Transport Requirement

May 05th, 2016

Network Topology & Service Constructs

Requirements

Generic Requirements

- *[R1] User Intent*: Maintain separation between high level user intent and the state in the network [Ref: OpenConfig].
  - E.g. separation between user service request, including all constraints, and the actual service & connection state in the network.
- *[R2] State Management*: Network and service objects supporting the following states [Ref: TAPI-FRS]:
  - Administrative state (locked, unlocked),
  - Operational state (enabled,disabled)
  - Lifecycle state (Planned, Potential, Installed, In_Conflict, Pending_Removal)
- *[R3] Identification*: Network and service object identifiers [Ref: TAPI-FRS]:
  - IDs [1]
  - Names[NV]
  - Labels[NV]
  - Extensions [NV]

Network & TE Topology

- [R4]: Network Topologies [Ref: TAPI-FRS]:
  - Topology Retrieval:
    - Allow retrieval of top-level Topology instances.
  - Topology elements:
    - Allow retrieval of Nodes and Links present in the topology.
  - Multi-level topologies [Ref: CIM]:
    - Allow retrieval of lower level topologies.
  - Virtual Topologies (VTN):
    - Documented in a later section

Topology Link

[R5]

- Support for the following Topological Links [Ref: TAPI-FRS]:
  - Physical Links
  - Logical / Abstract Links
  - Compound Link: Internally aggregated lower-level serial/parallel links.
  - Access Links: Links connecting router ports to client port of the transport system.
  - Transitional Links: Links between layers.
- Link attributes:
  - Cost, Latency, Integrity and Capacity
  - Risk characteristics including shared-risk
- Link elements:
  - Allow retrieval of the associated topology / virtual topology.
  - Allow retrieval of associated nodes and termination points.
- Layering
  - Association to the underlay circuit/service, if any.

Topology Node

[R6]

- Support for the following Topology Nodes [Ref: TAPI-FRS, CIM]:
  - Physical Node
  - Logical / Abstract Node
  - Chassis / Forwarding Domain (do we need this?)
- Node attributes:
  - Layer information
  - Node Type (?)
  - Node Version (?)
- Node elements:
  - Allow retrieval of termination points present in the node.
  - Allow retrieval of the associated topology / virtual topology
- Layering:
  - Associations to the underlay/server nodes, if any.

Termination Points

[R7]

- Support for the following Termination Points [Ref: OpenConfig]:
  - Physical client side TP
  - Logical TP
  - Optical channel TP
  - Physical Line side TP
- Termination Point attributes [Ref: OpenConfig]:
  - Supporting equipment vendor, part, and revision

Service

[R8]

- Support for CRUD operations for the service
- Support for Service creation and update requests with the following inputs and outputs [Ref: TAPI-FRS]:
  - Service Request Inputs:
    - Service ID (for service update)
    - Service Type (P2P, P2MP, MP2MP)
    - P2P – Uni-directional, Bi-directional
    - Capacity
    - Service End Points with following details:
      - End Point role (root, leaf)
      - Reference to the Termination Point
      - Service Endpoint Layer
    - Optional Constraints:
      - Service Layer
      - Service Level (CoS, Priority, Resiliency, Availability)
      - Latency
      - Cost
      - Risk Characteristics (shared risk): SRLG/Diversity
      - Include Path, Exclude Path (Nodes and Node Edge Points)

Service

- Risk Characteristics / Protection support:
  - Protection Type: UnProtected, 1+1, 1:N, etc.
- Schedule: Start & End Time

– Service Request Output:
- Service ID (for service creation)
- Service States
- Service characteristics - inputs

– Support for service notifications:
- Service lifecycle notifications: Service creation, deletion, Attribute Value Change
- State change notifications: Operational state notification

- Any requirements around the following:
  – Service Policies: TBD
  – Service Templates: TBD

Connection

[R9]

- Connection creation can be triggered as part of the service creation request.
- Connection creation request should use inputs provided for service creation. These inputs include the following [Ref: TAPI-FRS]:
    - Service End Points with following details:
        - End Point role (root, leaf)
        - Reference to the Termination Point
        - Service Endpoint Layer
    - Capacity
    - Optional Constraints:
        - Service Layer
        - Service Level (CoS, Priority, Resiliency, Availability)
        - Latency
        - Cost
        - Risk Characteristics (shared risk): SRLG/Diversity
        - Include Path, Exclude Path (Nodes and Node Edge Points)
    - Objective function (e.g. Minimize cost, Minimize latency, etc.)

