A Yang Data Model for ACTN VN Operation

draft-lee-teas-actn-vn-yang-12

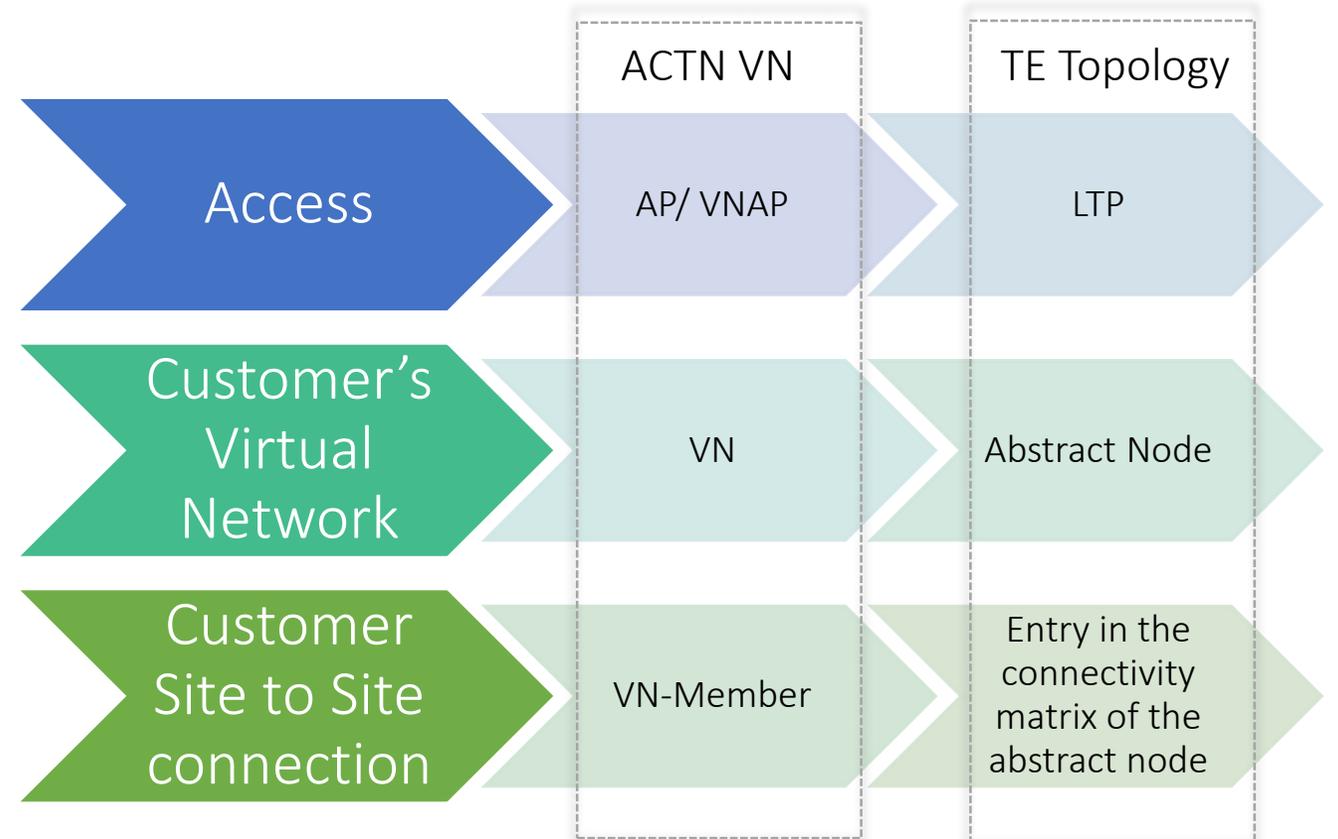|	
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Introduction

- A YANG data model for the ACTN Virtual Network Service (VNS) operation that is going to be implemented for CMI (between CNC and MDSC).
  - Aligned to Customer Service Model
  - VN Instantiation, VN Computation, VN Lifecycle
  - Access Points (AP) and Virtual Network Access Points (VNAP)
  - Virtual Network (VN)
    - List of VN members
  - Other VN Operations
    - Multi-src/Multi-dest
  - As per the ACTN Informational Model
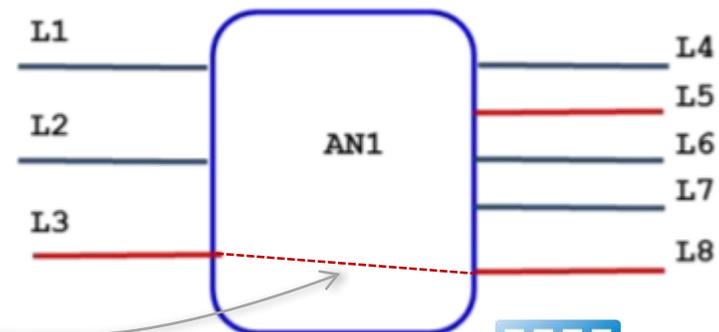
Major Change

