YANG-Based Service Models for Services over MPLS Networks

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SDN MPLS

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Agenda

- What is a Service Model?
- Why should we standardize Service Models?
- The Layer Three VPN Service Model (L3SM)
- Service Models in the SDN architecture
- What other Service Models could we develop?
- How will we measure success?

The Interface to the Operator

- A Service Model is part of the interface between a customer and the operator
  - That makes it one element of a business interface
  - Other aspects of the business interface are not in scope
    - Pricing
    - Billing
    - SLA
- Try to describe the services in a way that is common to multiple operators
  - Gives the customer a common point of reference

What is a Service?

- A collection of network functions provided by an operator to their customer
- Connectivity services
  - Internet connectivity
  - Virtual private wire
  - VPN
- Basic units of purchasable function
  - Available from multiple operators
  - Core characteristics the same
  - May be described and sold in different ways to maintain market differential

Benefits of a Common Approach

- A Service Model is a description of a service
  - A data model that can be represented in code
- Each operator could use their own data model
  - Would find a large overlap between models
- Try to standardise the common portions
  - Each operator uses the common model
    - Adds extensions for their own representation in the market
- Standard service model provides
  - Common base for customers
  - Opportunity for automation of service delivery

Using YANG for Service Models

- YANG is the data modelling language du jour
- There have been many modelling languages and there will probably be many more
- YANG is convenient for human and machine
- Not particularly good on the wire (it's XML)
  - Easily mapped to other encodings such as JSON
- The main benefit is that it is widely understood

Modularity and Extensibility

- Two important features of data model design
- Modular
  - Possible to pull out components of the model
    - Leave them out completely
    - Re-use them in other models
- Extensible
  - Possible to extend (augment) the model
  - Allows new features to be added
  - Lets operator build on standard model
    - Add their own features
    - Achieve market differential

Layer Three VPN Service Model as an Example

- First attempt at a Service Model in the IETF
  - Unsure that a common description can be agreed
  - Pick a “simple” and “popular” service – L3VPN
- Built a team of network operators (Orange, BT, Verizon, AT&T) and let them get on with it
- Constrained discussion to PE-based L3VPN
- Basic blocks
  - Service identification (service name, service id, customer name)
  - VPN sites (many parameter!)
  - VPN topology (any-to-any, hub-spoke, hub-spoke-disjoint…)
  - Service provided (cloud, multicast…)
- Somewhat to our surprise, these operators have been able to agree

What Can I See From Where I'm Standing?

