

A decorative graphic element consisting of a thick, curved blue bar that starts from the top right and curves downwards and to the left, ending near the bottom right corner of the slide. The bar has a gradient from light blue to dark blue.

# MEF Modeling Approach For Discussion

Tara Cummings, Ericsson

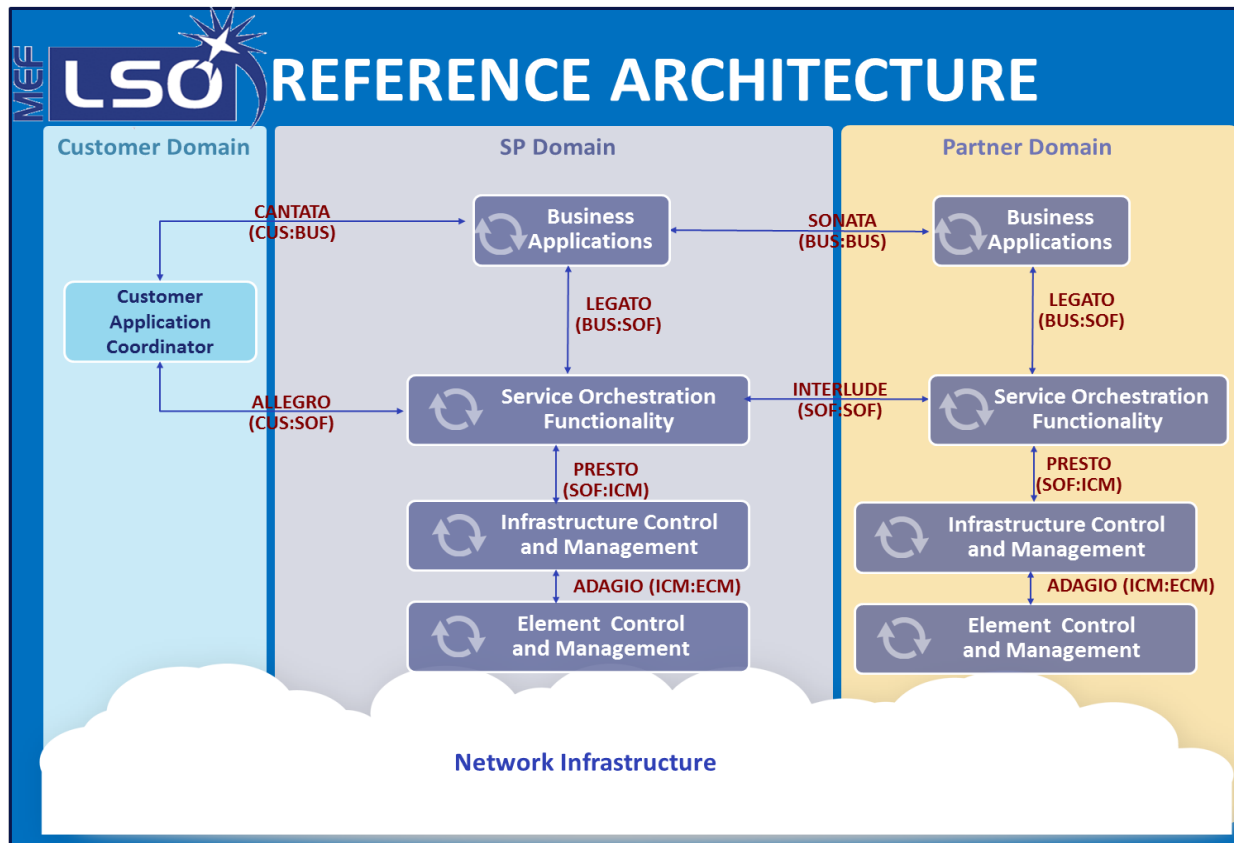
# What is MEF LSO?

- LSO defined in MEF Specification 55 and provides for the orchestrated management and control of Third Network Connectivity Services
- LSO Reference Architecture characterizes the management and control domains and entities that enable the cooperative LSO capabilities
- LSO overcomes existing complexity by defining product, service, and resource abstractions that hide the complexity of underlying technologies and network layers from the applications and users of the services

## ***Orchestration***

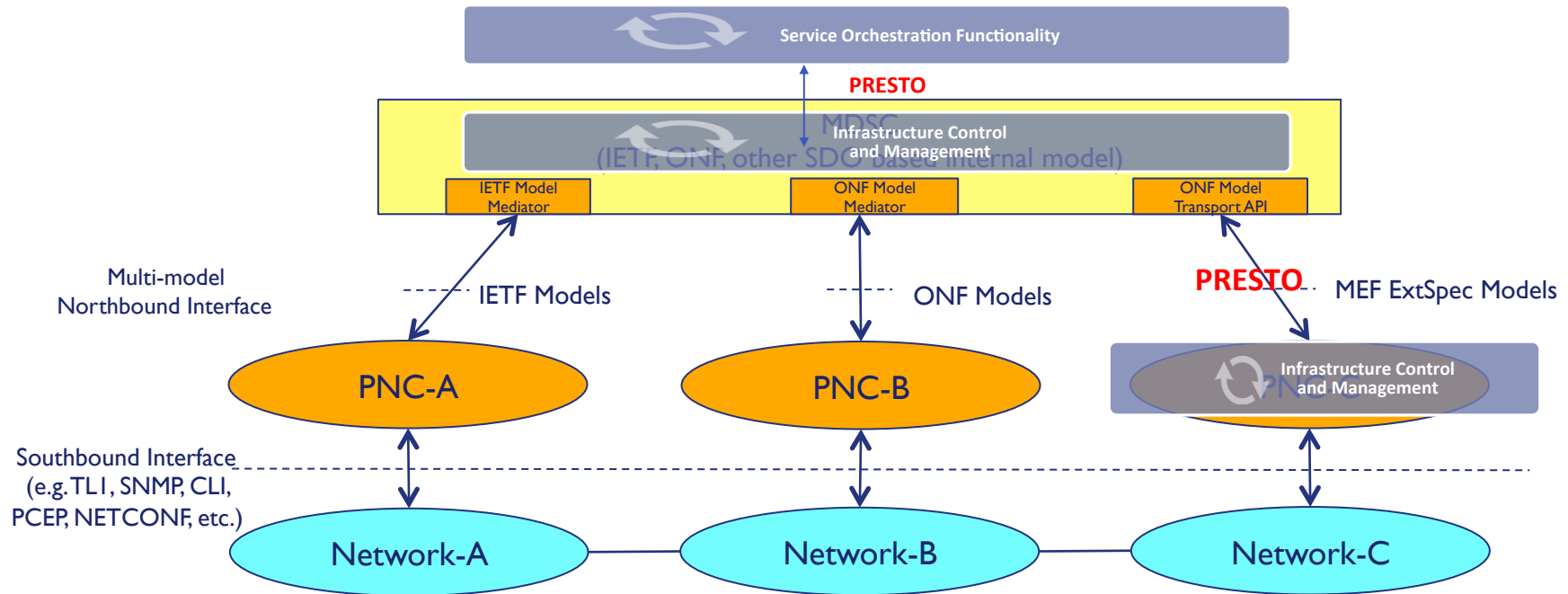
- Connectivity Services are orchestrated across all internal and external network domains from one or more network operators
- Encompasses all network domains that require coordinated end-to-end management and control to deliver connectivity services
- Within each provider domain, the infrastructure may be implemented with WAN technologies, as well as NFV and/or SDN
- Not only dramatically decreases the time to establish and modify the characteristics of the Connectivity Service, but also assure the overall service quality and security for these services.

