

Customize OpenStack for Telco NFV

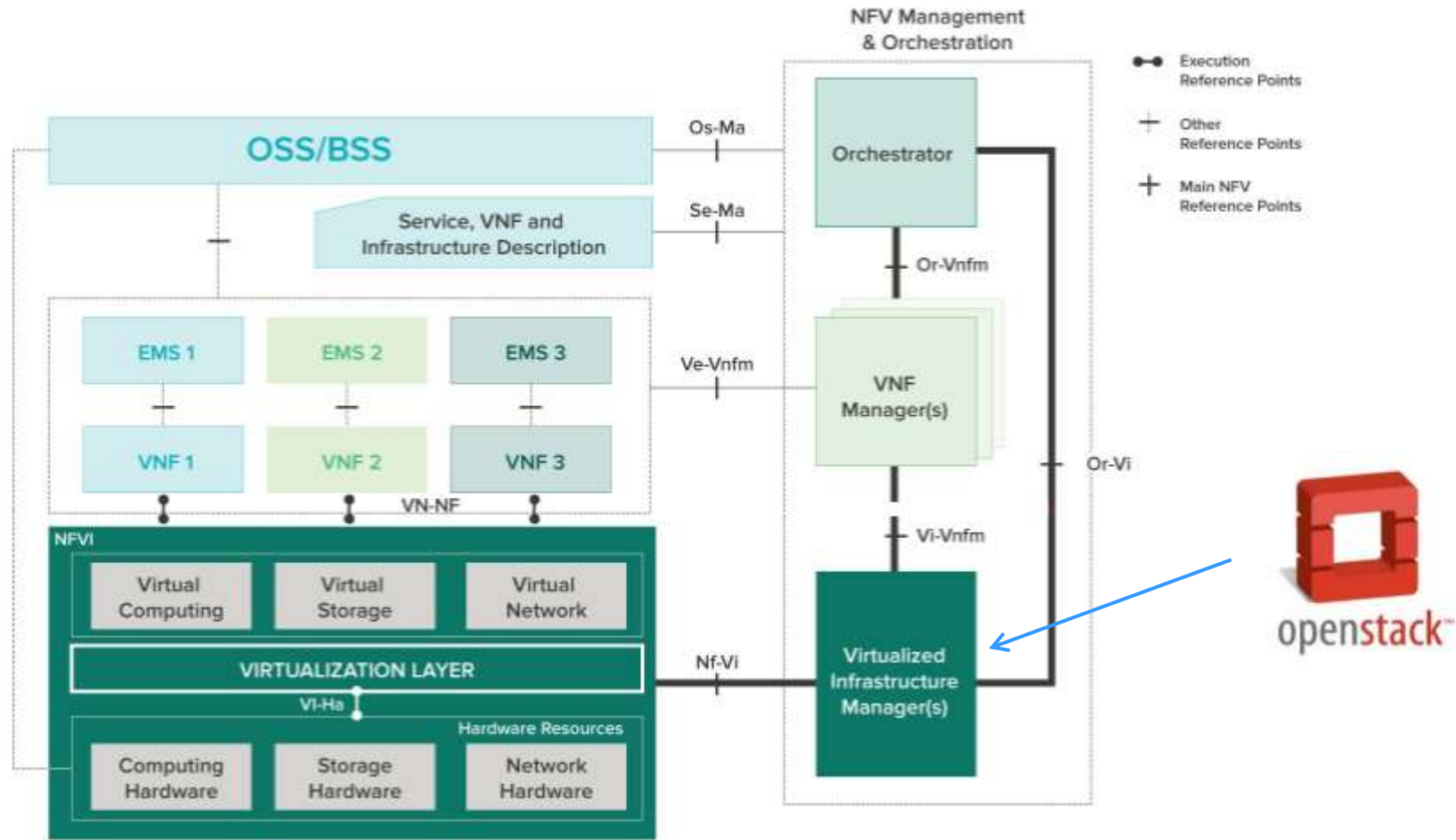
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Motivation

- Linux as a general operating system is customized for PC, server, mobile devices, etc.
- OpenStack as a general cloud OS need to be customized for different scenarios, of which Telco NFV is one.
- Customize OpenStack by providing a set of consistent and intuitive NBI for the Telco NFV Scenario.
 - NBI is essential to enable the application and MANO innovations by abstracting the NFV capabilities/information and opening the abstract/logic network.

