

A Network YANG Model for Service Attachment Point (SAP)

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History & Rationale

- Used to be UNI (User-Network Interface).
- Derived from L3NM and L2NM work
 - Work with L3NM/L2NM to provide closed loop lifecycle management for the VPN service
 - The use case has been documented in OPSAWG Automation Framework (RFC8969).
- Revived the UNI Topology work now that L3NM and L2NM are stable
 - Abandon the UNI terminology: better insist on the I-D focus;
 - Renamed to SAP (Service Attachment Points) Network Model to add clarity;
 - Add relation with other models in section 5 (also see page10 for details);
 - Add a new network topology type list in RFC8345 network model to indicate the service type(s);
 - Add a service type list and service description for each service attachment point in section 4,6;
 - Change type for service attachment point to interface type in section 4 and 6 (see page 8,9);
 - Clarify one service, multiple views in section 3;
 - Reference update;
 - Add a new author Victor Lopez from Nokia.
- Two Questions to be focused
 - How it is factored into the current L3NM/L2NM? (from authors)
 - What is usage example looks like? (from list)

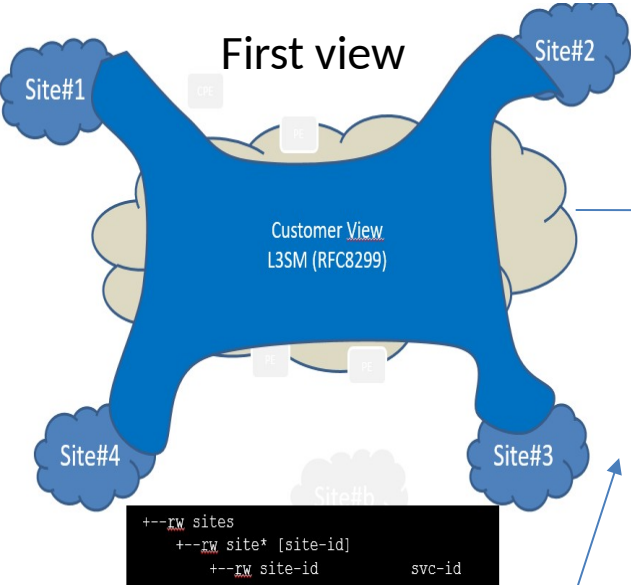
The SAP Approach

- Service Attachment Point (SAP) is a general concept in the deployments of network services: VPN service, SDWAN service, managed VoIP service, network slice service, etc.
 - Used to decide where to attach and deliver the service (e.g. L3SM and L2SM)
- To support service provision and resource management, the control elements need to exchange information for upper layer control elements (service orchestrators) to
 - Learn the capability and available endpoint(s) of interconnection resource of the underlying network
 - Determine the feasibility of an end-to-end connectivity service and to derive the sequence of domains and the points of interconnection to use
- SAP Network Model is proposed to represent a network view of the Service Provider network topology containing the points from which its services can be attached (e.g., basic connectivity, VPN).
 - Network topology model [RFC8345] is augmented with SAP-related attribute.
 - The services can be delivered to an end customer or to a peer network service provider.

Question1: How it works with L3NM?

One Service, Many Views

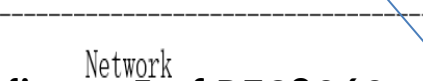
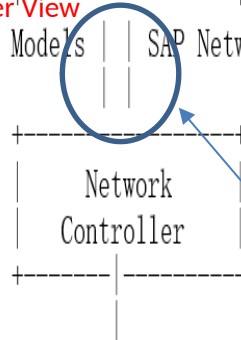
First view



