IETF Network Slice Topology YANG Data Model

draft-liu-teas-transport-network-slice-yang-10

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Updates since IETF-119 (1)

- Addressed comments received at and post-IETF 119
  - Unified the use of terminologies – customer intent topology
  - Model is implemented as two modules for ease of implementation (one defines the customer intent topology and the other augments ietf-ns-nbi with underlay path)
  - Added a new section to describe the reasoning of not reusing VN Type 2 for network slicing (and defining the customer intent topology)
  - Aligned with ietf-ns-nbi YANG updates, removed redundant definitions, e.g. diversity constraints which have been incorporated into the base model

- Added a new use case section with two example use cases on customer intent topology
  - Multi-tenancy network wholesaling
  - Realization of connectivity constructs on different segments within a customer intent topology for 5G RAN

Consideration on WG Adoption

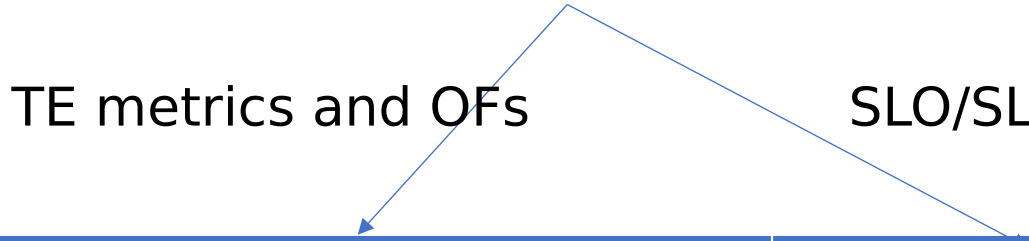
- This draft indicates that a big part of the use cases for customer intent topology are transport (OTN/MW/WDM) and TE-oriented
  - See use cases for OTN Slicing
  - Other possible scenarios, such as hierarchical/multi-domain composite network slice (draft-li-teas-composite-network-slices), may also benefit by using topologies for underlay resource reservation.
- However there also exist use cases for non-transport scenarios e.g. IP/MPLS, proposed by operators, that can benefit from using customer intent topologies
  - See use cases included in this draft
  - Developing this work outside TEAS (for example, in CCAMP) would risk creating two parallel solutions for the same problem when needs arise
- The data model proposed by this draft is technology-agnostic and complements the model in ietf-ns-nbi
- Authors would leave WG to decide on the best home for this work, but they consider that the draft is ready for WG adoption.
  - If the WG considers this WG being the best home, the authors would like to request for WG adoption based on the interest shown by the poll during IETF 119

Relationship with ACTN VN (also 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



Requirements	VN Solution Set	NS Solution Set
Connectivity Intent	VN Type 1 Model	NS Service
Connectivity Constraints	VN Type 2 Model	
Topology Intent	TE Topology Model (underlay)	

GAPs

See Appendix D of draft-ietf-teas-ietf-network-slice-nbi-yang-09

Open Issue: how many models/drafts?

Requirements	Option 1 (Current status)	Option 2	Option 3	Option 4	Option 5
Connectivity Intent	NS Service Model (NS NBI I-D)	NS Service Model (NS NBI I-D)	NS Service Model (NS NBI I-D)	NS Service Model (NS NBI I-D)	NS Service Model (NS NBI I-D)
Connectivity Constraints (*)	NS Topology Model (This I-D)		NS Path Constraints (NS NBI I-D)	NS Path Constraints (This I-D)	NS Path Constraints (New I-D)
Topology Intent		NS Topology Model (This I-D)	NS Topology Model (This I-D)	NS Topology Model (This I-D)	NS Topology Model (This I-D)
	Two models Two I-Ds	Two models Two I-Ds	Three models Two I-Ds	Three models Two I-Ds	Three models Three I-Ds