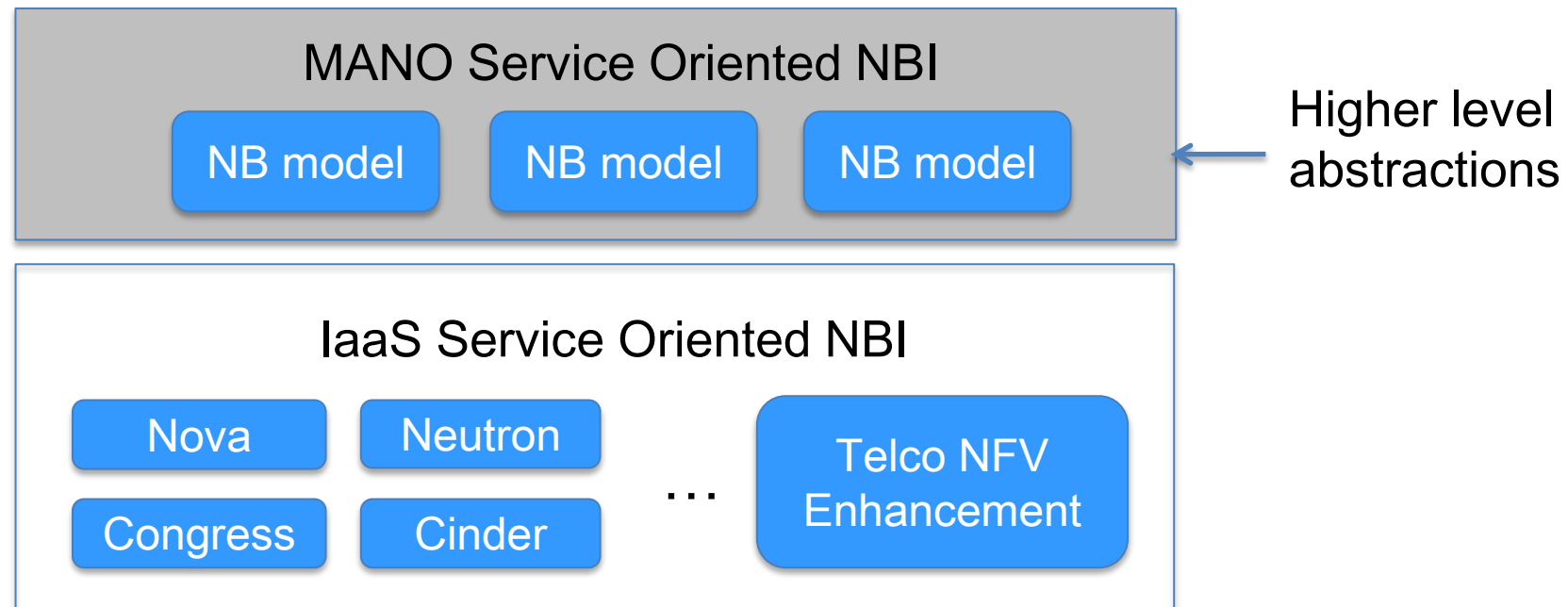
OPNFV Architecture



Ref: <https://www.opnfv.org/software/technical-overview>

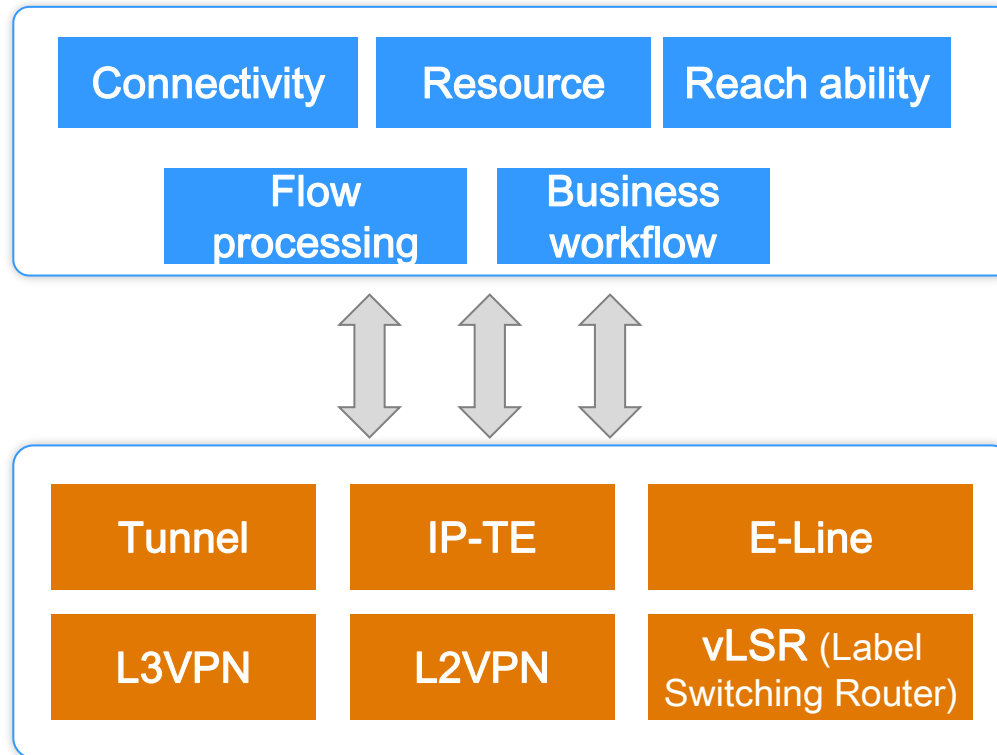
VIM NBI Project in OPNFV

- OPNFV: Model Oriented Virtualization Interface (Movie)
 - <https://wiki.opnfv.org/movie>
- The IaaS service oriented NBI to a more abstract MANO service oriented NBI alternative.



NBI Multiplicity

Intent based NBI : What I want



Functional NBI : What I can do

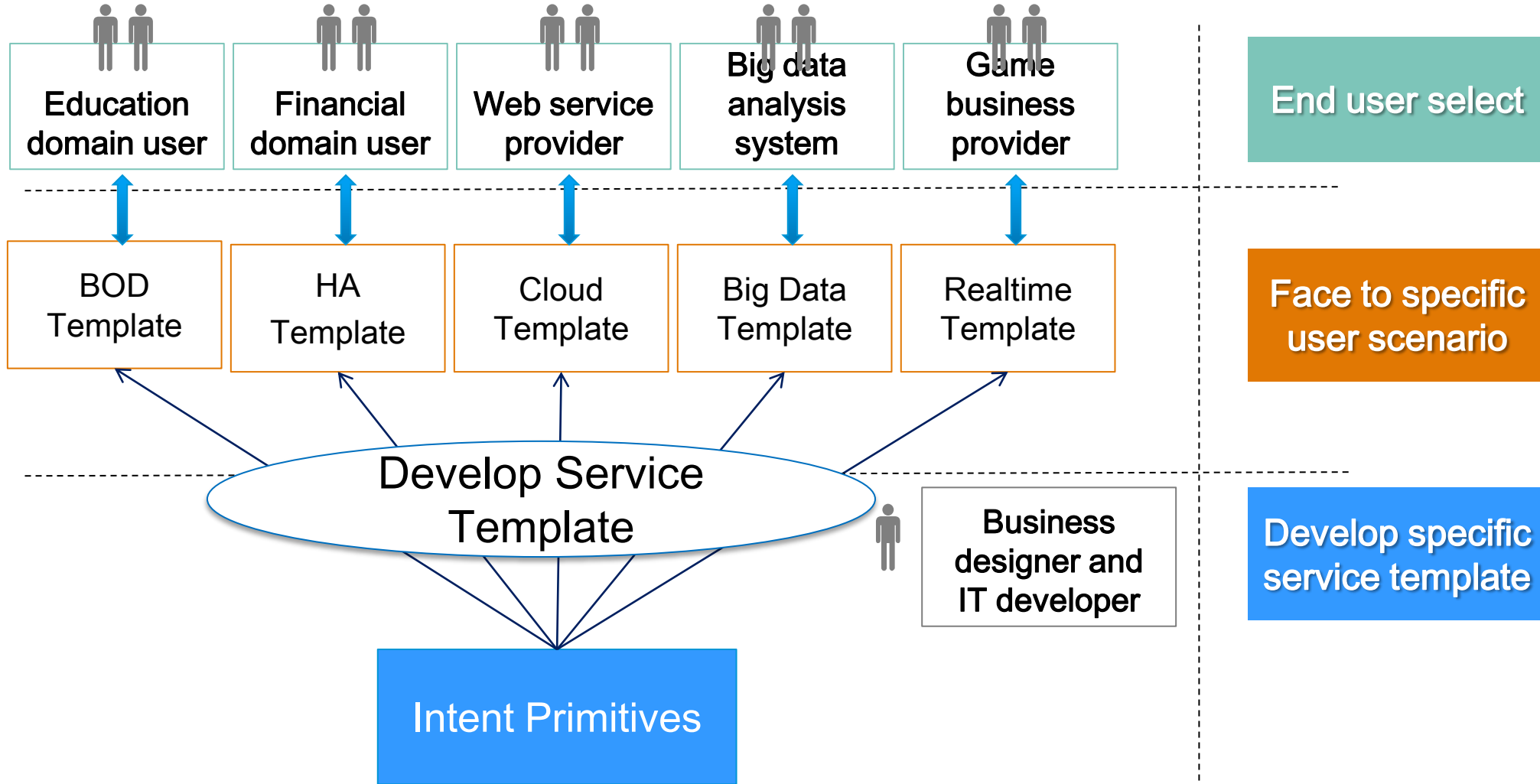
Technology-neutral and
business oriented

