



TURN
IT
UP

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The bridge to possible



Deploy and Manage SD-Branch

uCPE Onboarding/Provisioning Simplified

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BRKENT-2105

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Agenda

- Need for virtualization and automation
- Key Use-cases
- SD-Branch Architecture and components overview
- SD-Branch Design, Provision and Manage
- Conclusion

What Software Defined Branch Can Do For You

Quickly roll out new services and locations

Gives you flexible deployment options

Simplify day to day operations

Simple and easy
to design, provision,
manage the trusted
services that are critical
to your business

Virtualization Offers Flexibility, Simplicity, Savings



Why Virtualization?

- Flexibility
- Less Devices, More VNFs
- Quick Rollout Time
- Service Agility
- Efficient Resource Utilization
- OpEx Savings

Cisco's Virtualization is available for both Traditional Routing as well as SD-WAN routing

Cisco Software Defined Branch - Summary



SD-Branch is an architectural choice

Controller lead, modular architecture that allows for use of best-of-breed network function service chain in Enterprise Branch.



Turn-key automation of Enterprise service-chains

Cisco SDWAN controllers are used for automation, management and orchestration, though Cisco SDWAN is **not** a requirement



Can be used to address a number of use-cases

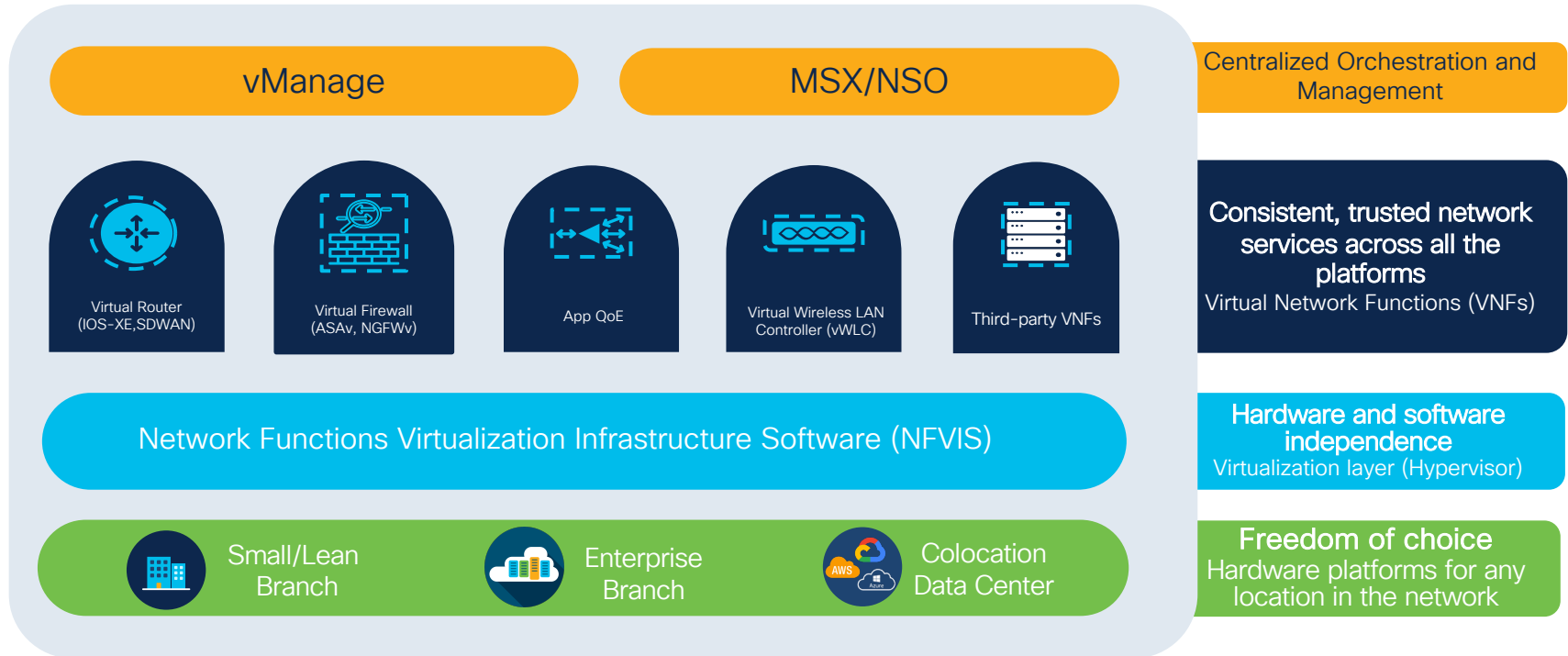
- SDWAN migrations
- Security / Compliance
- Hardware consolidation and Branch Virtualization
- Local file, Print and DDI (DHCP, DNS, IPAM) services
- SP hosted multitenant routing service