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

Next Steps

- Address comments / questions
- Request for WG adoption

* GitHub Repo
  https://github.com/aguoietf/ietf-network-slice-topology

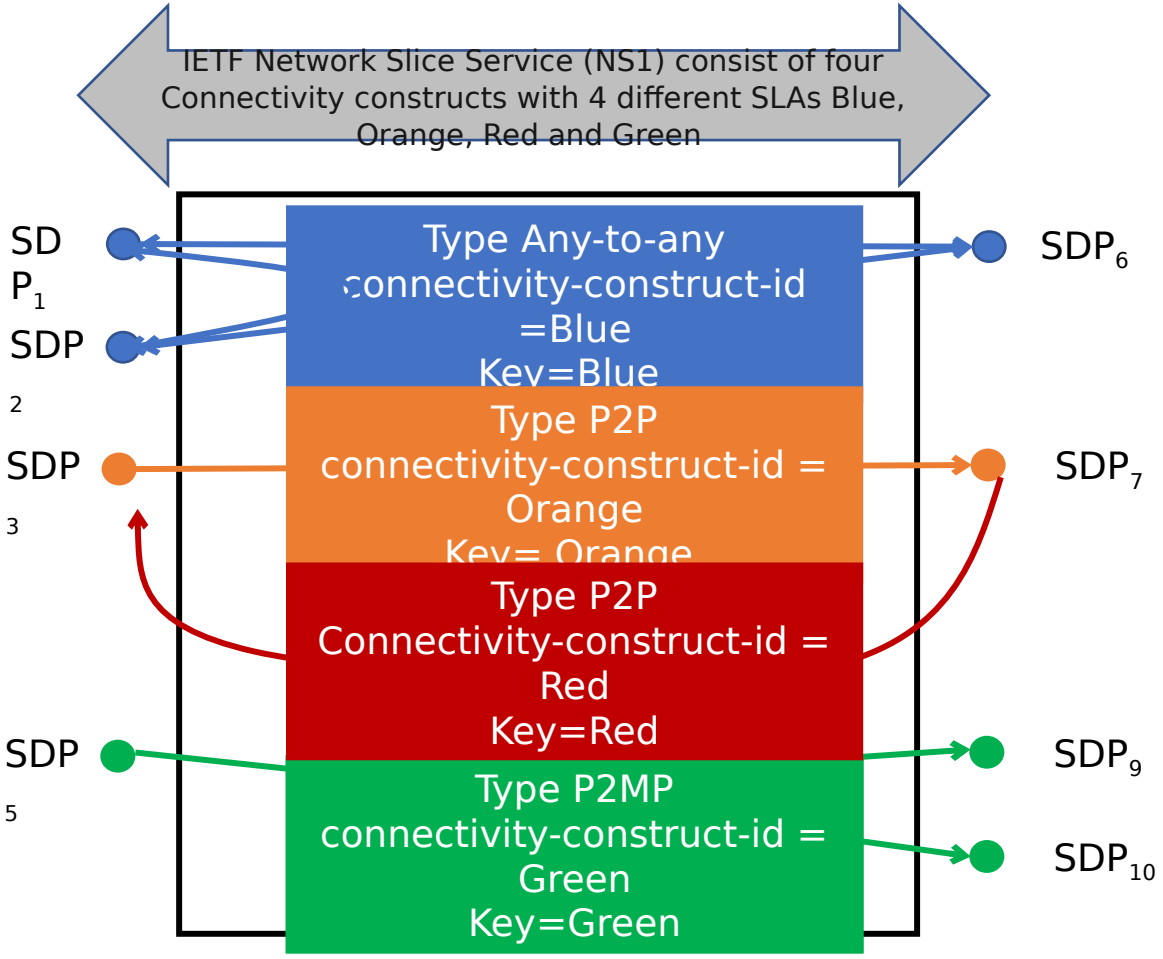
Thank You!

