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Key lessons from an advanced multi-vendor NFV Trial

Kiran Sirupa

Sr. PLM

Agenda

- Intro to Anuta

- Customer Background

- POC Criteria

- Anuta Proposed Solution

- Results

- Additional Use Cases

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The Anuta Story

Global Organization

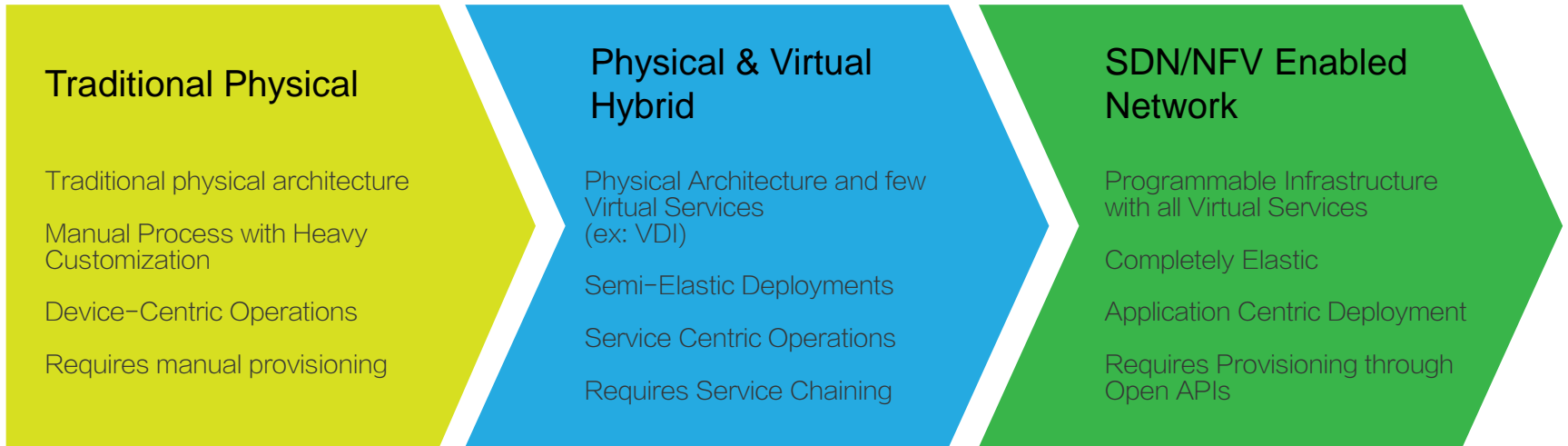|	
Milpitas, CA	France
United Kingdom	India
Australia	Japan