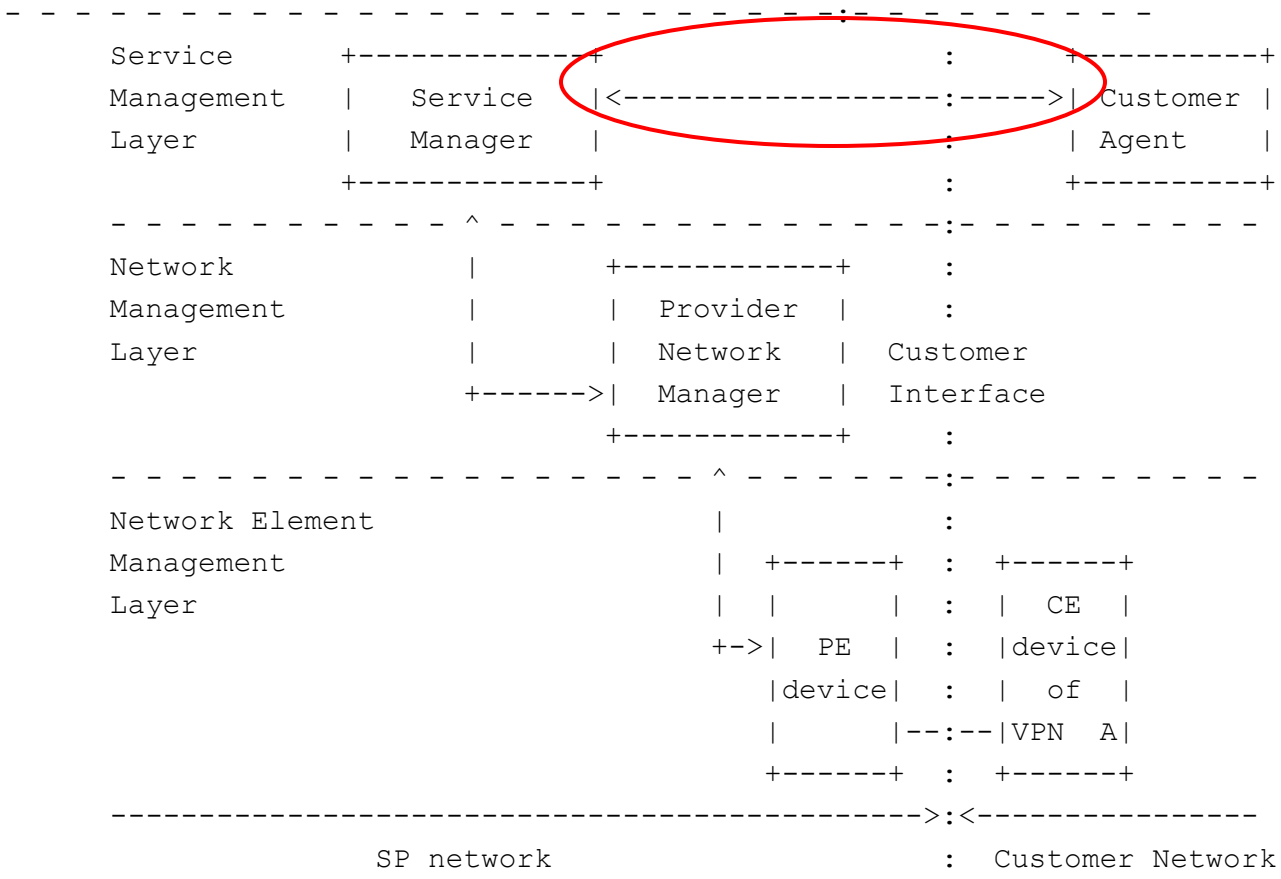
- Not a lot!
  - Customers can't see under the hood of the network
  - Service models are not configuration models

Automation of Service Delivery

- Delivery of services can be a major hassle for operator
- Now a service can be expressed in code
  - Perhaps we can automate service delivery
- This brings us into the world of SDN
- Service orchestration
  - Take Service Model as input
  - Output network and device configuration models
- See this in *many* SDN architectures…

