID: connectivity-matrix-id**

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

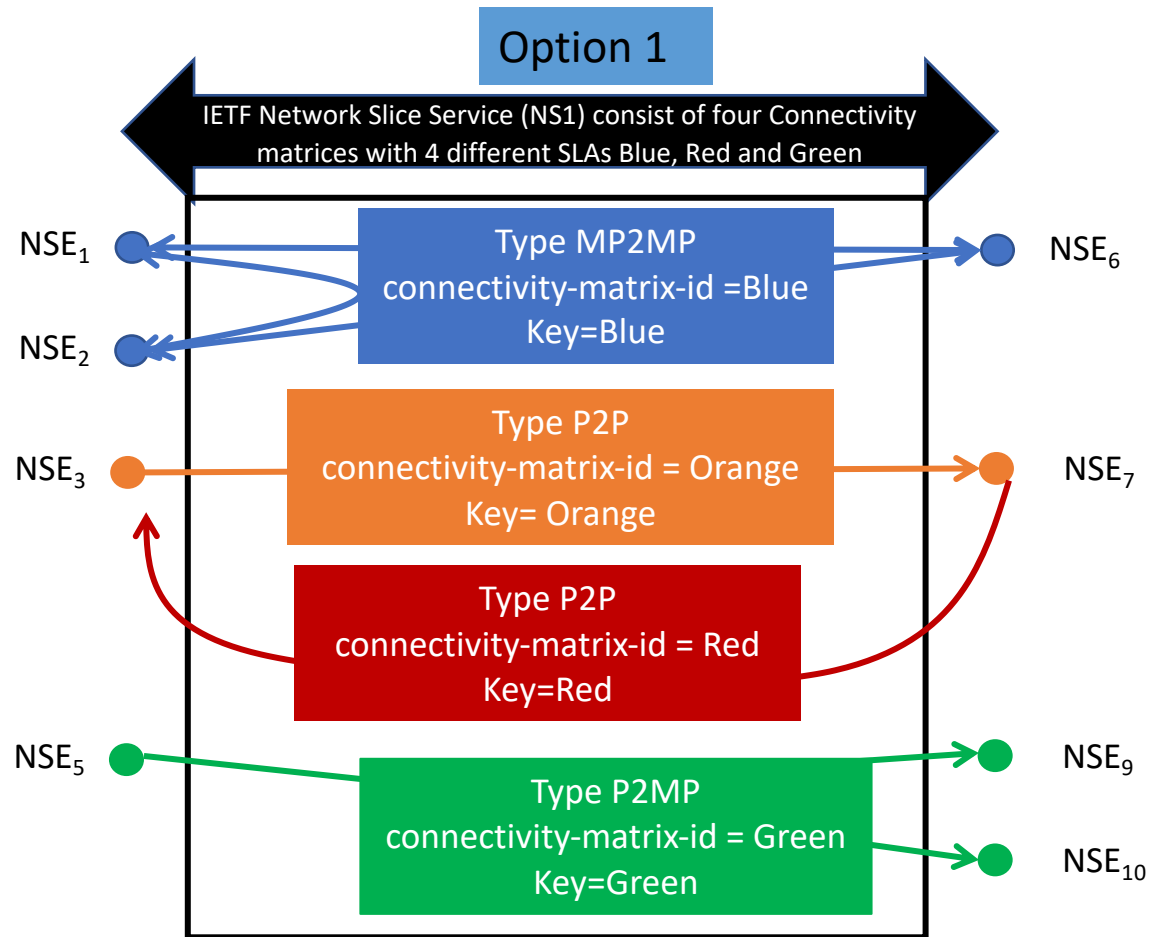
Why multiple Connectivity Matrices?