Founded

2010

Core Focus

YANG Model driven Network service orchestration for Data Center,
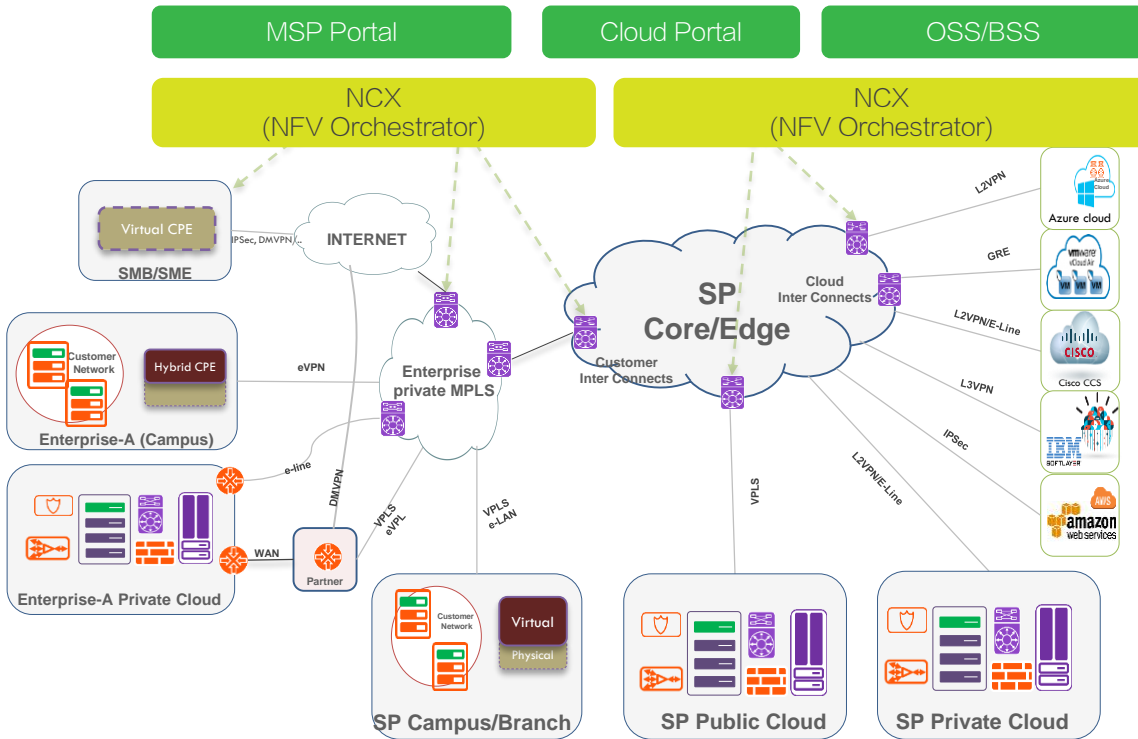
Campus, Branch, Mobile Backhaul & Mobile Packet Core

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NCX Supports Network Evolution

North Bound Business Services

Anuta Value - Make Business Agnostic to Underlying Technology

Traditional Physical

Traditional physical architecture

Manual Process with Heavy Customization

Device–Centric Operations

Requires manual provisioning

Physical & Virtual Hybrid

Physical Architecture and few Virtual Services
(ex: VDI)

Semi–Elastic Deployments

Service Centric Operations

Requires Service Chaining

SDN/NFV Enabled Network

Programmable Infrastructure with all Virtual Services

Completely Elastic

Application Centric Deployment

Requires Provisioning through Open APIs

SP/MSP/Fortune 500 Enterprise

- Multi-Tenancy Public Cloud
- Application Delivery in Private Cloud
- CPE - Physical, Virtual, Hybrid, Cloud
- Inter-Cloud, Multi-Cloud
- Segmentation In Campus
- Data Center Interconnect
- IP/MPLS Backbone
- NFV use cases in Data Center, CPE
- Virtual Appliance Life Cycle Management
- IP Address Management
- YANG Platform for Device and Service modeling
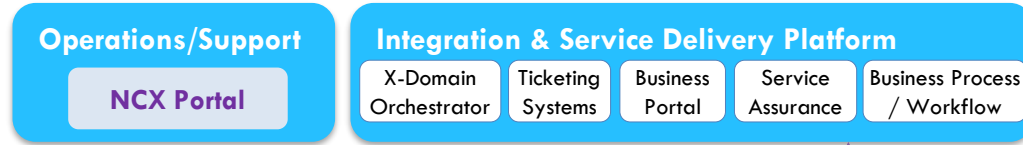- Metro Ethernet
- Wholesale Services

Common Orchestration Platform provides Operation efficiencies, DevOps, Engineering and Architecture alignment and quicker GTM
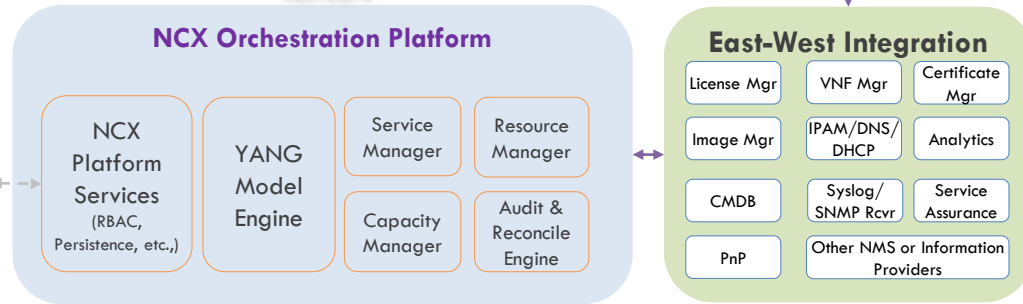
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High Level System Architecture