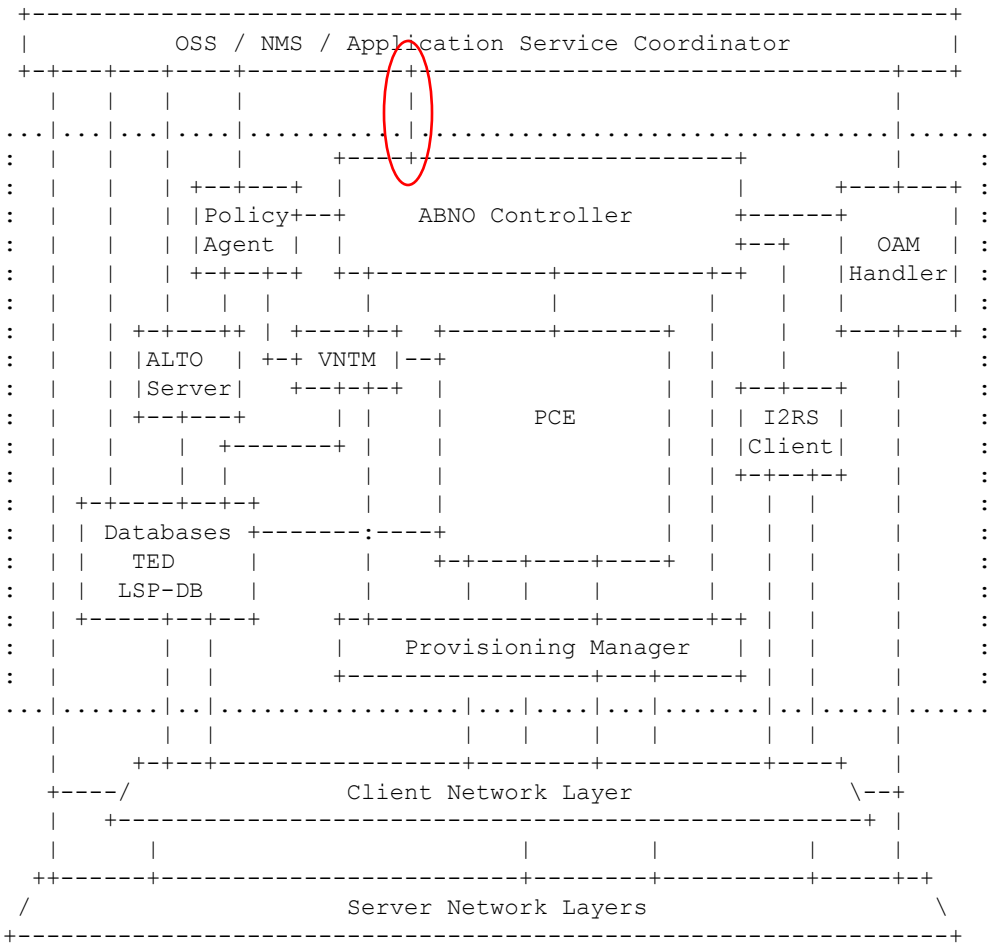
Service Models in RFC 4176

- Framework for Layer 3 Virtual Private Networks (L3VPN) Operations and Management