Function oriented and
technology related

Intent is “what” not “how”

- Intent definition
- Why Intent NBI is promising
- Target users

From Intent NBI to Service Template



Intent Expressions in Real World

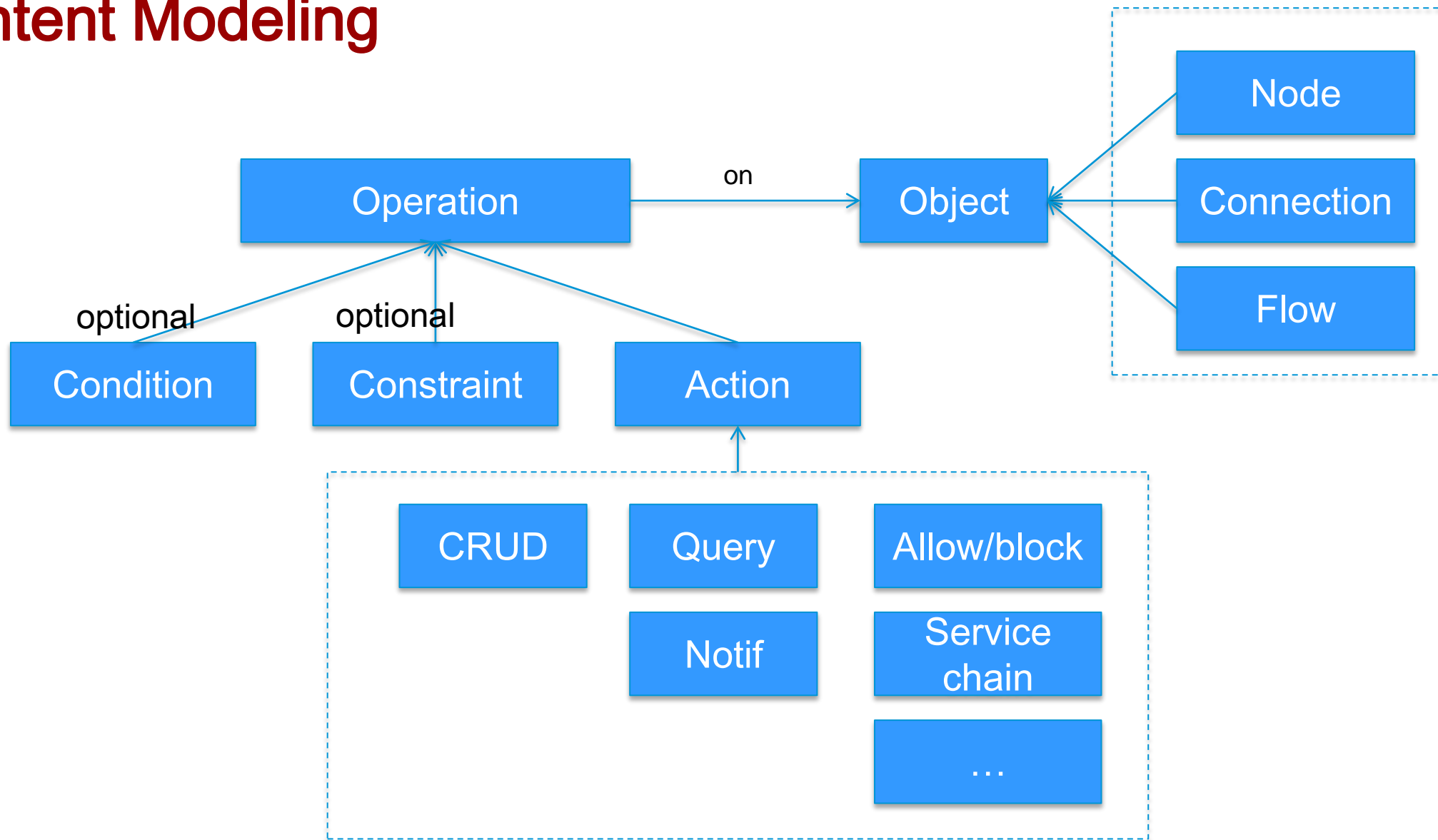
- "I want to watch Harry Potter right now in the living room"



Intent=Operation+Object

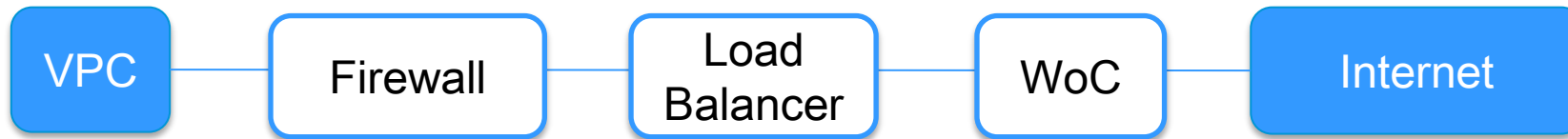
- "I want to create a DMZ" Node object
- "I want to block the http flow" Flow object
- "I want to adjust the bandwidth to 10G" Connection object

Intent Modeling



Example: Service Chaining

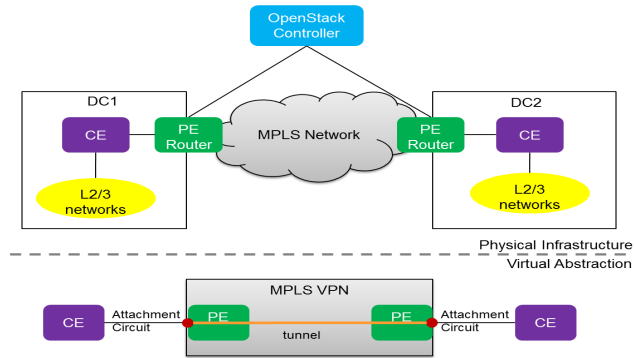
- Apply several virtual network functions, such as firewall, load balancer, WAN optimization between virtual private cloud and the internet.



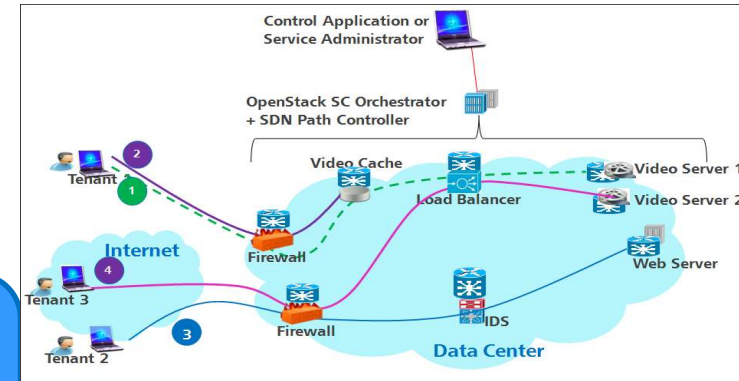
- Create 3 service nodes: Firewall, Load Balancer, WoC
- Setup the connection between VPC and the internet
- Operate the connection to go through the 3 service nodes
- Identify flows (e.g. web traffic from VIP user)
- Operate the flow to go through the connection.