Service, Network Inventory Auditing & Reconciliation
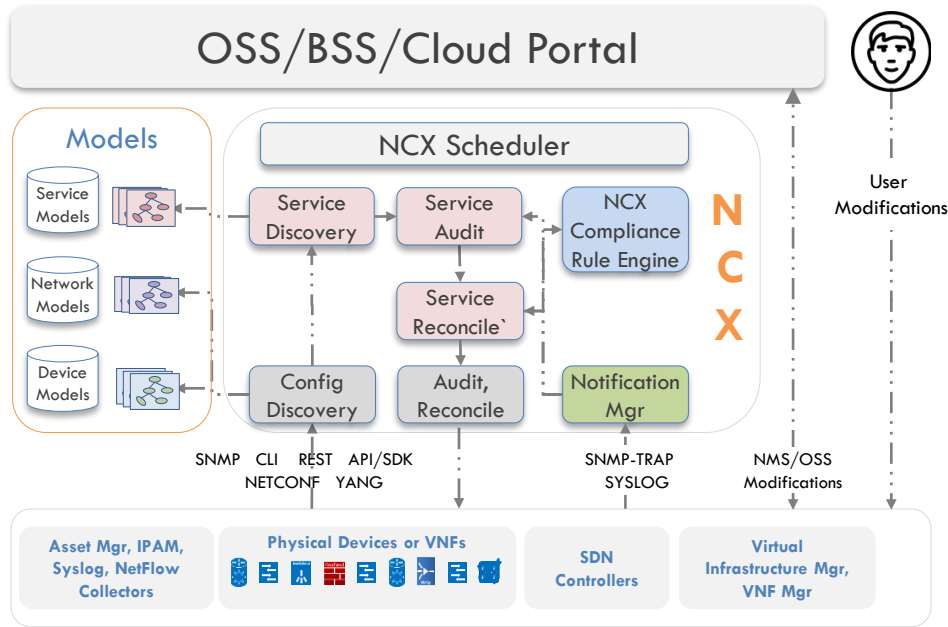
Network Discovery
- ✓ Device, Network & Service Inventory
- ✓ Scheduled & Triggered Collection
- ✓ Enables Brownfield network provisioning
- ✓ Through any Southbound configuration store (CLI, API, etc.)

Audit
- ✓ Validates Native Device Config state vs Device state on NCX

Reconciliation
- ✓ Device, Network & Service
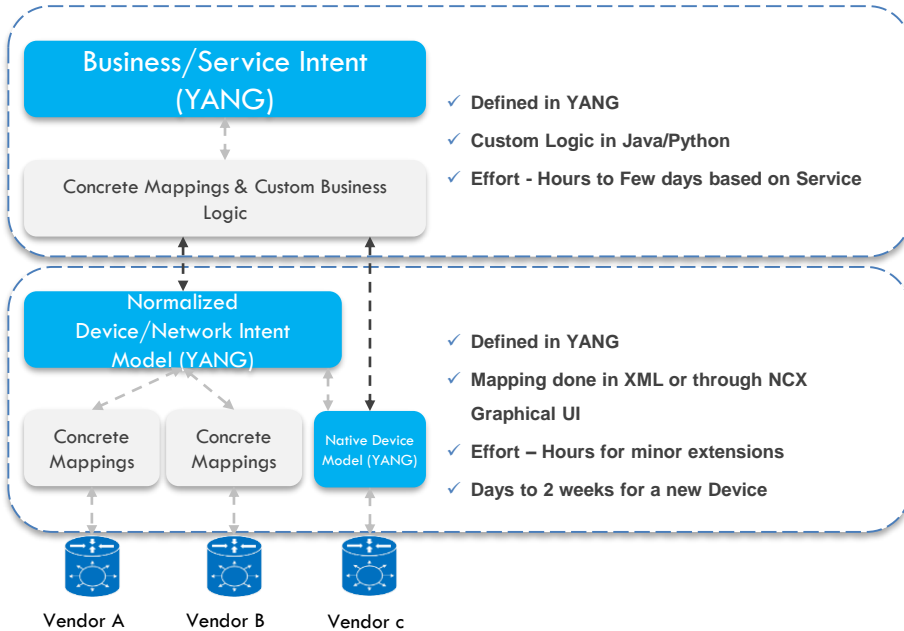- ✓ Reconciles NCX→Device or Device→NCX

