Software Defined Services – An Opportunity for Service Providers and Enterprises

Rada Stanic, Principal Systems Engineer
BRKSPG-2008
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Agenda

• What is Driving the Change Towards Software Defined?
• Programmable Transport Services
• Managed Services Transformation
• Software Defined WAN (SD WAN)
• Conclusion
What is Driving the Change Towards Software Defined?
How Do Your Customers Interact Today?

ACME Provider

Data Solution

Whether it’s a handshake, a phone call, or a download—all business connections. Every hour you spend with outdated systems slows down your business. When it comes to Internet and point-to-point circuits, count on us to provide you a solution with the performance, redundancy, and secure connections critical to your business.

Ready to get Started?

CONTACT US

Please complete the form below.

* = Required

What services are you interested in?*  
 Chí + select for multiple selections

Do you currently have service with C Spire?*

Yes

First Name*

Last Name*

Phone*

Email*

Company*

Address*

City*

County*

State/Province*

ZIP Code*

Comments

Submit

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Self-Service is Now a Must!
Now, Faster, Customised, Powerful
Imagine Your Telecom Services Menu

- Virtual Load Balancer
  - Create new LB
- Virtual Firewall
  - Modify Your Rules
- L2 Network
  - Increase Bandwidth
  - Schedule on-Demand
- L3 Network
  - Change QoS
- Cloud VPN
  - Add new Location
  - Change Existing Bandwidth
## Differences Traditional SP vs. SW Defined SP

<table>
<thead>
<tr>
<th>Traditional SP</th>
<th>Software Defined SP</th>
</tr>
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<tbody>
<tr>
<td>• Call Center / Sales Team</td>
<td>• Self-Service Portal</td>
</tr>
<tr>
<td>• Waterfall</td>
<td>• Agile</td>
</tr>
<tr>
<td>• Silo’ed Developers and Operators</td>
<td>• DevOps &amp; cross-functional teams</td>
</tr>
<tr>
<td>• HW Based Availability</td>
<td>• SW Based Availability</td>
</tr>
<tr>
<td>• Configuration by copy/paste or script</td>
<td>• Automated Intent-Based Provisioning</td>
</tr>
<tr>
<td>• Annual/Bi-annual SW Releases</td>
<td>• Continuous SW Releases</td>
</tr>
<tr>
<td>• Incidents and Problems</td>
<td>• Situational Awareness (Service Assurance)</td>
</tr>
</tbody>
</table>

**DISRUPT OR BE DISRUPTED!**
Software Defined Journey

- Start Virtualising
- Transform managed services (VMS), vPC
- Programmable Fabric
- SD WAN
- Close the Loop with Telemetry

Operational Efficiency

High

Fast

Service Agility

Low

Slow

CY’16/17

CY’19

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Programmable Transport Services
Agenda

• Key Building Blocks
  • NSO – Network Services Orchestrator
  • WAE – WAN Automation Engine
  • XTC – XR Transport Controller

• Common Use Cases
Network Automation Framework

OSS/BSS/ Operations Portal

Service Provisioning

- Services Creation
- Multi-vendor Device Abstraction
- Multi-Domain, Physical and Virtual Service Provisioning

TE Automation/Visibility

- Topology Visualisation
- What-If Analysis and Capacity Mgmt
- Constraint Based Traffic Mgmt
- BW Services

- Near Real Time Collection and Deployment of TE Tunnels
Automation Enablers

Network Service Orchestrator (NSO)
Services / Device Abstraction

WAN Automation Engine (WAE)
Multi Layer Correlation, Predictive Analysis, Demand Deduction

XR Transport Controller (XTC)

EMS
Domain Controller

Netconf/Yang
REST API

Netconf, REST, CLI

Telemetry, SNMP, Netflow, IGP
PCEP
BGP-LS

CPE

Metro and Access
Edge
Core
Data Centre

Metro DWDM
Long Haul DWDM

Netconf, YANG
REST API

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Cisco NSO: Orchestration Platform Architecture