Requirement for Telco Scenario

BGP MPLS VPN

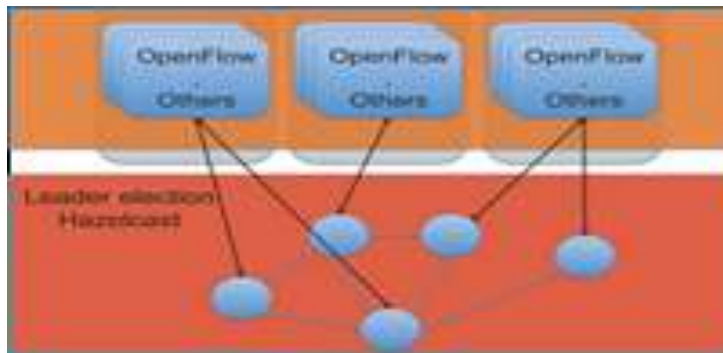


Service Chaining

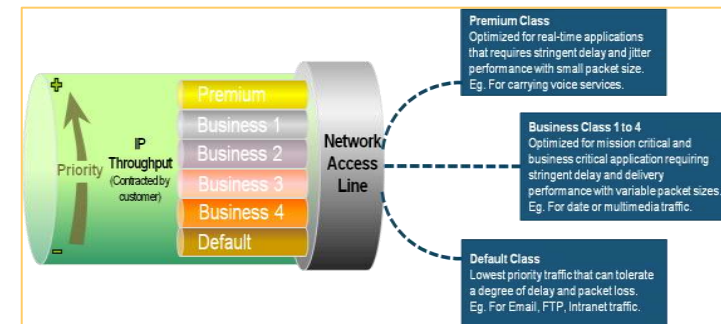


Telco Scenario

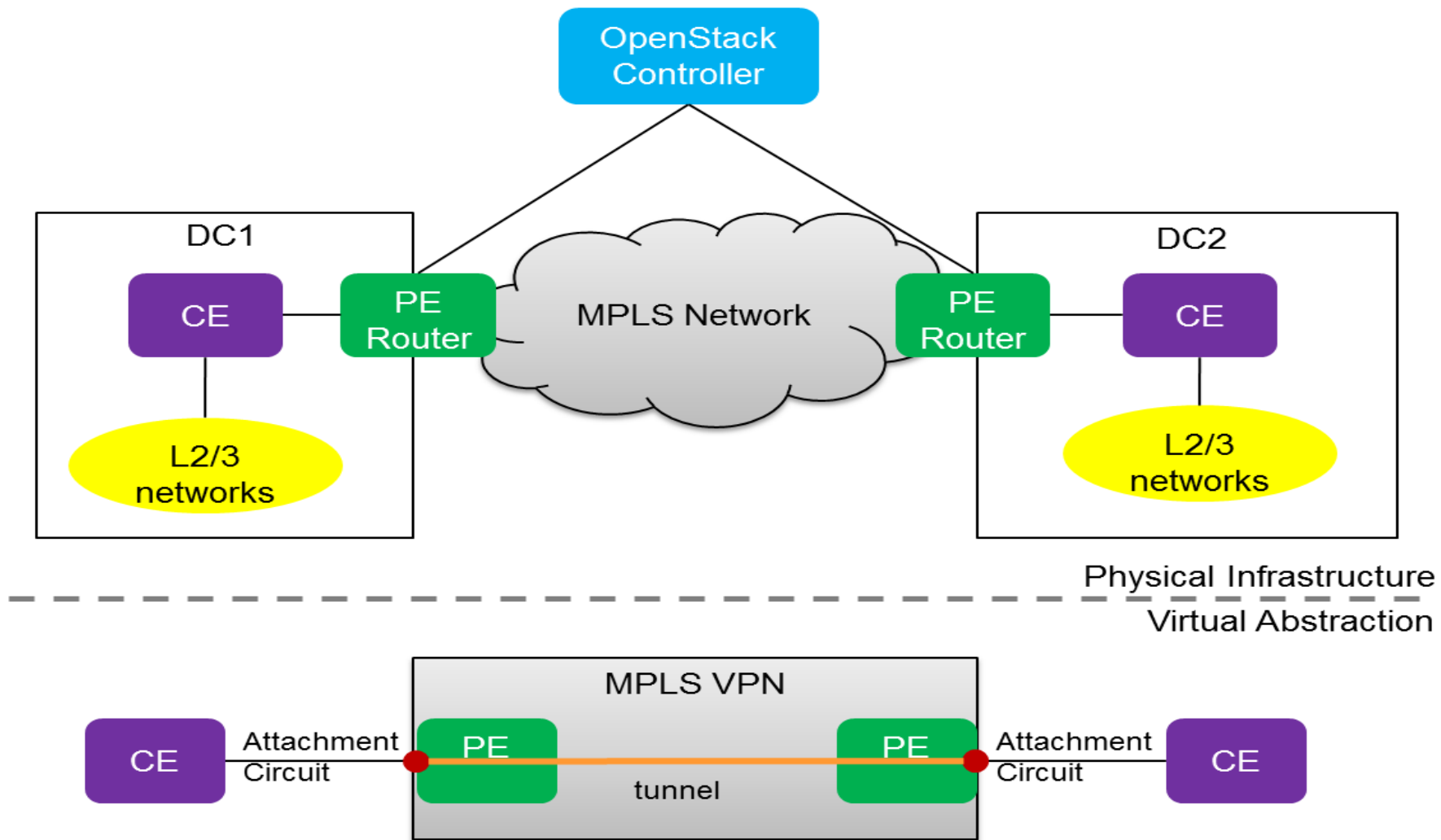
Global Topology



E2E Qos



MPLS VPN Building Blocks

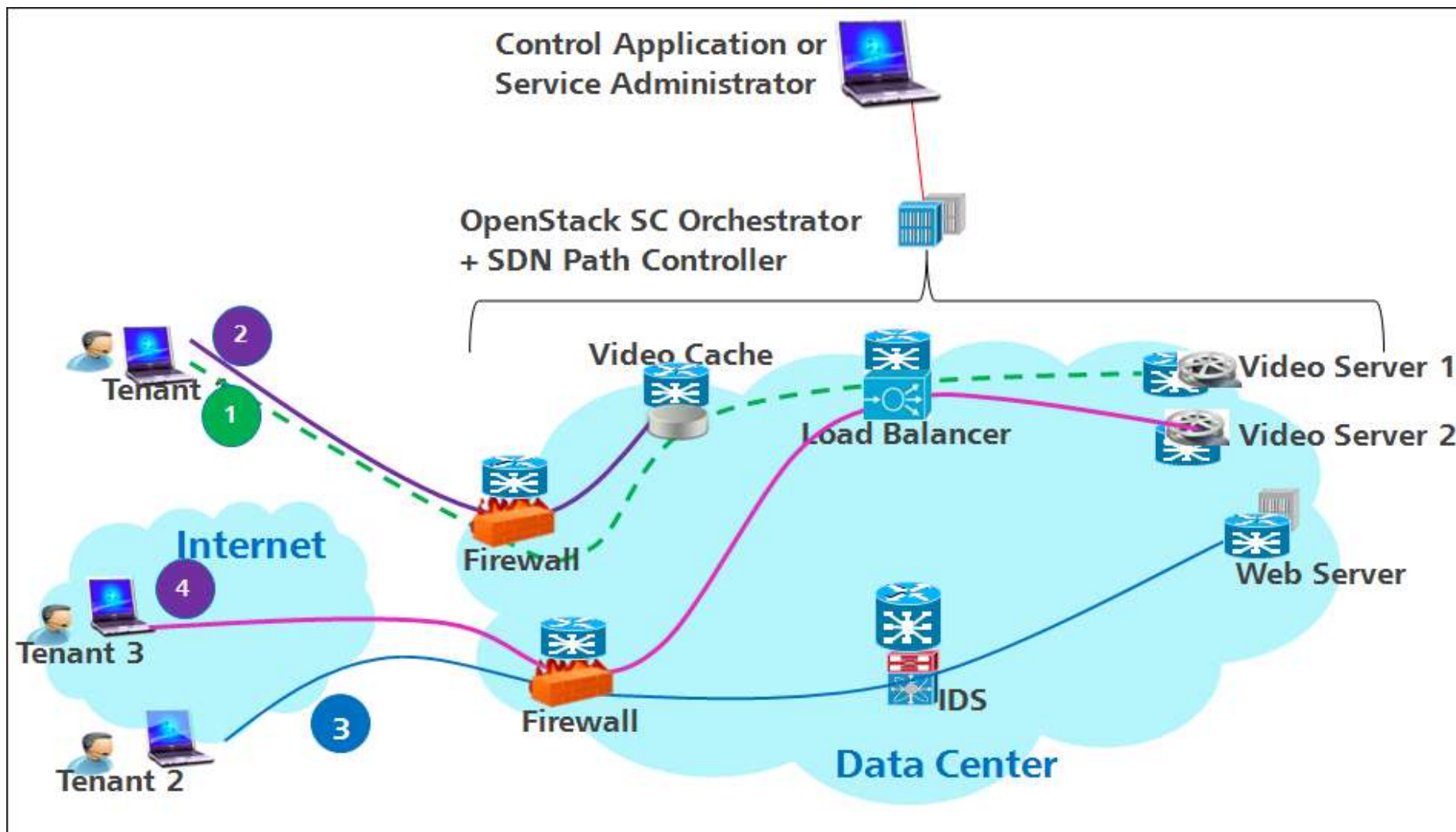


OpenStack Operations Workflow

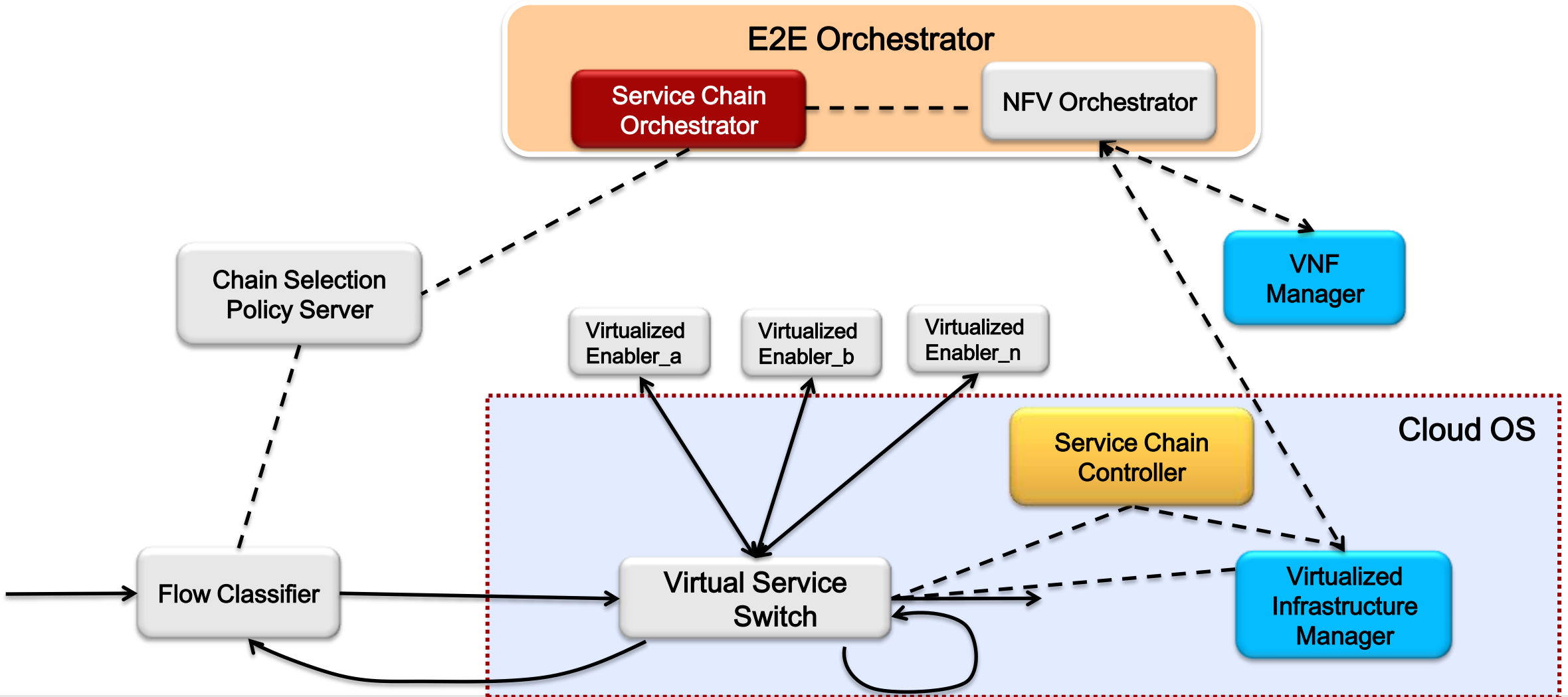
- **Using Neutron API extensions**
- **Create attachment circuits in each tenant network**
 - Treated as a logical interface
 - In L2 networks, they could be represented using a set of VLANs
- **Create MPLS LSP tunnels**
 - This step is optional when using dynamic tunnels using LDP signaling
- **Create MPLS VPN service using attachment circuit and LSP tunnels**
 - Connectivity between attachment circuits in different data centers using LSP tunnels (Full mesh of LSPs by default with MPLS resiliency enabled)
- **MAC Withdrawal for faster convergence**
 - During VM movement/deletion and server consolidation