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

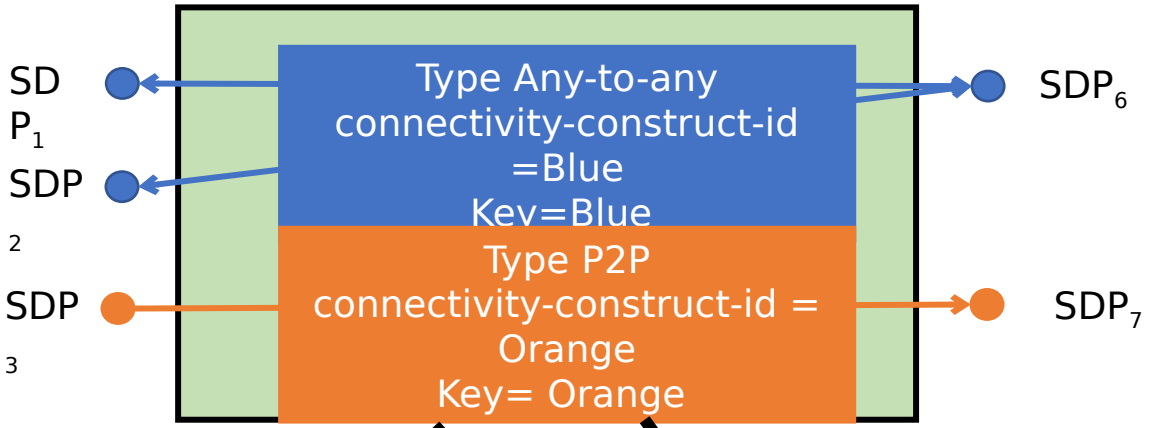
RFC9543 Network Slice Connectivity Constructs