Cisco NSO

- Customer Portal
- Network Operations
- Management Systems
- Network Automation

Network Abstraction - YANG Models

- NED
- NETCONF
- SDN Controller

Multi-Vendor
Multi-Layer
Multi-Domain
Provisioning

L2VPN
L3VPN
Network Abstraction
- NFV
- Security
- Mobile
- Service X

Access & Aggregation
Core IP/MPLS
Packet/Optical Transport

Cisco, Vendor X, Vendor Y
WAN Automation Engine

- **Modeling**
  - What if/predictive analysis
  - Global optimization

- **Assess historical and real-time data**
- **Find and manage hot spots**
- **Network efficiency analysis**

**WAE Planning**

**Path Activation**

- **Programmatic network control**
- **Model-driven Path Activation**

**Dynamic SLA Management**

- **Monitor for path constraint violations**
- **Automate network changes to ensure path compliance**

**WAE Automation**

**Time Series Visibility**

**Optimize**

**Build**

**Plan**

**WAE**

**WAE Planning**

**WAE Automation**
Cisco L3 PCE Controller Architecture

XTC (XR Transport Controller):

- **Runs** on any XR platform
- **Collects topology** via IGP, BGP-LS or combination of both BGP-LS and IGP.
- **Deploys** RSVP-TE tunnel via PCEP and SR policy via PCEP or BGP.
- **Computes** paths for **Shortest, Disjoint, Low Latency, Resource Avoidance use-cases**
  - For these applications, XTC can operate as a stand-alone PCE without relying on WAE.
- **North Bound** interface with application: YANG, REST, CLI

WAE (Wan Automation Engine):

- **Collects topology** via XTC
- **Collects BW utilisation** via Streaming Telemetry, SNMP
- **Deploys** RSVP-TE tunnel or SR policy via XTC (preferred: stateful) or NSO (optional: stateless)
- **Computes path** for all bandwidth related use-cases
Service-Driven Bandwidth on Demand

1. NSO Service
   NSO
   NEDs

2. Configure headend router with path-delegated LSP

3. Path delegation
   Path compute request with BW constraint
   Topology via REST/YANG
   Topology via BGP-LS/PCEP

4. Traffic

5. Path programming via PCEP

Configure headend router with path-delegated LSP

Path compute request with BW constraint

Topology via REST/YANG

Topology via BGP-LS/PCEP

Traffic
Service-Driven Path Computation (non-bandwidth)

1. NSO Service
2. Configure Headend router
3. Path delegation
4. Path programming via PCEP

WAE
Topography via REST/YANG

XTC
Topography via BGP-LS/PCEP

NSO
NEDs
Tactical BW Optimisation

BWopt (TTE) app

1. Topology via REST/YANG
2. Topology change
3. Policy violation
4. Path response/request
5. Path compute with BW constraint
6. Topology/BW change
7. New/modify LSP
8. Deploy via PCEP

Traffic

Topology change via BGP-LS

Topology via BGP-LS/PCEP
Vision - SP Automation Lifecycle

Automated Workflow & Applications

- Configuration and Change Automation
  - Define & Model Intent
  - Deploy the Network Model
- Real-Time Visualization
  - Inventory, Service-level Topology
- Real-Time Analytics
  - Ongoing Health Checks
- Event Correlation
  - Situation Mgr; Increase Signal to Noise Ratio
- Path Optimization
  - Increase Efficiency
- Remediation
  - Speed to Resolution

Big Data to Enable Automation

- Collector Service
- Data Store
- Telemetry
- Infrastructure Layer
- Relevant Data
- Raw Data at Scale

- Take action upon relevant filtered data
- Capture all data for peak accuracy
Managed Services Transformation
Agenda

• Transforming Managed Services with x86 CPE - ENCS
• Orchestration Options – Customisable vs Turn Key
  • NSO with Function Packs
  • VMS Platform
Network Functions Virtualisation Infrastructure

Orchestration and Management

- Virtual Router (ISRv)
- Virtual Router (vEdge)
- Virtual Firewall (ASA v)
- Virtual WAN Optimisation (vWAAS)
- Virtual Wireless LAN Controller (vWLC)
- 3rd Party VNFs