BP link: <https://blueprints.launchpad.net/neutron/+spec/edge-vpn>

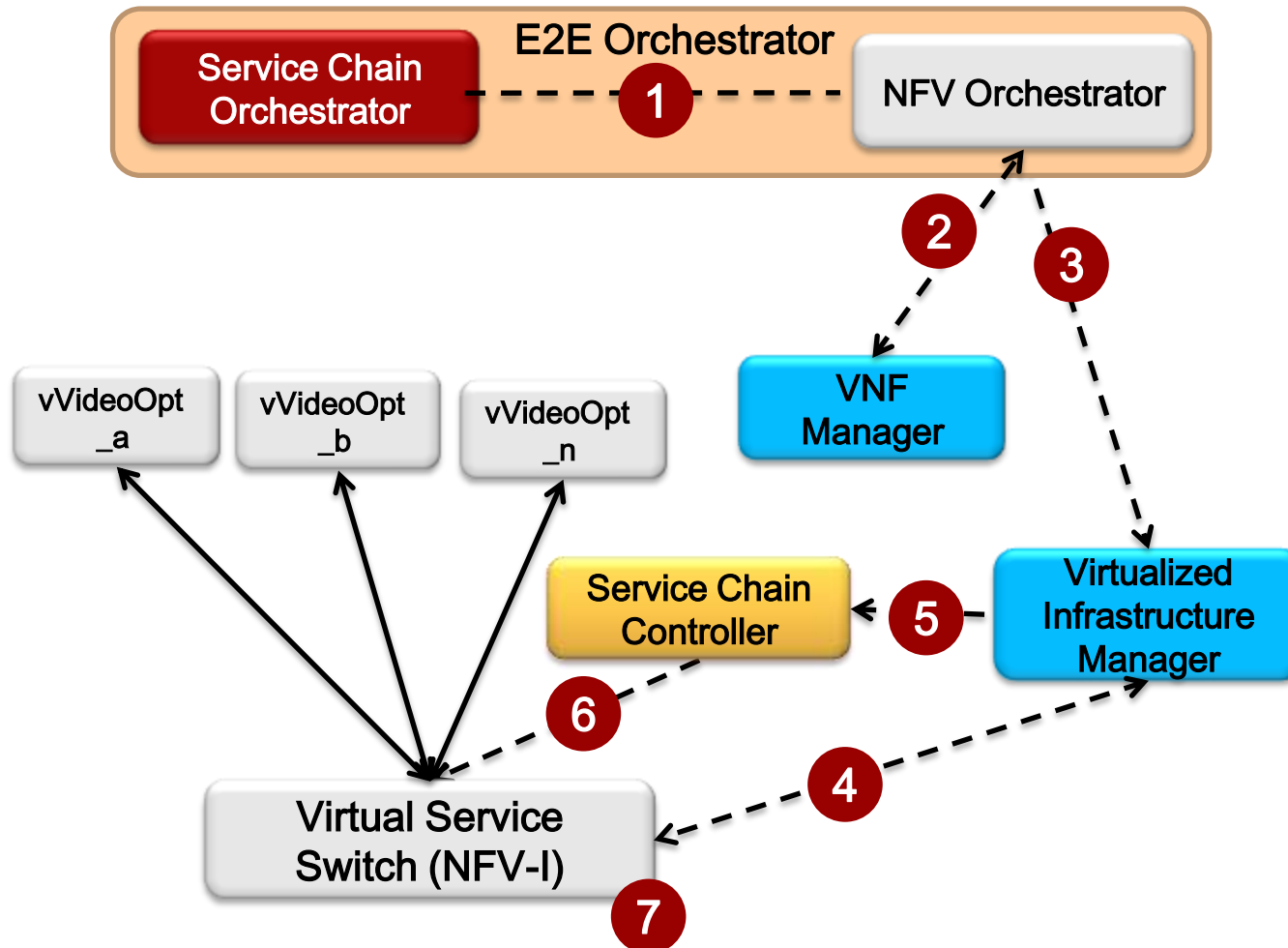
What is Service chaining (VNF Forwarding Graph)?



Service Chain Architecture in NFV Environment - Inherent in NFVI



Automatic Service Provisioning in NFV Environment – Inherent in NFVI

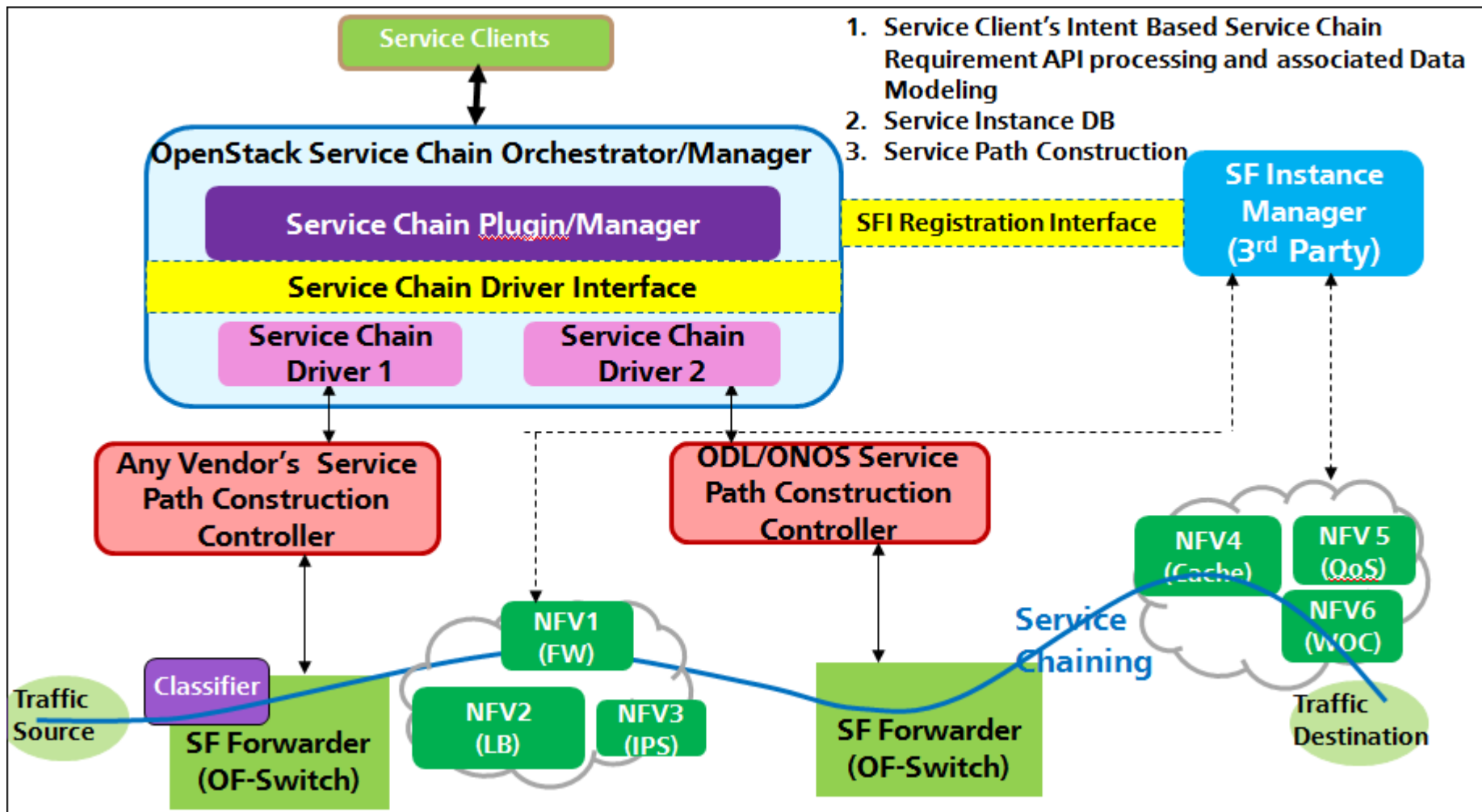


1. Logical service chain definition
2. Request a new vVideoOpt. instance
3. Request VIM to allocate a new VM for the instance
4. Create a new VM and, load VideoOpt image and run the instance
5. Synchronize the new vVideoOpt instance profile and logic service chain definition (e.g. characteristics, status, capacity, address and attached virtual service switch) to SC Controller
6. According the logical service chain definition and the new adding vVideoOpt instance resource, SC Controller generates service chain flow tables for the new adding instance and send to the virtual service switch
7. The virtual service switch steers traffic to the new instance according the policy