NCX Scheduler & Notification Mgr
- ✓ Trigger Periodic Discovery and Audit
- ✓ Monitor network changes and trigger Device, Network or Service Audit

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- ✓ Business Policy is always Compliant
- ✓ Provisioning decisions based on up-to-date Device, Network & Service

Pluggable Modular Extensible Platform

Business/Service Intent (YANG)

Concrete Mappings & Custom Business Logic

✓ Defined in YANG
✓ Custom Logic in Java/Python
✓ Effort - Hours to Few days based on Service

Normalized Device/Network Intent Model (YANG)

Concrete Mappings
Concrete Mappings
Native Device Model (YANG)

✓ Defined in YANG
✓ Mapping done in XML or through NCX Graphical UI
✓ Effort – Hours for minor extensions
✓ Days to 2 weeks for a new Device

Vendor A
Vendor B
Vendor c

Network Service Examples
✓ **Layer-3 VPN, Layer-2 VPN**
✓ **Application Container**
✓ **Load Balancer As a Service**
✓ **Security as A Service**
✓ **Find Unused Ports on a Switch**
✓ **QOS Assessment and remediation**
✓ **Bulk AAA and User management changes**
✓ **Security Vulnerability assessment**

Customer/Partners can use NCX SDK to Extend or Develop New Services or Device plugins

Significant Out-of-the-box support for Device/Vendors and Vendor Validated Designs

✓ > 30 Vendors Supported
✓ > 100+ Device platforms supported
✓ > 10,000+ Device Commands/APIs mapped
✓ **Out of the Vendor Validated Designs for the following Networking Domains:**
  ✓ Public Cloud, Private Cloud with SDN Controller
  ✓ Carrier Core / Mobile backhaul
  ✓ Branch, Campus, Data Center Interconnect
  ✓ SD-WAN, Virtual CPE & NFV Use cases, OpenStack or VIM
  ✓ Mobile Packet Core, Metro Ethernet, Optical, L3VPN / Wholesale Services

Customer Background

- Tier-1 SP offering services on mobile, internet and fixed platforms
- Major Initiative to Reduce OPEX using NFV
- Initial Focus on Building a Virtual DC
- End to End NFV Deployment

POC Key Criteria

- Carrier Grade Scalability
- Multi-Vendor VNFs on Multi-Vendor VIMs (ESXi, OpenStack, KVM)
- Rapid Extensibility
- Integration with OSS/BSS for analytics
- Self-Service
- Multi-Tenancy
- Service Assurance and Telemetry

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Challenges

- New Infra Components and Architectures
- Multiple Integration Points
- Complex Workflow required between components for a service
- Operational Complexity
- Availability
- Performance
- Scalability