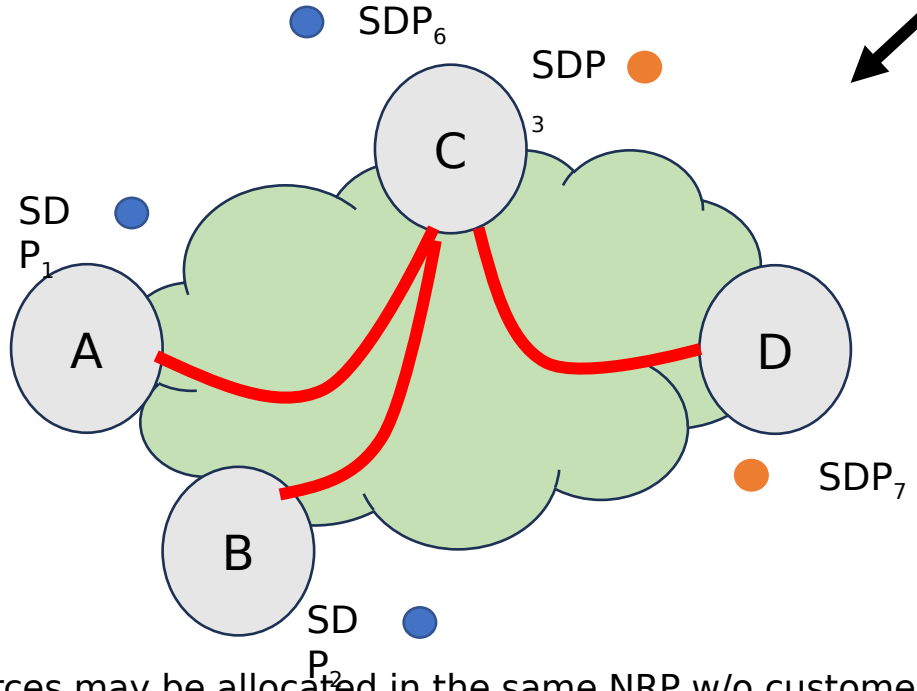
Modelling as NS framework definition

- 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

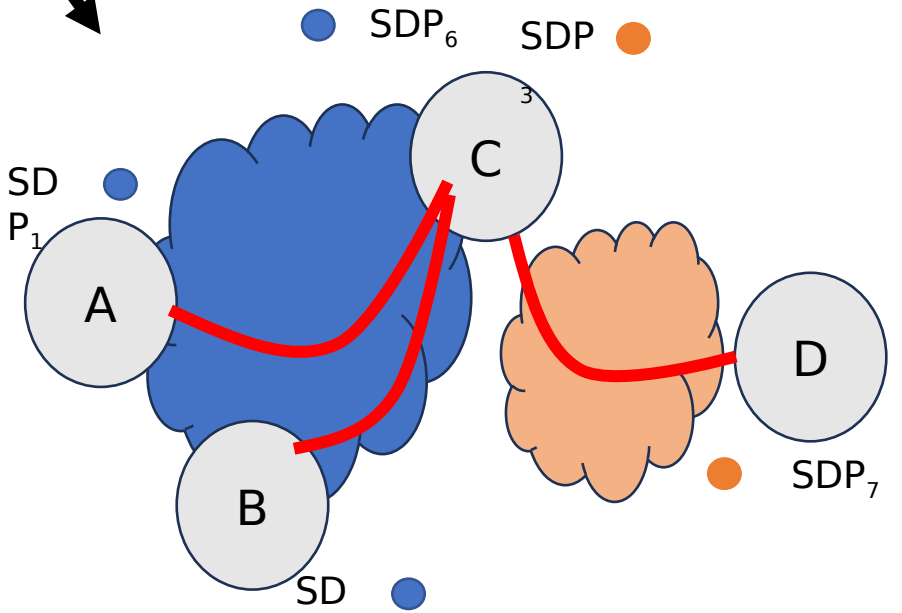
Example



w/o customer topo



With customer topo



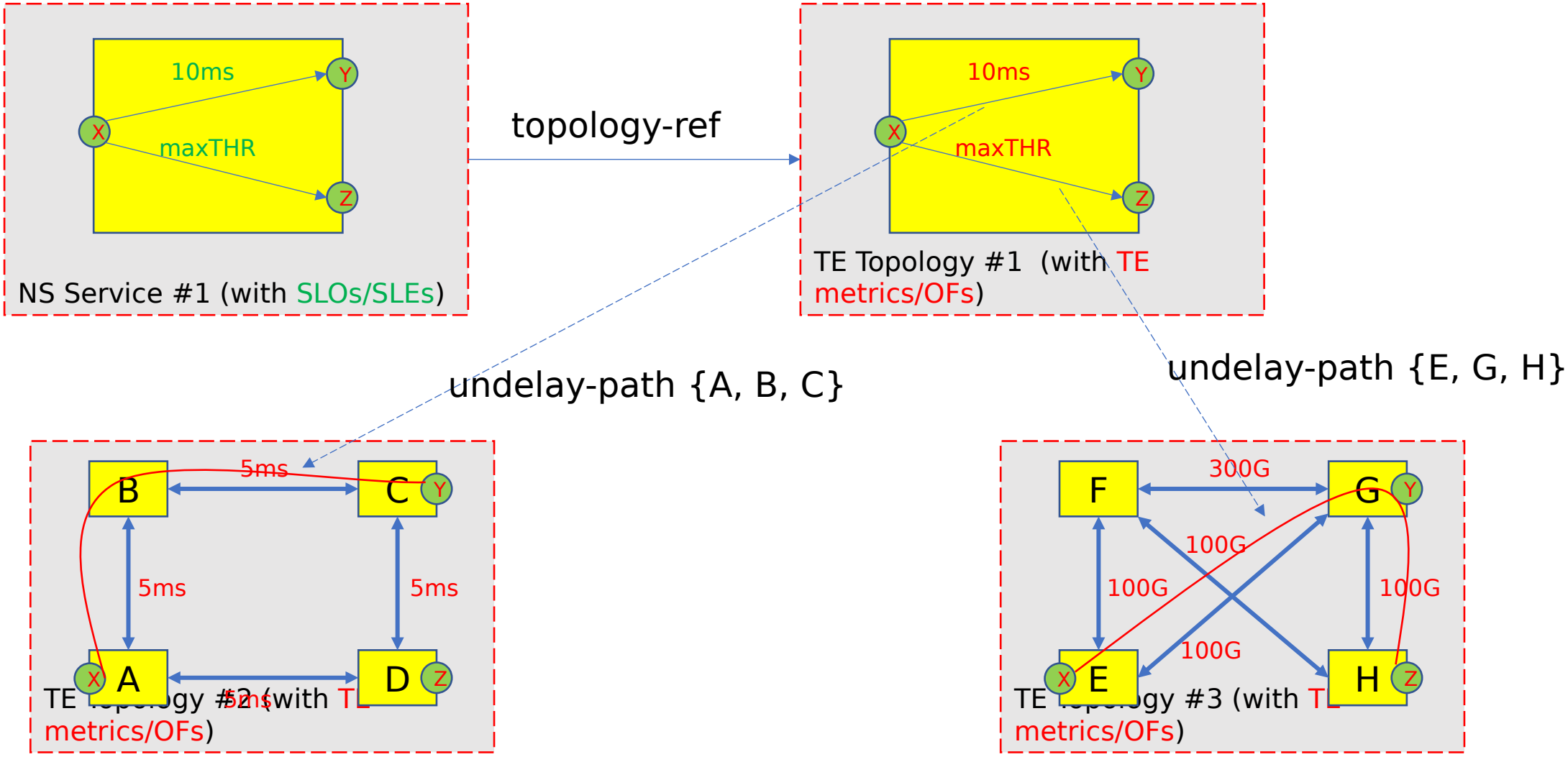
- Resources may be allocated in the same NRP w/o customer topology
- Adding DU nodes could affect the CU-UPF connections

