

A Framework for Automating Service and Network Management with YANG

draft-wu-model-driven-management-virtualization-05

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Objectives of the Draft

Goal:

- Discuss YANG model architecture for service and network management automation
- Articulate common functionality and framework to be used by multiple models and help operationalizing YANG-based model.
- Guidance on how models at different level interconnect and glue together for service delivery and fulfillment

Motivation:

- Considerable number of YANG data models are used to model devices, e.g., configuration data and operation state and services (for example, the L3VPN Service Model produced by the L3SM working group)
- They cover many of the networking protocols and techniques.
- how these models work together to configure a device, manage a set of devices involved in a service, or even provide a service is something that is not currently documented either within the IETF or other SDOs.

Something beyond scope of this document

- List all the models that fit into different use cases
- Provide an inventory of tools and mechanisms used in specific network and service management domains;
- Document the gap between YANG data model developed by IETF and other SDOs and relevant network operator requirements.
- Provide YANG data model registration mechanism
- Integration IETF models with models defined in other SDOs

Status Update

- We introduced this draft in both opsawg and rtgwg WG during IETF 104 Prague meeting
- Some ML discussion after IETF 104 meeting and solicit feedback from operator community
- **Updated since IETF-104**
 - 03 – 04
 - Typo fixes
 - Clarify the scope and motivation of this draft
 - Clarify the relationship between Module composition and YANG catalog
 - Document restructuring and move architecture conception section to section 3
 - 04 -05
 - Add Operators such as Christian Jacquenet,Luis Miguel Contreras Murillo,Diego R. Lopez,Chongfeng Xie,Weiqiang Cheng as new coauthors
 - Highlight different level models are example models.
 - Further clarify the scope and goal, purpose
 - Clarify the goal is not list every YANG module but we might come to a recom for YANG module developers in the draft.
 - Clarify this framework is drawn from a network provider perspective irrespective of the origin of a data module

Update from YANG Side meeting

- IETF YANG Side Meeting
 - IETF-105, Montreal, Canada
 - 8.30am~9:45am Tuesday 23 July
- Goal: Discuss the gap between IETF YANG and Industry needs and collect requirements from operators and equipment vendors.
- Agenda:
 - 1. YANG Model Status Update, Problem statement. (GengLiang China Mobile)
 - 2. What have already been done for IETF YANG. (Qin Wu Huawei)
 - YANG Catalog Project Update in IETF
 - YANG Data model Interconnection Framework Development in IETF
 - Telefonica SDN Architecture and Model Usage (Luis/Oscar Telefonica)
 - China YANG Round Table meeting Update (Reach out to China Operator Community)
 - 3. Open Discussion Questions (30 minutes)
- Meeting Material and minutes:
- <https://trac.ietf.org/trac/ietf/meeting/wiki/105sidemeetings>
- Outcome:
 - It was agreed that **gaps exist between IETF YANG and Industry needs**
 - IETF MUST take measures to address some of these gap
 - Framework for model integration
 - Education/Coordination/ML creation/Reach out operator community

The Authors Have one Question

- Is this stuff "obvious" or is there value in publishing an RFC?
 - Are we entering to next stage of model standardization?
 - The number of IETF developed model is huge, there are many YANG models still being developed;
 - IETF service models have sufficient input from operator but IETF lower level models not, there might have a gap between operator's requirements and current developed model
 - Many operators are not engaged enough in the IETF to create that perfect world.
 - The operators expected to deploy these technologies often don't even know that the standards are being developed. This lead to critical new technologies currently being developed without sufficient direct operator input.
 - Our intention is to provide framework for model interconnection and exemplify how different level model glue together for service delivery and fulfilment
 - If we pursue publication, in which WG?