# LSO Reference Architecture and Framework



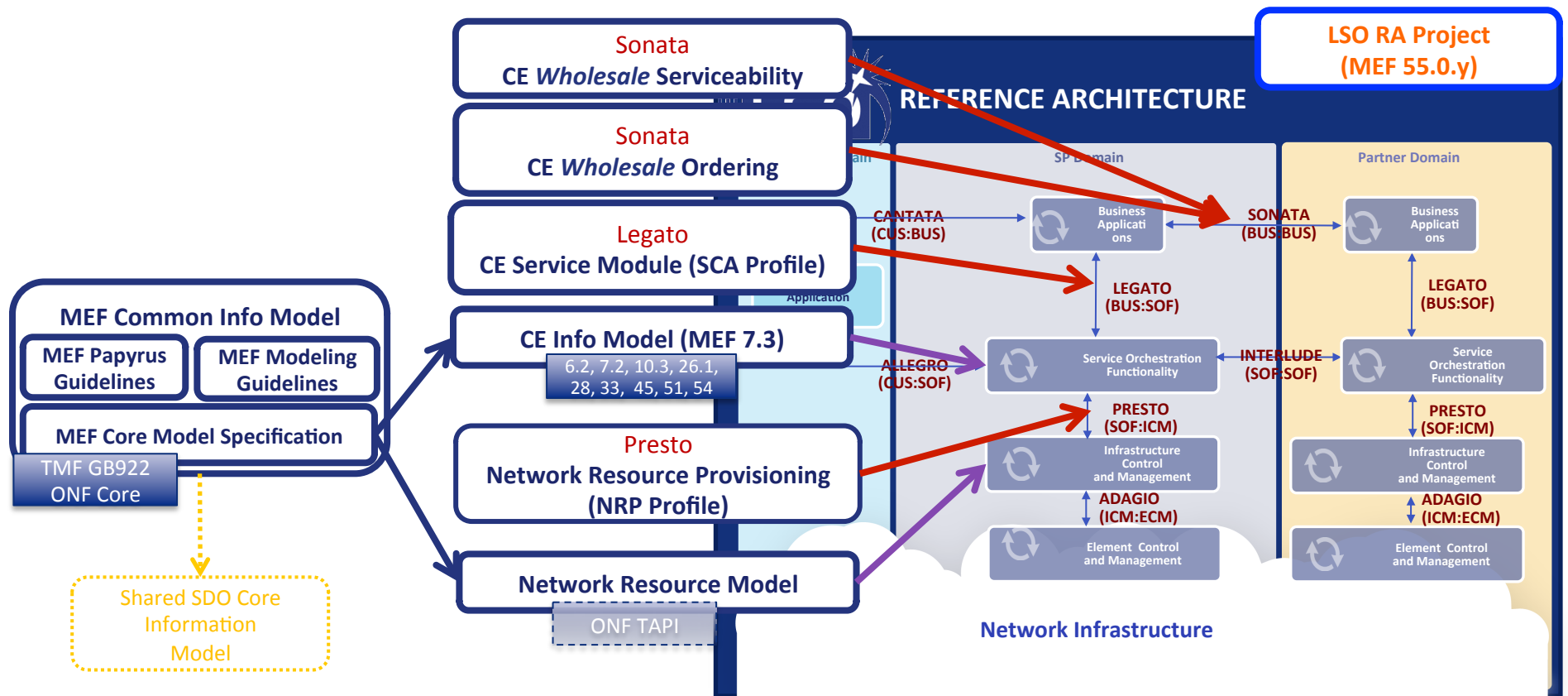
- Provides a layered architecture that characterizes the management and control domains and entities that enable the cooperative LSO capabilities for Connectivity Services.
- High level operational threads describing user stories of orchestrated Connectivity Service behavior as well as interactions among management entities, expressing the vision of the MEF LSO capabilities
- The management interface reference points that characterize interactions between LSO ecosystem components are identified in the reference architecture

# Potential LSO Alignment to IETF –for discussion

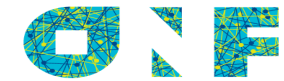


- **Model Translation/Mediation:** For multi-model environment, deployment use case must be fully supported by all models.
  - Model translation / mediation between systems using different models should be seamless.

# CURRENT approach for MEF Projects

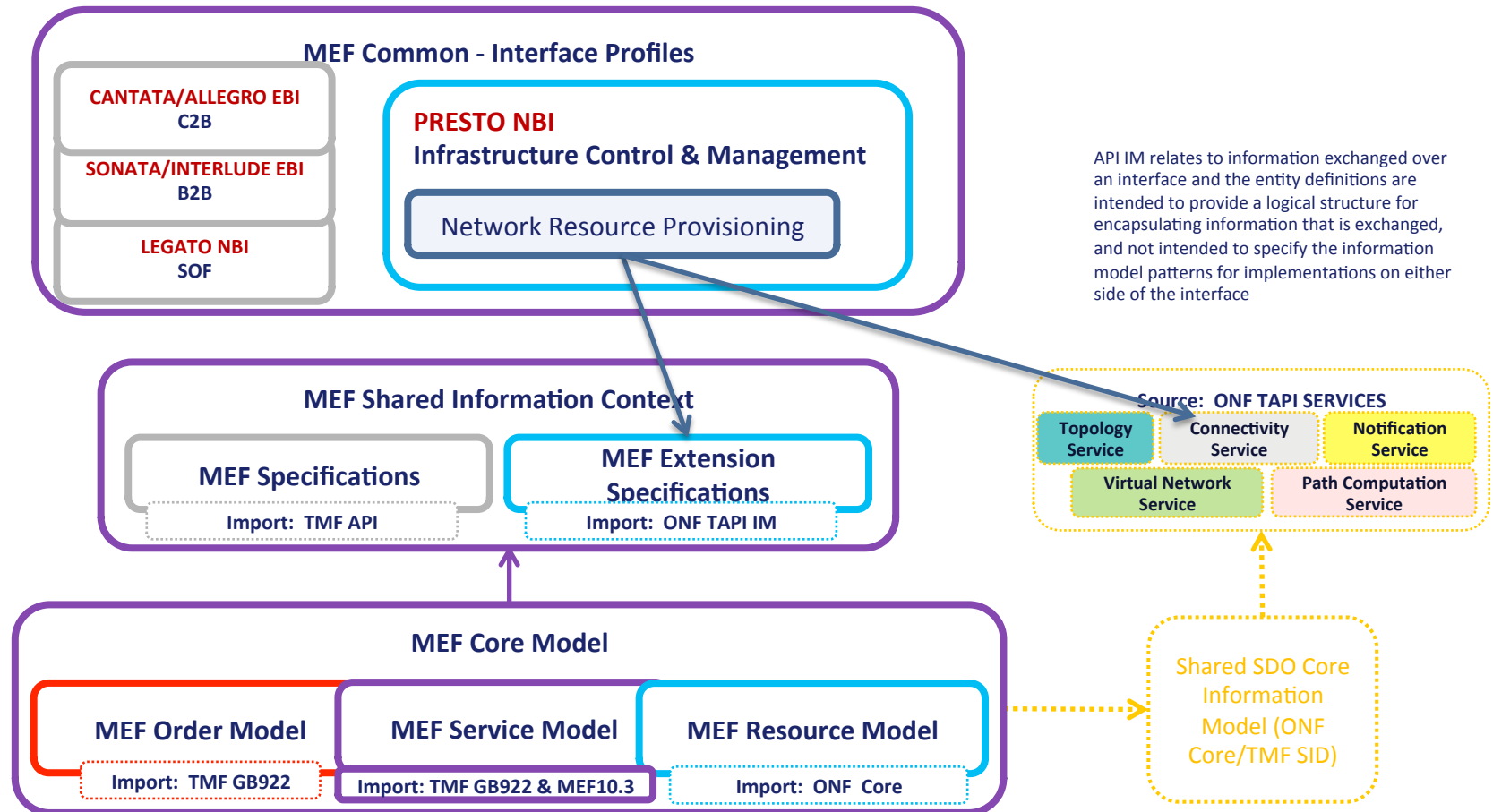


## Leveraging T-API SDK Structure Considerations



- Modularity
  - Package functional features into small self-contained largely-independent modules
- Conformity
  - Standardize a single core technology-agnostic specification that abstracts all common transport network functions for the interface
- Extensibility
  - Facilitate exchange of diverse network information specific to different layers, technologies, standards organizations and vendors in a consistent manner using the same API core model constructs
- Interoperability
  - Ensure interoperability via conformance to the TAPI methodology and compliance with the core standardized TAPI spec

