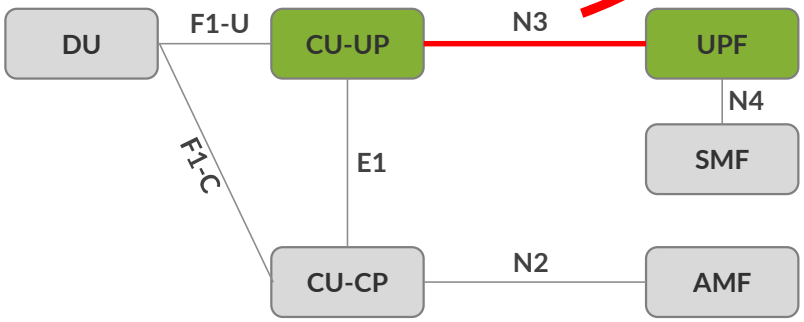
WG6 - TN integration in 5G

5G slicing vs IETF network Slicing

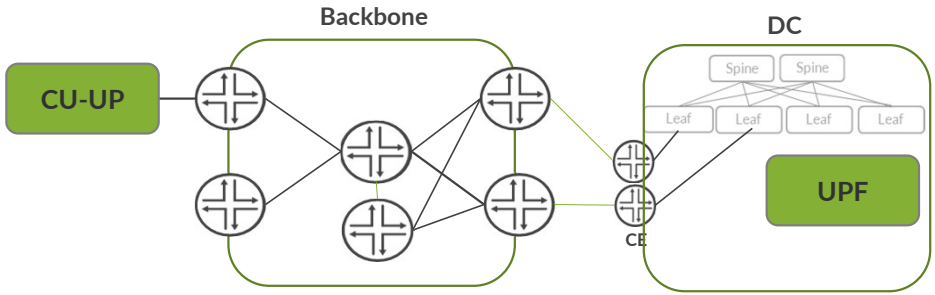
5G slicing (3GPP)

Regards transport as abstracted "logical wire"



Transport network slicing (IETF)

Describes how transport network can provide capacity resources to slices



5G slicing vs IETF network Slicing

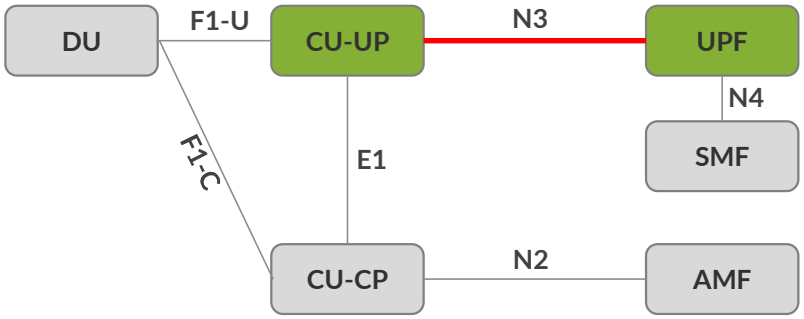
5G slicing (3GPP)

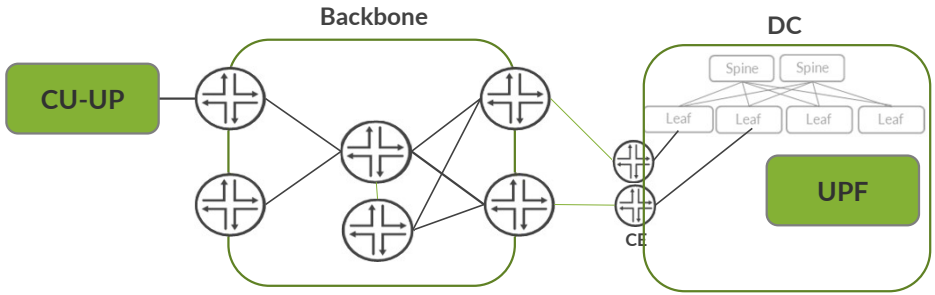
Transport network slicing (IETF)

Regards transport as abstracted "logical wire"

