Cisco Network Function Virtualization Infrastructure: Carrier – Grade NFVI
O&A APJ CKN

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Oct 31st 2017
Agenda

• SP Transformation
• Market Outlook & Trends
• NFV Use Cases & Landscape
• Key asks for NFVI
• Cisco NFVI Solution
• Industry Partnerships
• Cisco NFVI Use Cases
Simplification Paramount to SP Transformation

Orchestration

Simple Operations

SDN

NFV

Mobility

Managed Services

Video

Security

Converged Infrastructure

Reduce Network Appliances, Siloes

Automate Service Creation

Avail Self-service Personalization

Highly Available Infrastructure

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APAC NFV Forecast 2017–2022

- OpenStack is the open source platform of choice for IaaS in NFVI
- Tier 1 MNO’s leading the way with core network and radio access network (RAN) deployments
  - NTT DOCOMO: EPC (2016)
  - China Mobile: NovoNet
  - SK Telecom: T-MANO
  - Others: China Unicom, KDDI, KT, Telstra
- Biggest Deployment Challenge: Multi-vendor on-boarding complexity

NFV market revenue in Asia-Pacific to reach US$9.24 billion in 2022

Source: ABI Research Network Function Virtualization Tracker and Forecasts market data
Business Benefits of NFV

Efficiency + Speed = Digital Disruption

- Cost Reduction
- Elasticity and Agility
- Programmable On Demand
- Accelerate Consumption Models
- Monetize New Streams
CXO: Business Outcome Focused

**CEO**
- Increase Shareholder Value
- Enhance Customer Experience
- Grow Brand Value

**CTO**
- Drive Infrastructure asset efficiency
- Agility in Operations
- Improve quality of services
- Reduce CAPEX and OPEX

**CFO**
- Manage Investments
- Risk management
- Look for Revenue Upsides
- Evaluate New Business Models

**CIO**
- Workforce productivity
- Drive Innovation
- Faster TTM
- IT/Network ecosystem
Distributed NFV with Edge Cloud & CO Transformation

**Cust Prem**
- vBranch, Analytics

**Access**
- Nothing is seen today...
- MEC, VPC & Fog Apps

**CO**
- vBNG, vOLT, vCMTS, vPE
- Biz Services (vMS), vRAN, vCDN, Analytics
- VPC & vCDN, Cloud RAN, AR/VR, IoT, Fog, location based services, Data Analytics

**Remote DCs**
- VPC, SecGW, vIMS, vManaged Service, Media xCoding, cDVR, vPE, vBNG, vCMTS, vCDN, Analytics
- IOT / Fog Computing, Online Gaming, Location based Services, AR/VR, Data Analytics

**Central DCs**
- VPC, Gi-LAN, vIMS, Biz Services (vMS), Media xCoding, cDVR, vCDN, Virtualized RR, Analytics

**Co-Lo / Peering**
- vMS, vCDN, vDDoS, Analytics

**Cloud Hosted**
- XaaS delivered from the Multi-Cloud

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Trade-Off’s in Infra, Orchestration to consider

- Edge Compute: Latency sensitive apps (MEC, IoT, Edge Analytics)
- >10s of Virtual workloads, Production Services
- >100s of Virtual workloads, Production Services
- >1,000s of Virtual workloads, Production & Backend services
- >100s of Virtual workloads, Production services

Integrated Cloud & SP WAN Management Plane along with End-to-End Service Orchestration & Assurance

Unified Control Plane and Unified Data Plane

High Performance, Automation, Day 0 – N Lifecycle Management, HA, Consistent Networking Models, Logging, Assurance, Security
NFVI: SP Key Asks

- Carrier Class Performance
- Open Standards Based, Modular and Elastic
- Use Case Agnostic Infrastructure
- Integrated Solution with Single Point of Ownership
- Easy to use with Unified Management
- A secured NFVI cloud
Cisco NFVI Solution, Key Features, Use Cases
Cisco NFV Solution Architecture

North Bound APIs

NFVO, Resource Orchestration & VNF Service Orchestration

NSO – Network Services Orchestrator enabled by Tail-f

Virtual Network Functions (Cisco and 3rd Party)
- CSR
- ASA
- Ultra
- VMS
- Video
- XRv
- VWSA
- 3rd Party

VNF Manager
- Cisco ESC

Cisco NFVI Scope

VIM
- Red Hat OSP
- Cisco VIM Lifecycle Manager

Optional Network VIM (Cisco VTS / Cisco ACI)

Cisco Physical Infrastructure
- Compute (UCS)
- Network (Nexus)
- Storage (UCS)

Virtual Infrastructure
- Virtual Compute (RHEL)
- Virtual Storage (Ceph)
- Virtual Network (OVS, VTF, SR-IOV)