## *In progress discussion* - MEF Modeling aligned with ONF



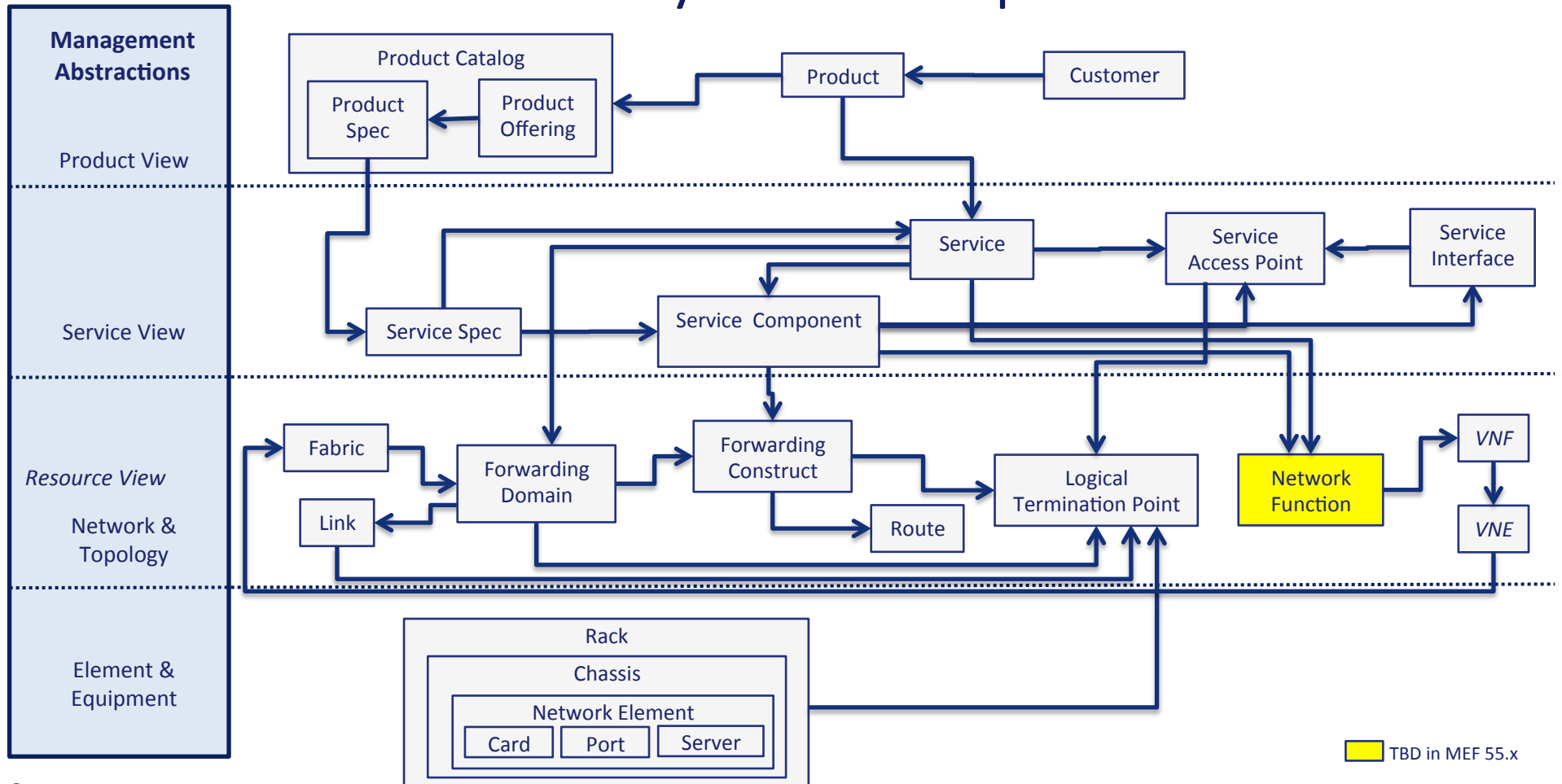
# MEF 55 Entities

- CIM project focus is to model MEF 55 abstractions to support LSO management of Product, Service and Resource Views
  - CIM identifies relationship between leveraged TMF and ONF models
- Model and Interface projects are based on CIM and share models that include attributes defined in MEF Technical Specifications
  - projects identify support for MEF 55 functional requirements
  - *Resource View aligning with ONF TAPI model*

Management Abstractions	Information Class Examples per Management Abstraction View	LSO RA Context
Product View	Product Catalog, Product Offering, Customer, Product, Product Spec	Business Apps
Service View	Service, Service Component, Service Spec, Service Access Point, Service Interface	Service Orchestration (Provider domains & multi-domain)
Resource View Network & Topology	Route, Fabric, Forwarding Domain, Forwarding Construct, Logical Termination Point, Link, VNE, VNF	Service Orchestration & Infrastructure Management (Subnetwork)
Equipment	Rack, Chassis, Network Element, Card, Port, Facility, Server	Element Control & Management



# MEF 55 Entity Relationships



# Modeling Service to Network entities

- MEF 55 Service View relationship to Network View
  - A Service is visible and directly usable by the Customer, but may be divided within the Service Provider's infrastructure into one or more **Service Components, for instance corresponding to forwarding domains at the resource layer** [*Forwarding Construct is resource layer instance*] or to underlying access services that the Service Provider has purchased from a Partner domain. Service Components are not visible to the Customer. Software systems implementing service related functionality have traditionally been operational support systems in the service management domain or service management systems. Note: in the TM Forum SID [TMF GB922], a Service is referred to as a Customer Facing Service (CFS) and a **Service Component is referred to as a Resource Facing Service (RFS)**.
- *\*Note -Although the UML from the TM Forum SID Model includes both the GB922 (classic SID objects) and the Zoom objects as independent models, the effort to align the GB922 with Zoom is outside the scope of MEF. Current approach is that MEF considers the GB922 objects for product and service constructs building a relationship to ONF constructs via a resource “placeholder” entity. MEF providing input and aligning with a shared SDO model.*

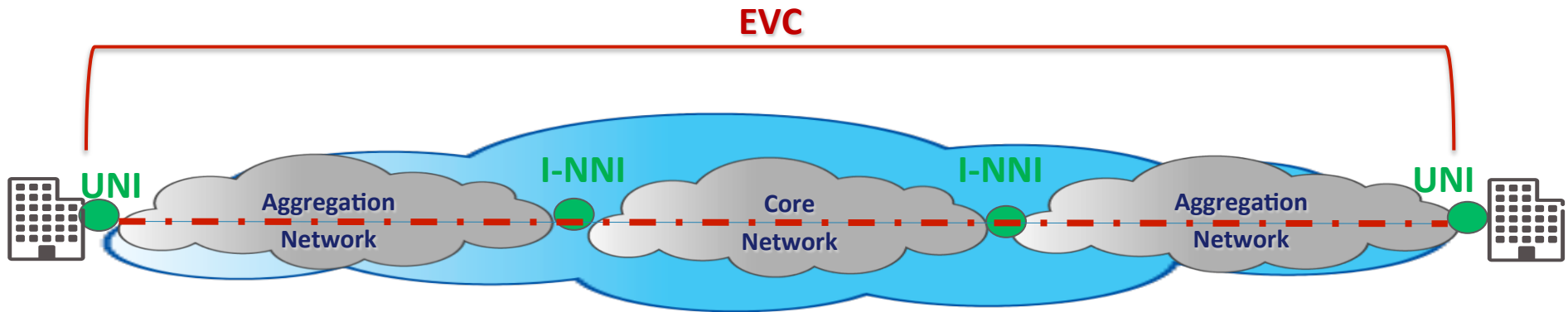
Service View

# Ethernet Service View Concepts

“ The ETH Layer is responsible for the service view presented by the Service Provider to its Subscribers and CENs participating in the Ethernet service. It is responsible for the instantiation of Ethernet MAC oriented connectivity services and the delivery of Ethernet service frames presented across well-defined internal and external interfaces and associated reference points”.