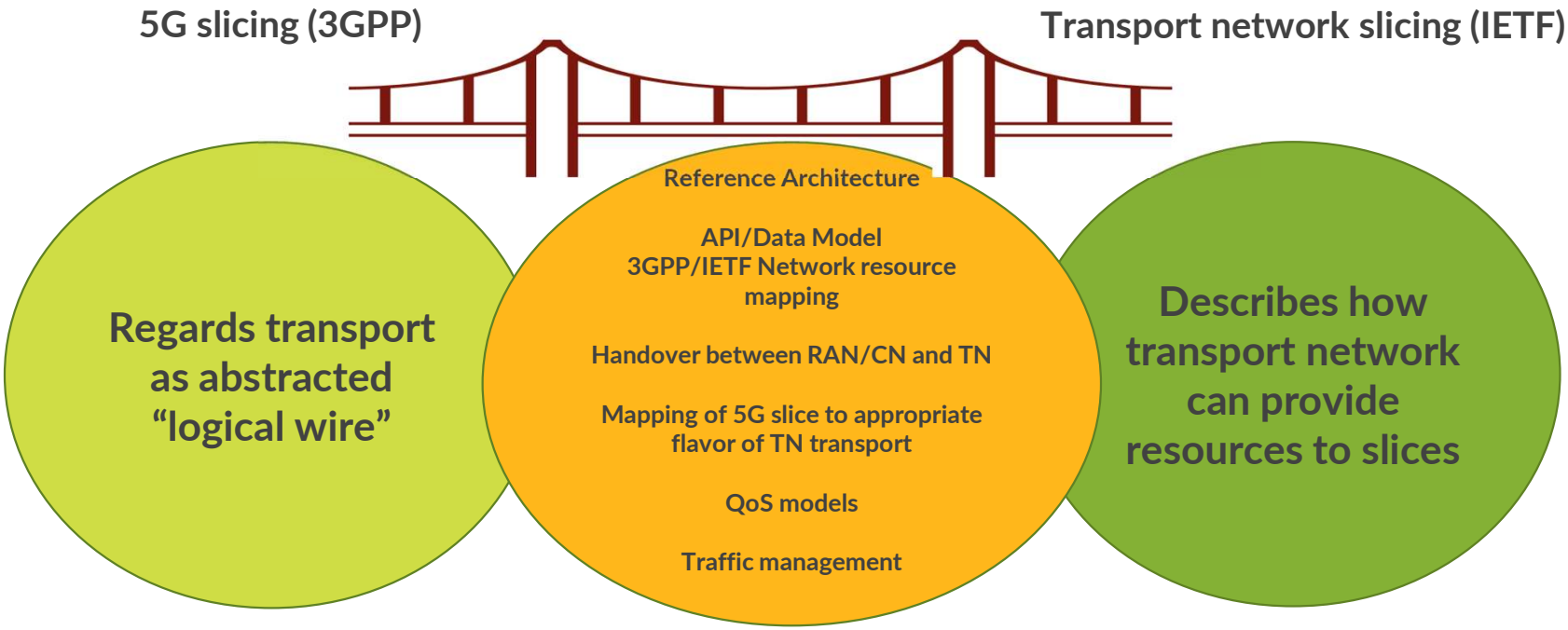
Gap!