Network Functions Virtualisation Infrastructure Software (NFVIS)

- ISR 4000 + UCS-E-Series
- UCS C-Series
- Enterprise Network Compute Systems (ENCS)
- COTS
**ENCS 5000 Series Portfolio**

- **NEW Q3/CY17**
  - ENCS5104 4-Core
    - ISRv + 2 core VNF
    - LTE on Radar

- **ENCS5406 6-Core**
  - ISRv + 3 core VNF
  - LAN Ports
  - NIM LTE, DSL, T1
  - HDD, SSD
  - RAID, HW Crypto

- **ENCS5408 8-Core**
  - ISRv + 3 core VNF
  - PoE

- **ENCS5412 12-Core**
  - ISRv + 9 core VNF
  - PoE

**Ciscolive!**
Virtualising the Branch

Network VNFs running on ENCS with NFVIS

NFVIS on ENCS

Cisco live!

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NFVIS Software Stack

The NFVIS Software Stack includes components such as PnP Server, Console/SSH, NSO, DNA-C, Local Device Web Portal, CLI, NETCONF, REST, PnP Client, Health Monitoring, Orchestration (VM Lifecycle), Host Management, RBAC, HTTPS, Virtualisation Layer – Hypervisor and vSwitch, Interface Drivers, Platform Drivers, Linux.
NFVIS Local Management

- Enterprise NFV local management capabilities

- Components:
  - Local GUI, VM Life-cycle Manager
  - Local PnP Agent
  - Useful if WAN connectivity is unavailable
  - For small deployments

All controls written using public APIs!!
## Cisco and 3rd Party VNF Support

<table>
<thead>
<tr>
<th>VNF</th>
<th>Features</th>
</tr>
</thead>
</table>
| vEdge | • High performance  
        • SDWAN Edge  
        • NETCONF support |
| ISRv | • High performance  
      • Rich features  
      • End-to-end support |
| NGFWv | • Harden virtual services  
       • Enable secure access  
       • On-premise or cloud management |
| Third-Party VNFs | • VNF program  
                  • Tested and certified  
                  • Streamlined support from Cisco and third party |
| vWAAS | • ISR WAAS: Leader in Gartner MQ  
       • Superior caching with Akamai Connect |
| vWLC | • Survivability and scale  
      • Built for small and medium-sized branches |
| ASAa | • Comprehensive protection  
      • Full DC class  
      • Featured functionality  
      • Designed for NFV |
| Applications | • Microsoft Windows  
               • Custom applications |
<table>
<thead>
<tr>
<th>Turn-Key (Enterprise Grade)</th>
<th>Customisable – NSO with Function Packs</th>
<th>Customisable – VMS Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turnkey solution stack for end-to-end enterprise orchestration</td>
<td>Service-orchestration focused</td>
<td>One platform from offer to orchestration</td>
</tr>
<tr>
<td>On-prem or cloud-based</td>
<td>Modular solution architecture</td>
<td>OSS Integration made easy</td>
</tr>
<tr>
<td>Build/design/run &amp; Analytics</td>
<td>Flexible demarcation between SP and Enterprise</td>
<td>Well defined SDK for extensibility &amp;</td>
</tr>
<tr>
<td>Virtual and Physical</td>
<td>Multi-vendor / Multi-tenancy</td>
<td>Micro-Services Framework</td>
</tr>
<tr>
<td>Support for SDA and IWAN</td>
<td>Customised SP service catalogues</td>
<td>Multi-vendor / Multi-tenancy</td>
</tr>
<tr>
<td>Open API for Extensibility</td>
<td></td>
<td>Customised SP service catalogues,</td>
</tr>
<tr>
<td>Multi-vendor &amp; Multi-Tenant</td>
<td></td>
<td>with admin, tenant, operator portals</td>
</tr>
</tbody>
</table>

**DNA Centre**

**Network Services Orchestrator (NSO)**

**Virtual Managed Services Platform (VMS)**
NSO – Model Based Architecture

The NETCONF protocol allows a manager to set configuration, query configuration and state and execute actions on the device.