- ❑ **Ethernet Service** An end-to-end connection (EVC) offered by a service provider between two or more subscriber sites (UNI's) that enables the transfer of Ethernet Service Frames between them in accordance with a specified level of quality.
- ❑ **Ethernet Service Type** A classification of an Ethernet service based upon the topology (i.e. p2p, mp2mp, rooted mp...) of the subscriber sites and a well specified direction of Ethernet flows between sites.
- ❑ **Ethernet Service Component** A segment of an Ethernet service that represents connectivity (OVC) between a subscriber site and a network operator (UNI/ENNI), or connectivity between network operators (ENNI/ENNI), or connectivity between a service providers internal networks (UNI/INNI, INNI/INNI).
- ❑ **Ethernet Service Access Point** An endpoint of an Ethernet service through which Ethernet service frames are classified, metered, and marked for transit through the Carrier Ethernet Network (EVC per UNI, OVC endpoint)
- ❑ **Ethernet Service Interface** A place of interconnection between a subscriber site and an Ethernet service provider (UNI) , or between two service providers (ENNI). A demarcation point between administrative boundaries.
- ❑ **Ethernet Service Specification** A specification of a set of Ethernet Service attributes and their associated values that characterize an Ethernet Service, an Ethernet Service Access Point, or an Ethernet Service Interface.

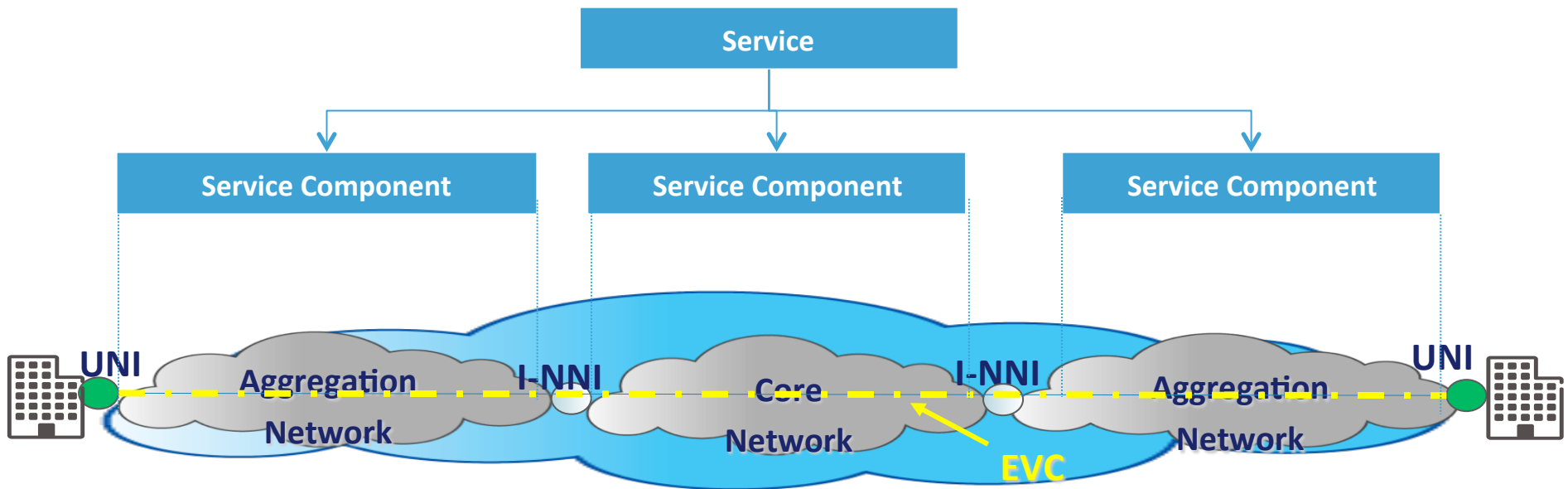
# MEF Intra Provider Service Example



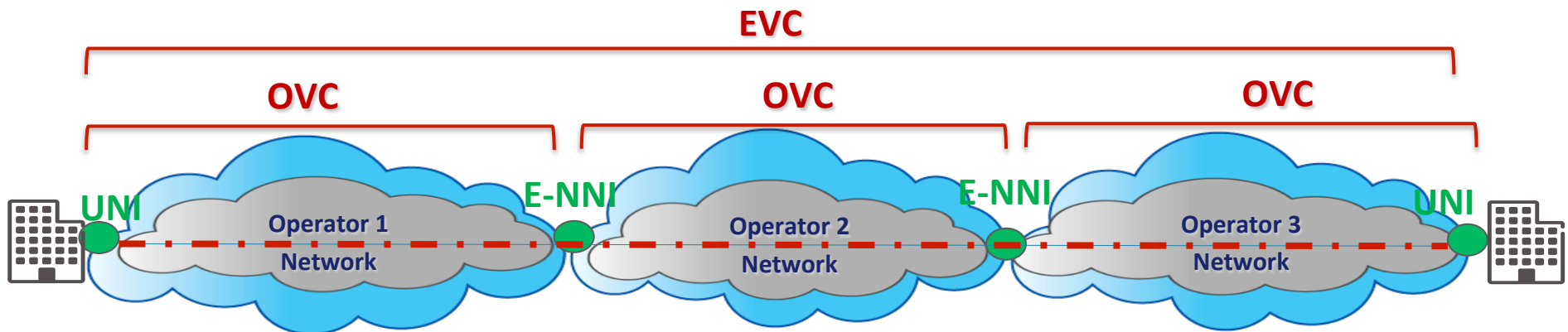
- UNI (User-to-Network Interface)
  - Physical interface/demarcation between service provider and subscriber
  - Service start/end point
- Ethernet Virtual Connection (EVC)
  - Logical representation of an Ethernet service as defined by the association between 2 or more UNIs
- NNI (Network-to-Network Interface)
  - Demarcation/peering point
    - between service provider internal networks (I-NNI)
    - between service provider networks (E-NNI) (not shown)