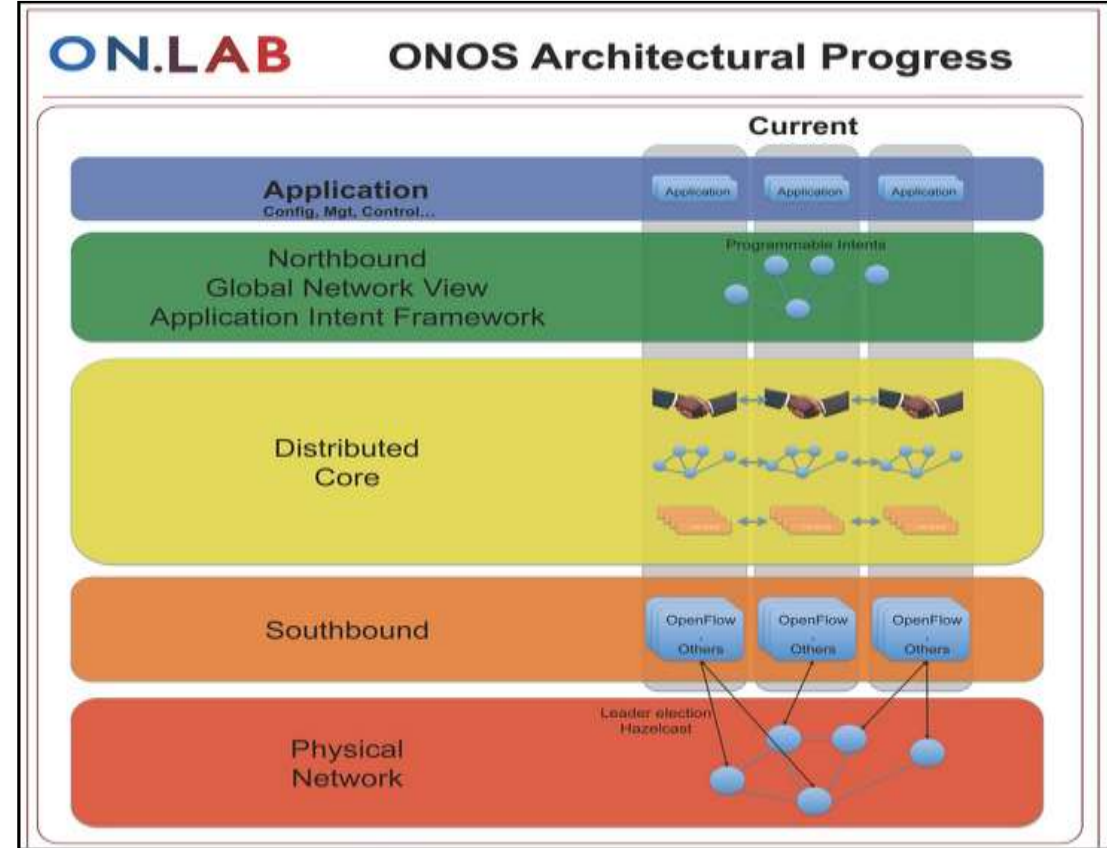
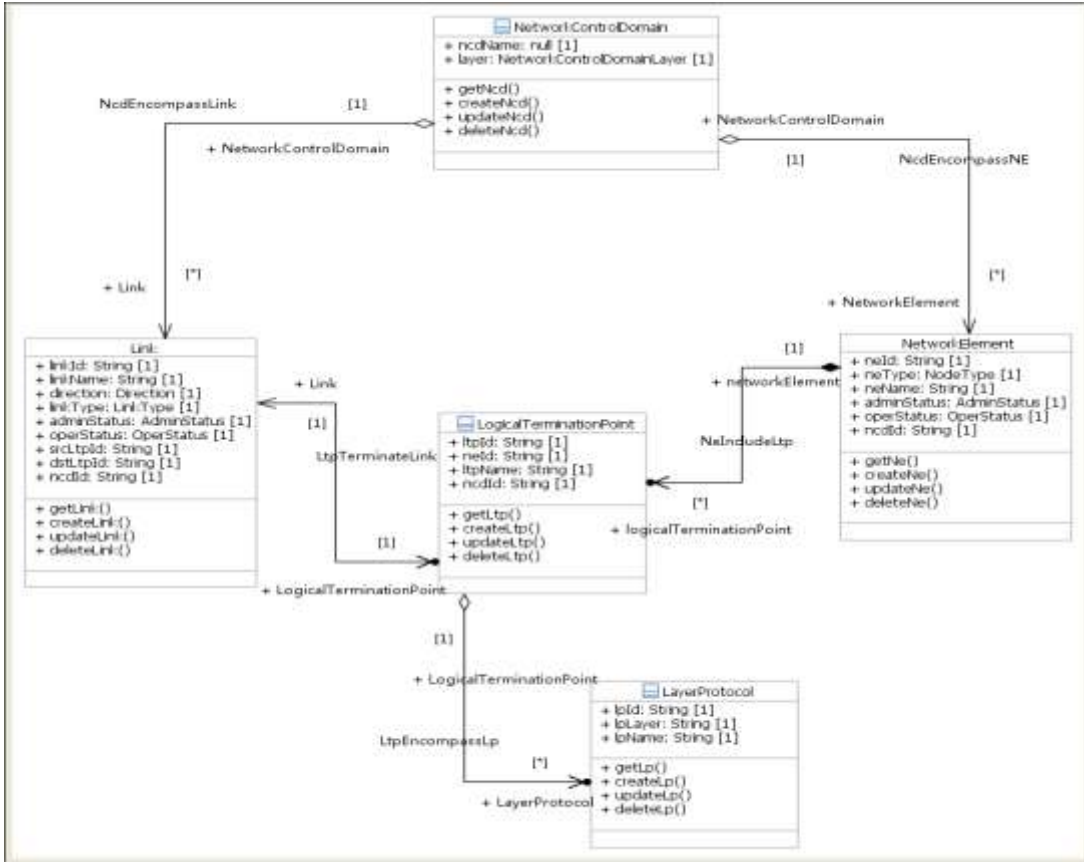
OpenStack Service Chaining – The Problems