Built on
Catalyst 8200 uCPE, Enterprise Network Compute System(ENCS 5000)
Cloud Services Platform(CSP5000)
UCSE(in ISR4K, Catalyst 8K) with NFVIS

Cisco's virtualization portfolio

Network services on any platform, anywhere - branch or data center



Platform and Use-cases



Cisco's Virtualization Platform Portfolio

Small/Lean SD-Branch

NEW



Catalyst 8200 Series Edge uCPE
8 cores

Enterprise Virtualization



ENCS 5400 Series
6 to 12 cores

DC, Hub and Colocation



CSP 5200 & 5400 Series
16 to 56 cores

Cisco Catalyst 8200 Edge uCPE

System Status

- Status LED
- FAN LED
- Power LED

USB Storage

- USB 3.0

LTE WAN PIM Slot

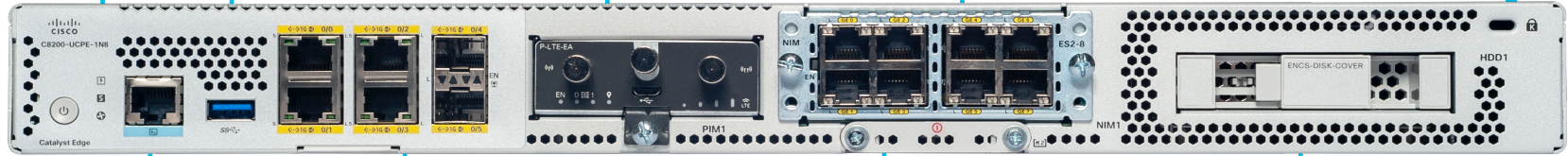
- CAT 4/6/18 PIM

Network Modules

- NIM slot

Physical Security

- Kensington lock



Management Interface

- RJ 45 Console

Data Interfaces (FPGE)

- 4 RJ45 GE WAN
- 2 SFP WAN

Storage

- USB M.2 (32GB)
- NVMe SSD M.2 (600GB, 2TB)

Storage

- SATA/SSD(2TB/4TB)

Flexible and Converged SD-Branch Solution

SD-WAN Migrations

Hardware consolidation and
Branch Virtualization

Security/Compliance

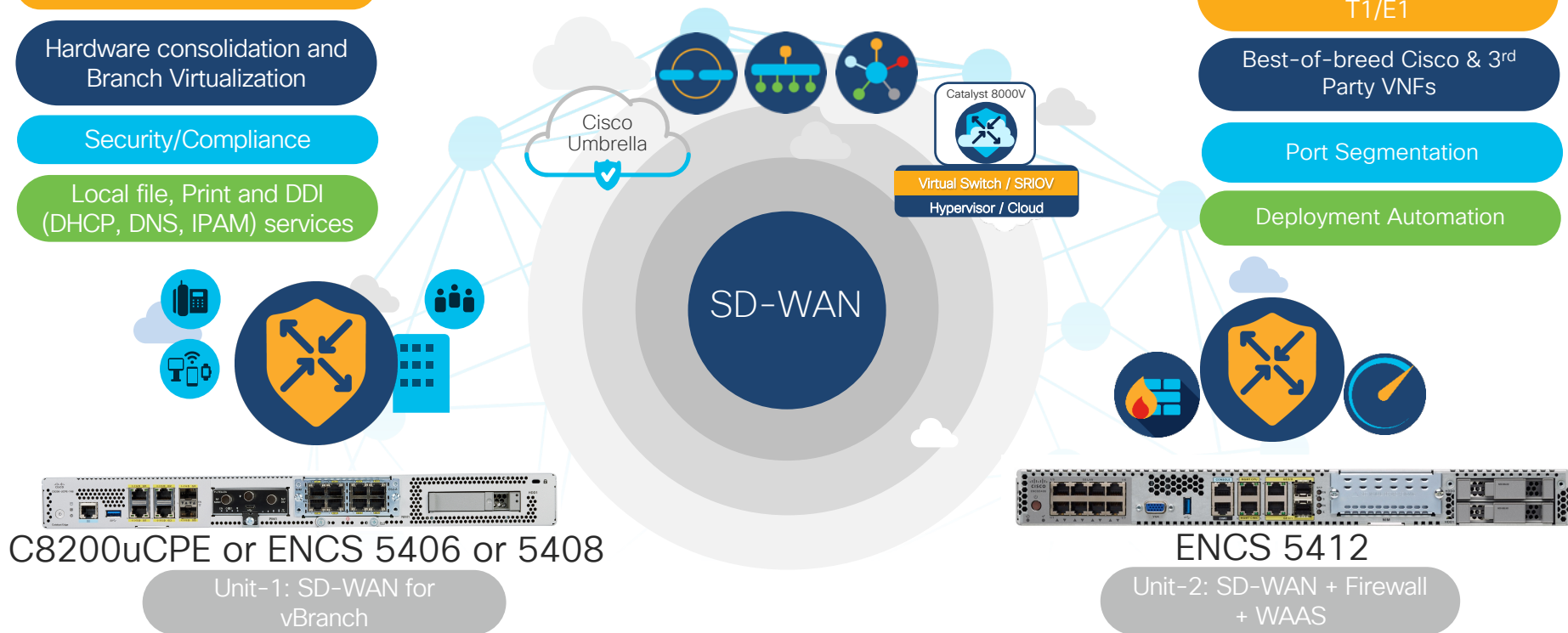
Local file, Print and DDI
(DHCP, DNS, IPAM) services