# MEF 55 – Service View (SOF)

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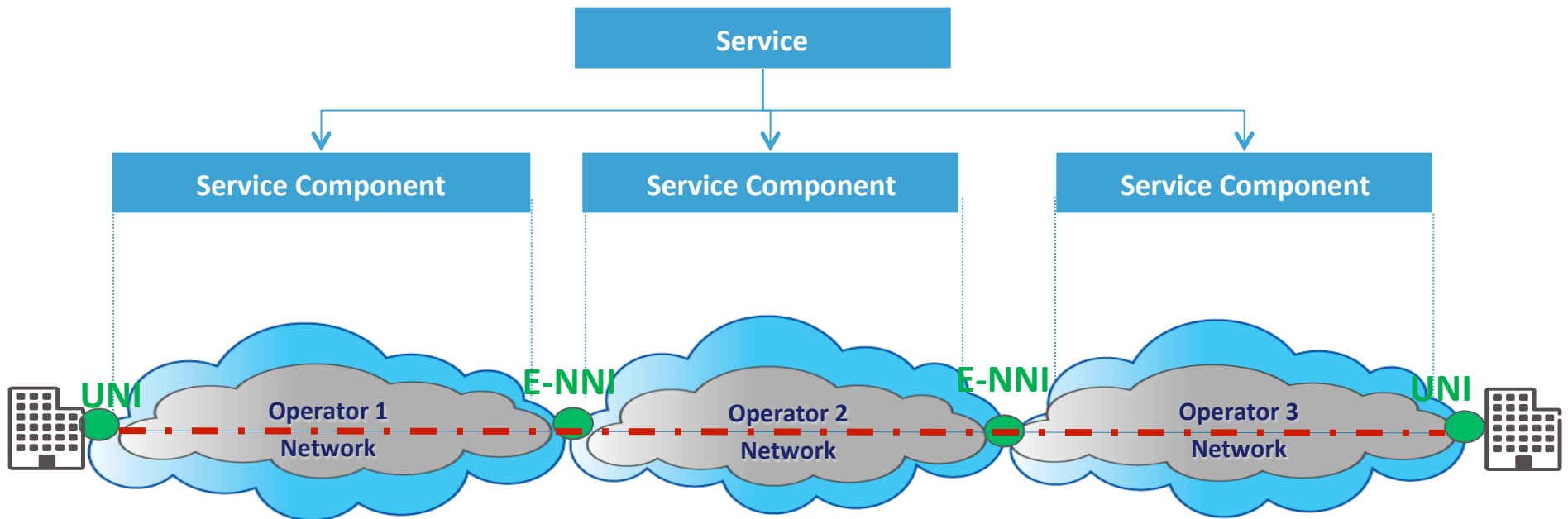
# MEF Inter Provider Service Example



- UNI (User-to-Network Interface)
  - Physical interface/demarcation between service provider and subscriber
  - Service start/end point
- Ethernet Virtual Connection (EVC)
- Logical representation of an Ethernet service as defined by the association between 2 or more UNIs
- Operator Virtual Connection (OVC)
  - Logical representation of an Ethernet service as defined by the association between 0 to many UNIs AND 1 or more ENNs
- NNI (Network-to-Network Interface)
  - Demarcation/peering point
    - between service provider internal networks (I-NNI) (not shown)
    - between service provider/operator networks (E-NNI)

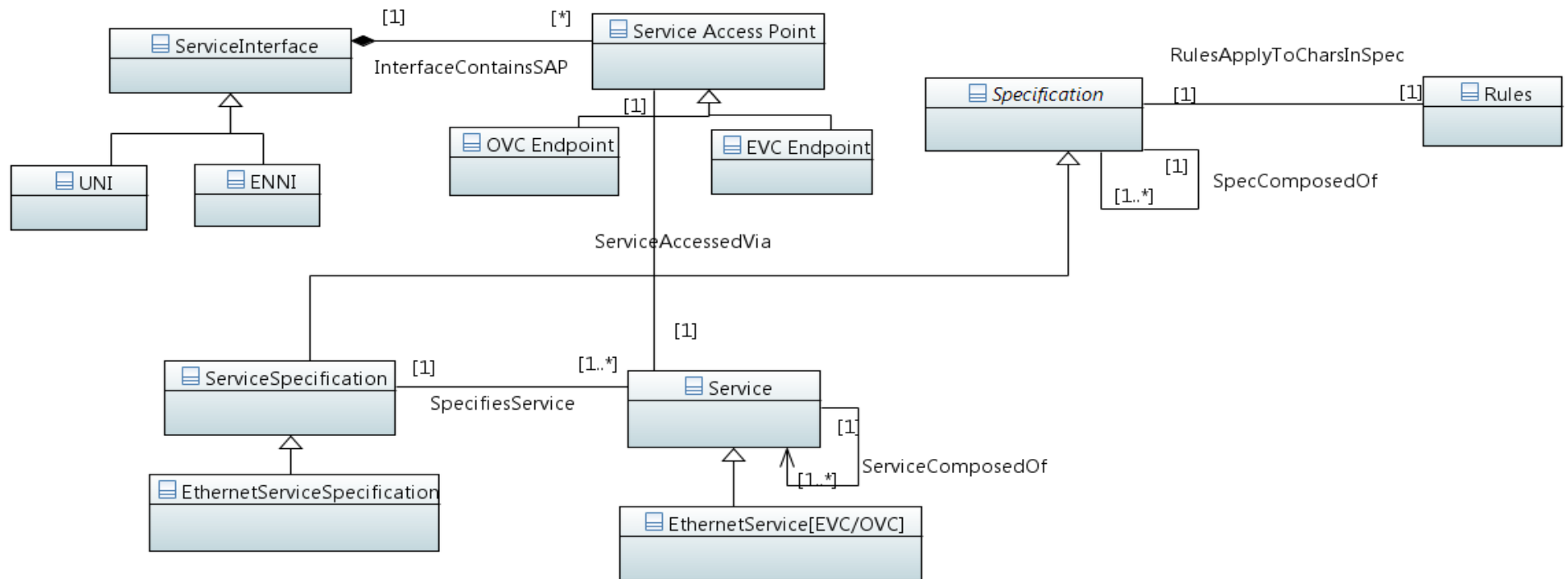
# MEF 55 – Service View (SOF)

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# Service View MEF Core Model