- **No open interface to integrate Openstack with different vendors' service function instance (virtual/physical)**
 - SF instances created by many existing service devices need to be included to provide service chaining ecosystem under OpenStack umbrella
 - No well defined open interface to allow registration of 3rd party's service instance locator, flavor, and capability information
 - Vendors develop proprietary interfaces
- **No normalized interfaces for different vendors' service chain drivers**
 - Service chaining brings low CAPEX and OPEX by auto provisioning and steering different tenants' flows through different sequence of service functions
 - Vendors develop proprietary driver interfaces to Openstack to get service chaining functionality

SC Components and Interfaces



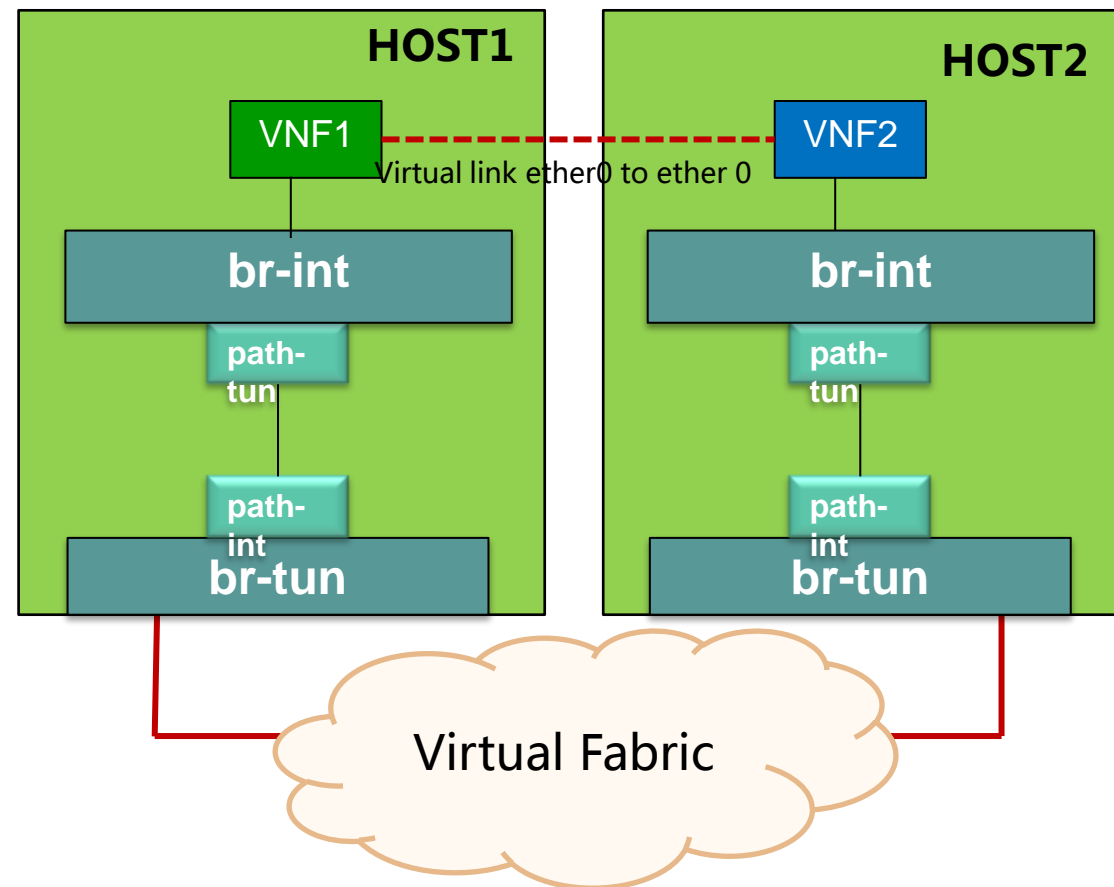
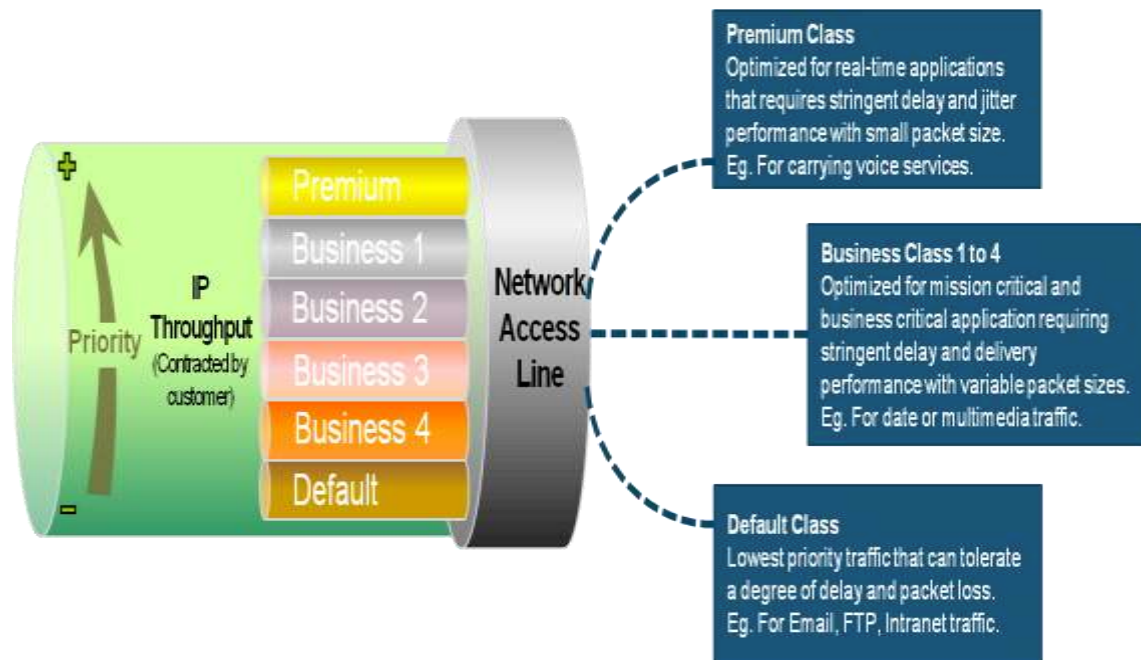
Global Topology



SDN controllers like ONOS have global view of network elements. In NFV case, OpenStack being the VIM, there should also be a global topology with virtualized node and link information.

OpenStack should derive some output from ONF NBI and ONOS to form a good model and API for topology.

E2E Qos for VNF



In NFV cloud environment, VNFs may be VMs running on COTS hardware which is connected together by a virtual fabric set up by SDN controller. There is need for ensure the bandwidth/Latency/.. between the virtual links of these VNFs. The model and APIs are needed in Neutron.

Summary

- Motivation of customizing OpenStack for Telco NFV from NB point of view
- Intent base interfaces
- Functional interfaces
- Four typical use cases
- More to go with the community support

Thank You

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