Connection

- Connection Request Output:
  - Connection ID
  - Connection States
  - Connection path
  - Routing constraints that are met
- Support for connection notifications:
  - Connection lifecycle notifications: Connection creation, deletion, Attribute Value Change
  - State change notifications: Operational state notification

- Do we need Connection to represent device cross connected / flow entry?

Virtual Network (VTN)

[R10]

– TBD

Summary & Log

Requirements	Briefing	Log
[R1]: User Intent	Modeling requirements?	
[R2]: State Management	Parameter requirements?	
[R3]: Identification	Parameter requirements?	
[R4]: Network Topologies	A mixture of both protocol and parameter requirements?	
[R5]: Topology Node	Parameter requirements?	
[R6]: topology links	Parameter requirements?	
[R7]: topology tp	Parameter requirements?	
[R8]: service	A mixture of both protocol and parameter requirements?	
[R9]: connection	parameter requirements?	
[R10]: VTN	No content yet	

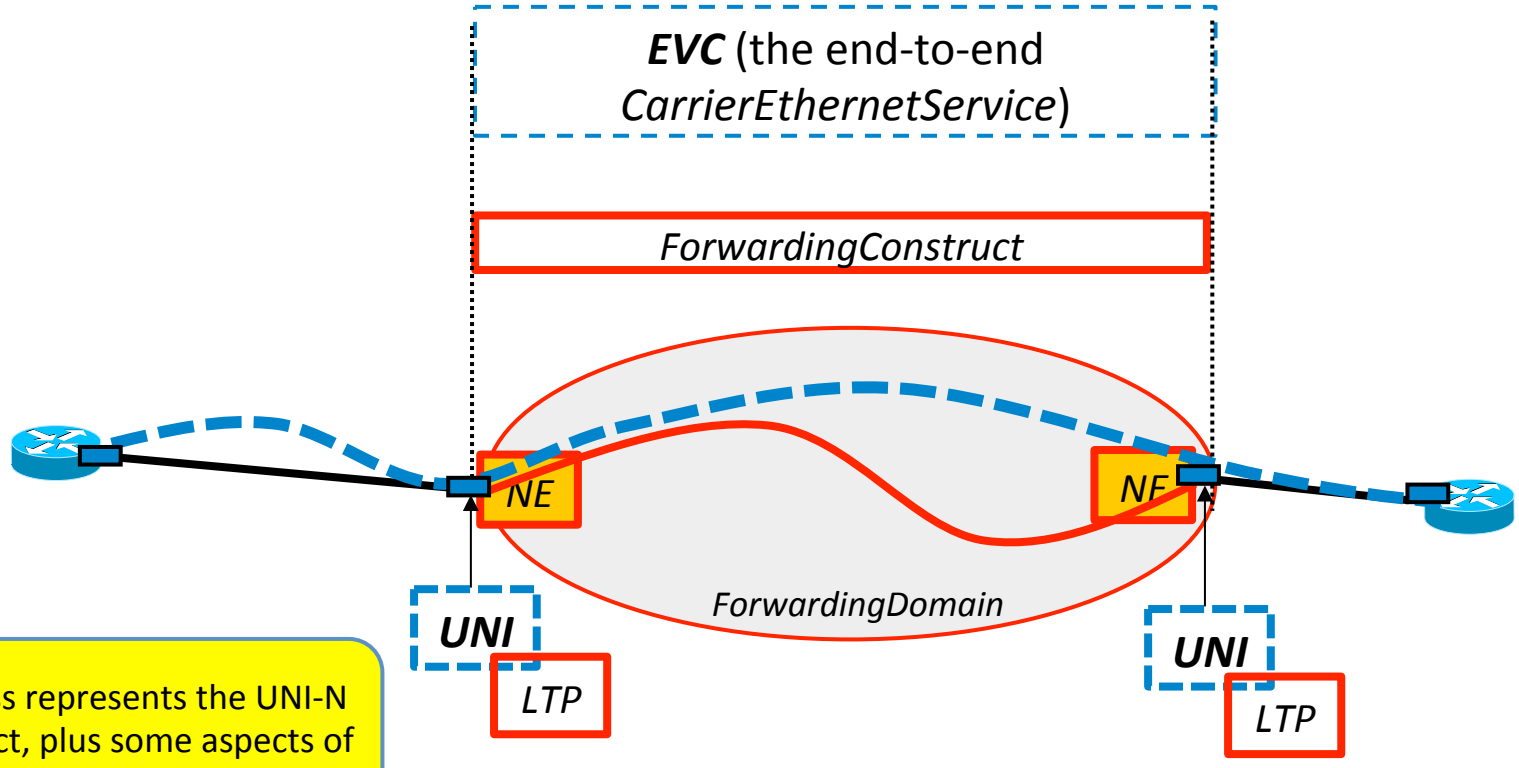
Transport Use Cases

Requirements

Mapping from Service/EVC to ForwardingConstruct
Single Provider, single Forwarding Domain

managed object classes at Service level
(potentially appearing at Legato, Interlude)

managed object classes at Resource level
(potentially appearing at Presto)



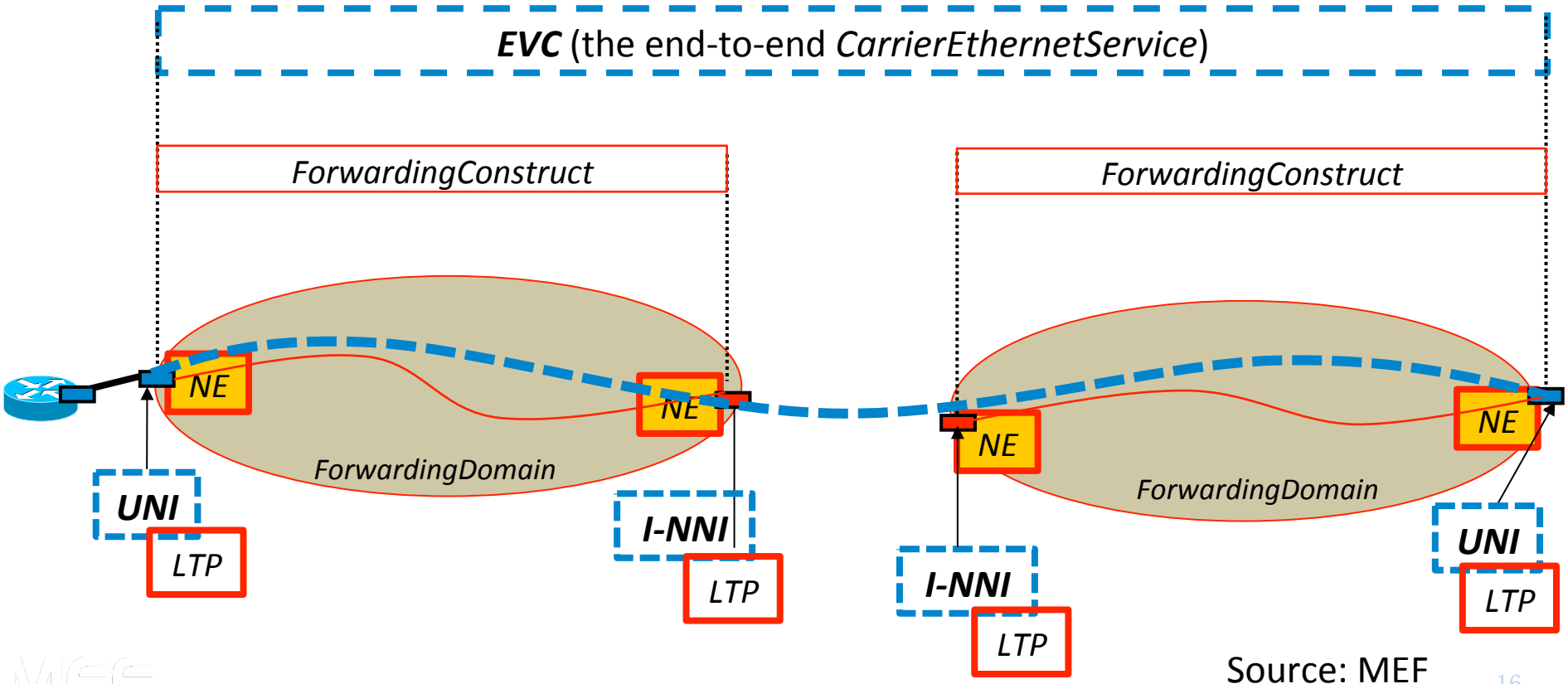
The MEF 7.3 *UNI* class represents the UNI-N architectural construct, plus some aspects of related Ethernet Link.