NETCONF (RFC 6241)

The YANG models describe everything there is to …
• Configure
• Monitor
• Admin actions
• Notifications
• … for each device type and version

Yang Models

 EMS  NMS  OSS  NETCONF Manager
Extending Orchestration to the Datacentre for NFV
**NSO – Model Based Architecture**

- Logically centralised network services
- Model based architecture
  - Data models written in YANG (RFC 6020)
  - Structured representations of:
    - Service instances
    - Network configuration and state
- No hard-coded assumptions about:
  - Network services
  - Network architecture
  - Network devices
- Mapping service operations to network configuration changes
- Transactional integrity
- Multiprotocol and multivendor support

### Applications
- REST, NETCONF, Java, Python, Erlang, CLI, Web UI

### Engineers
- Service Manager
- Device Manager
- Network Element Drivers (NEDs)

### NETCONF, REST, SNMP, CLI, etc
- Physical Networks
- Virtual Networks
- Network Apps

- VNFM
- Controller Apps
- EMS and NMS
Instantiating a Service with NSO

API calls to NSO to Map Service to Device Models

- **API with Input Parameters**
  - `{configure interface}
  - {interface}
  - {GigabitEthernet}
  - {1}
  - {172.16.11.1}
  - {100}0

- **Service Model**
  - service
  - interface
  - type
  - number
  - ip
  - speed
  - {10.1.1.21}
  - {100}

- **Device Model**
  - device
  - interface
  - type
  - number
  - ip
  - mtu
  - speed
  - {Device 'N'}

- **NED**
  - Network Element Driver.
  - Allows Models to be written independent of Devices.
  - NEDs provide ability to translate configuration to devices.
Core Function Pack Design

• Stacked Services Approach

- Service Models composed of multiple internal models. Single NB API exposed.
- Models are “layed” on top of each other to build specific services.
- This creates reusability in the models for new services to be deployed.
- The internal models are currently not yet supported as individual packages.
On-Boarding ENCS/NFVIS
## PnP Discovery

Cisco PnP is used to onboard ENCS/NFVIS platform.

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| 1    | **DHCP with options 43**  
      PnP server IP Address added to DHCP Server option string |
| 2    | **DNS lookup**  
      pnpserver.localdomain resolves to PnP server IP Address |
| 3    | **Plug and Play Connect** - [https://devicehelper.cisco.com/device-helper](https://devicehelper.cisco.com/device-helper)  
      re-directs to SP Provisioning Server Address |
| 4    | **USB-based bootstrapping**  
      USB drive with bootstrap configuration file - router-config/router.cfg/ciscortr.cfg |
| 5    | **Manual - using the Cisco® Installer App**  
      iPhone, iPad, Android, (roadmap - Windows mobile and PC) |
Network-PnP Cloud Redirection Service
On Boarding ENCS/NFVIS

1) ENCS boots and creates basic n/w infrastructure

2) NFVIS registration to NSO using PnP IP + serial + model + capabilities

3) NFVIS registered to NSO

4) NSO connects to branch NFVIS (NETCONF)

ENCS/NFVIS on-boarded in NSO
Loading ISR VNF

Network Service Orchestrator (NSO)

Core FP (vBranch)

SERVICE INSTANCE
VNF Definitions
NETWORK Definitions

1) NSO registers ISRv to NFVIS
2) NFVIS pulls ISRv images / local preparation
3) NSO instructs NFVIS to deploy NWS/ISRv
4) NFVIS deploys ISRv, load day 0 config and sets up local ISRv monitoring
5) NFVIS notifies NSO ISRv is active

ISRv loaded
VNFs are loaded in parallel
Agenda

• SD WAN Trends and Benefits
• SD WAN Standalone Solution
• SD WAN with NSO FPs
• SD WAN with VMS

Bringing Together Managed Services with SD WAN
**SD-WAN Enterprise Grade Capabilities**