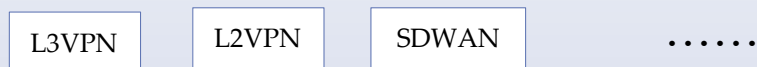
Q&A

Or talk to us on the mailing list

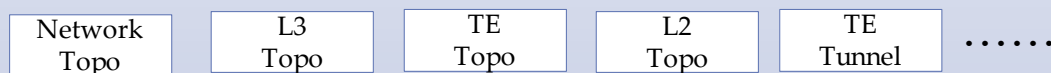
THANK YOU

Data Model Layering and Representation

An overview of Layered YANG Modules

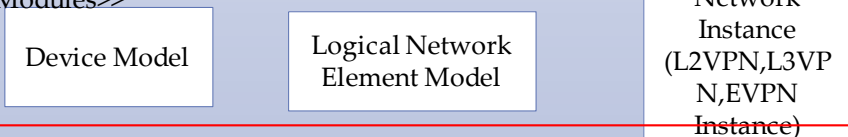


Network Service Modules

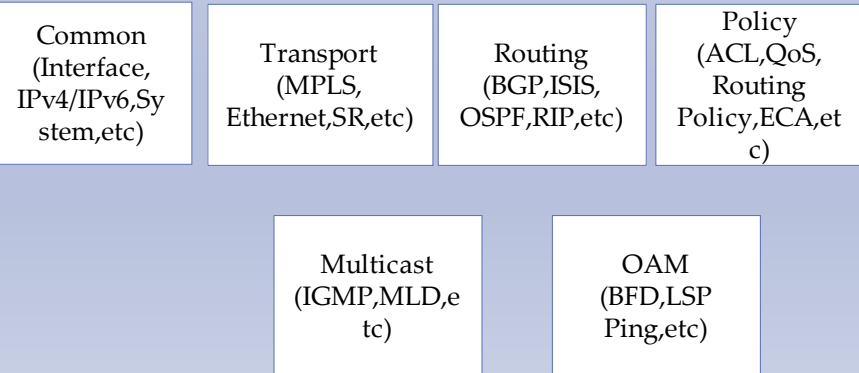


Network Resource Modules

<<Composition Modules>>



<<Function Modules>>



House Consumer



House Building Blueprint



Electricity



Water Supply



Trench for sewerage



House building Block



House building Foundation



Network Element Modules

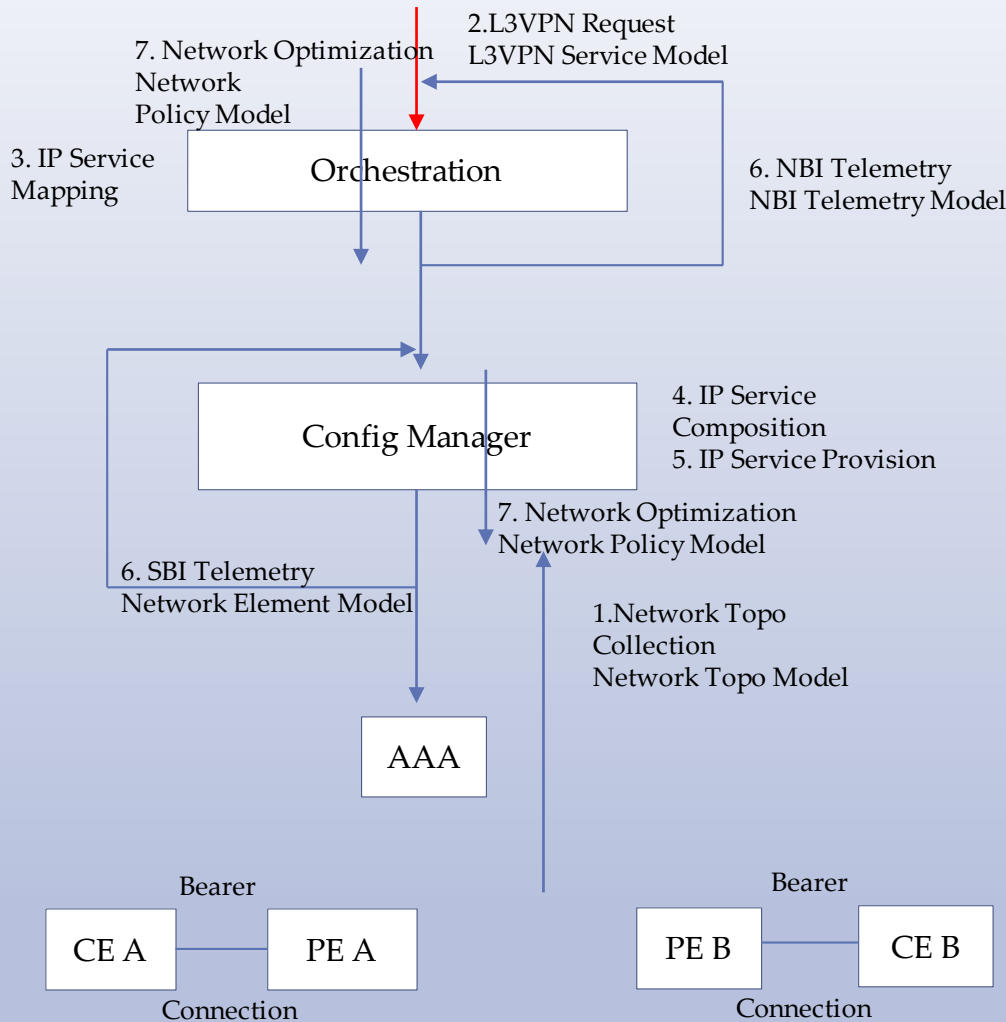
Model Interconnection

- **Model top down Decomposition**
 - Model mapping from high layer to lower layer
 - Model mapping between service and resource
 - Model translation from multiple domain to each single domain
- **Interact with periphery component(e.g., topology, inventory, performance monitoring)?**
 - Define Northbound interface telemetry model, troubleshooting model
 - Monitor the resource changes in the network resource module
 - Troubleshoot the network problem in the network topology
- **Model bottom up Composition**
 - Assemble a set of network element modules to provision each network device type all at once
- **Close Loop Control with the same layer model**
 - Model driven telemetry
 - Model driven provision
 - Common Network Policy model

