Network Operations in the Era of NFV & SDN

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Agenda

1. Introduction
   - Overview of NfV & SDN

2. The Challenge
   - Today’s Carrier operations
   - Contrasting Carrier and IT operations

3. NfV will Change Operations
   - Managing hybrid networks end to end
   - Impact of NfV on the organization & architecture

4. The 3rd Way
   - The new network operations world
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Overview of NfV and SDN

The operational challenges of NfV and SDN are Different!
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Challenges of Today’s Carrier Operations

- **Costly** manual deployment & upgrade processes
- Many Specific H/W management and planning processes

- Operations is either process & script driven & **Highly automated** for volume services or **Highly skilled & specialised** for complex services

- Network operations avoid the risk of centralisation but data centre operations avoid the costs of distribution

- **Many monolithic operational silos**
  - Difficult to manage & coordinate, resulting in challenges delivering end-to-end service

- **Operational teams focus is on customer service**
  - Impacts their ability to engage early on new technologies

All of these impact the overall Customer Experience

Does NfV present an opportunity to address these challenges?
Contrasting Carrier and IT Operations

**CHANGING ENGINE OIL**

*Principle similar to a typical IT upgrade*

- The car and engine are stopped and idle during the operation.
- Context of operation can be broad (full service to engine replacement)
- Taking longer has little or no consequence for the car & engine
- Carried out as a matter of routine.

**HIP REPLACEMENT SURGERY**

*Principle similar to a typical Network upgrade*

- The patient must remain alive during the operation
- Scope of operation is precise and focused
- Time is limited.
- Only attempted if really needed.

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Operating mission critical IT Apps or a network built on IT in the Cloud requires merging the best of today's Carrier & IT operations to provide carrier-grade performance, availability and outstanding Customer Experience.
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Global carriers today have to manage **heterogeneous networks** e.g. **Owned & Shared** elements of:

- Access (xDSL, Fibre, WiFi, LTE, etc.)
- Core (Optical, IP/MPLS 3rd Party, etc.)
- Services (Ethernet, VPNs, Mobile EPC, IMS, VoIP, CDNs, etc.)
- Data Centre & Cloud Compute

Operational processes must be designed to support interoperability, E2E Services and meet customer SLAs **underpinned by Standards**

How does NfV fit into this operational framework?
NfV as a Catalyst to Change Network Operations

THE NfV PROMISE...

- Automation
- Flexibility
- Simpler planning
- Uniform operations
- Cost savings
- Customer Experience

THE REQUIRED CHANGES ARE...

- Convergence of IT & Network mind-sets
- Learning from both
- Modular Technical & Operational Architectures
- Organisation
- Evolutionary or Revolutionary?
Although the operational frameworks are different the technology architecture should be consistent to minimise development & operational costs.
Modularity and What Goes Where

- Type registration
- Instance creation coordination
- Resource coordination
- Alarm monitoring

- Type template creation
- Instance reconfiguration coordination
- Resource Reservation & usage database

- Type template repository
- Instance removal coordination
- Inventory database
- Fault correlation, localisation, and route cause

- E-E Service
  - NS
  - VNF
  - VM
  - VN
  - Existing Components

- EM
- VNFM
- VIM
- NFVO
- OSS/BSS

- VNF vendor
- OpenStack
- Existing
Linking of Processes – Especially Inventory Database

- Instance creation coordination
- Instance reconfiguration coordination
- Instance removal coordination

Inventory database

- Updates
- Interrogates

Logical

Fault correlation, localisation, and root cause

EM  VNFM  VIM  NFVO  OSS/BSS

Existing

VNF vendor

Existing
Conclusions for Technical & Operational Architectures

- Modular and well-defined architectures, interfaces & processes are required
- More than one Operational model may exist but they should use the same architecture
- There is no single orchestration entity
  - Need end-to-end and domain orchestration
  - Need peer or sideways interfaces, including to legacy OSS
  - Enables evolutionary migration of legacy network to NfV

Hence, the Network must be viewed as the source of authoritative information about the network
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Operationally, Network Equipment and Servers Are Different

- TACACS/RADIUS authentication
- Serial console port
- Rich network features: timing & sync, dying gasp, OAM, TDM interfaces
- In-box fault resiliency
- Single vendor contact & support point
- Well bounded behaviours

- Active Directory
- Intelligent Platform Management Interface
- Simple Ethernet
- Move to a new box fault resiliency
- Multiple vendor contacts & support points
- Less well bounded behaviours
NfV - A Catalyst for The New Operations World

Standards - E2E service management of NfV will require inter-working/inter-operating between peer ops teams and OSS/Orchestration systems.

Parallelism and load balancing used to protect network functions & critical IT functions, rather than moving VMs & their state

Maximize operational benefits by bringing together the best of IT and Networks

The 3rd Way

Hardware spares, upgrades and maintenance:
Leverage standard Data Centre processes and infrastructure management

VNF Technology Refresh:
Software upgrade rather than operationally-intensive hardware-based refresh

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Convergence in Hardware – the “Rouver”

IT Server
- PCIe bus

Converged hardware
- Packet processor
- CPU
- PCIe bus

Telecoms Router
- Line cards
- Switch fabric
- Control cards
Supply Side Mash-Up

- Turnkey supply
- In house
- Open source
- Systems integrator

New development and supply processes

System maintenance
Changes in Service Operations

NfV allows us to rapidly create, deploy and operate a service or service chain from a catalogue of functions.
Ongoing innovation will present further Operational Challenges

Open, competitive supply of innovative applications

- Separation of network control from forwarding
- Network abstraction enables faster innovation
- Network service speed & agility
- Improves Customer Experience

Open Innovation

Business Intelligence, Process Mining...

Network Functions Virtualisation

Software Defined Networks

Open source, Big Data....

OSS / BSS

Service operations

Network operations

- Network Functions virtualised on standard server H/W
- Modular architecture
- Service creation speed & agility
- Reduces CAPEX, OPEX, Space & Energy Consumption
- Improves Customer Experience