Anuta and HPE Solution

Source: ETSI GS NFV 002 V1.1.1 (2013-10)
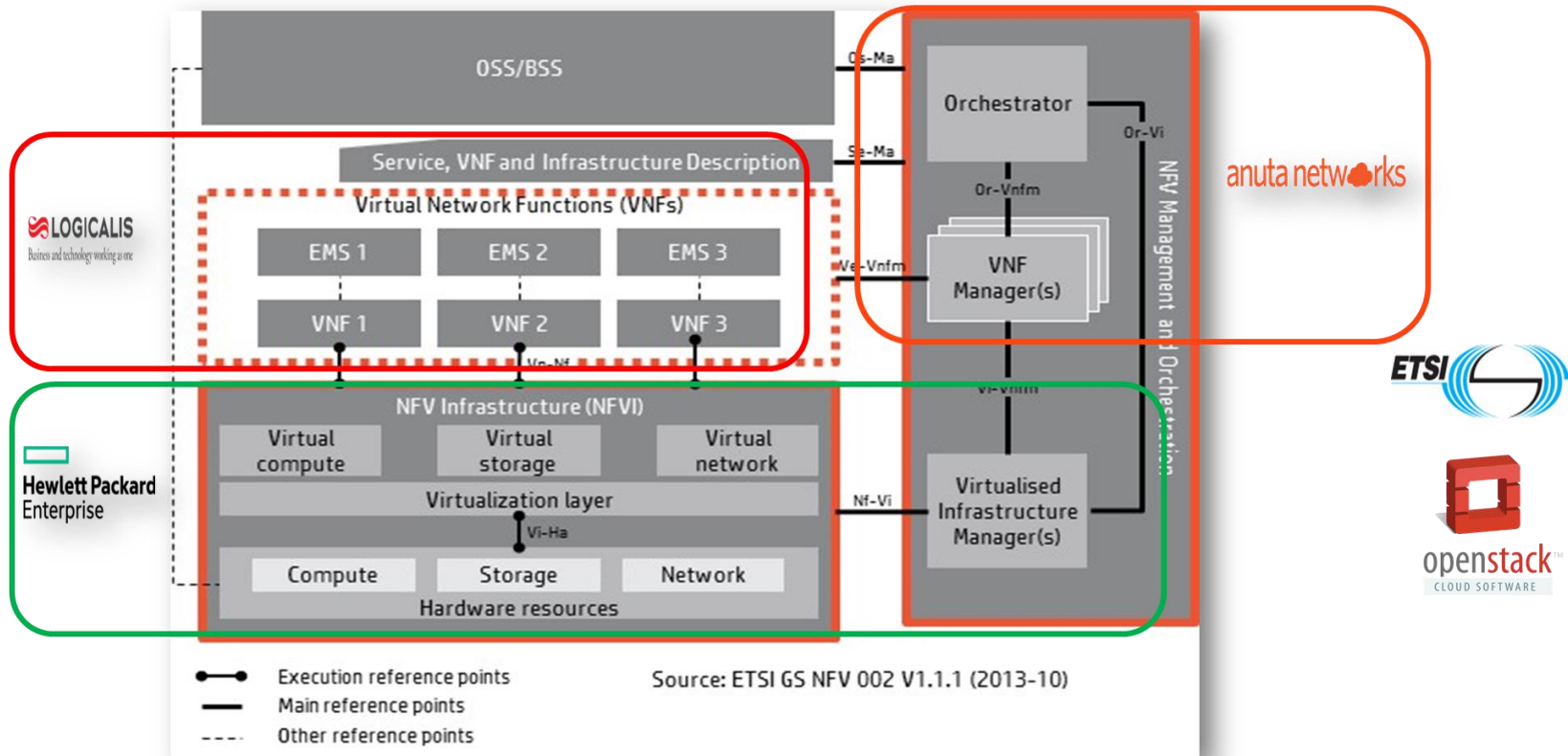
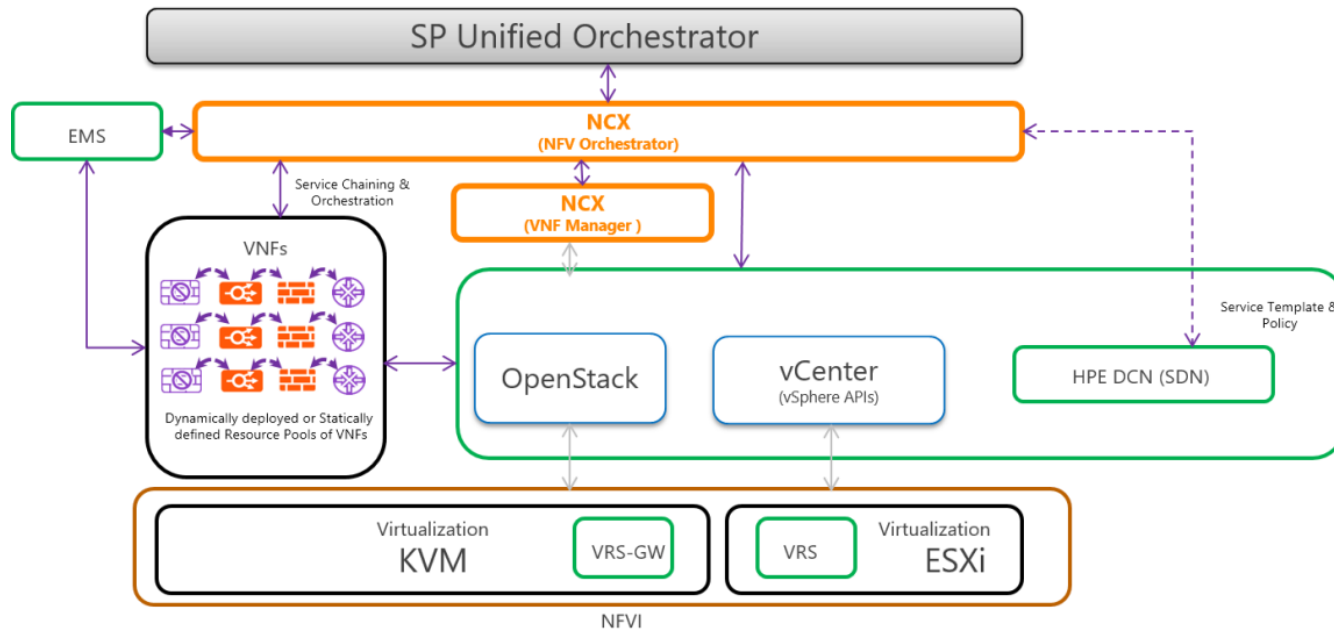