Functional Components

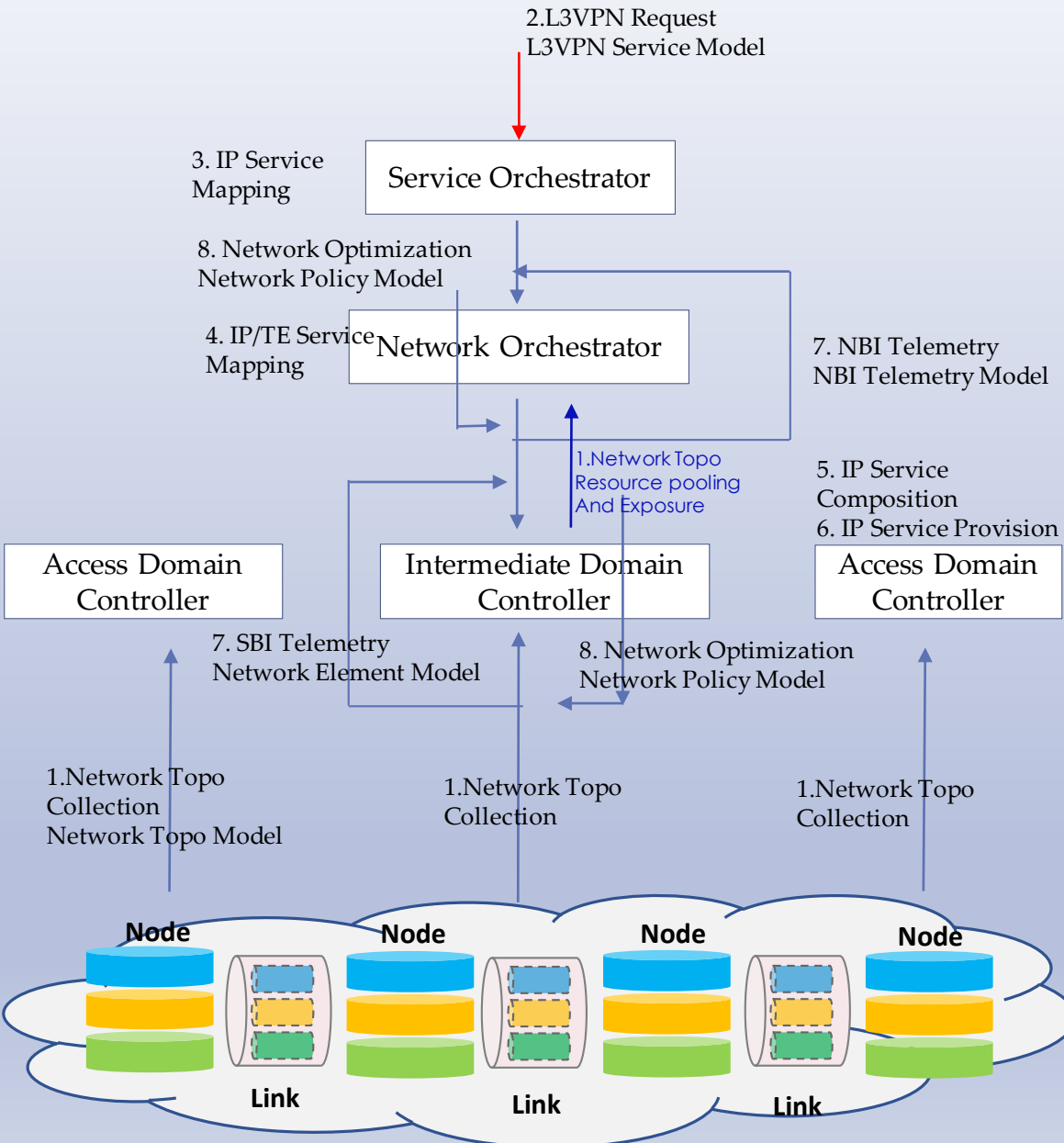
- **Resource Collection and abstraction**
 - Pub/Sub mechanism, Management Plane telemetry (e.g., YANG push, gNMI)
 - Network topology Model, L3/TE/L2 Topo Model
- **Service Exposure**
 - Service Catalog (analogous to app store)
- **IP Service Mapping**
 - Mapping between Service abstraction and network technology
- **TE Service Mapping**
 - Mapping between service abstraction and TE topo, TE tunnel and VN
- **TE/IP Service NBI/SBI Telemetry**
 - Pub/Sub mechanism
 - NBI telemetry model
 - SBI Network Element Model
- **IP Service composition**
 - Schema Mount
 - Device Model creation
- **IP Service Provision**
 - SBI Network Element Model
- **Path Management**
 - PCEP Computation API model