Source: MEF

Mapping from Service/EVC to ForwardingConstruct
Single Provider, two FDs separately managed

managed object classes at Service level
(potentially appearing at Legato, Interlude)

managed object classes at Resource level
(potentially appearing at Presto)

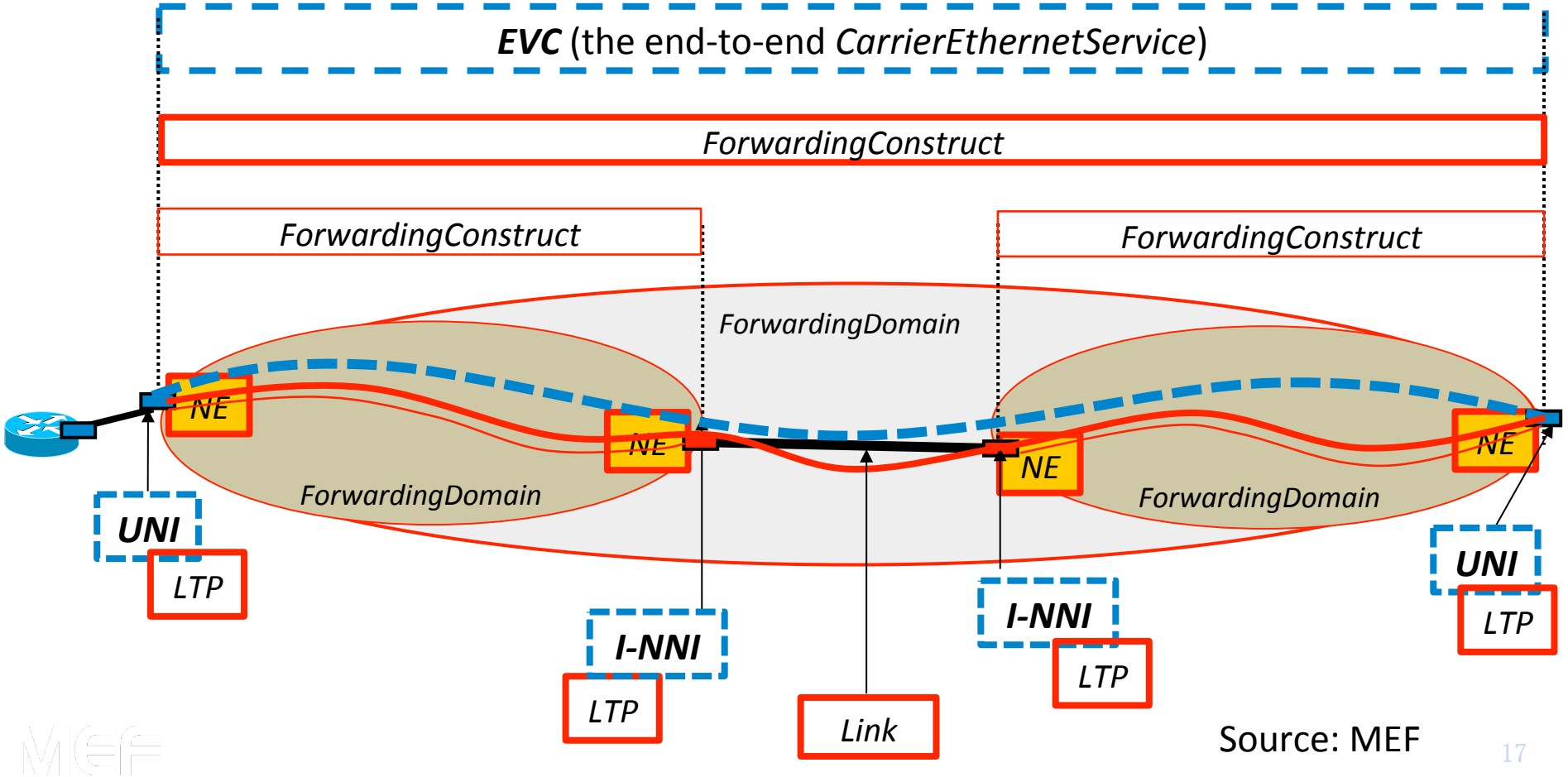


Source: MEF

Mapping from Service/EVC to ForwardingConstruct
Single Provider, single managed FD, partitioning

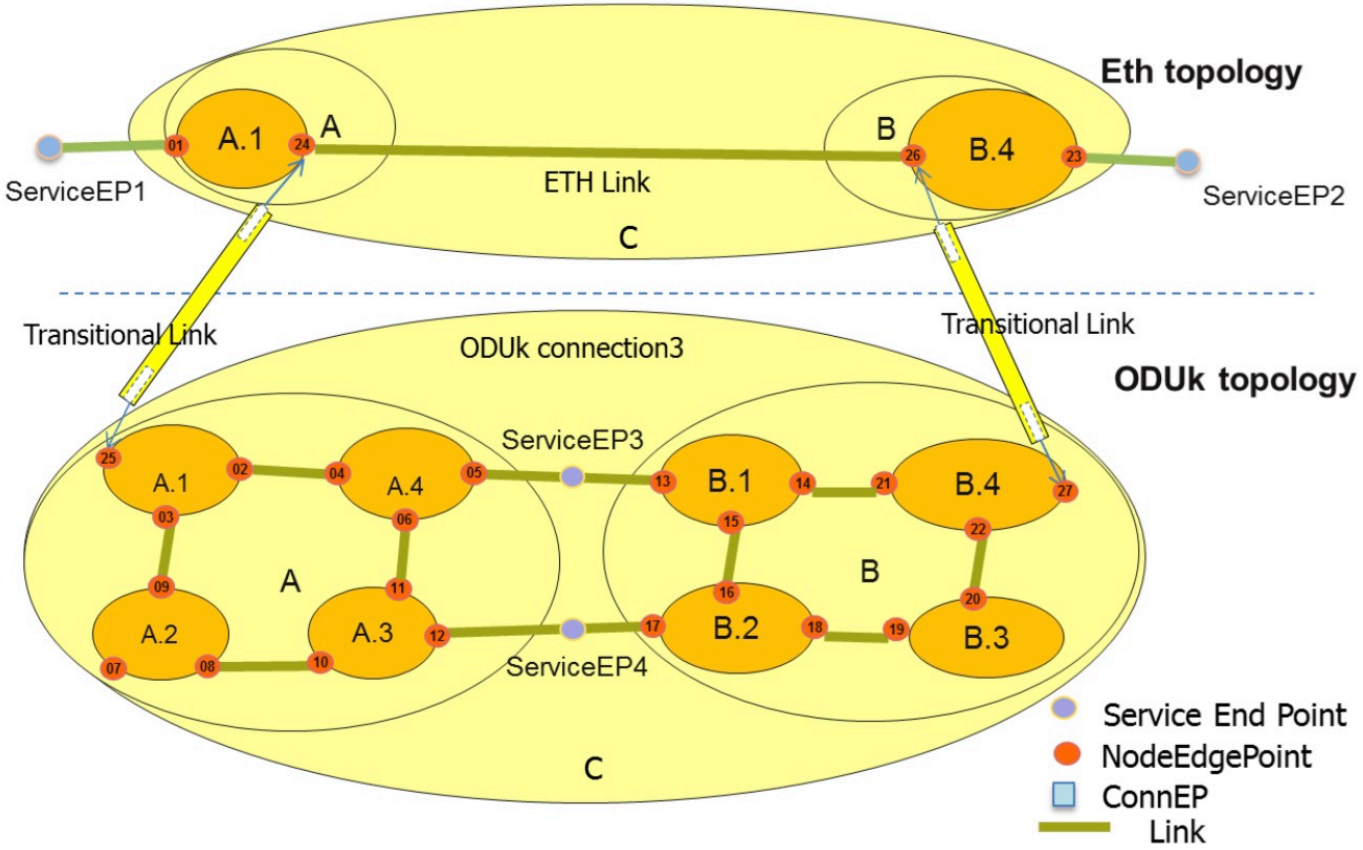
managed object classes at Service level
(potentially appearing at Legato, Interlude)