Infrastructure Abstraction with RHEL, KVM/Qemu, Host Packages, vSwitches

Unified Management
- API
- GUI

Monitoring and Assurance
- Unified Management
- Infrastructure Management
Cisco NFVI Powered by Cisco VIM Platform

- Automated Installer & Lifecycle Manager
- Seamlessly scale your cloud
- Automated SW Updates/Upgrades
- Health Checks, Monitoring & Assurance
- Unified Management
- Ubiquitous Security

Unified Management

Deployment A
Deployment B
Deployment C
# Cisco VIM – Key Features & Benefits

## Carrier Class platform
- Provides a highly available, secure, scalable & high-performance cloud

## Automated Deployment
- Reduces cloud bring up time via an end to end automated modular flow that is reliable, repeatable & consistent

## "Air-Gapped" or Online Install
- Enables offline or online installation and full software lifecycle management

## HW & SW Lifecycle Mgmt
- Seamless fully automated hardware addition, removal and replacement & software updates, rollback with zero to minimal service disruption

## Ubiquitous Security
- Reduces the surface area for attacks by using a defense in depth approach following Cisco’s security best practices

## Enhanced Platform Awareness (EPA)
- Automated deployment of EPA features across multiple nodes, validated & tuned for a carrier class cloud

## Data Plane Flexibility & SDN Integration
- OVS, SR-IOV, VPP (fd.io), LinuxBridge and integrated with SDN controllers (VTS, ACI)

## Integrated Tools
- Integrated tools to actively monitor the cloud’s control plane & validate the data plane performance
Best of Breed Partnership

Joint innovation and optimization across the stack

- Intel PTT (Platform Trust Technology) (TPM enabled)
- Deep Security Hooks (planning)
- CPU/Memory Access
  - NUMA, huge pages, CPU pinning, socket affinity
- Network Access
  - SR-IOV, NSH, PCI-Passthrough
- Virtual switching
  - VPP, OVS-DPDK

Joint Engineering
Joint Innovation Labs
Open Source and Standards Cooperation
Broadest Combined Ecosystem

Leading Networking Solutions provider

Leading Open source Linux, OpenStack, CEPH Provider

Leading Data center Silicon / Technology provider

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Cisco NFVI Use Cases

Business Services (VMS)
- New Buy Models, vCPE, SD-WAN
- Lower Costs, Better Performance

Mobility
- IoT, M2M/M2P applications
- Connected Cars, Business, Homes

Media
- Content providers & Broadcasters
- Rapidly introduce new experiences
Business Services Use Cases

- vCPE
- vRouter
- vPE
- vIPS
- vFW
- 3rd Party

Cisco NFVI
Cisco is delivering the most flexible service creation platform in the market today.

Reach new, untapped markets, like SMB, SME, and Enterprise Managed Services.

Deploy business services in minutes using the most modern and advanced orchestration techniques (NSO).

All with security services, assurance, and analytics to meet every market's needs.
Cisco SD-WAN made easy with VMS
Cisco Digital Network Architecture

Cisco® Intelligent WAN

Automate with policies
Analytics with network insights
Physical and virtual platforms

Virtual Managed Services
Service Creation | Multi-tenancy | Orchestration | Business Logic

Automation
Abstraction and Policy Control from Core to Edge

Analytics
Network Data, Contextual Insights

Virtualization
Physical and Virtual Infrastructure | App Hosting

Simplify SP Managed Services
Deploy locations faster
More responsive user apps
Physical and Virtual Multi-vendor devices
Mobility Use Cases
Ultra Mobility Services

Deploy GUI

VNF
VPC (MME, SGSN, SGW, PGW) Element Manager

VNFM
Cisco ESC

Cisco NFVI

Compute, Network & Storage Hardware
Cisco UCS C

Pre-integrated, tested & validated by Cisco

Single support point of contact

Ready to deploy today!

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Summarizing – Cisco NFVI addresses key SP asks

Automated Installer & Lifecycle Manager
Seamlessly scale your cloud
Automated SW Updates/Upgrades
Health Checks, Monitoring & Assurance
Unified Management
Ubiquitous Security
Useful Links

Cisco NFVI: http://www.cisco.com/go/nfvi
Cisco VIM: http://www.cisco.com/go/vim
CloudPulse: https://wiki.openstack.org/wiki/Cloudpulse
KloudBuster: https://github.com/openstack/kloudbuster
NFVbench: https://wiki.opnfv.org/display/nfvbench/NFVbench
NFVbench @ OPNFV: https://wiki.opnfv.org/display/fds/NFVBENCH+performance+testing+demo+for+FDS
FD.io: https://fd.io/