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



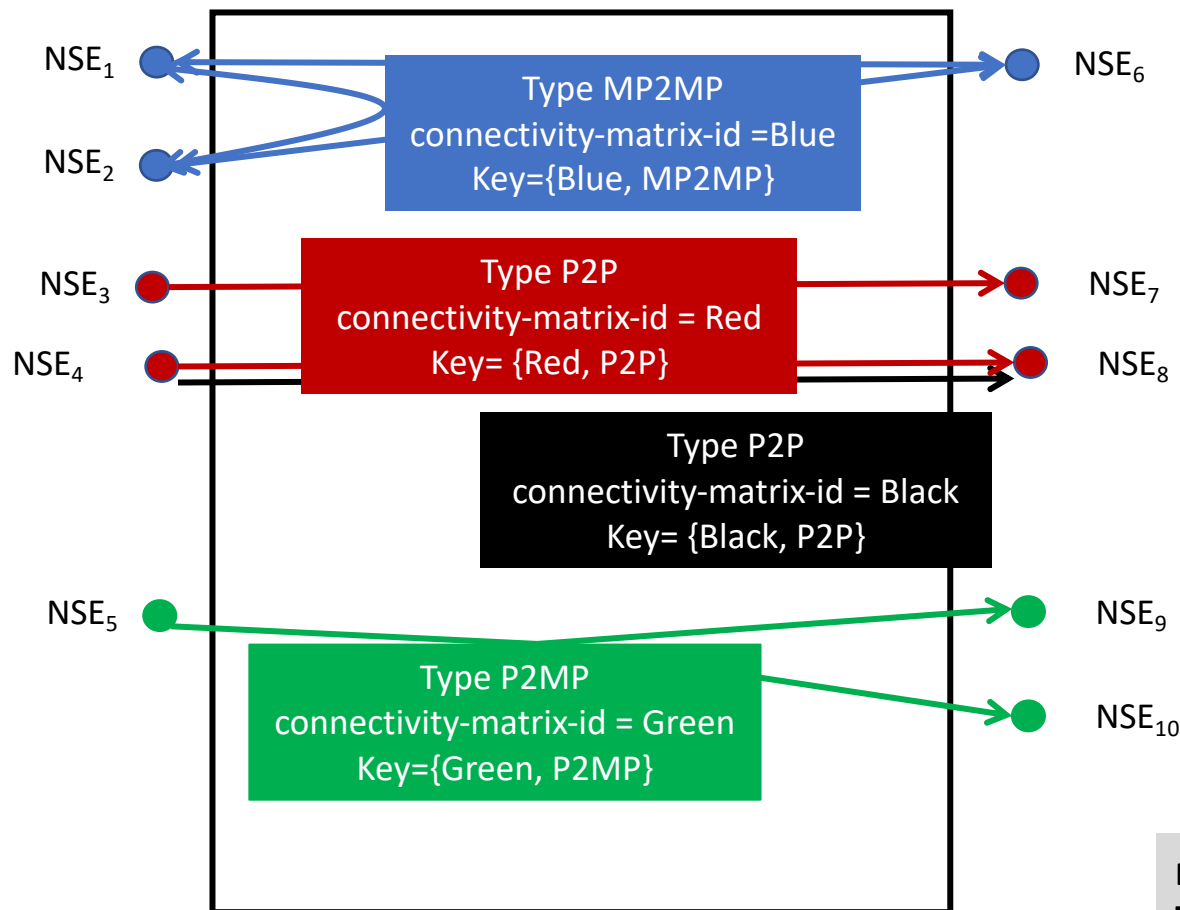
Modelling as NS framework definition

- 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

IETF Network Slice Connectivity Matrix- Option 2

Option 2

IETF Network Slice Service (NS1) consist of three Connectivity matrices with 3 different SLAs Blue, Red and Green



- 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)