Customer View
Customer Service Models

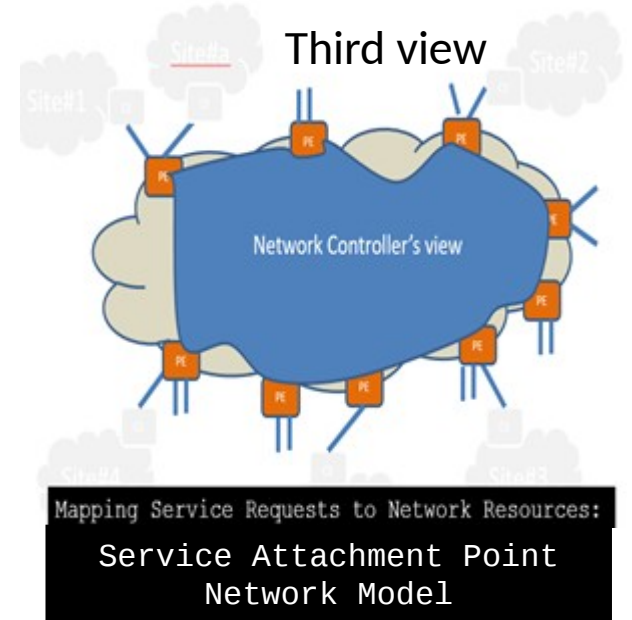


Network Controller View
Service Network Models | SAP Network Model



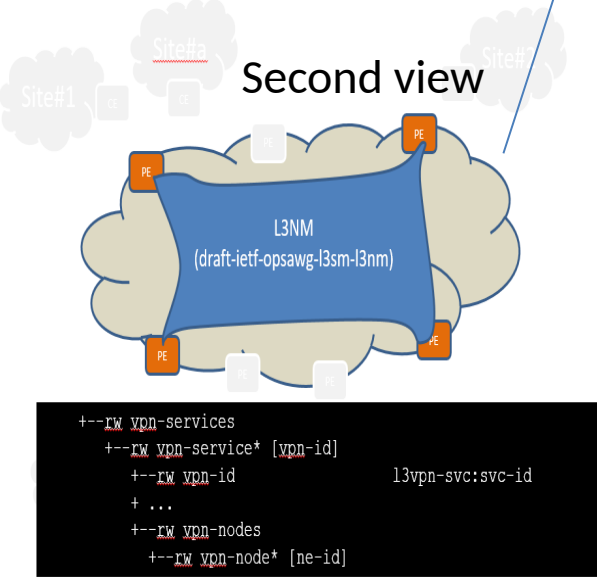
Also see figure 5 of RFC8969

Third view



Where to attach/deliver the service?

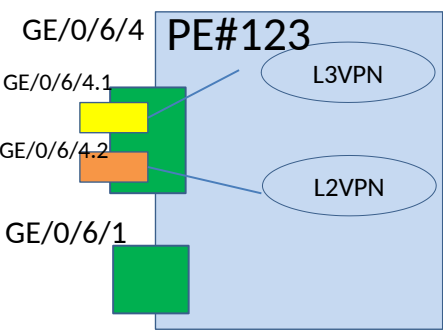
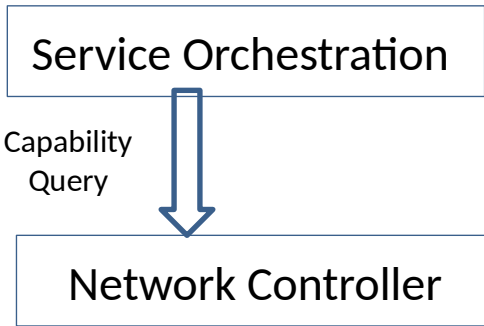
Second view



Top down L3NM and Bottom up SAP to build closed loop

Question2: A Simple Example of SAP Network Model: Node Filter

```
GET
/nw:networks/nw:network/nw:node/sap:service-attachment-point
Host:example.com
Accept: application/yang-data+json
```



Two Physical interface: GE/0/6/1,GE/0/6/4
Two sub-interfaces of GE/0/6/4
GE/0/6/4.1,GE/0/6/4.2

RESPONSE from RESTCONF Server

```
{
  "ietf-sap-ntw:service-attachment-point": [
    {
      "attachment-id": "GEO/6/1",
      "type": "if:gigabitEthernet",
      "admin-status": "false",
      "operation-status": "false",
      "encapsulation-type": "ethernet",
      "sap-type": [],
      "service-description":"No service enabled via GEO/6/1."
    }
  ],
  "ietf-sap-ntw:service-attachment-point": [
    {
      "attachment-id": "GEO/6/4",
      "type": "if:gigabitEthernet",
      "admin-status": "true",
      "operation-status": "true",
      "encapsulation-type": "ethernet",
      "sap-type": [l3vpn,l2vpn],
      "service-description":"Enable L3VPN service, L2VPN service via GEO/6/4"
    }
  ],
  "ietf-sap-ntw:service-attachment-point": [
    {
      "attachment-id": "GEO/6/4.1",
      "type": "if:Ether-sub-interface",
      "admin-status": "true",
      "operation-status": "true",
      "encapsulation-type": "vlan",
      "sap-type": [l3vpn,l2vpn],
      "service-description":"L3VPN service has been activated via GEO/6/4.1"
    }
  ],
  "ietf-sap-ntw:service-attachment-point": [
    {
      "attachment-id": "GEO/6/4.2",
      "type": "if:Ether-sub-interface",
      "admin-status": "true",
      "operation-status": "true",
      "encapsulation-type": "vlan",
      "sap-type": [l3vpn,l2vpn],
      "service-description":"L2VPN service has been deactivated via GEO/6/4.2"
    }
  ]
}
```