WAN diversity: LTE, DSL,
T1/E1

Best-of-breed Cisco & 3rd
Party VNFs

Port Segmentation

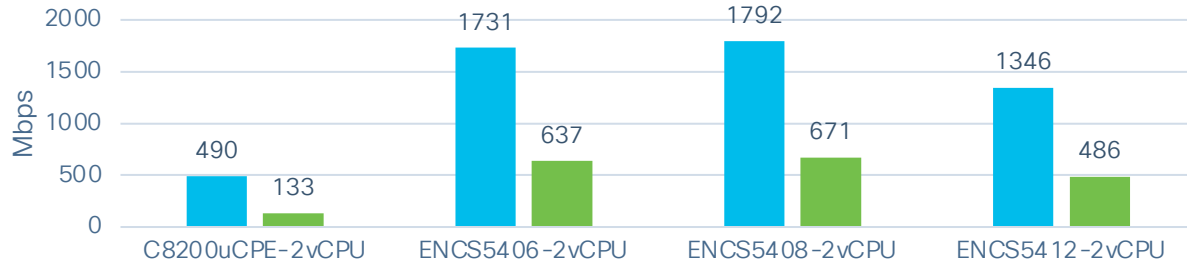
Deployment Automation



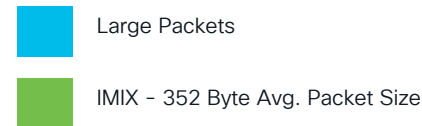
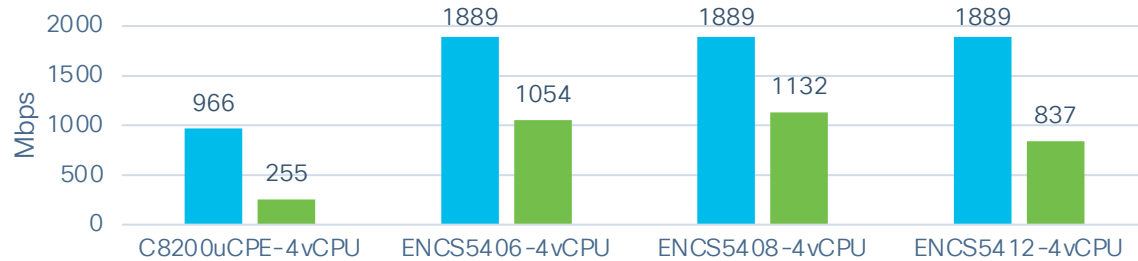
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SD-WAN (IPSec) Throughput Performance with QoS, DPI and Netflow/cFlow on SD-Branch Platforms