Describes how transport network can provide capacity resources to slices





5G slicing vs TN Slicing



draft-ietf-teas-ietf-network-slices

draft-gcdrb-teas-5g-network-slice-application

draft-ietf-teas-ns-ip-mpls

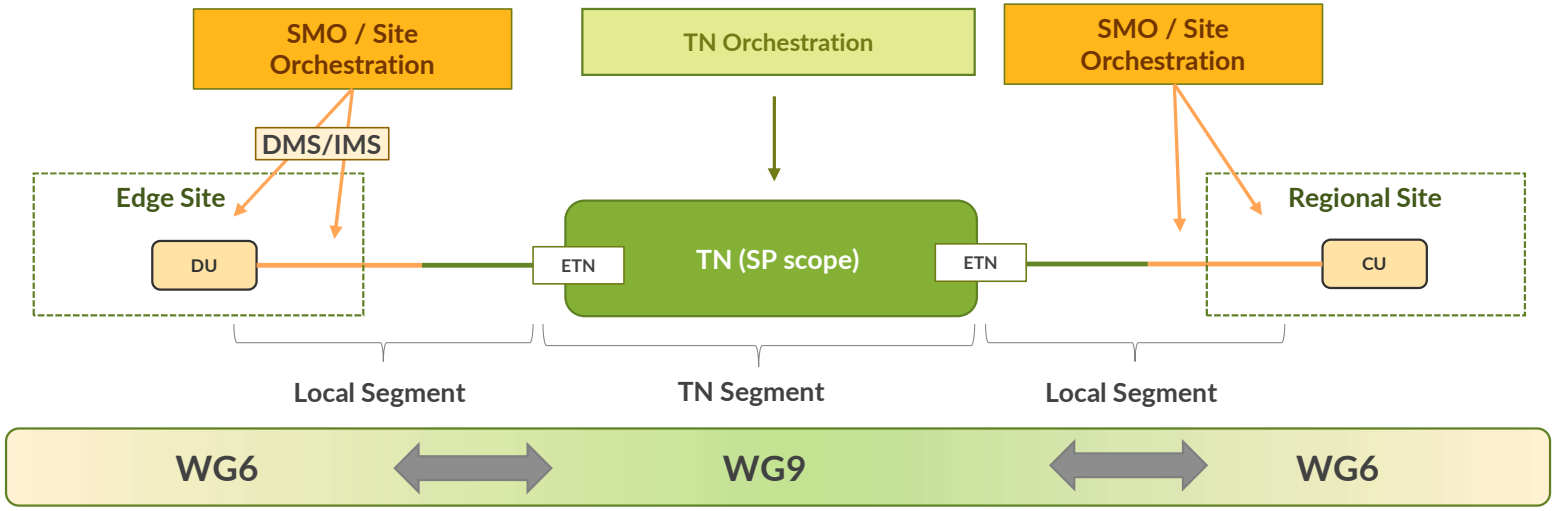
draft-srld-5g-slicing

draft-boro-opsawg-teas-attachment-circuit

draft-ietf-teas-ietf-network-slice-nbi-yang

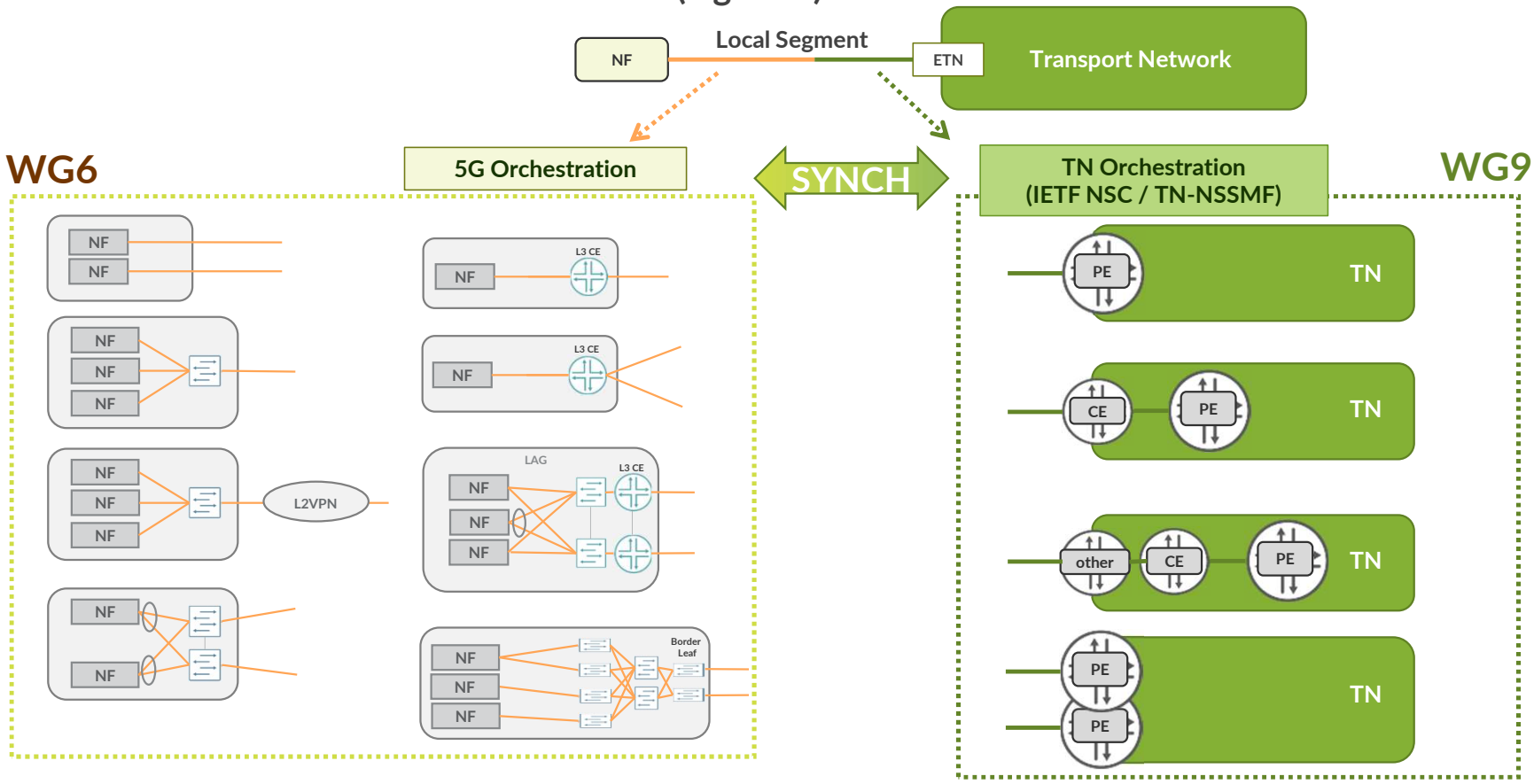
End-to-End Networking

- The datapath between NFs is segmented
- Multiple technologies, different organizations (DC vs Core), SDOs and Orchestration
- We introduce segmentation based on Orchestration scope and define the TN with an SP focus (MPLS/SRv6 backbone). This approach is described in more details in *"draft-srld-teas-5g-slicing"* –feel free to join and contribute-.
- ETN = Edge Transport Network –typically a PE or managed CE-