- 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)

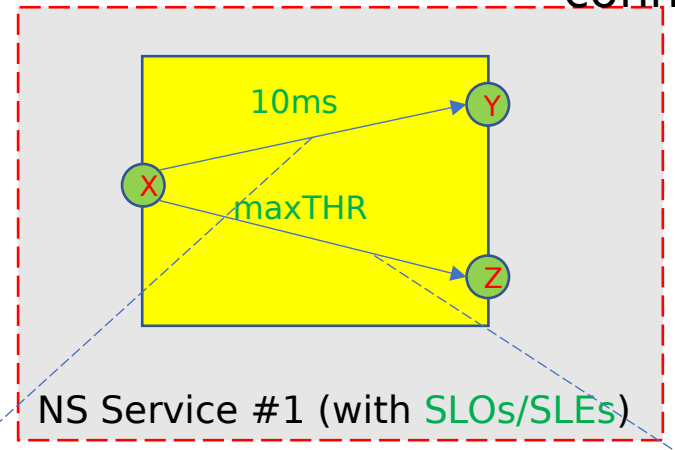
DPs: {X, Y, Z}
onnectivity-constucts: {X-Y, X-Z}

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



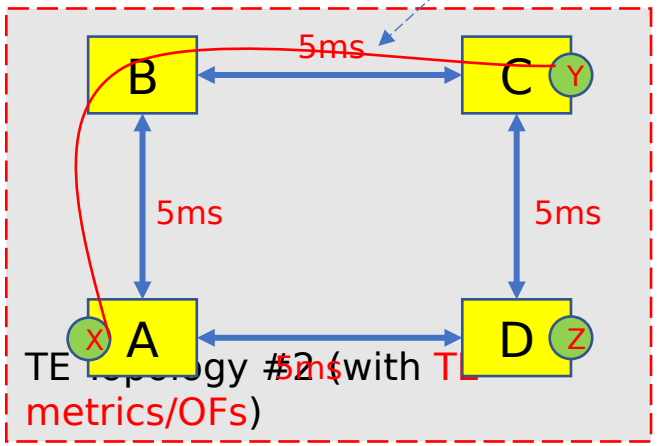
Alternative solution

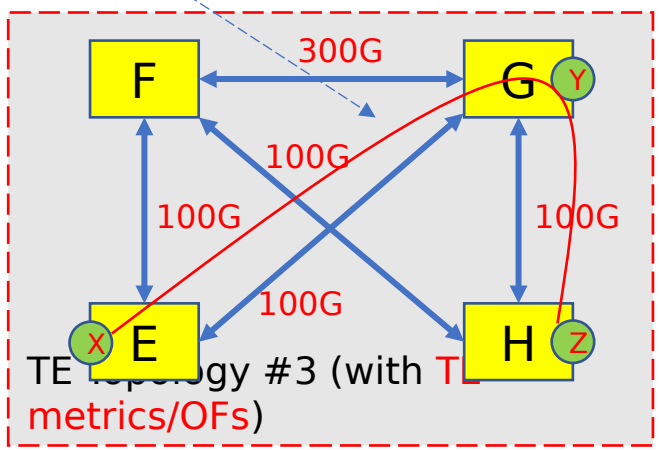
SDPs: {X, Y, Z}
connectivity-constucts: {X-Y, X-Z} with SLO/SL