- Coupling with the TE Topology Yang Model
  - Removed any duplicated information that can be found in TE Topology
    - Constraints
    - Explicit Path
    - Underlay path
    - Etc.
- Simplification of model for both VN Type 1 & VN Type 2
- JSON examples are added
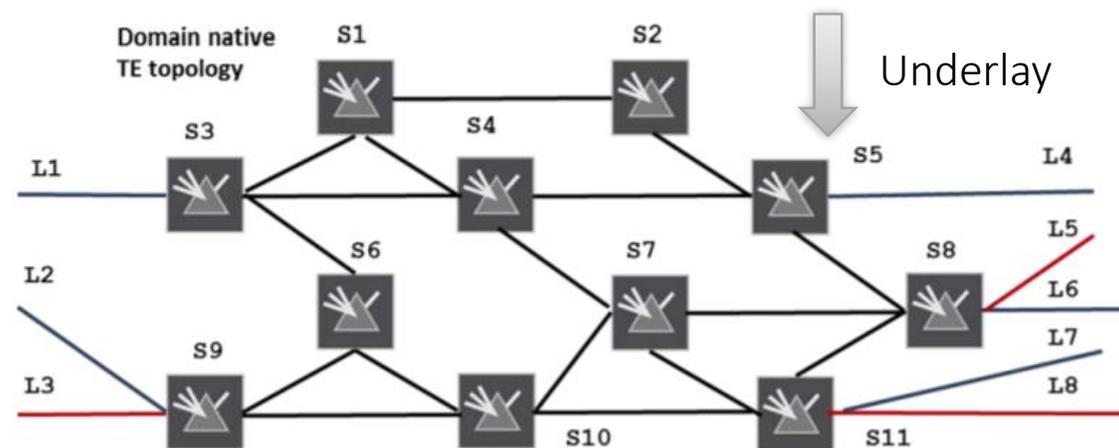
Access	ACTN VN AP/ VNAP	TE Topology LTP
Customer's Virtual Network	VN	Abstract Node
Customer Site to Site connection	VN-Member	Entry in the connectivity matrix of the abstract node