Reducing Cost and Complexity for Agile IT

- **Separation of management, control, data for scaling**
- **Redundant management—cloud or on premises**
- **Zero-touch provisioning in minutes, not days**
- **Full segmentation support for fast app deployment**
- **Choice of topologies with point-and-click**
- **Complete visibility from single pane of glass**

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**Comprehensive and Flexible to Fit Your Business**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYSICAL SECURE ROUTERS</td>
<td>on premises or cloud</td>
</tr>
<tr>
<td>VIRTUAL SECURE ROUTERS</td>
<td></td>
</tr>
<tr>
<td>IN-HOUSE IT</td>
<td></td>
</tr>
<tr>
<td>MANAGED SERVICE</td>
<td></td>
</tr>
<tr>
<td>CAPEX WITH ANNUAL SUBSCRIPTION</td>
<td></td>
</tr>
<tr>
<td>ENTERPRISE-BASED AGREEMENT</td>
<td></td>
</tr>
</tbody>
</table>
Flexible Connectivity
Lower WAN costs

- Leverage local Internet path for public cloud and Internet access
- Secure VPN for private and virtual public cloud access
Cisco SD-WAN Architecture
The Power of Abstraction

Orchestration Plane
Management Plane
Control Plane
Data Plane

vManage
vAnalytics
vBond
vSmart Controllers
vEdge Routers

APIs
3rd Party Automation

Cloud
Data Centre
Campus
Branch
SOHO

4G
INET
MPLS
Cisco SD-WAN Platform Options

Branch Services (Future)
- ISR 1000
  - 200 Mbps
  - Next-gen connectivity
  - Performance flexibility
- ISR 4000
  - Up to 2 Gbps
  - Modular
  - Integrated service containers
  - Compute with UCS E
- ASR 1000
  - 2.5-200Gbps
  - High-performance service w/hardware assist
  - Hardware & software redundancy

vEdge Appliances
- vEdge 100
  - 100 Mbps
  - 4G LTE & Wireless
- vEdge 1000
  - Up to 1 Gbps
  - Fixed
- vEdge 2000
  - 10 Gbps
  - Modular
- vEdge 5000
  - ~30 Gbps
  - Modular

Virtualisation
- ENCS 5100
  - Up to 250Mbps
- ENCS 5400
  - 250Mbps – 2GB

Public Cloud
- Microsoft Azure
- Amazon Web Services
SDWAN Rollout and Positioning

**Phase 1 – Now**
No Integration

- **Deployment Scenarios**
  - vManage w/ vEdge/ENCS

- **Lead Motion**
  - vManage w/ vEdge/ENCS

- **Key Dates**
  - vEdge on ENCS (x86) = Jan’18

**Phase 2 – Mid CY18**
Platform Integration

- **Deployment Scenarios**
  - vManage w/ Any EN Platform

- **Lead Motion**
  - vManage w/ Any EN Platform

- **Key Dates**
  - LA – Mar’18
  - GA – Jul’18

**Phase 3 – 1HCY19**
Management Integration

- **Deployment Scenarios**
  - DNA Centre w/ Any Platform

- **Lead Motion**
  - DNA Centre w/ Any Platform

- **Key Dates**
  - Early 2019
Running vEdge Cloud on ENCS

Virtualizing the branch

- vEdge Cloud + other VNFs
- NFVIS 3.7.1
- ENCS5104
- ENCS5406
- ENCS5408
- ENCS5412

- ENCS On Boarding
- Automation of Managed Virtual Branch (vEdgeCloud, Firewall, WAN Opt, etc …)
- vEdge Cloud day0 configuration
Plug-n-Play vEdge Secure Bring-up

Administrator

Identity Trust

vEdge List (White-List)

ZTP Server

vEdge Configuration Template

vManage

vSmart

vBond

Identity Trust Administrator
SDWAN-SITE Function Pack

**NSO/vManage Split**
Cisco and 3rd party VNFs

- NSO (vBranch, vManage NED) to instantiate VNFs (including 3rd party VNFs) and activate vEdge. Apply device template
- vManage to configure vEdge