Local Segment and EDGE Transport NODE

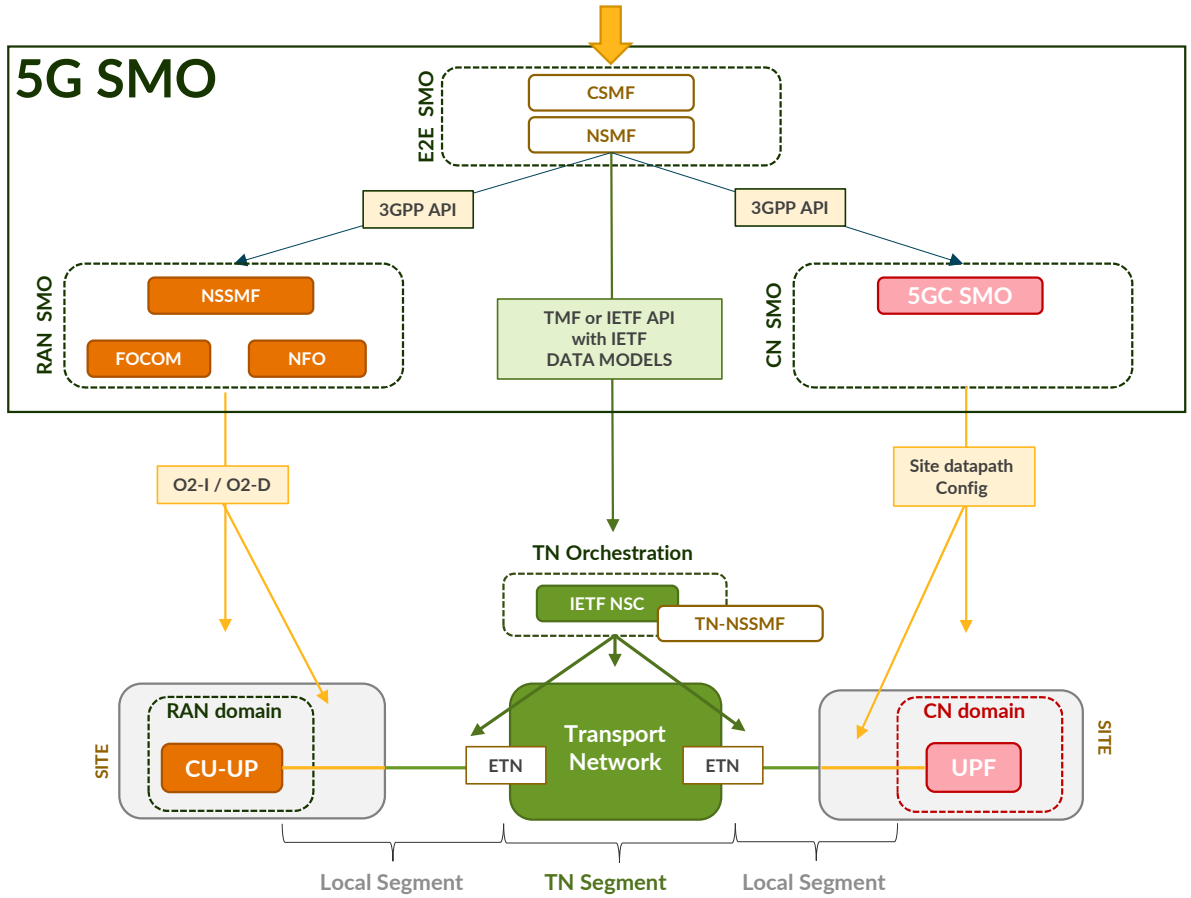
- The interconnection is based on shared resources (e.g. vlan)