Low Range Access



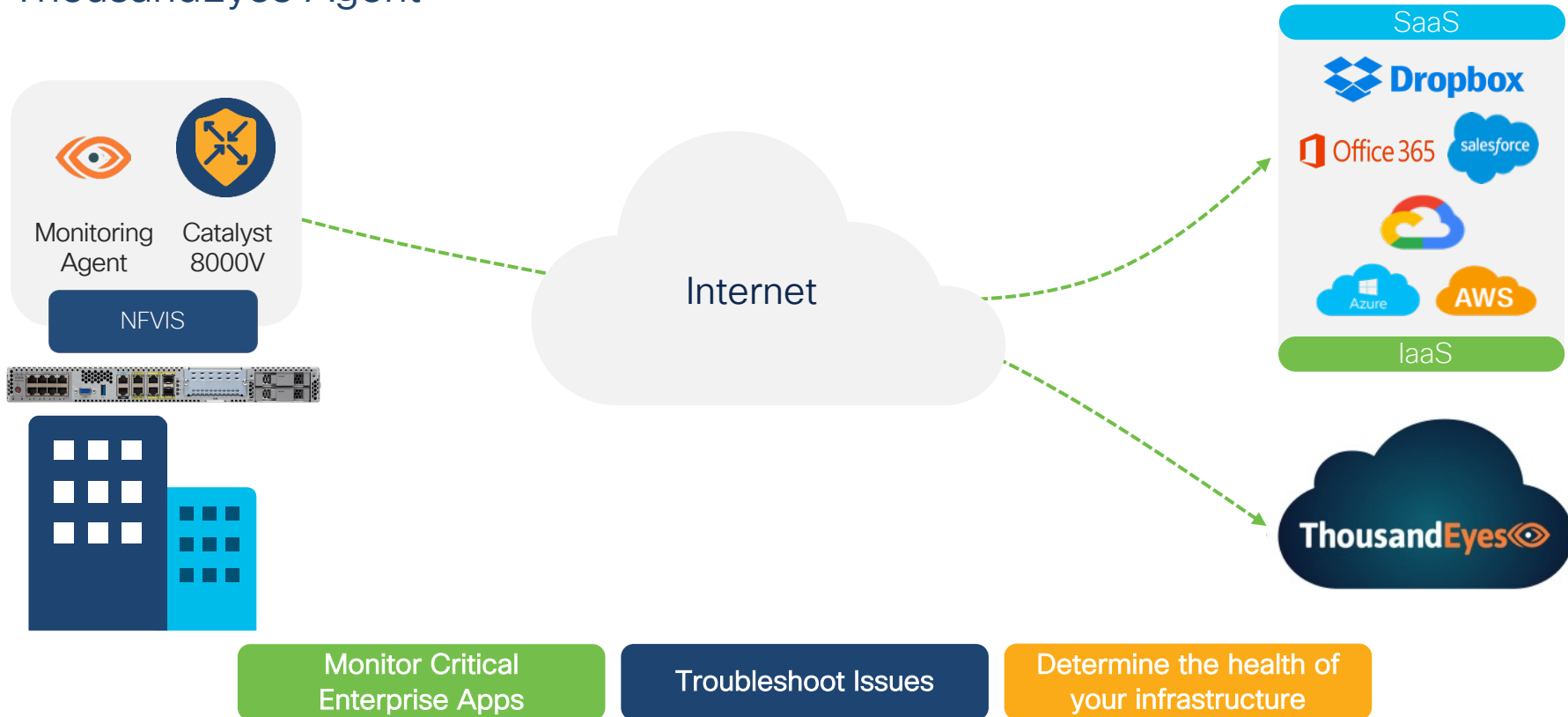
Mid-High Range Access



All Results are based on Cisco's Unified Throughput Test Methodology

- BiDirectional 1 to Many Flows
- PDR = 0.01% Packet Drop Tolerance
- Based on RFC 2544

