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

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<th>Applications</th>
<th>Business</th>
<th>Mobility</th>
<th>Video</th>
<th>Consumer</th>
<th>Cloud</th>
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</thead>
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### Cisco Services
- Automation
- Management
- Orchestration
- Policy

### Cisco® Evolved Services Platform
- Service Broker
- Catalog of Virtual/Physical Functions
- Orchestration Engine
- Service Profiles

### Cisco Evolved Programmable Network
- Physical and Virtual Infrastructure
- VNFS
- Network
- Compute
- Storage

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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

**Network Apps**

- VNFM
- Controller Apps
- EMS and NMS

**Virtual Networks**

- NETCONF, REST, SNMP, CLI, etc

**Physical Networks**
NSO Main Features
#1 Model-based Architecture

Applications

Service Manager

Device Manager

Network Equipment Drivers (NEDs)

Engineers

REST, NETCONF, Java, Python, Erlang, CLI, Web UI

NETCONF, REST, SNMP, CLI, etc

- No hard-coded assumptions about:
  - Network services
  - Network architecture
  - Network devices
- Instead:
  - Data models written in YANG (RFC 6020)

Physical Networks

Virtual Networks

Network Apps

• VNFM
• Controller Apps
• EMS and NMS
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

- **Create**
  - Update
  - Delete
  - Redeploy

- **Physical Networks**
- **Virtual Networks**
- **Network Apps**
  - VNFM
  - Controller Apps
  - EMS and NMS

**Network Equipment Drivers (NEDs)**

**Service Manager**

**Device Manager**

**NETCONF, REST, SNMP, CLI, etc**

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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
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...

TMForum Readiness

TMForum Fulfillment
NFV Service as part of RFS Service

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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

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

Instantiation

NSD
  VNFD
    VDU
  VNFD
    VDU
  VNFD
    VDU

NSR
  VNFR
    VM
  VNFR
    VM
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?