managed object classes at Resource level
(potentially appearing at Presto)



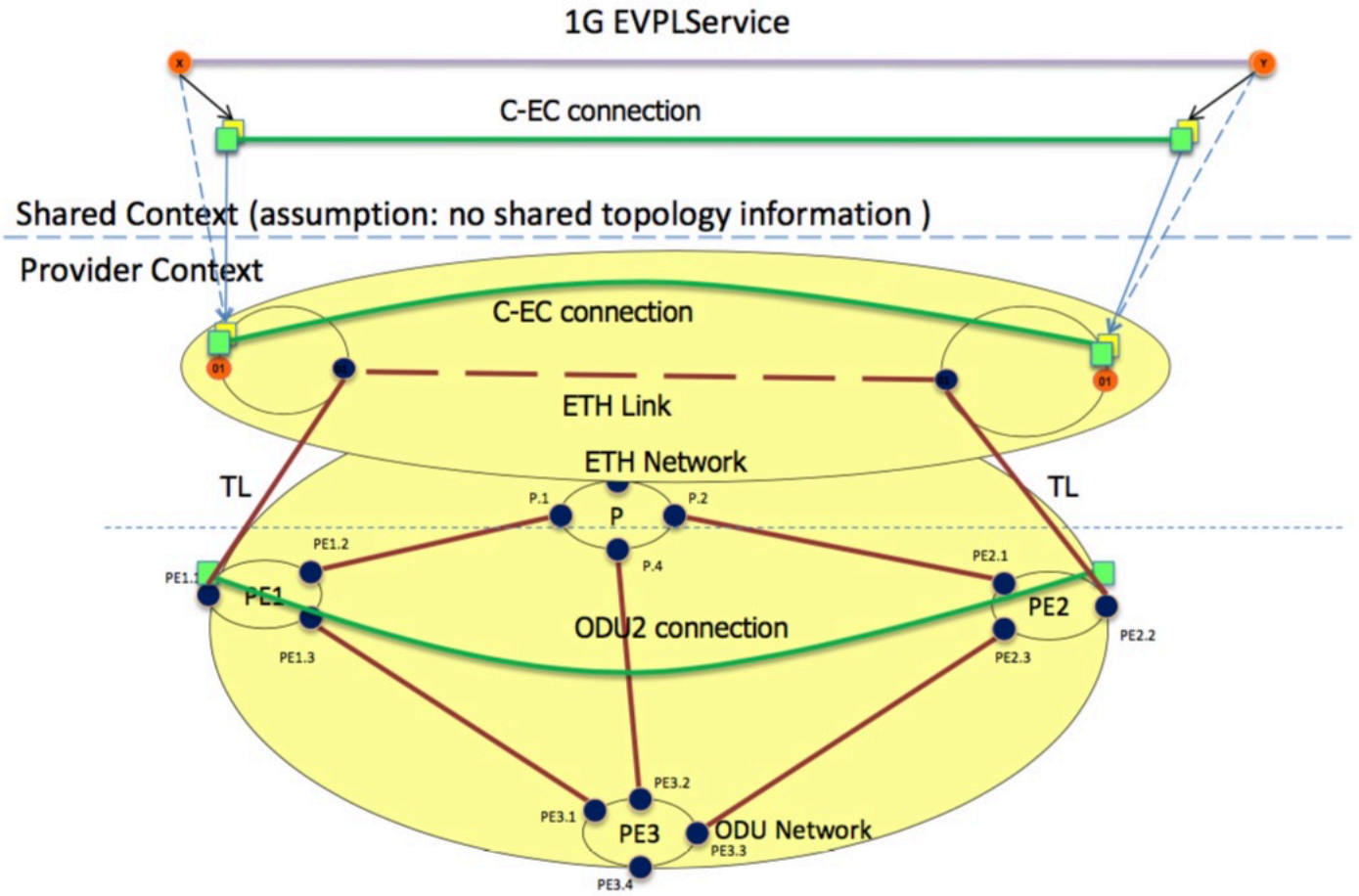
Source: MEF