Monitor WAN Edge Connectivity with ThousandEyes Agent

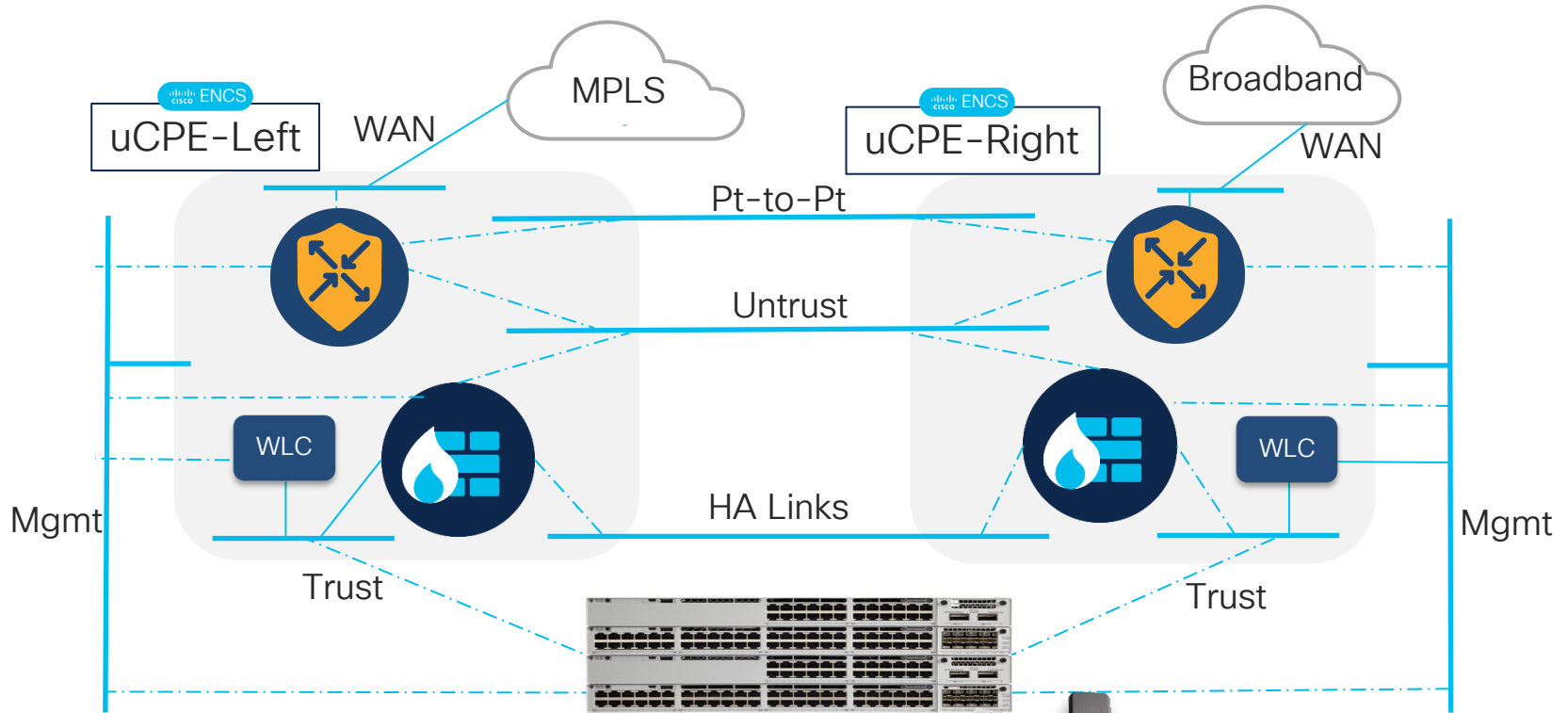


Monitor Critical Enterprise Apps

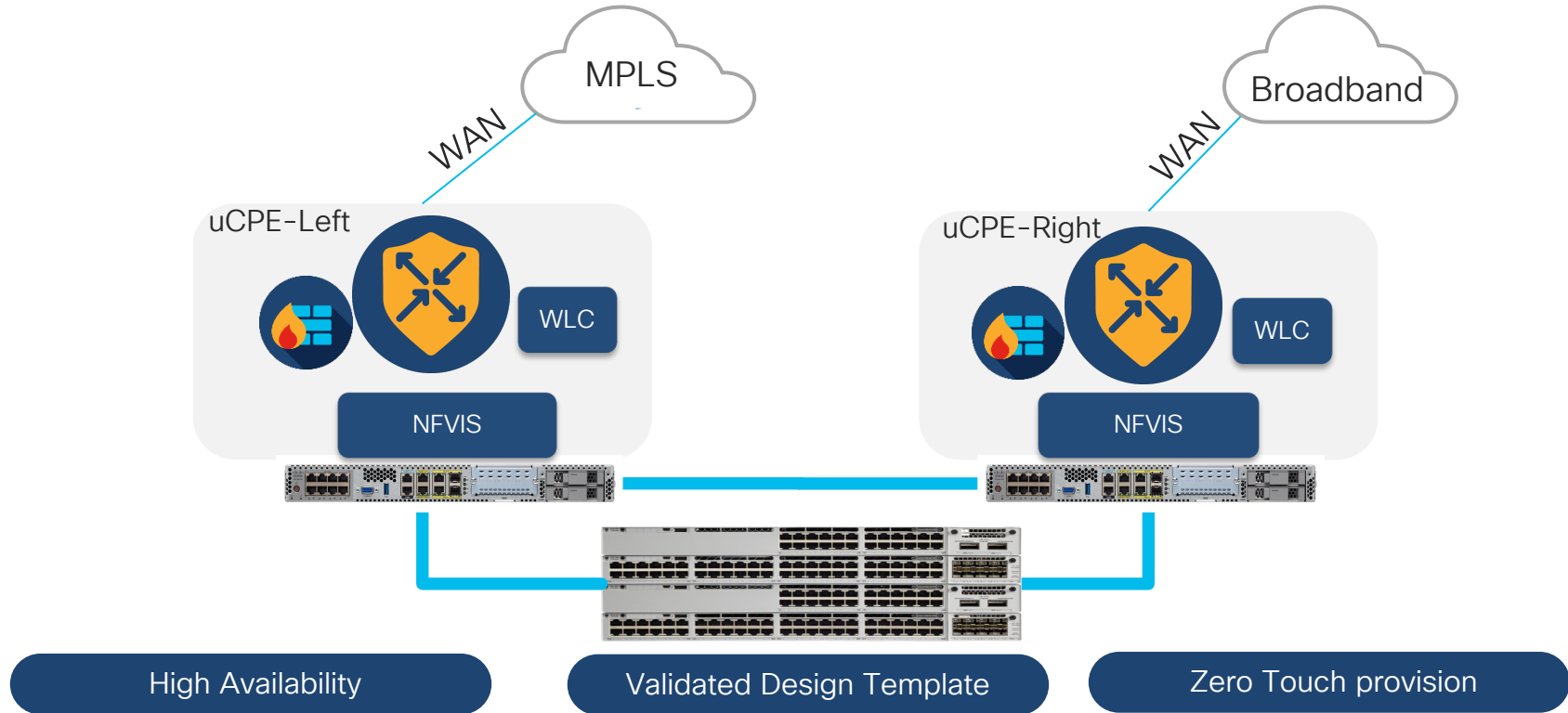
Troubleshoot Issues

Determine the health of your infrastructure