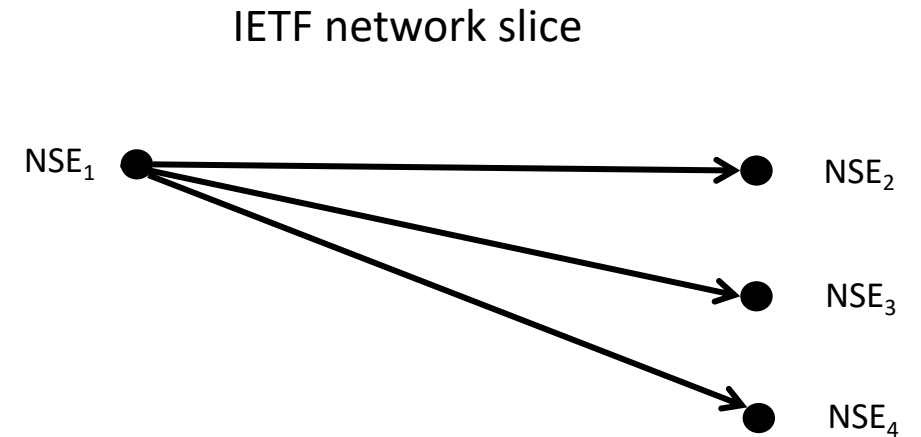
Note:

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 BW₁, Max BW₂, Max BW₃)
- 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

$$\text{Max BW}_1 + \text{Max BW}_2 + \text{Max BW}_3 \leq \text{Max BW}$$



5G slice might specify SLO requirements per

5wq

NSE₁ ---> NSE₂: guaranteed BW: 1G, maximum BW 2G

NSE₁ ---> NSE₃: guaranteed BW: 1.5G, maximum BW 2G

NSE₁ ---> NSE₄: guaranteed BW: 1.5G, maximum BW 3G

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

NSE₁ ---> < NSE₁, NSE₂, NSE₃ >: guaranteed BW: 4G, maximum BW 4G

IETF Network Slice Multiple SLOs support

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

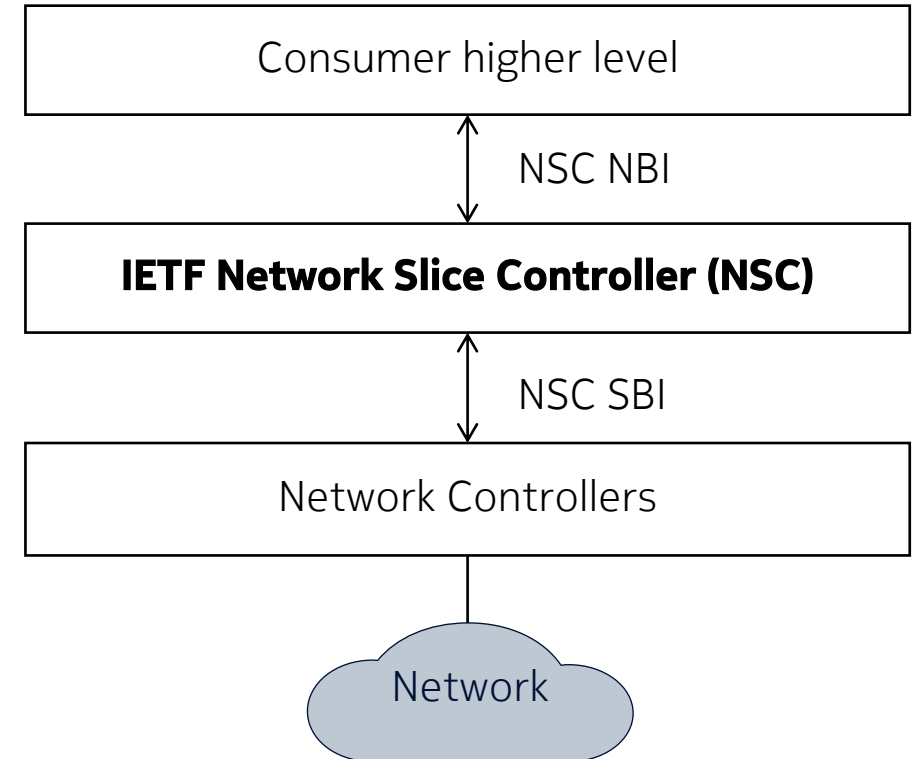
Guaranteed Minimum Bandwidth

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

Under investigation

- 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