Applicability of layered models and Function Components



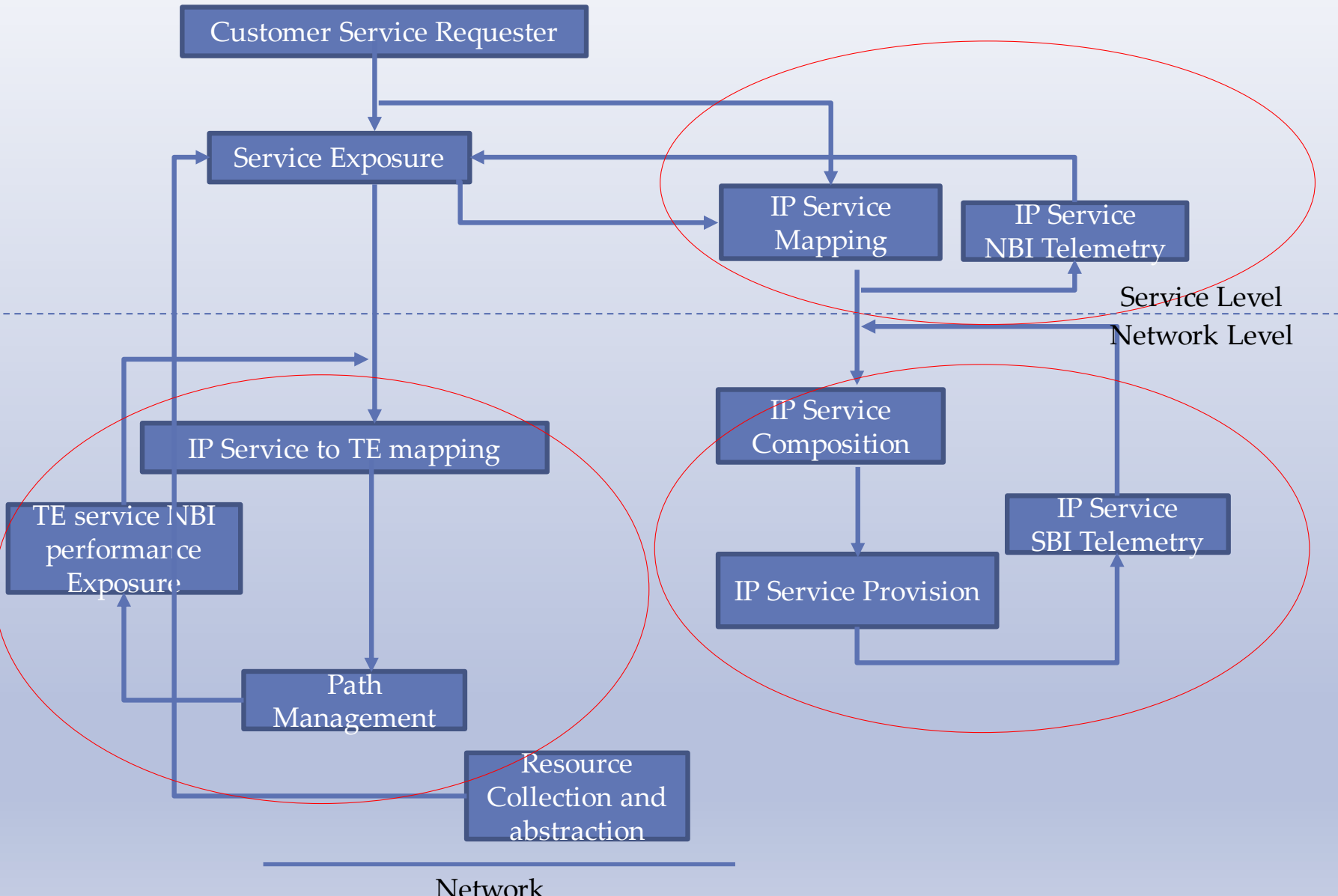
- **Single domain L3VPN Service Delivery Case**
- Resource creation method:
 - Customer Initiated
 - Network Initiated
- Service creation
 - Service Request
 - IP Service Mapping
 - IP Service composition
 - IP service provision
- Service assurance
 - NBI/SBI Telemetry
 - Network optimization
- Service maintenance
 - OAM (ping, traceroute,etc)

Applicability of layered models and Function Components



- **Multi-domain L3VPN Service Delivery**
- Resource creation method:
 - Customer Initiated
 - Network Initiated
- Resource creation
 - Pool resource based on pre-configured service requirements
- Service creation
 - Service Request
 - IP Service Mapping
 - IP Service Composition
 - IP Service Provision
- Service Mapping To Resource
 - Allow user select pooled resource (e.g., Topo, Tunnel) to meet service requirements
 - Setup Tunnel based on on demand service requirement
- Service assurance
 - NBI/SBI Telemetry
 - Network optimization
- Service maintenance
 - OAM (ping, traceroute,etc)

Architecture Overview



Framework for model interconnection