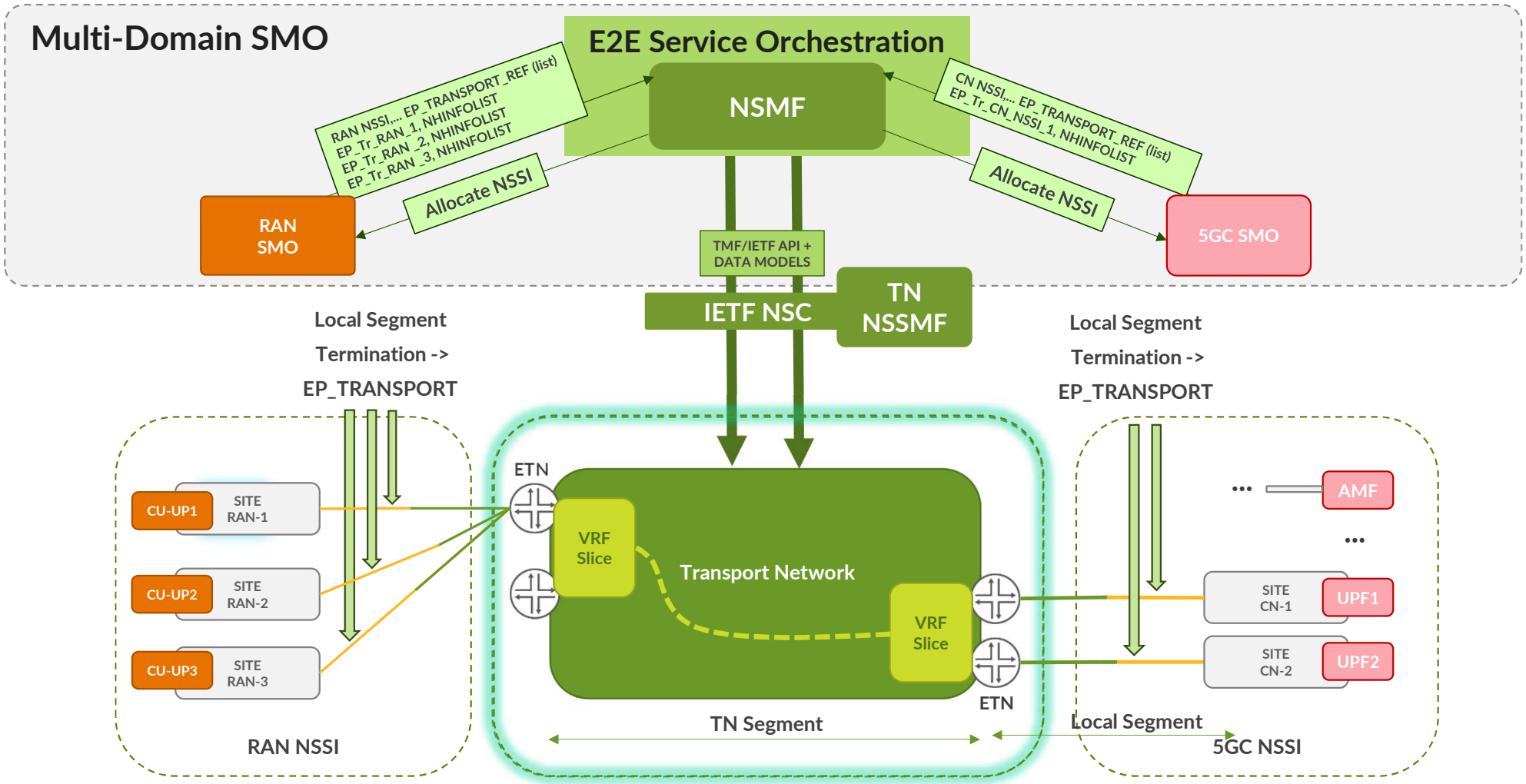
Orchestration APIs and DOMAINS

Multi-domain SMO E2E reconciliation

- 3GPP APIs to domain NSSMF
- TMF or IETF API with IETF YANG Data Models (TN-NSSMF Integration)



End to End Orchestration



End-to-end Data Models for ORAN

Standard APIs and Data models for the orchestration of the end-to-end datapath

WG6 Network Resource Data Model

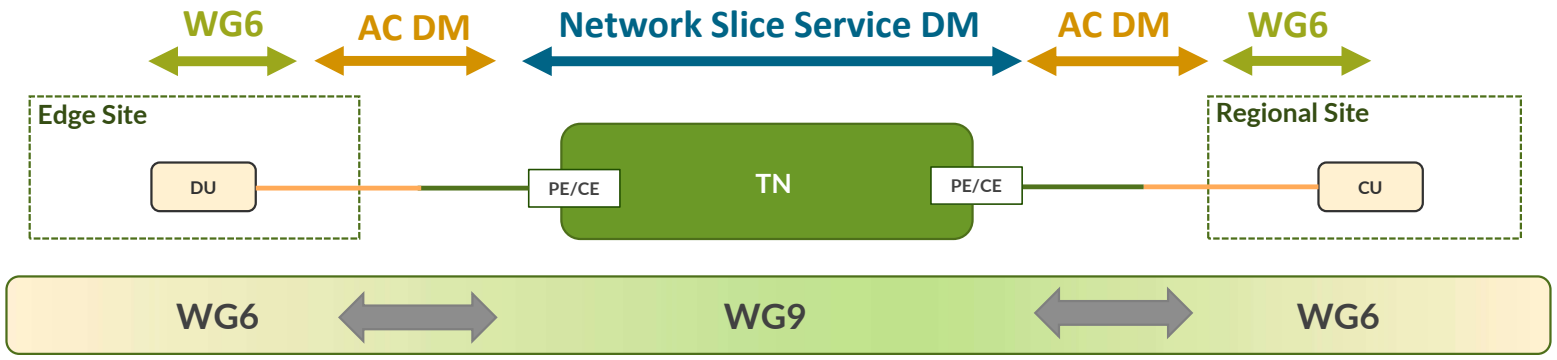
Attachment Circuit Data Model YANG :

- https://datatracker.ietf.org/doc/html/draft-boro-opsawg-teas-attachment-circuit

Network Slice Service YANG Model:

- https://datatracker.ietf.org/doc/draft-ietf-teas-ietf-network-slice-nbi-yang/

3GPP NRM : EP_TRANSPORT with IETF YANG DM integration (Attachment Circuit)

