NSO in an ETSI NFV Context

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Agenda

• NSO Overview
• ETSI MANO Terms
• Demo Time
• Questions and Wrap
NSO Overview
Cisco Service Provider Architecture Strategy
Business Transformation Through Innovation

Cisco Services

Applications
Business
Mobility
Video
Consumer
Cloud

Automation
Management
Orchestration
Policy

Cisco® Evolved Services Platform

Service Broker

Catalog of Virtual/Physical Functions
Orchestration Engine
Service Profiles

Physical and Virtual Infrastructure

Cisco Evolved Programmable Network

VNFs

Network
Compute
Storage
Cisco Orchestration Architecture
High Level View

- Model-driven end-to-end service lifecycle and customer experience in focus
- Seamless integration with existing and future OSS/BSS environment
- Loosely-coupled and modular architecture leveraging open APIs and standard protocols
- Orchestration across multi-domain and multi-layer for centralized policy and services across entire network
NSO Main Features

Applications

- REST, NETCONF, Java, Python, Erlang, CLI, Web UI
- Service Manager
- Device Manager
- Network Equipment Drivers (NEDs)

Engineers

- Logically centralized network services
- Data models for data structures
- Structured representations of:
  - Service instances
  - Network configuration and state
- Mapping service operations to network configuration changes
- Transactional integrity
- Multiprotocol and multivendor support

NETCONF, REST, SNMP, CLI, etc

Physical Networks

- Virtual Networks
- Network Apps

- VNFM
- Controller Apps
- EMS and NMS
NSO Main Features
#1 Model-based Architecture

- No hard-coded assumptions about:
  - Network services
  - Network architecture
  - Network devices
- Instead:
  - Data models written in YANG (RFC 6020)
NSO Main Features
#2 Fastmap

- FastMap:
  - Only the CREATE operation needs to be specified
  - UPDATE, DELETE and REDEPLOY automatic

- Benefits:
  - Reduces service implementation code by two orders of magnitude
  - Supports modifications of services at runtime

- PHYSICAL NETWORKS
  - VNFM
  - Controller Apps
  - EMS and NMS

- VIRTUAL NETWORKS

- NETCONF, REST, SNMP, CLI, etc
NSO Main Features
#3 Reactive Fastmap (RFM)

- Development pattern to:
  - Redeploy service configuration on operational changes
  - Idempotent

- One algorithm supporting:
  - Provisioning
  - Orchestration
  - Elasticity
  - Virtual machine and VNF mobility
  - Self-healing network

NETCONF, REST, SNMP, CLI, etc

Service Manager

Device Manager

Network Equipment Drivers (NEDs)

Create
Update
Delete
Redeploy
High-level Mapping – NFV Orchestrator View

- Modular architecture that conforms to ETSI NFV framework
- Model driven design for declarative NFV orchestration
- Supports Cisco and 3rd party VNF Managers
- Supports Cisco and 3rd party DC SDN Controllers
- Supports Cisco and 3rd party VNFs
ETSI NFV MANO Terms
ETSI NFV Definition of Service

Figure 2: Graph representation of an end-to-end network service
Service Provider definition of Service

ETSI Network Service:
• A set of VNFs with optional VNF forwarding graphs
• A better name would have been “Application”

Service Provider Services
• Spans elements and one element supports multiple services instances.
• Examples: E-Line, VPN, VOIP connection, 4G mobile data

...is a subset of...

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NFV Service as part of RFS Service
Terms Used in the Demo

- An **NSD** is static information elements used by the NFVO to instantiate a Network Service (one or more VNFFGs, VNFs, PNFs and VLs)

- A **VNFD** is a deployment template describing VNF in terms of deployment and operational behavior requirements. Also contains connectivity, interface to establish appropriate links between VNF instance other Network Functions

- A **VDU** references an VM image and runtime requirements

- **NSR** is a runtime record created by instantiating an **NSD**
Descriptors and Records

NSD

- VNFD
  - VDU

NSR

- VNFR
  - VM

Instantiation
Demo Time
What I will show

• Starts with an L3 VPN demo to show-case NSO core features for existing (physical) networks

• Onboard descriptors into NFVO and VNFM
  • VNFDs for router (CSR) and firewall (vASA)
  • NSDs:
    • *Basic* consists of CSR only
    • *Advanced* consists of graph of CSR and vASA

• Insert Basic NSD into segment of existing VPN
• Switch NSD of segment
• Remove NSD
NFV Service as part of RFS Service
Questions?