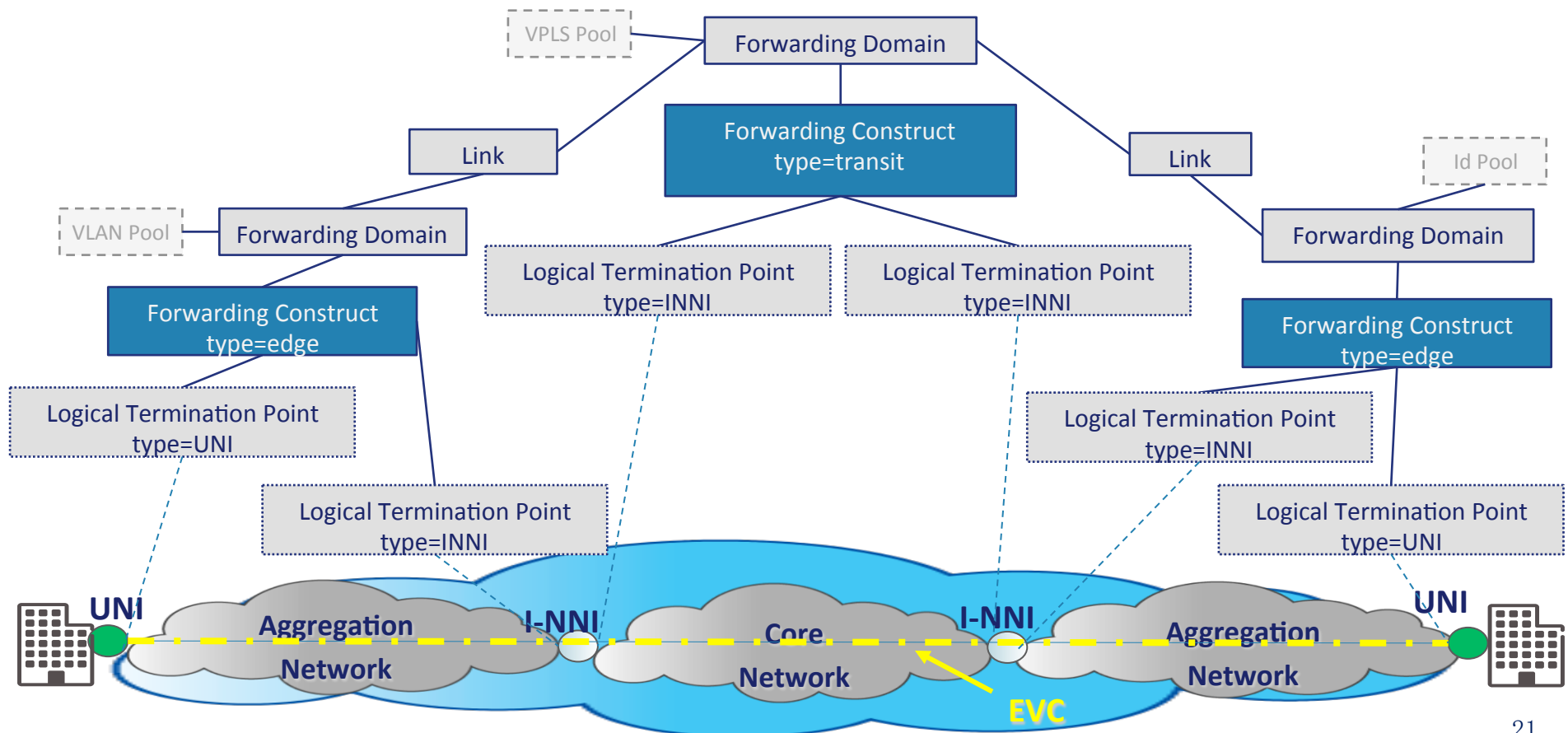
## Resource View

# Ethernet Resource View Concepts

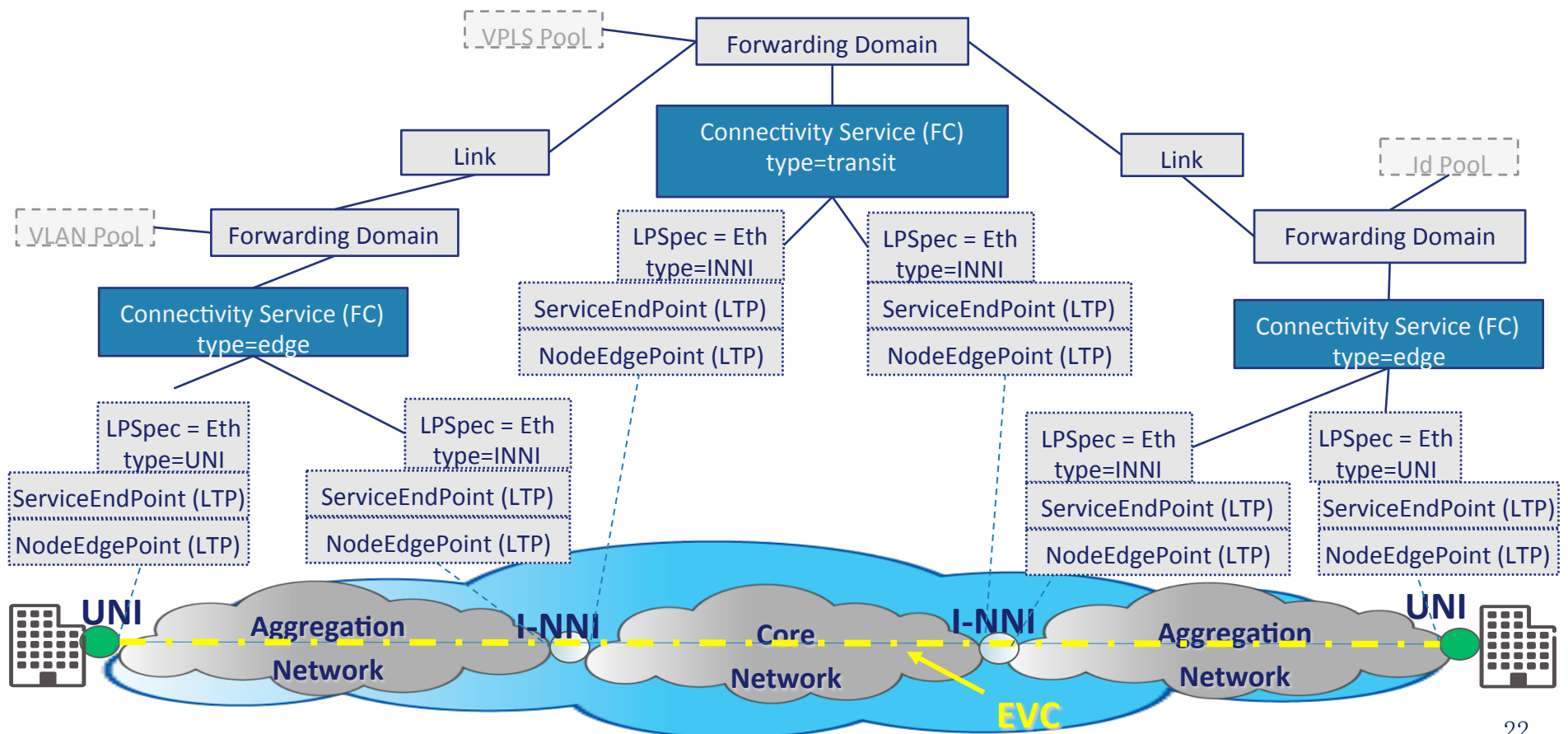
“The ETH Layer is also responsible for all service-aware processing aspects associated with the treatment of the Service Frames, including operations, administration, maintenance and provisioning capabilities [of network resources] required in support of the Ethernet services”.

- ❑ **Ethernet Forwarding Domain** A topological component of the Eth Layer defined by a set of Eth Service EndPoints, made available for the purpose of transferring information within a given administrative portion of the ETH layer network
- ❑ **Ethernet Link** A topological component that describes a topological relationship between Ethernet Forwarding Domains.
- ❑ **Ethernet Forwarding Construct** The ETH layer transport entity that conveys the ETH Characteristic information (CI) between a set of two or more ETH Layer termination points in a given ETH Layer.
- ❑ **Ethernet LTP Service EndPoint** A reference point that represents a point of transfer for connectionless traffic units between Ethernet forwarding domains.
- ❑ **Ethernet LTP Node EndPoint** A reference point that represents a point of entry into an Ethernet Layer Network.

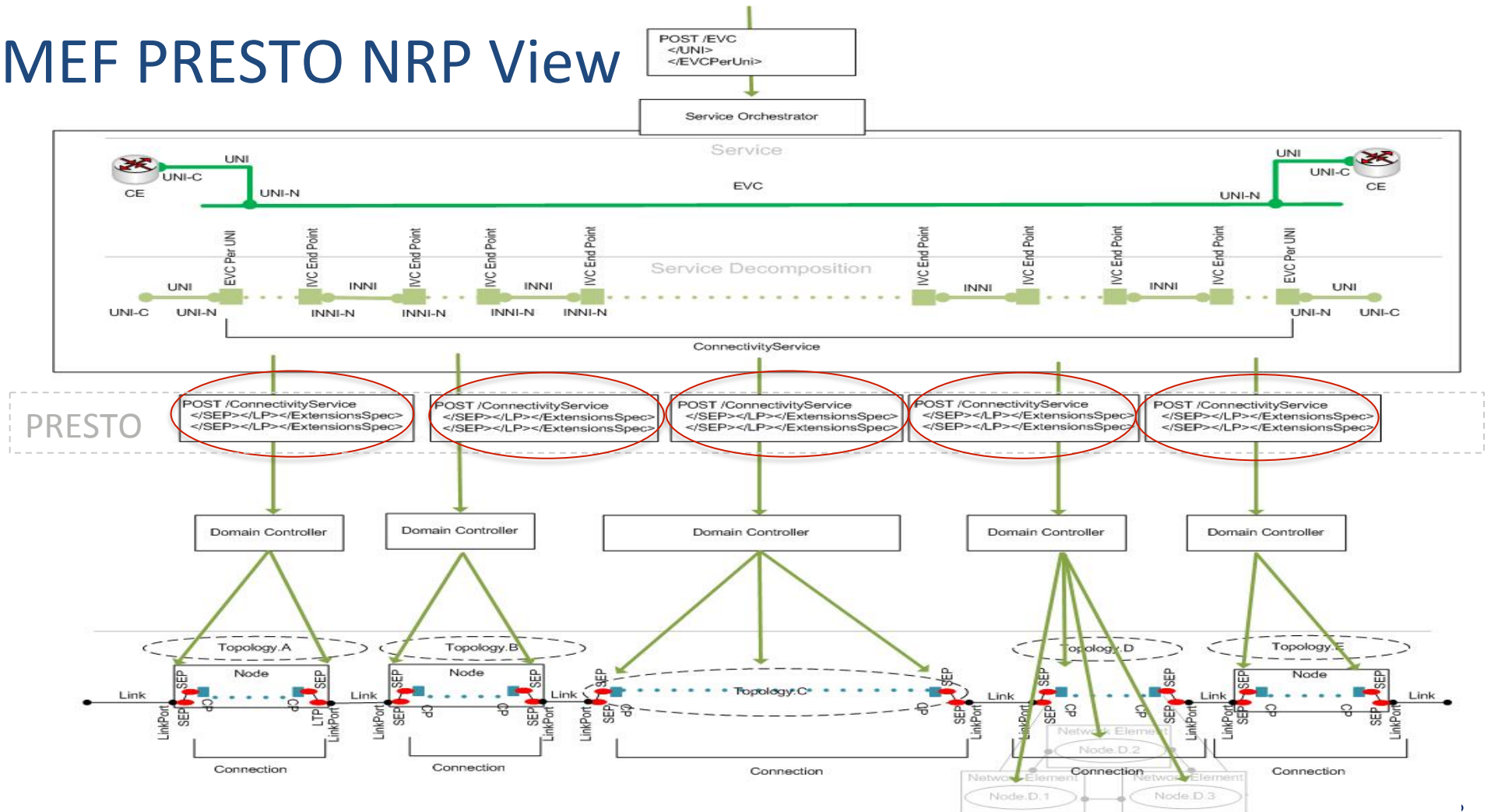
# MEF 55 - Network View (SOF)