Multi-Layer Topology Instantiation



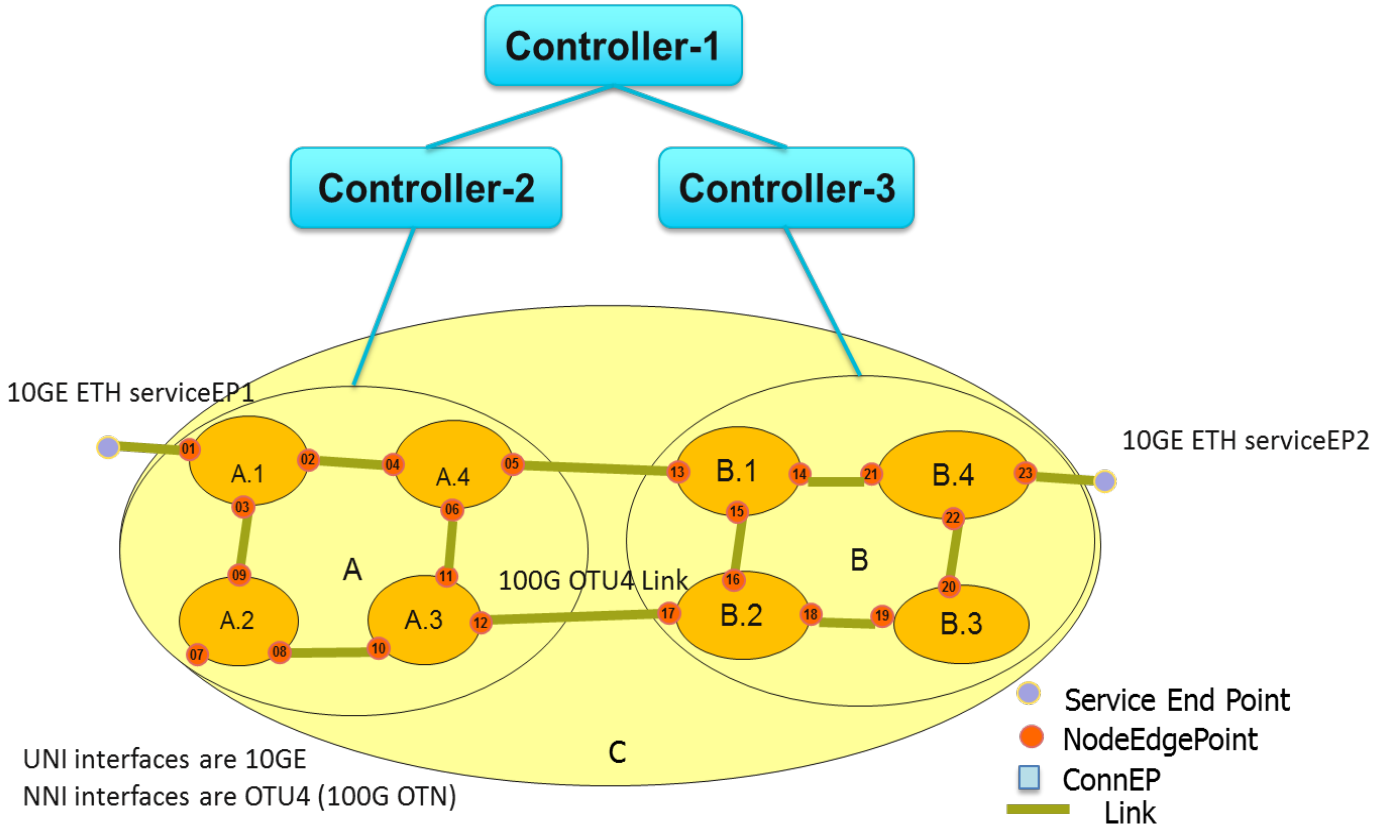
Source: T-API FRS

E2E Service in ML Topology