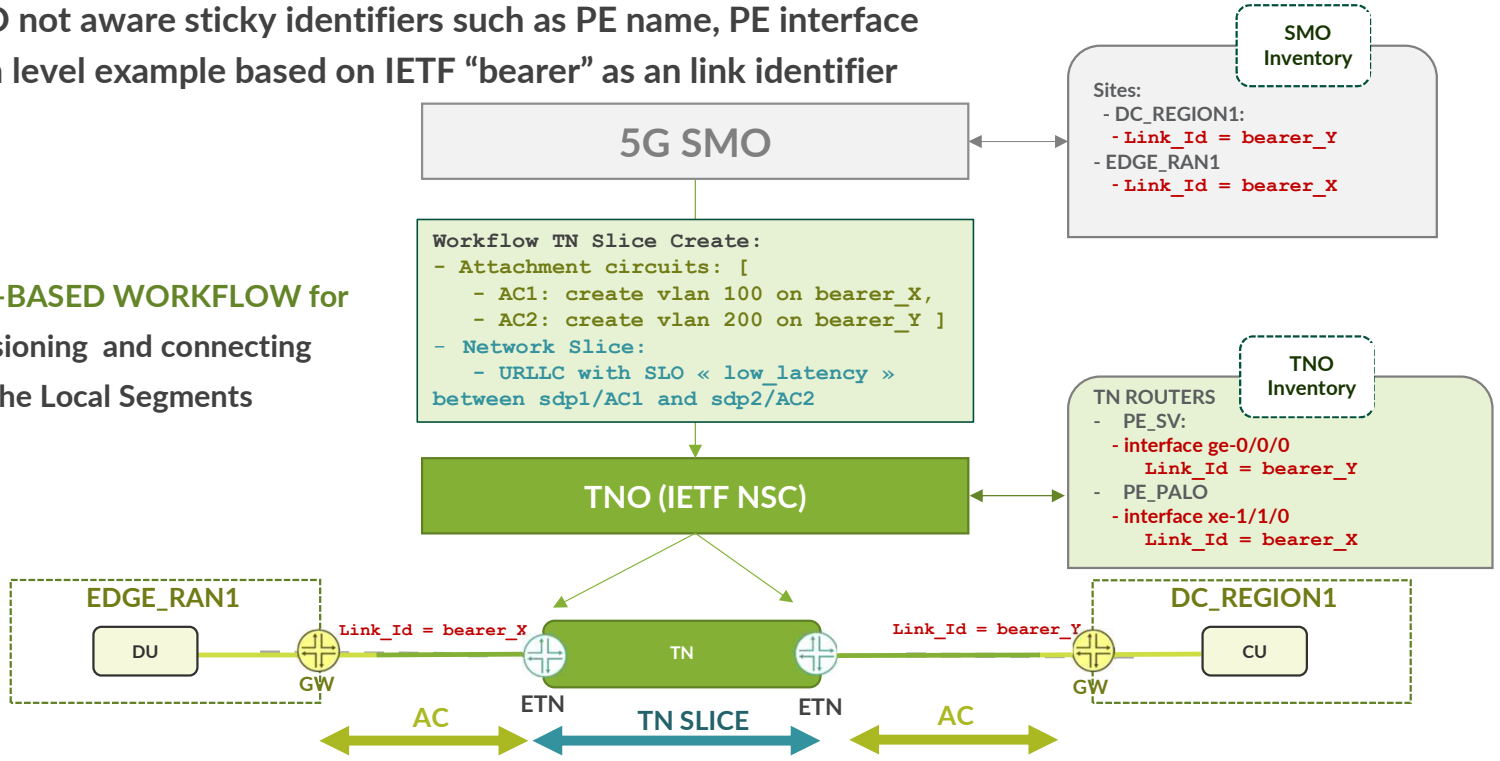


TN integration – intent-based DM/API

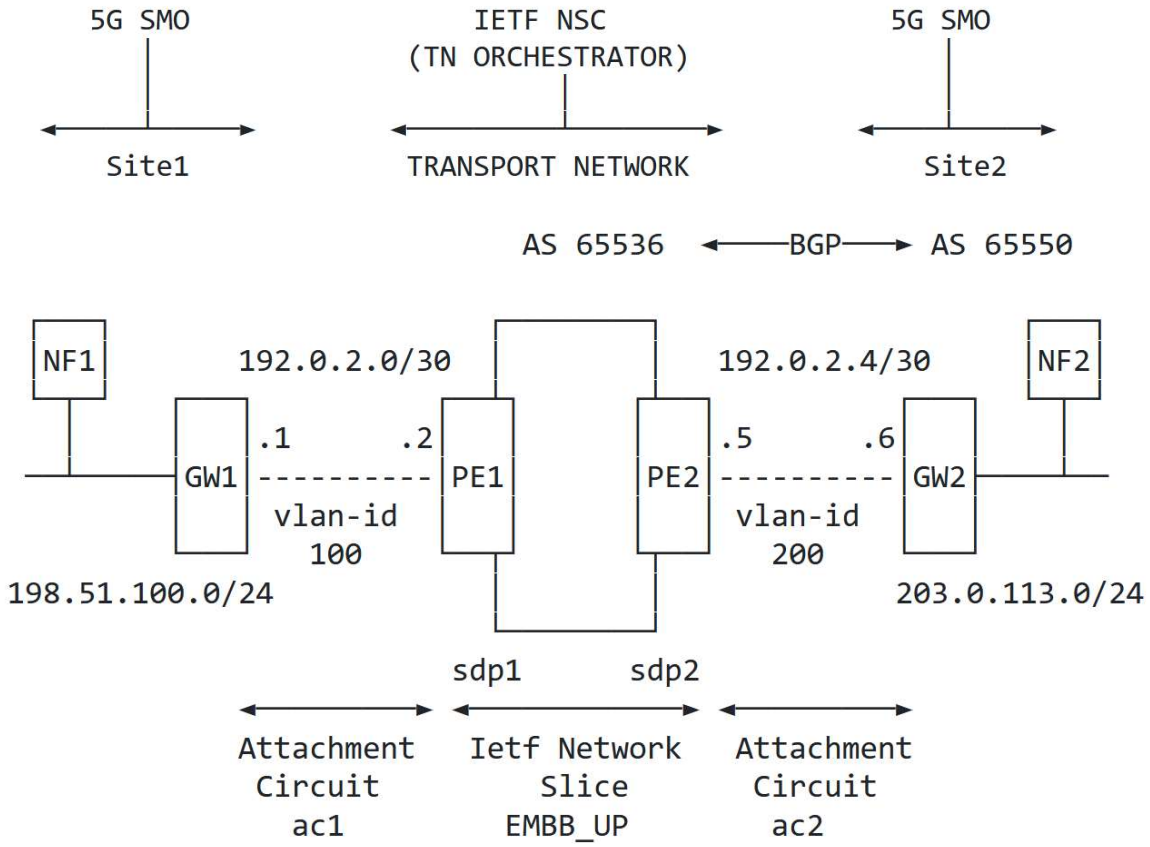
SMO consumes a generic customer model, with minimal inventory synchronization