Overview

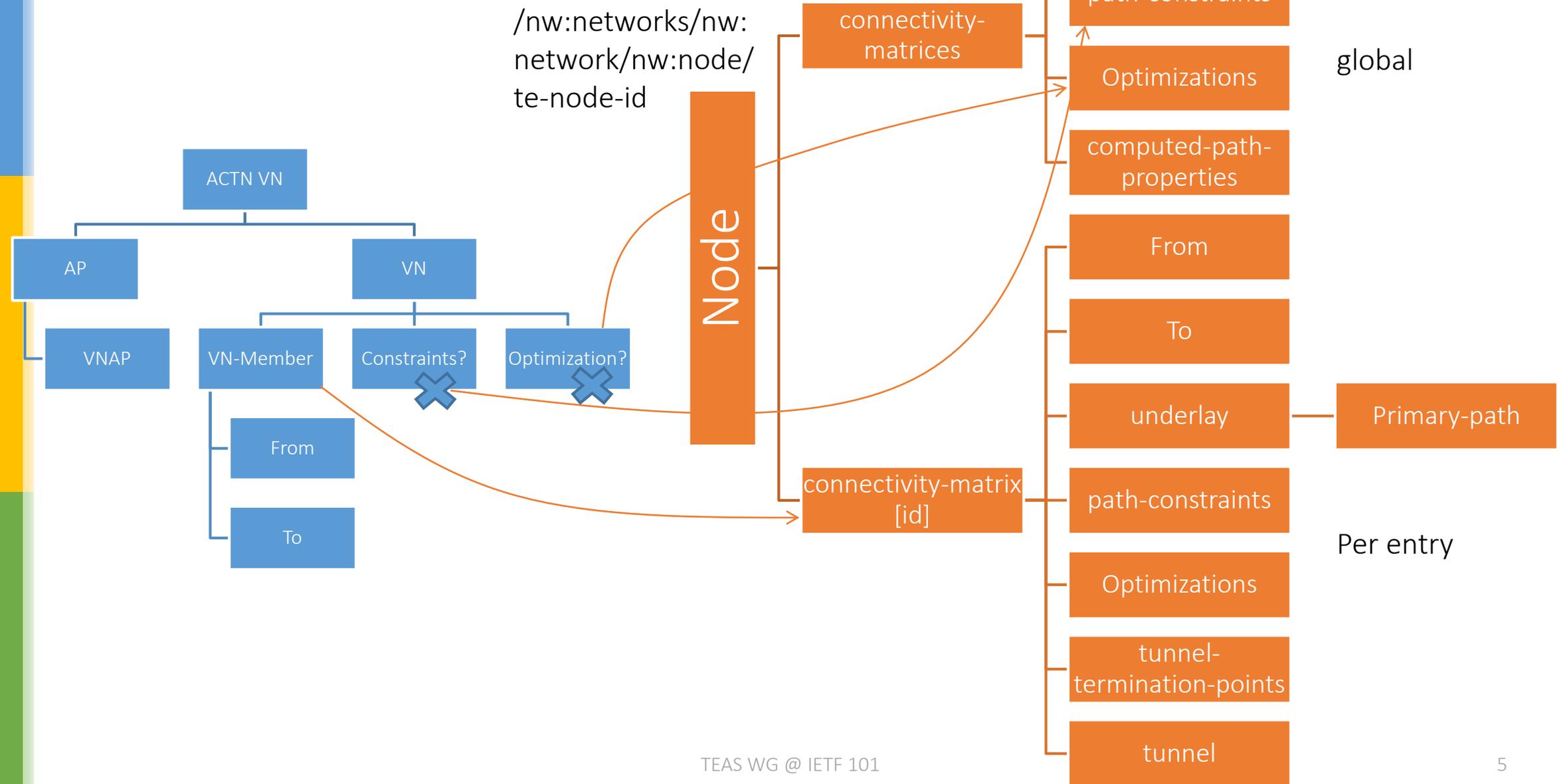Abstract Topology with a Single Node

ACTN VN Yang Model

AP/VNAP

VN

VN-Member

- For both VN Type 1 or Type 2 VN Yang model rely on a single node in the abstract TE Topology
- The abstract node has
  - connectivity-matrices
  - connectivity-matrix [id]
  - The attributes directly under container connectivity-matrices are the default attributes for all connectivity-matrix entries when the per entry corresponding attribute is not specified. When a per entry attribute is specified, it overrides the corresponding attribute directly under the container connectivity-matrices.

Connectivity Matrix

Underlay

Overview

/nw:networks/nw: network/nw:node/ te-node-id

How: Reference to TE Topology Yang Model

Access	• AP/ VNAP -> LTP • Ltp of type te-types:te-tp-id
Customer's Virtual Network	• VN -> Abstract Node • vn-topology-id of type te-types:te-topology-id • abstract-node -> /nw:networks/network/node/tet:te-node-id (reference)
Customer Site to Site connection	• VN-Member -> Entry in the connectivity matrix of the abstract node • connectivity-matrix-id -> /nw:networks/network/node/tet:te/te- node-attributes/connectivity-matrices/connectivity-matrix/id (reference)

All parameters which are can be set as global attributes to VN are set in the connectivity-matrices (such as bandwidth) and an attribute for a particular VN-member is set in the connectivity-matrix [id] (such as explicit path)! Duplicate parameters in ACTN VN Yang model are removed!

VN Type 1

• VN 1

  • VN-Member 1   L1-L4
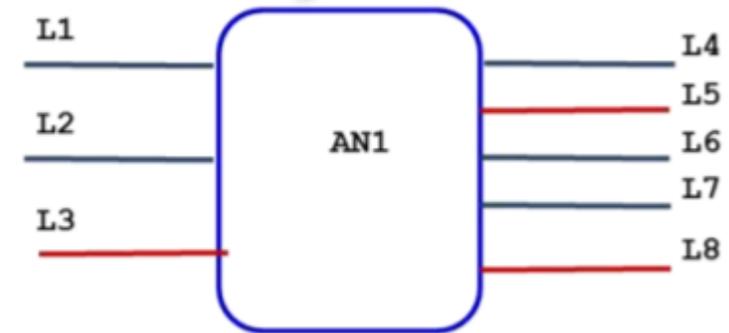 • VN-Member 2   L1-L7
  • VN-Member 3   L2-L4
  • VN-Member 4   L3-L8
  • This VN has following properties
    • Bandwidth 500
    • Optimize by delay

Abstract Topology with a Single Node

L1   L4
L2   L5
L3   L6
      L7
AN1   L8

connectivity-matrices

Attributes

These properties are set in TE Topo

| 14: L1-L4 | 17: L1-L7 |
| 24: L2-L4 | 38: L3-L8 |

Connectivity Matrix

VN Type 2

- VN is seen as a topology of virtual nodes and links

- To ease mapping between VN Yang Model and TE models, an abstract single node topology is created with VN topology as the underlay!

