

# A YANG DATA MODEL FOR ACTN VN OPERATION

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# Introduction

- A Yang Data Model for ACTN VN operations
- This is for CMI
  - i.e. CNC – MDSC Interface of ACTN
  - Aligned to Customer Service Model
  - Business Boundary Between Customer & Network Provider
- VN Yang model for
  - AP, VNAP
  - VN, VN-member
  - Constraint, Policy etc.
- Updates in the latest version
  - Aligned to ACTN framework WG draft
    - VN Types and VNS Types
  - Aligned to ACTN Information Model WG draft
  - Added justification section
  - Yang Model as per NMDA

# VN (& VNS) Type

## VN Type

VN Type 1 - Customer defines a VN, as list of VN-members with QoS, Metric, Policies etc

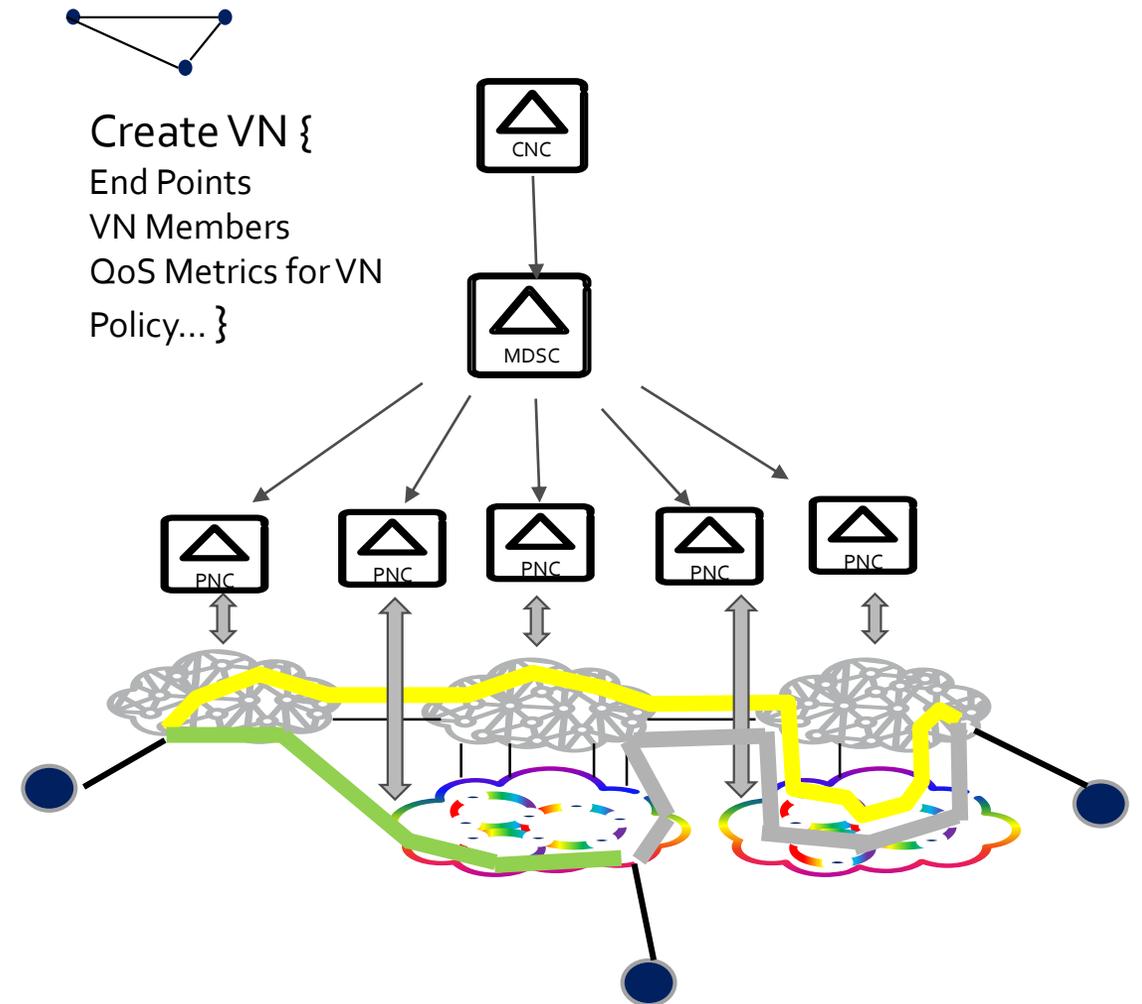
VN Type 2 – Customer defines VN as a topology with abstract nodes and links as well as list the VN-members

Type 2A – Customer can't make changes to the VN topology once created.

Type 2B – Customer can also dynamically change the VN topology.