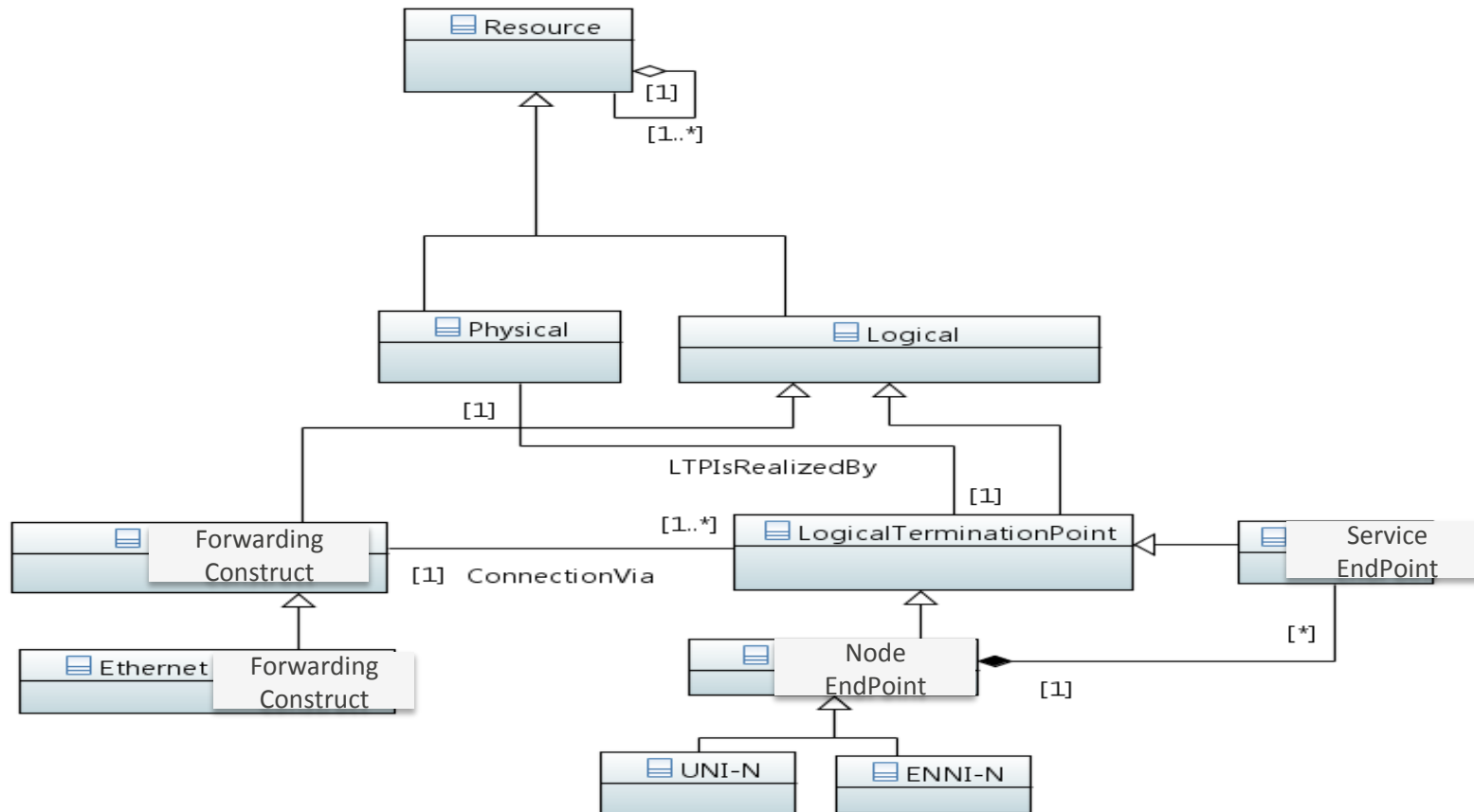
# Network View (ICM)