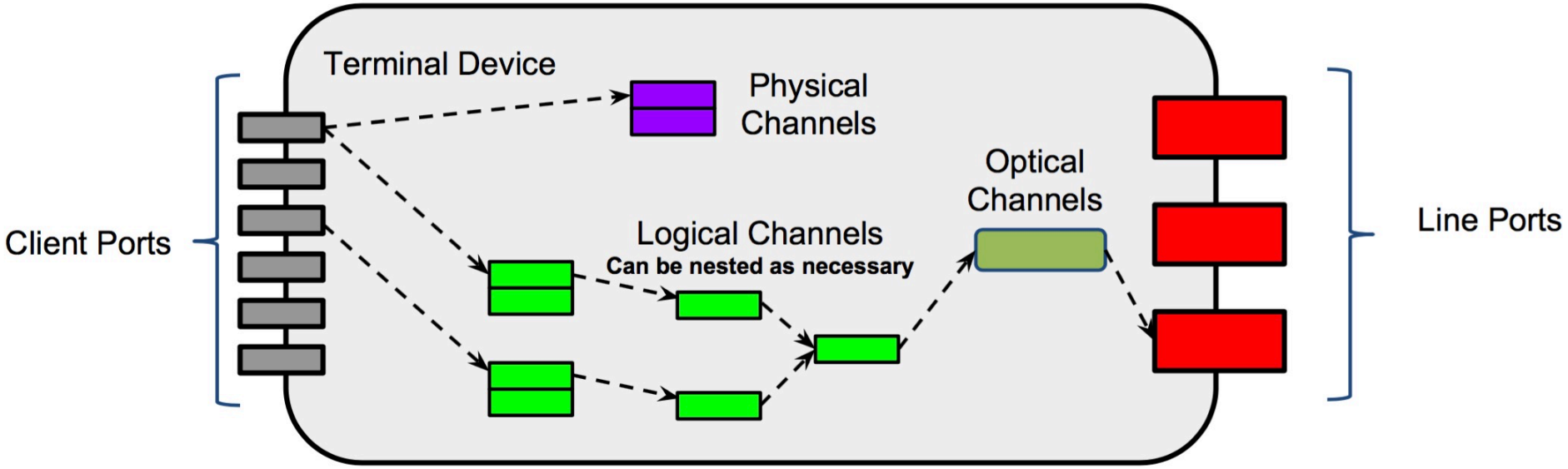


Source: T-API FRS

Multi-layer and multi-domain



Terminal Device Model



Source: OpenConfig