path-constraints {A, B, C}

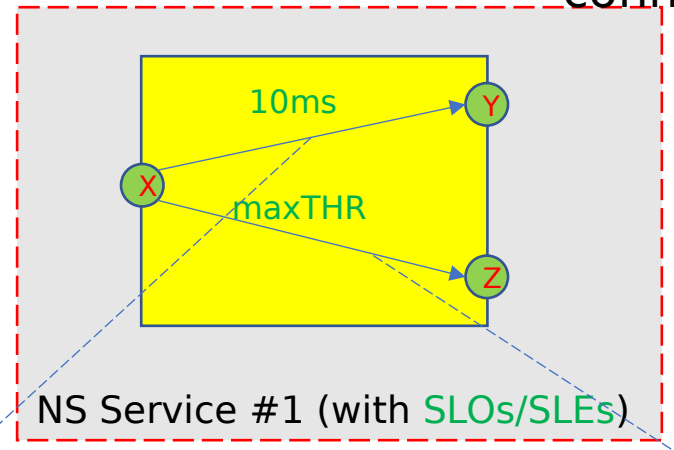
path-constraints {E, G, H}





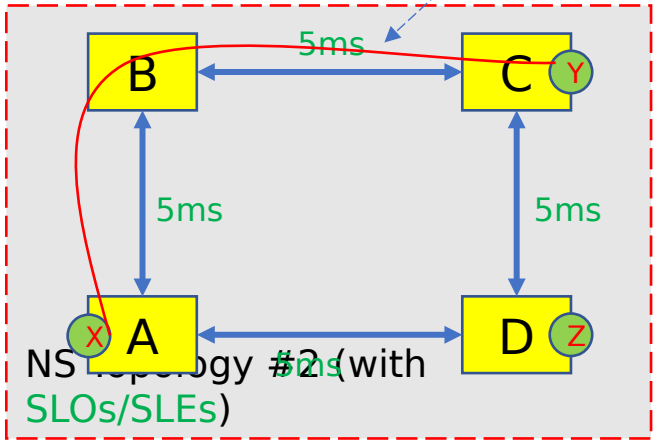
Proposed solution

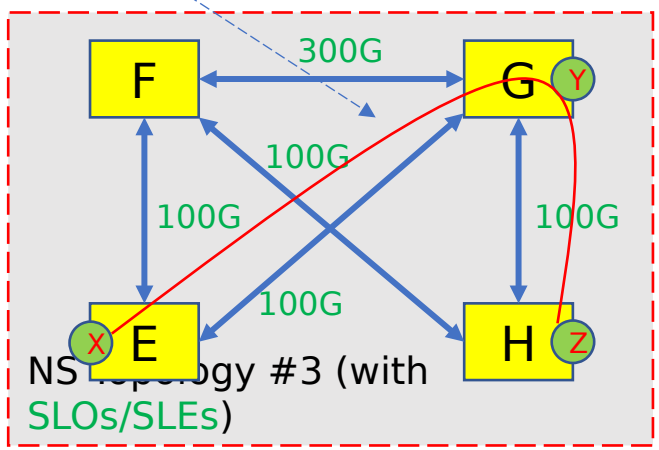
SDPs: {X, Y, Z}
connectivity-constucts: {X-Y, X-Z} with SLO/SL