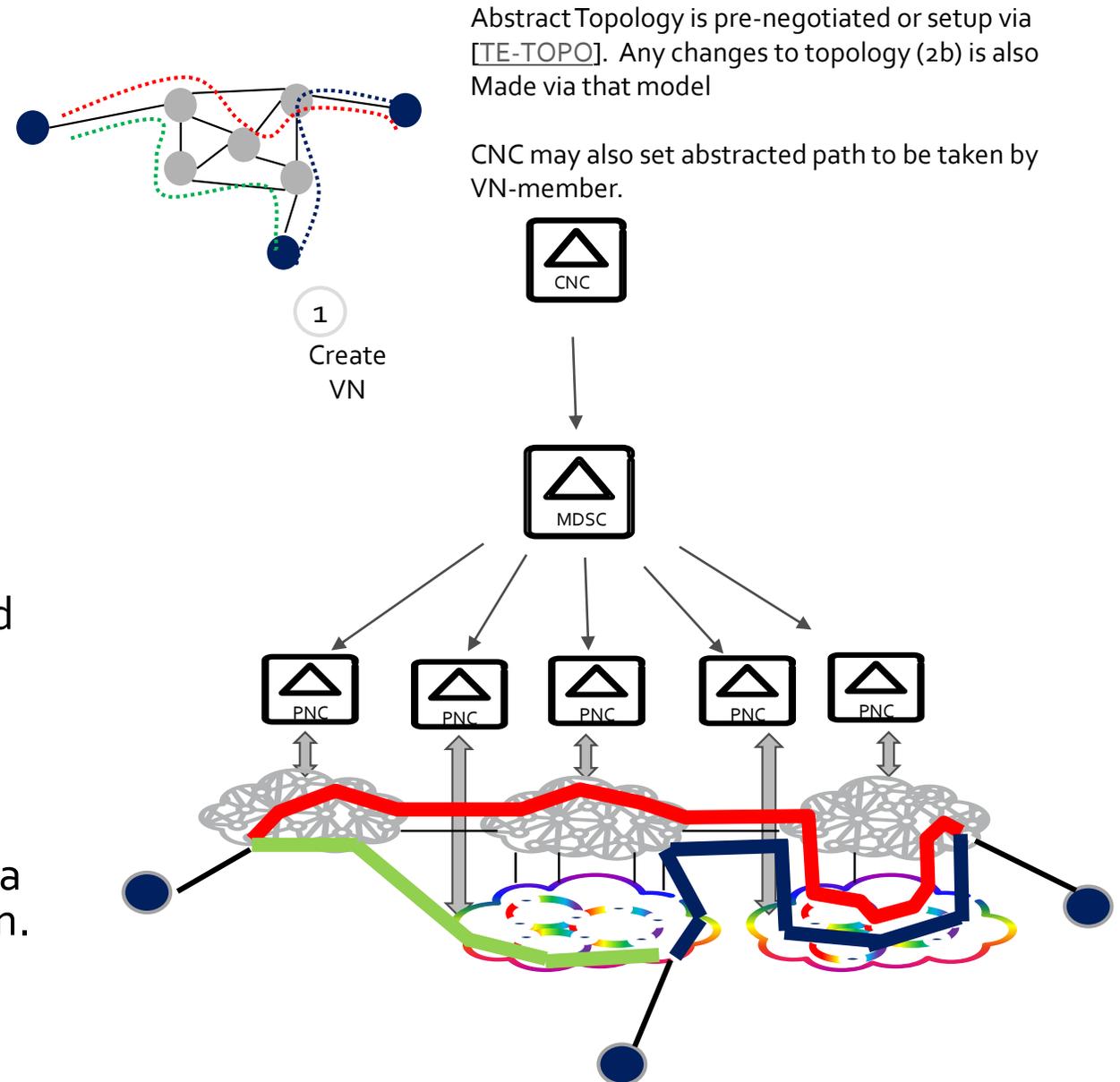
# VN Type 1

- Customer defines a VN as a list of VN-members
- Each VN-member identifies Source and Destination AP
  - Identified by VNAP
- All constraints, policies etc. are set for VN as a whole (i.e. on all VN members)
- MDSC is responsible for translating and mapping the VN into specific network centric-models (e.g., TE-tunnels) to coordinate the multi-domain network operations with PNCs.