- IETF API + Intent-Based Data Model to manage Slices in the Transport Network.
  - SMO not aware sticky identifiers such as PE name, PE interface
  - High level example based on IETF "bearer" as an link identifier

INTENT-BASED WORKFLOW for provisioning and connecting the Local Segments



End to End Orchestration – example (draft-boro)




```
ac1 properties:
- bearer-reference: bearerX@site1
- vlan-id: 100
- CE-address: 192.0.2.1/30
- PE-address: 192.0.2.2/30
- Routing: static 198.51.100.0/24 via
           192.0.2.1 tag primary_UP_slice

ac2 properties:
- bearer-reference: bearerY@site2
- vlan-id: 200
- CE-address: 192.0.2.5/30
- PE-address: 192.0.2.6/30
- Routing: BGP local-as:65536
                customer-as:65550
                customer-address: 192.0.2.6
```

Data model – example (draft-boro)

```
{
  "ietf-ac-svc:attachment-circuits": {
        "name": "ac2",
        "description": "Connection to site2 on vlan 200 for slice EMBB_UP",
        "l2-connection": {
          "encapsulation": {
            "type": "ietf-vpn-common:dot1q",
            "dot1q": {
              "tag-type": "ietf-vpn-common:c-vlan",
              "cvlan-id": 200
            }
          },
          "bearer-reference": "bearerY@site2"
        },
        "ip-connection": {
          "ipv4": {
            "local-address": "192.0.2.6",
            "prefix-length": 30,
            "address": [
              {
                "address-id": "1",
                "customer-address": "192.0.2.5"
              }
            ]
          }
        },
```



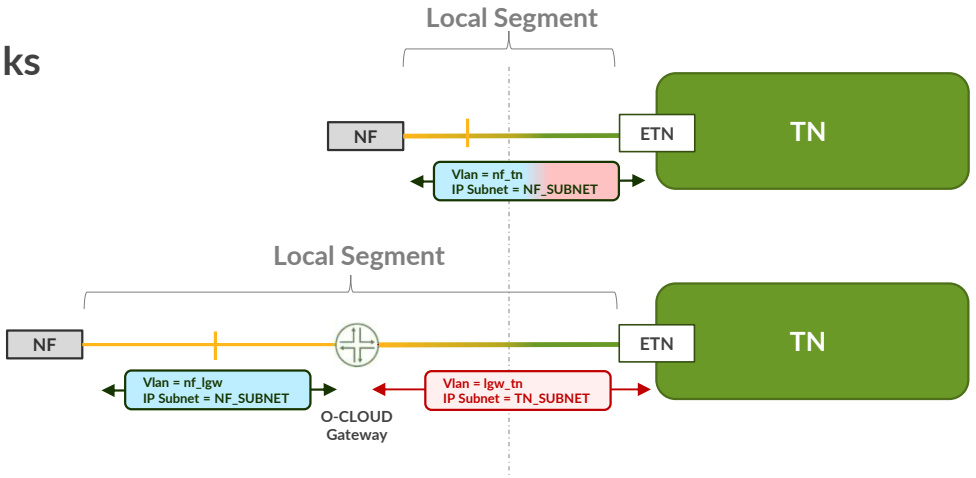
```
 "routing-protocols": {
          "routing-protocol": [
            {
              "id": "1",
              "type": "ietf-vpn-common:bgp-routing",
              "bgp": {
                "neighbor": [
                  {
                    "id": "1",
                    "local-as": "65536",
                    "peer-as": "65550"
                  }
[...]
}
```

```
{
  "ietf-network-slice-service:network-slice-services": {
    "slo-sle-templates": {
      "slo-sle-template": [
        {
          "id": "low-latency-template",
          "template-description": "Lowest possible latencey"
        }
      ]
    },
    "slice-service": [
      {
        "service-id": "Slice URLLC_UP",
        "service-description": "Dedicate TN Slice for URLCC-UP",
        "slo-sle-template": "low-latency-template",
        "status": {},
        "sdps": {
          "sdp": [
            {
              "sdp-id": "sdp1",
              "ietf-ac-glue:ac-ref": [
                "ac1"
              ]
            },
            {
              "sdp-id": "sdp2",
              "ietf-ac-glue:ac-ref": [
                "ac2"
              ]
[...]
}
```