- The same mapping as VN Type 1 is reused.

- VN 2
  - VN-Member 1: L1-L8 via S3, S67110, S11
    - Set via the underlay path in connectivity-matrix[id]

Abstract Topology with a Single Node

Underlay

VN Topology

Underlay

Domain native TE topology

Multi-Src / Multi-Dest

VN-Member 1	L1-L4(*)
VN-Member 2 (selected)	L1-L7(*)
VN-Member 3	L2(*)-L4
VN-Member 4 (selected)	L3(*)-L4
(*)	Multi-src or Multi-destination enabled
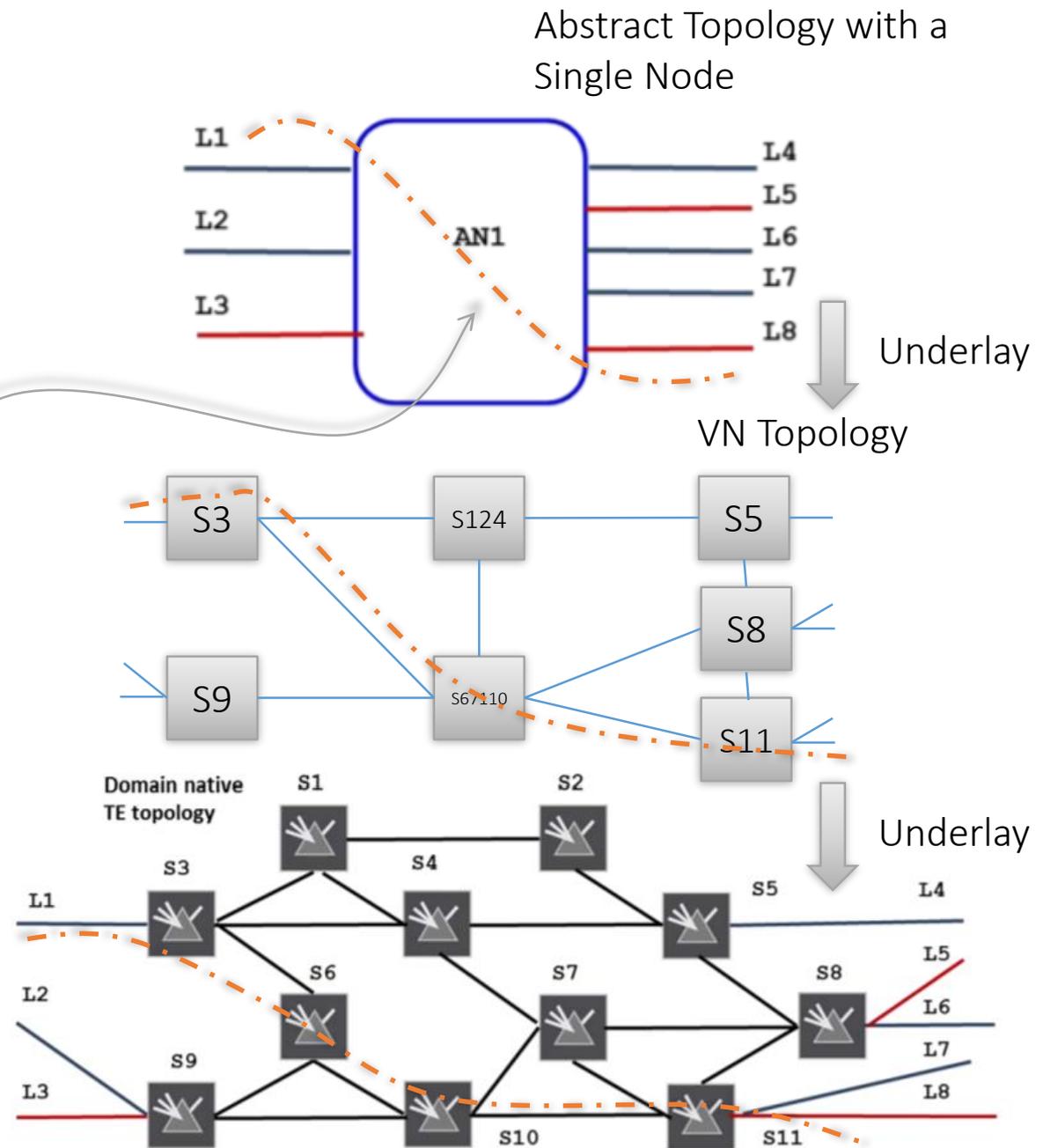
- Multiple VN members are configured and marked with multi-src or multi-dest option