# VN Type 2

- Allow the customer to also configure and learn a VN abstract topology via the TE topology yang model [TE-TOPO].
- A reference to the abstract topology is maintain in the VNYang model.
- Any change in topology (Type 2b VN) would be made via [TE-TOPO].
- Using the path in VN-member in the ACTN VN yang model, CNC can also set a path based on the abstract topology. The MDSC translates the abstracted path to tunnels via [TE-Tunnel] or simpler path setup operation.
- Rest procedures are the same



# Why?

## Customer view of VN (VN Type 1)

- The VN-Yang model allows to define a customer view
  - Allows the customer to communicate using the VN constructs as described in the [ACTN-INFO].
  - It also allows to group the set of E2E tunnels (i.e VN members) under a common umbrella of VN.
  - This allows the customer to instantiate and view the VN as one entity, making it easier for some customers to work on VN without worrying about the details of the provider based YANG models.
- Better to maintain a set of E2E Tunnels as one VN unit for applying policy, reroute, protection, restoration, etc., rather than treating each TE-tunnel as individual unit.
  - This allows customer to set one VN to be disjoint to another as a whole, allows the optimization functions to be applied to the VN rather than to an individual tunnels.
- Similar to the benefits of having a separate YANG model for the customer services as described in [SERVICE-YANG]
  - Service models do not make any assumption of how a service is actually engineered and delivered for a customer
  - Details of how network protocols and devices are engineered to deliver a service are captured in other models that are not exposed through the Customer-Provider Interface.
  - Ability to hide the complexity of the TE topology and TE tunnel YANG from some customers would be beneficial.

# Why?

## Innovative Services

- VN Compute
  - A pre-instantiation mode to view the full VN as a single entity before instantiation.
  - Achieving this via path computation or "compute only" tunnel setup does not provide the same functionality on a full VN.
- Multi-source / Multi-destination
  - Sources or destinations or both may not be pre-determined by the customer.
  - For instance, for a given source, there may be a list of multiple-destinations to which the optimal destination may be chosen depending on the network resource situations.
  - The MDSC would pick a destination, MDSC is also notify CNC if it wish to change the destination.

## Others

- Mapping VN to services (L3SM, L2SM)
  - Easily augmented to support the mapping of services to a single VN (L3SM and L2SM)
- Telemetry, performance monitoring, network autonomies (auto-scaling)

# Summary

Maintenance of AP and VNAP along with VN.

VN construct to group E2E tunnels

VN Compute (pre-instantiate)

Multi-Source / Multi-Destination

Ability to support various VN & VNS Types

- VN Type 1: Customer configures the VN as a set of VN Members. No other details need to be set by customer, making for a simplified operations for the customer.
- VN Type 2: Along with VN Members, the customer could also provide an abstract topology, this topology is provided by the Abstract TE Topology Yang Model.

# ACTN VN Yang Model

Reference to TE Topology

Access Point

```

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 src-tp-id?            binary
        +--rw dst-tp-id?            binary
        +--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
  
```

List of VNAP, inside each AP

List of VN Member inside each VN

```

+--rw vn
  +--rw vn-list* [vn-id]
    +--rw vn-id          uint32
    +--rw vn-name?      string
    +--rw vn-topology-id? te-types:te-topology-id
    | {type-2}?
    +--rw vn-member-list* [vn-member-id]
      +--rw vn-member-id  uint32
      +--rw src
        +--rw src?          leafref
        +--rw src-vn-ap-id? leafref
        +--rw multi-src?    boolean
        | {multi-src-dest}?
      +--rw dest
        +--rw dest?          leafref
        +--rw dest-vn-ap-id? leafref
        +--rw multi-dest?    boolean
        | {multi-src-dest}?
      +--rw path {type-2}?
        +--rw path-element* [path-element-id]
          +--rw path-element-id  uint32
          +--rw index?           uint32
          +--rw address?         te-types:te-tp-id
          +--rw hop-type?        te-types:te-hop-type
        +--ro metric* [metric-type]
          +--ro metric-type      identityref
          +--ro value?           uint32
  
```

Configure abstract path

```

| +--ro oper-status?  identityref
| +--ro tunnel-ref?   te:tunnel-ref
+--ro multi-src-dest {multi-src-dest}?
| +--ro selected-vn-member? leafref
+--rw objective-function? pcep:objective-function
+--rw metric* [metric-type]
| +--rw metric-type  identityref
| +--rw limit
| | +--rw enabled?   boolean
| | +--rw value?     uint32
+--rw optimize
| +--rw enabled?     boolean
| +--rw value?       uint32
+--rw bandwidth?    te-types:te-bandwidth
+--rw protection?   identityref
+--rw local-reroute? boolean
+--rw push-allowed? boolean
+--rw incremental-update? boolean
+--rw admin-status? identityref
+--ro oper-status?  identityref
  
```

Handle Multi-src / Multi-dest

# Next Step

- Aligned to the philosophy of customer service model
- Work well with other ACTN and related yang models
- WG Adoption