EP_TRANSPORT for Network Integration in 3GPP API

Consolidation of IP Networking within the SMO thanks to EP_TRANSPORT IOC:

- Network Function datapath ressources
- Interconnection with the TN (in Local Segment) captured in "NexthopInfoList"



6.3.18.2 Attributes

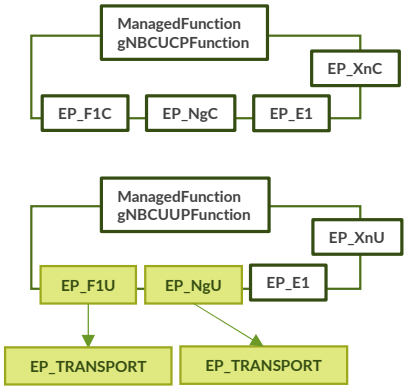
The EP_Transport IOC includes attributes inherited from Top IOC (defined in TS 28.622[30]) and the following attributes:

Attribute name	S	isReadable	isWritable	isInvariant	isNotifyable
ipAddress	M	T	F	F	T
logicalInterfaceInfo	M	T	T	F	T
nextHopInfoList	O	T	F	F	T
qosProfile	O	T	T	F	T
Attribute related to role					
epApplicationRef	M	T	T	F	T

EP_TRANSPORT: Looking forward

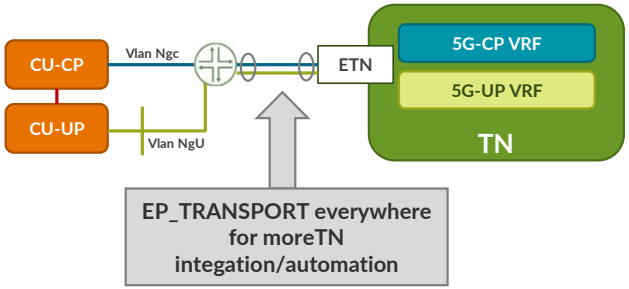
Extension of EP_TRANSPORT to Control Plane

- TODAY = EP_TRANSPORT for User Plane only
- TOMORROW = EP_TRANSPORT to all 3GPP interfaces (inc. Control Plane)



28.541 TODAY

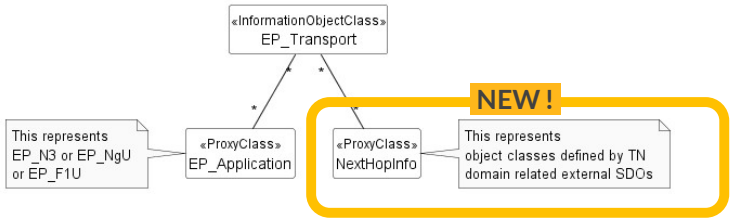
EP_TRANSPORT ONLY FOR USER PLANE EP



EP_TRANSPORT: Looking forward

OBJECTIVE #2 – IETF Data Modelling in EP_TRANSPORT

- 3GPP SA5 Federated Network Information Modeling
  - REPLACE **NextHopInfoList String** attribute WITH a **POINTER to an external TN model** (e.g. IETF)



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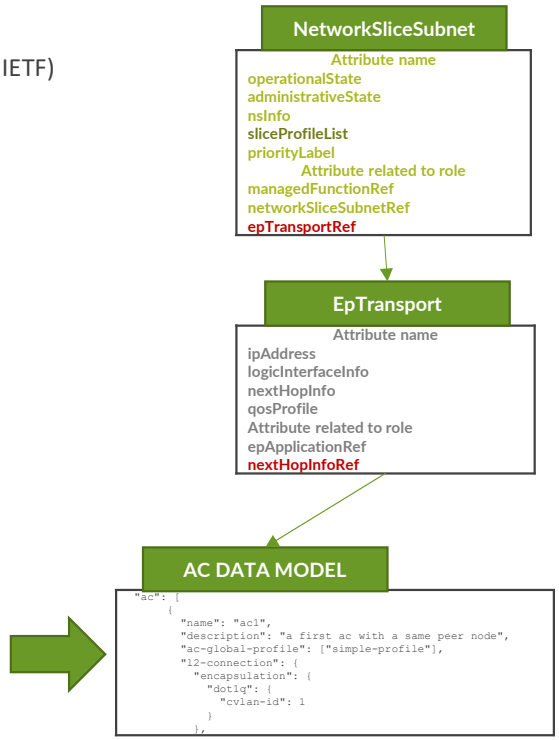
qosProfile	O	T	T	F	T
Attribute related to role					
epApplicationRef	M	T	T	F	T
nextHopInfoRef	M	T	T	F	T

Need new IETF Data Model ?



Thank You !