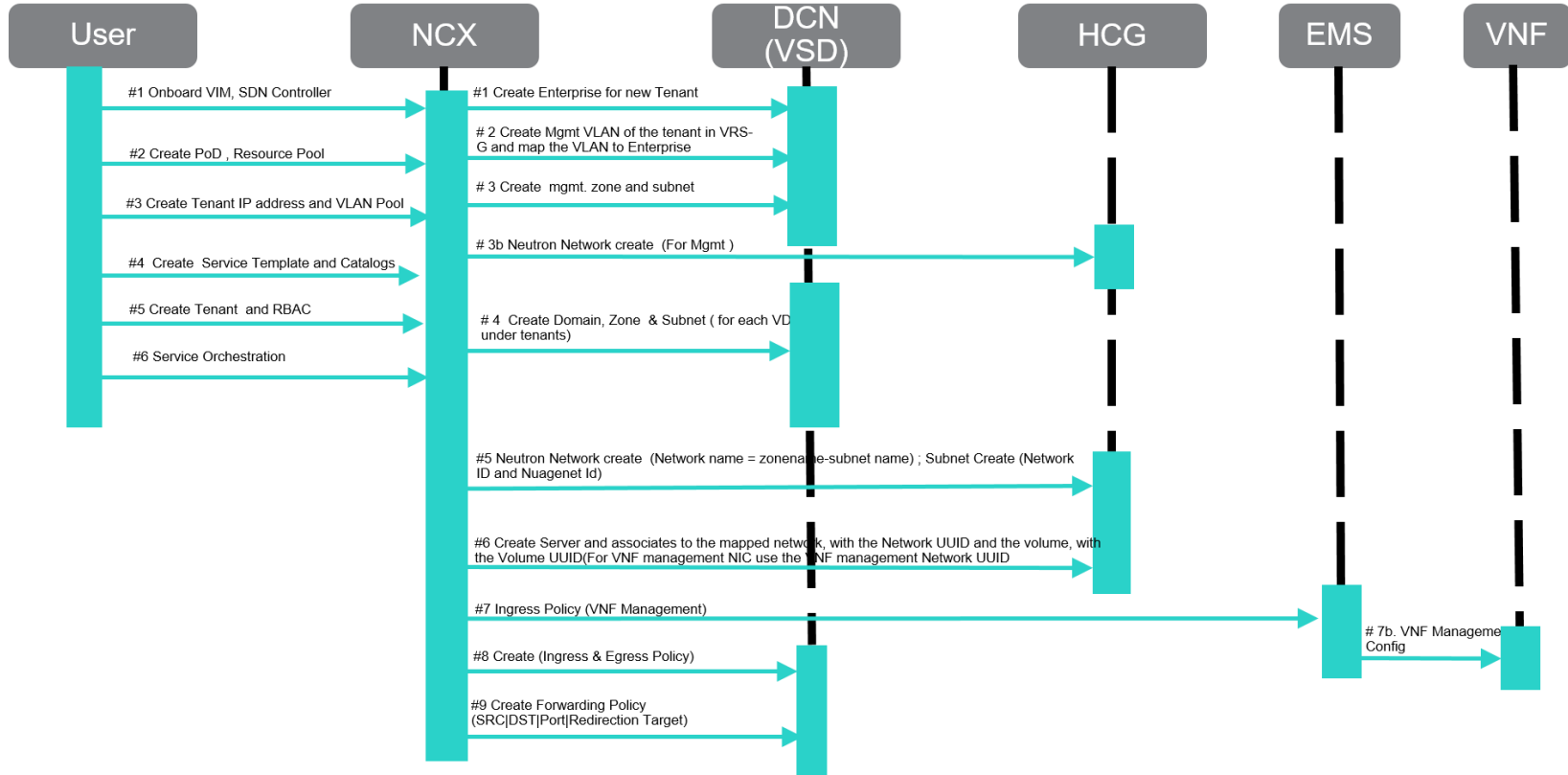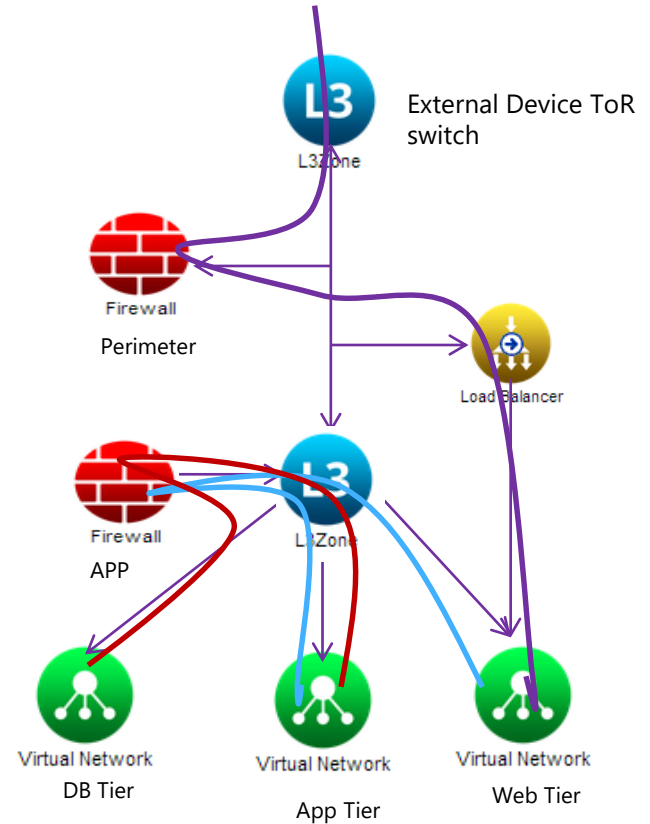# Solution Components