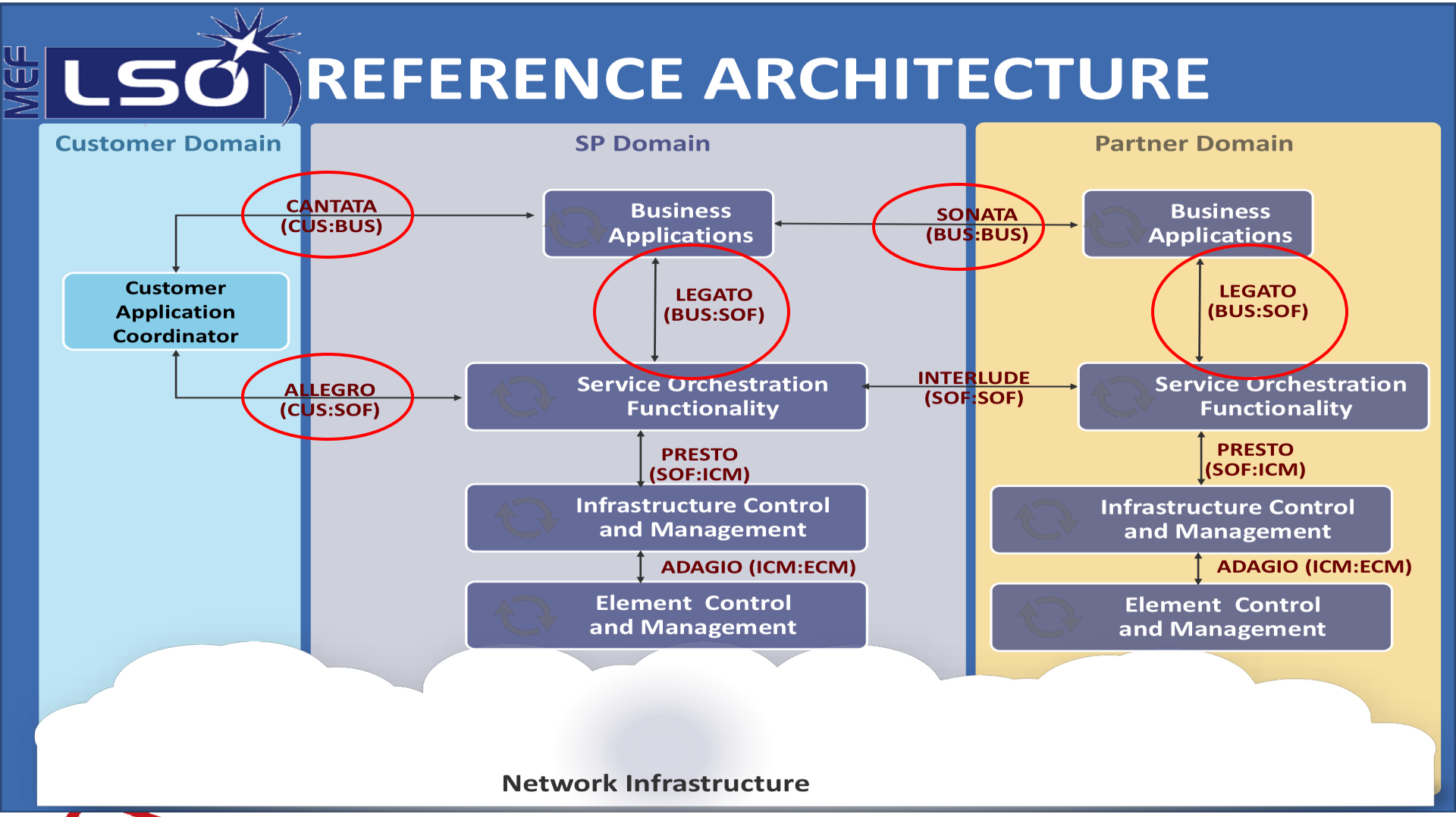


Service Models in ABNO

- RFC 7491
  - A PCE-Based Architecture for Application-Based Network Operations

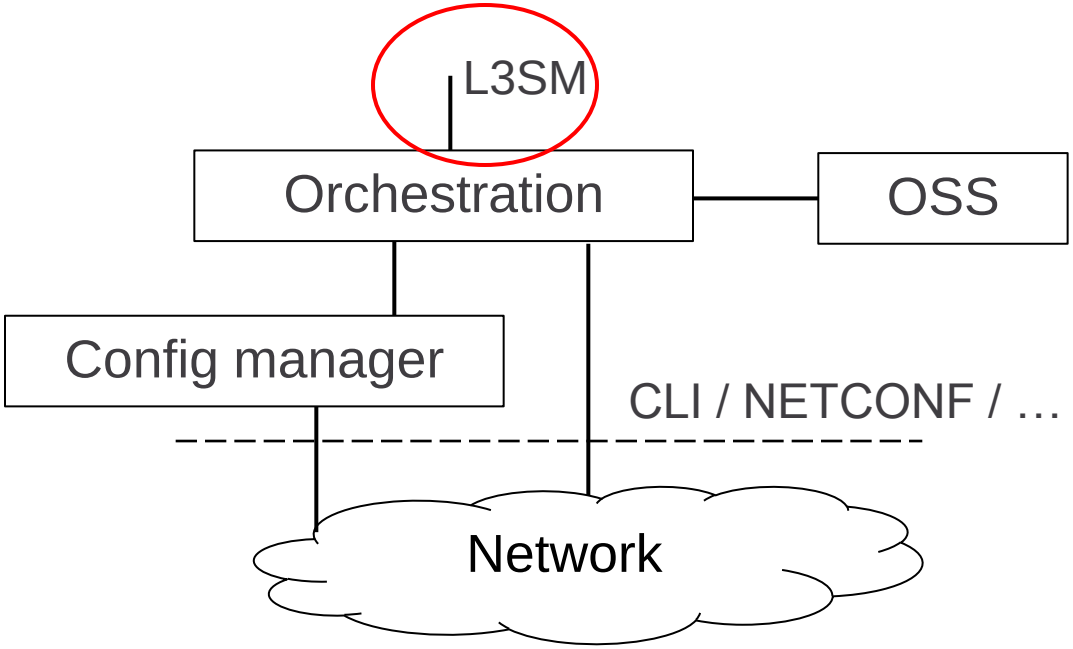


Service Models in the MEF



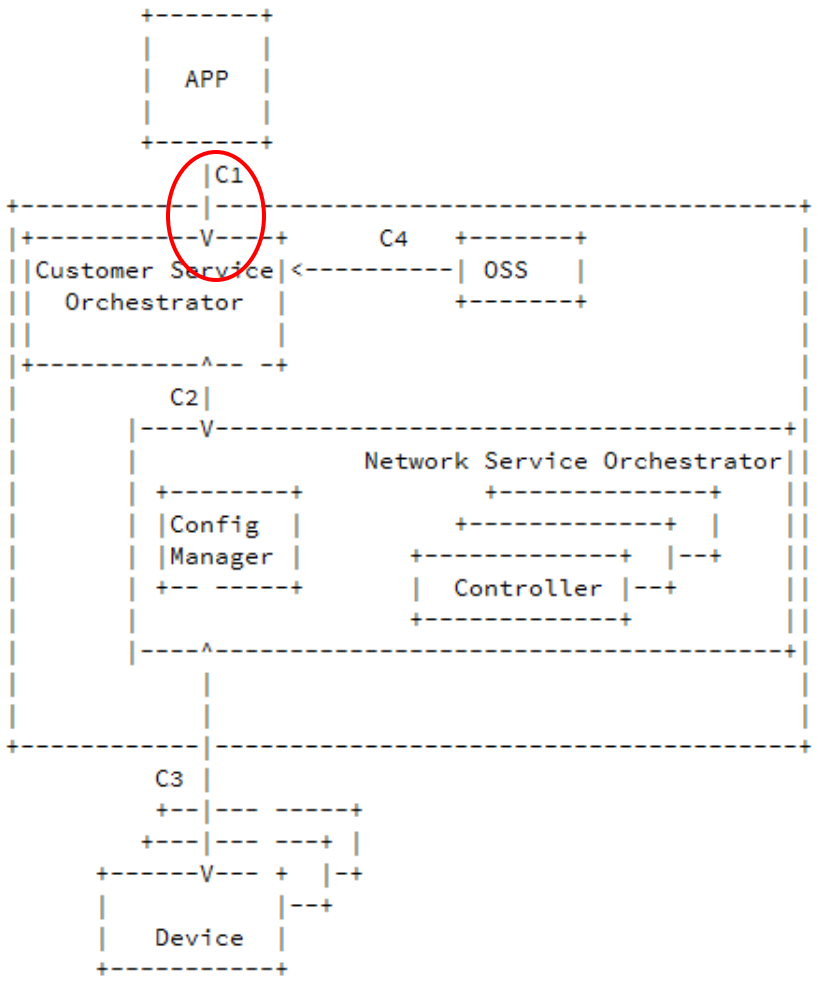
How the L3SM Fits In

- draft-ietf-l3sm-l3vpn-service-model
  - YANG Data Model for L3VPN service delivery



Another View of the Architecture

- draft-wang-l3sm-service-automation-architecture



What Other Service Models Could We Work On?

- L2VPN is a popular candidate
  - But is it too complex to make common?
  - How about EVPN?
- Maybe some higher level commonality
  - A common VPN service model?
  - A data model for all services?
- Connectivity as a service
  - Maybe this is too simple?

- The big question: Why bother?

Other Related Work

- Following the principle of modularity
- IETF has work efforts on…
  - Policy
    - A key component of service description
    - Also relevant to configuration models
    - Is it possible to make a common description of policy?
    - A set of tools that could be used in other models
    - SUPA working group just formed
  - Security
    - Many different security functions in the network
    - These need to be configured and selected as services
    - I2NSF working group just formed

What Would Success Look Like?

- Can operators agree on a common subset of features?
  - Is this subset large enough to be useful?
- Is the resulting model extensible for operator use?
  - Can operators represent their different services?
- Can a Service Orchestrator be built to map to configuration models?
  - Might uncover some holes in the configuration models

- Prototypes have been built using early L3SM
  - Indicates that success is possible

Questions

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