Next Steps

- Request WG adoption call
- Comments & Question are welcome

Appendix

SAP-Augmented Network Model (1)

- Augments the ietf-network model with service-attachment-points

```
module: ietf-sap-ntw
  augment /nw:networks/nw:network/nw:network-
types:
  +--rw sap-network!
    +--rw sap-type identityref

  augment /nw:networks/nw:network/nw:network-
types/nw:network-topology
  +--rw service-attachment-point
  id]
  +--rw attachment-point
  +--rw type?
  +--rw admin-status? boolean
  +--rw oper-status? boolean
  +--rw encapsulation-type? identityref
  +--rw sap-type* identityref
  +--rw service-description
```

- Add a new network topology type
- Indicate the service type(s) that are bound to this topology

SAP-Augmented Network Model (2)

- Augments the ietf-network model with service-attachment

- Inventory of nodes and the SAPs
- A SAP may be used for one or multiple service types
- A SAP may be already servicing a customer or is ready for service activation

```
module: ietf-network
  augment /nw:networks/nw:network/nw:node:
  types:
    +--rw sap-network-id? identityref
    +--rw sap-type* identityref

  augment /nw:networks/nw:network/nw:node:
    +--rw service-attachment-point* [attachment-id]
      +--rw attachment-id          nt:tp-id
      +--rw type?                  identityref
      +--rw admin-status?         boolean
      +--rw oper-status?         boolean
      +--rw encapsulation-type?  identityref
      +--rw sap-type*             identityref
      +--rw service-description?  string
```

Relation with other Models

- SAP Network model can be seen as *an inventory data* associated with service attachments (e.g., PE nodes)
 - It maintains an inventory of nodes contained in a network based on RFC8345. For design choice, See quoted text in RFC8345: “Although it would be possible to combine both parts into a single data model, the separation facilitates integration of network topology and network inventory data models, because it allows network inventory information to be augmented separately, and without concern for topology, into the network data model.”
- There is no overlapping with TE topo model
 - TE topo model augments from Network topology while SAP Network model augments from Network model and import Network Topo Model
 - ‘service-attachment-point’ defined in SAP Network model is not a ‘ttp’ nor a link but abstraction of termination point defined in RFC8345
 - ‘service-attachment-point’ defined in SAP Network model is related to CE facing interface of PE rather than network facing interface of PE

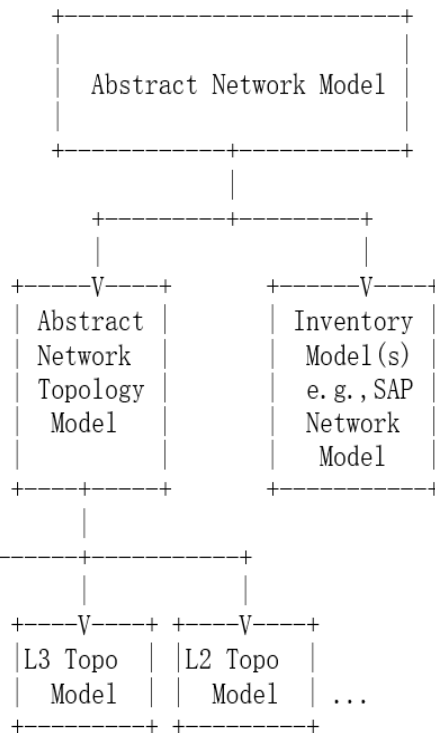


Figure 6: Relation of SAP Network Model to Other Models