End to End NFV Deployment with HPE and Anuta NCX

Use Case Workflow – High Level

User	NCX	DCN (VSD)	HCG	EMS	VNF

#1 Onboard VIM, SDN Controller

#1 Create Enterprise for new Tenant

2 Create Mgmt VLAN of the tenant in VRS-G and map the VLAN to Enterprise

#2 Create PoD , Resource Pool

3 Create mgmt. zone and subnet

#3 Create Tenant IP address and VLAN Pool

3b Neutron Network create (For Mgmt)

#4 Create Service Template and Catalogs

4 Create Domain, Zone & Subnet (for each VD under tenants)

#5 Create Tenant and RBAC

#6 Service Orchestration

#5 Neutron Network create (Network name = zonename-subnet name) ; Subnet Create (Network ID and Nuagenet Id)

#6 Create Server and associates to the mapped network, with the Network UUID and the volume, with the Volume UUID(For VNF management NIC use the VNF management Network UUID

#7 Ingress Policy (VNF Management)

7b. VNF Management Config

#8 Create (Ingress & Egress Policy)

#9 Create Forwarding Policy (SRC|DST|Port|Redirection Target)

Template – 2FW &LB with External

External Device ToR switch - Physical

Perimeter Firewall

SDN

Firewall
APP

L3Zone

Load Balancer

Virtual Network
DB Tier

Virtual Network
App Tier

Virtual Network
Web Tier

External Device ToR switch

Firewall
Perimeter

APP
Firewall

L3Zone

Load Balancer

Virtual Network
DB Tier

Virtual Network
App Tier

Virtual Network
Web Tier

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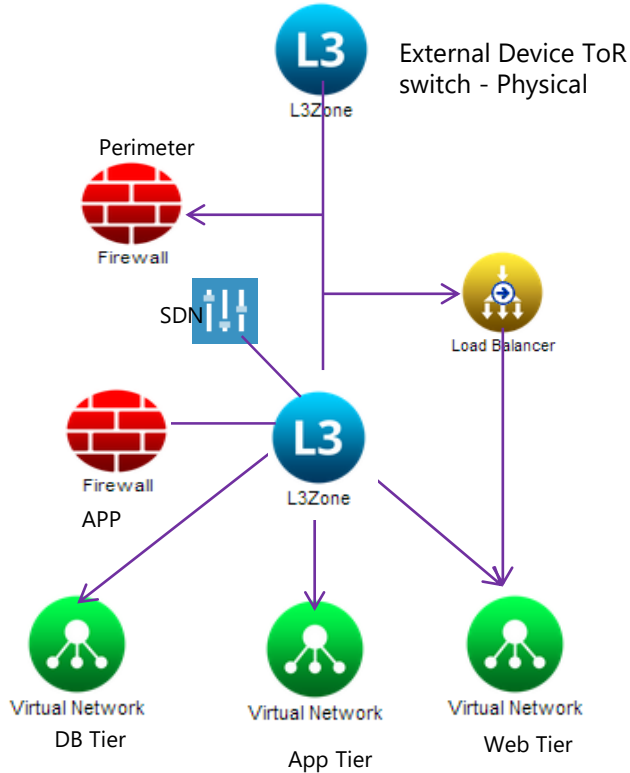
Results

- Successful Integration with HP Helion OpenStack, VRS GW, HP EMS and HP VIM
- NCX YANG Model-driven platform enabled customization
- Out-of-the-box support for VNFs from F5, HPE and Open Stack was critical to the POC success
- Currently working on verifying Scale and HA

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Key Lessons

- Orchestrator is critical to Multi-Vendor Integration
- YANG Modeling Critical to Customize NFV Deployment
- NFV offers opportunity to re-invent Operational analytics
- KPI based service placement
- Community based Development Model is key to NFV success

A BIG THANK YOU !

Intel® Network Builder

- Webinar - Delivering Agile Network Services with NCX - PNF and VNF Orchestration

- Chip Chat Podcast: Network Insights Episode 43

- Microsite: https://networkbuilders.intel.com/ecosystem/anuta-networks

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