- The MDSC selects the VN member to actually setup and create a connectivity matrix entry in the single node abstract topology based on the selected.

- MDSC is free to change the selected VN-member in coordination with CNC
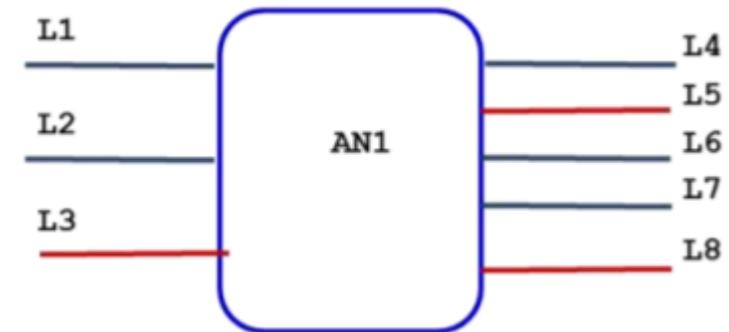
Role of ACTN VN Model

Customer view of VN

- VN as a single entity (as per the ACTN info model)
- ~ Service Model

Innovative Services

- VN Compute
- Multi-Src / Multi-Dest

Service Mapping

AP / VNAP

```
module: ietf-actn-vn
   +--rw actn
      +--rw ap
      | +--rw access-point-list* [access-point-id]
      |    +--rw access-point-id      uint32
      |    +--rw access-point-name?   string
      |    +--rw max-bandwidth?       te-types:te-bandwidth
      |    +--rw avl-bandwidth?       te-types:te-bandwidth
      |    +--rw vn-ap* [vn-ap-id]
      |       +--rw vn-ap-id        uint32
      |       +--rw vn?             -> /actn/vn/vn-list/vn-id
      |       +--rw abstract-node?  -> /nw:networks/network/node/tet:te-node-id
      |       +--rw ltp?            te-types:te-tp-id
      +--rw vn
        +--rw vn-list* [vn-id]
          +--rw vn-id             uint32
          +--rw vn-name?          string
          +--rw vn-topology-id?      te-types:te-topology-id
          +--rw abstract-node?       -> /nw:networks/network/node/tet:te-node-id
          +--rw vn-member-list* [vn-member-id]
          | +--rw vn-member-id          uint32
          | +--rw src
          | | +--rw src?          -> /actn/ap/access-point-list/access-point-id
          | | +--rw src-vn-ap-id?   -> /actn/ap/access-point-list/vn-ap/vn-ap-id
          | | +--rw multi-src?     boolean {multi-src-dest}?
          | +--rw dest
          | | +--rw dest?          -> /actn/ap/access-point-list/access-point-id
          | | +--rw dest-vn-ap-id?   -> /actn/ap/access-point-list/vn-ap/vn-ap-id
          | | +--rw multi-dest?     boolean {multi-src-dest}?
          | +--rw connetivity-matrix-id?   -> /nw:networks/network/node/tet:te/te-node-attributes/connectivity-matrices/connectivity-matrix/id
          | +--ro oper-status?         identityref
          +--ro if-selected?       boolean {multi-src-dest}?
          +--rw admin-status?       identityref
          +--ro oper-status?        identityref
          +--rw vn-level-diversity?   vn-disjointness
```

Next Step

- This update of draft is based on feedback received during the last IETF to reuse existing TE yang model as much as possible.

- This update does just that and works well with abstract TE topology model

- Request for WG Adoption!

Thank You!