# MEF PRESTO NRP View

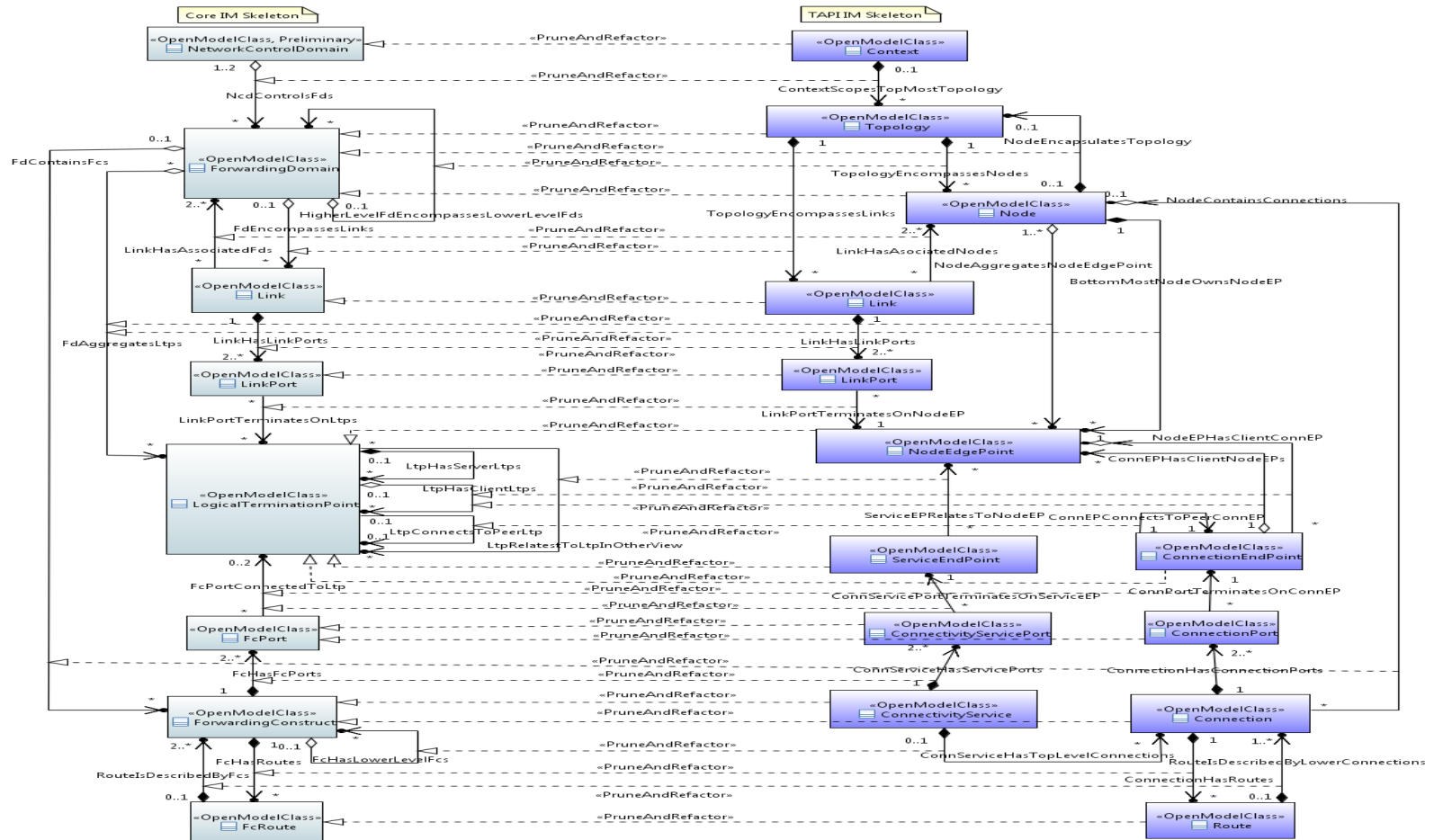


# Network View MEF Core Model

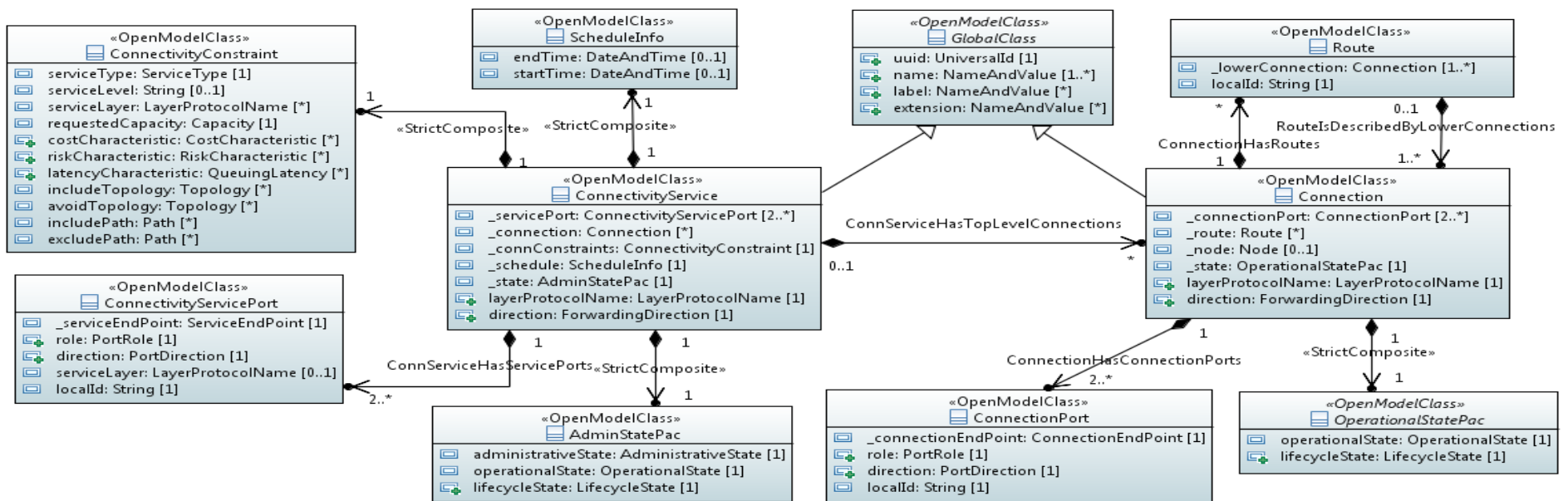




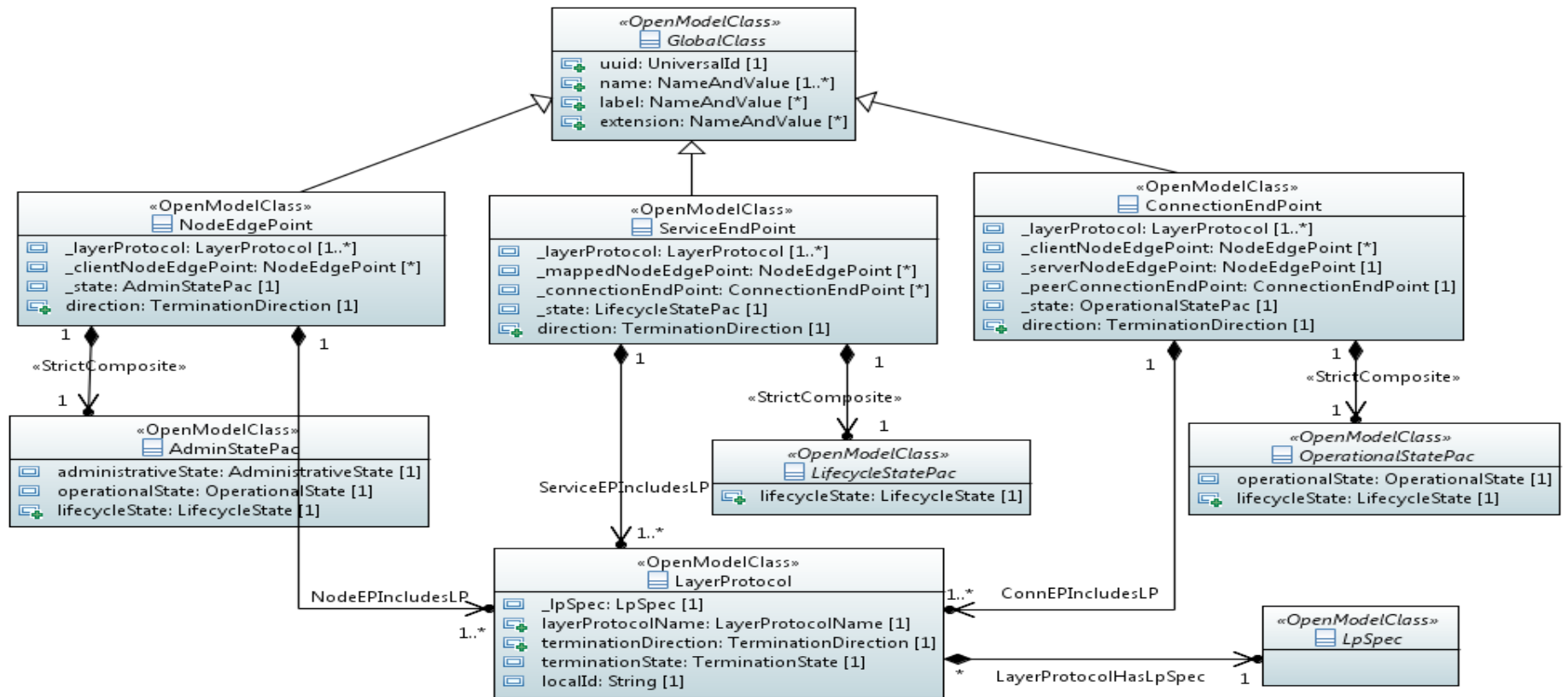
# ONF CORE with ONF TAPI realization



# ONF TAPI – Connectivity Model



# ONF TAPI – Endpoint Model



# MEF NRP/NRM – Network Model based on TAPI