---

**Potential SP Model**

**Service Abstraction APIs**

**SDWAN-SITE Function Pack**

**vBranch Function Pack**

SDWAN FP scope with expand over time
vEdge Cloud Provisioning / Activation

1. Define SDWAN Service on ENCS (VNF and Chaining)

2. Get the unclaimed vEdge Cloud router list from vManage. Generates Bootstrap Configuration file (cloud-init config file) which contains cloud-config (bootstraps) and cloud-boothook (day0) sections

3. Deploy VM

4. VNFs instantiated and loaded with Bootstrap Configuration cloud-init file. Chaining of VNFs occurred if requested.

5. Initial control communication

6. Initial device configuration from vManage

7. Full Registration and Configuration

Network Service Orchestrator (NSO)

Core FP (vBranch)

Core FP (SDWAN-SITE)

vManage

Control and Policy Elements

Virtual Networks (ENCS)
vEdge-Cloud Onboarding process

1) Upload vEdge Certified Serial Numbers onto vManage
2) Get the unclaimed vEdge Cloud router list from vManage
3) Instruct vManage to:
   - Create day0 template
   - Attach day0 template (with variables) to an unclaimed vEdge Cloud router
   - Generate a Bootstrap Configuration file for the vEdge Cloud router (UUID, Token, …).
4) Get Bootstrap Configuration file for the vEdge Cloud router (cloud-init config file) which contains cloud-config (bootstraps) and cloud-boothook (day0) sections
5) VNFs instantiated and loaded with Bootstrap Configuration cloud-init file. Chaining of VNFs occurred if requested.
6) NFVIS notifies NSO vEdge is alive
7) vEdge to Viptela Control Plane Initial control communication
8) vManage installs certificate into vEdge Cloud router and sync up. vEdge Cloud router is ready for configuration from vManage
9) Poll vManage to verify vEdge Cloud router is in-sync
Cisco SD-WAN Automation Stack – so far …

1. Viptela vManage
   Customer has vEdge appliances without a need for virtual CPE, service orchestration and OSS/BSS from Cisco

2. Extended SD WAN Orchestration
   Customer has virtual CPE’s or when orchestration of other than vEdge appliances are needed without a need for OSS/BSS from Cisco
Combination of All Solution Components = Service Offer

- Network Orchestrator
  Provide the configurations to the network to instantiate or modify the service.

- Billing Notifications
  Service specific billing notifications and actions to customer billing systems.

- Service Integration APIs
  APIs designed to tie into relevant OSS/BSS systems for service specific integration.

- IDM Integration
  Ability to integrate with existing systems to enable single sign-on capabilities.

- Service Data Storage
  Ability to collect and store service data on a per-tenant basis.

- Service Health/Stats
  Service health, usage and performance data presented in graphical/tabular format.

- Service Performance Data
  Tenant accessible portal used to add/modify/delete services and view other service attributes.

- Admin/Operator Portal
  Web based portal available to the operator as well as the administrator.

- End User Portal
  Web GUI for Tenants, Administrators and Operators

Customised Solution Components Designed for Integration into Service Provider Environments

- Correlate Service Data
  Correlate service data across components to make relevant for SP systems and use.

- Service Correlation
  Service health, usage and performance data presented in graphical/tabular format.

- Service Health/Stats
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VMS is a Service Creation and Delivery Platform

Service Catalog

Cloud based Service Creation …One Platform from Offer to Orchestration

VMS Service Packages simplify…

How to create and monetise a service

How to orchestrate and activate a service

How to monitor and modify a service

How to collect analytics and bill a service

How to boot and manage virtual and physical devices

Many Service Packages offered from the SP Cloud
VMS is Agnostic to Service Implementation

Bidirectional APIs

Managed Services Based On 
Self-Orchestrating Systems

VMS service packs

VMS

Service Provider 
OSS/BSS Systems

YANG, 
Netconf, CLI

Managed Services Based On 
VMS-Orchestrated Systems

meraki

3rd-Party

viptela

Cisco VNFs

3rd Party VNFs

DNA-C

ENCS

ISR
VMS provides a Self-Service Portal and Service APIs
Capture new Customers with customised Service offers