Backup Slides

Typical Interactions: VN Type 1

CNC

Set Attributes, Connectivity Matrix, via Single Node Abstract TE Topology
POST /nw:networks/nw:network/nw:node/te-node-id/tet:connectivity-
matrices/tet:connectivity-matrix

MDSC

200 OK

Create VN with VN members, VNAP and map it to the TE Topology model
POST /actn/vn/vn-list/vn-id

200 OK

Get VN Status, selected VN-members in case of multi-src/multi-dest
GET /actn/vn/vn-list/vn-id

Typical Interactions: VN Type 2

CNC

MDSC

Set Attributes, Connectivity Matrix, via Single Node Abstract TE Topology
Explicitly creating a single node topology
POST /nw:networks/nw:network/nw:node/te-node-id/tet:connectivity-
matrices/tet:connectivity-matrix

200 OK

Create VN with VN members, VNAP and map it to the TE Topology model
POST /actn/vn/vn-list/vn-id

200 OK

Get VN Status, selected VN-members in case of multi-src/multi-dest
GET /actn/vn/vn-list/vn-id
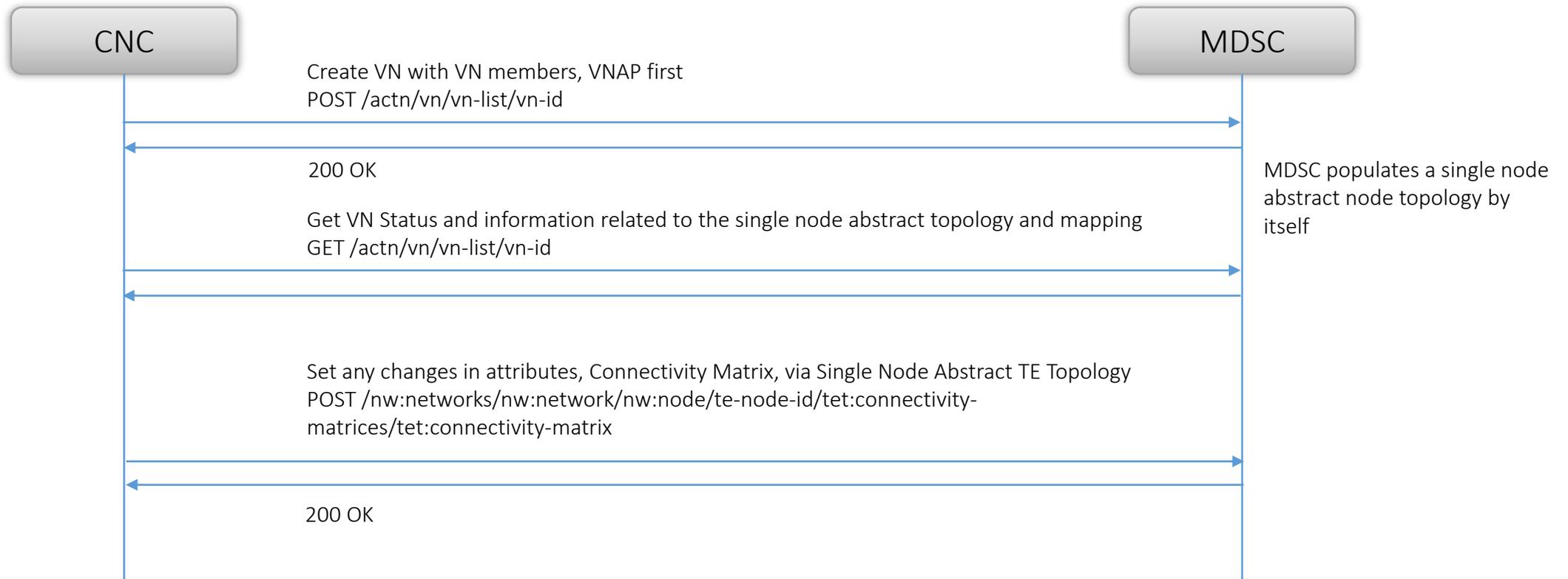
The CNC creates a single node topology by itself, in this way VN Type 1 and VN Type 2 would have similar interactions

Typical Interactions: VN Type 2

CNC   MDSC

Create VN with VN members, VNAP first
POST /actn/vn/vn-list/vn-id

200 OK

MDSC populates a single node abstract node topology by itself

Get VN Status and information related to the single node abstract topology and mapping
GET /actn/vn/vn-list/vn-id

Set any changes in attributes, Connectivity Matrix, via Single Node Abstract TE Topology
POST /nw:networks/nw:network/nw:node/te-node-id/tet:connectivity-matrices/tet:connectivity-matrix

200 OK

The MDSC creates a single node topology by itself and maps it to the ACTN VN Yang model. Any attribute changes are done next via the te topology model