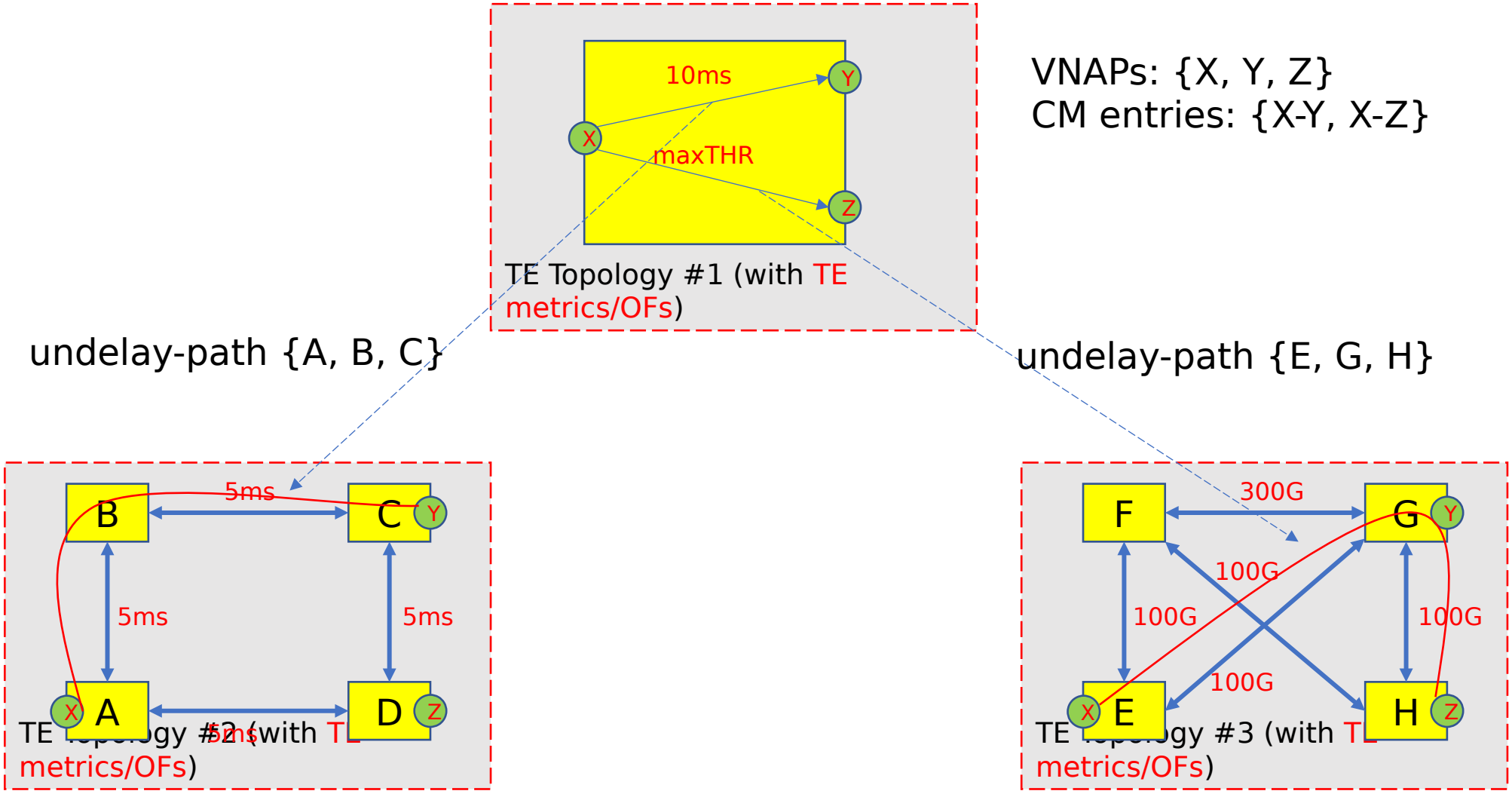
path-constraints {A, B, C}

path-constraints {E, G, H}





VN Solution


10ms
maxTHR
X
Y
Z
TE Topology #1 (with TE metrics/OFs)
VNAPs: {X, Y, Z}
CM entries: {X-Y, X-Z}
undelay-path {A, B, C}
undelay-path {E, G, H}
B
C
A
D
5ms
5ms
5ms
5ms
TE topology #2 (with TE metrics/OFs)
F
G
E
H
300G
100G
100G
100G
100G
TE topology #3 (with TE metrics/OFs)