Customers can...
• Purchase new Services
• Create new customer sites
• Select devices for each site
• Select new Service options
• Confirm service terms and conditions

Service Providers can...
• Create customised offers with monetised choices
• Integrate the service workflow with your BSS/OSS systems
• Rapidly bring services to market
• Support many tenants from a single platform

** All service configs are available through APIs or an optional User Interface
VMS with Viptela - Overview
Viptela Control Plane Onboarding to VMS

Service Interface
Service Offers
Service Infrastructure
Data Platforms

OpenAPIs
Cisco VMS Ordering Portal
Viptela Control Plane
vManage Orchestrator
vSmart Controllers
vEdge Routers

Viptela Dashboard

New or Existing
VMS Onboarding of NFVIS on ENCS as CPE Device

Service Interface
Service Infrastructure

Service Offers
Data Platforms

Service Creation Platform
OpenAPIs

NSO Orchestration
NSO Core Function Packs

VNF-Manager (ESC)
Network Functions Virtualisation Infrastructure Software (NFVIS)

ENCS Service Dashboard
Cisco VMS Ordering Portal

vBranch CPE Service
Onboard ENCS/NFVIS

Onboard NFV-IS Infrastructure to ENCS
VMS Onboarding of Viptela vEdge device to ENCS

- Service Interface
- Service Creation Platform
- Service Infrastructure
- Service Offers
- Data Platforms
- NSO Orchestrator
- NSO Core Function Packs
- OpenAPIs
- Cisco VMS Ordering Portal
- VBranch Service Pack
- ENCS Service Dashboard
- Onboard the Viptela vEdge VNF
- VNF-Manager (ESC)
- Network Functions Virtualisation Infrastructure Software (NFVIS)
- ONF (Network Functions Virtualisation)
- ENCS
VMS Onboarding of Viptela vEdge device to ENCS

VMS Viptela Service Adds ENCS vEdge to SD-WAN Service

Service Interface | Service Offers
---|---
Service Infrastructure | Data Platforms

NSO Orchestrator
NSO Core Function Pack

VMS Viptela Service Creation Platform

OpenAPIs

ENCS Service Dashboard

Viptela vEdge VNF

VNF-Manager (ESC)

Network Functions Virtualisation Infrastructure Software (NFVIS)

VBranch Service Pack

Viptela Microservice

Viptela on AWS
vManage Orchestrator
vSmart Controllers
vEdge Routers

Viptela vEdge Router on ENCS
VMS Onboarding of Viptela vEdge device to ENCS

ENCS Service Dashboard

VMS Provisions vEdge Router into Viptela SD-WAN Service Using Information from Viptela CP

VMS Viptela Service Adds ENCS vEdge to SD-WAN Service

Viptela on AWS

vManage Orchestration

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VMS Onboarding of Viptela vEdge device to ENCS
Opportunity to Add in Additional Services to Compliment Viptela SD-WAN

ENCS

VMS Viptela Service Adds ENCS vEdge to SD-WAN Service

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ENCS Service Dashboard

VNF-Manager (ESC)

Network Functions Virtualisation Infrastructure Software (NfvIS)
Cisco SD-WAN Automation Stack – Range of Options

1. Viptela vManage
   Customer has vEdge appliances without a need for virtual CPE, service orchestration and OSS/BSS from Cisco

2. Extended SD WAN Orchestration
   Customer has virtual CPE’s or when orchestration of other than vEdge appliances are needed without a need for OSS/BSS from Cisco

3. Full Stack SD WAN
   Customer has a need for Cisco OSS/BSS capabilities together with SD WAN
Conclusion

• Start with simple service first
• Decide on customisable (NSO+FPs) vs turn key platform approach (VMS)
• Embrace Model-Driven approach – it is key for configuration and operations
• Phased Approach with clear Use Cases is the way to go
  • Programmable transport
  • Managed Services
  • Extend with SD WAN
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