SD-Branch High Availability Design Connections



SD-Branch High Availability design



NFVIS

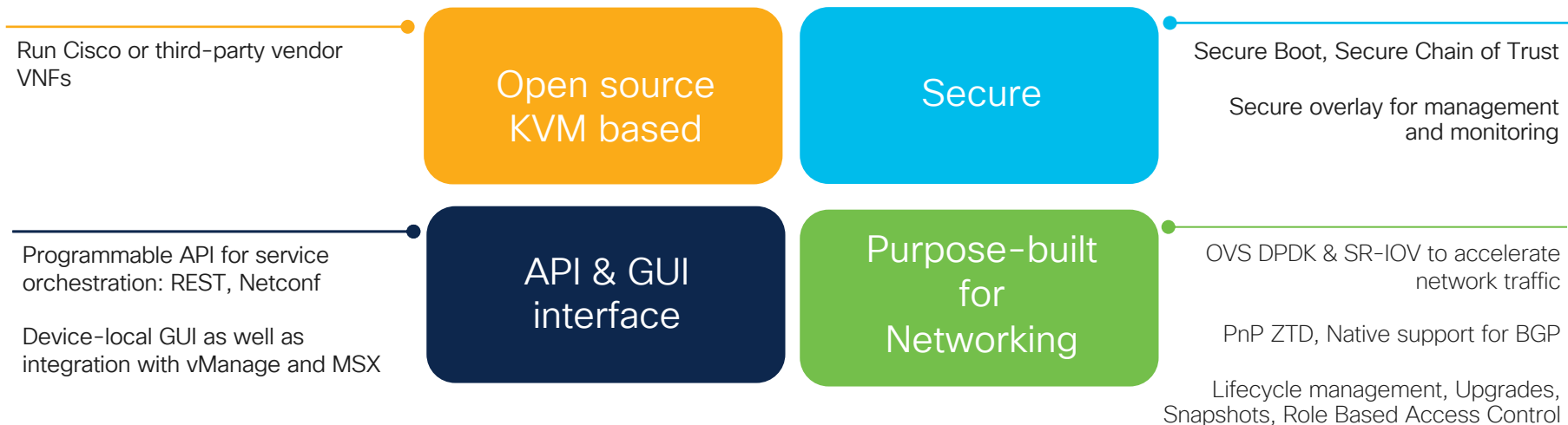
Network Function Virtualization
Infrastructure Software

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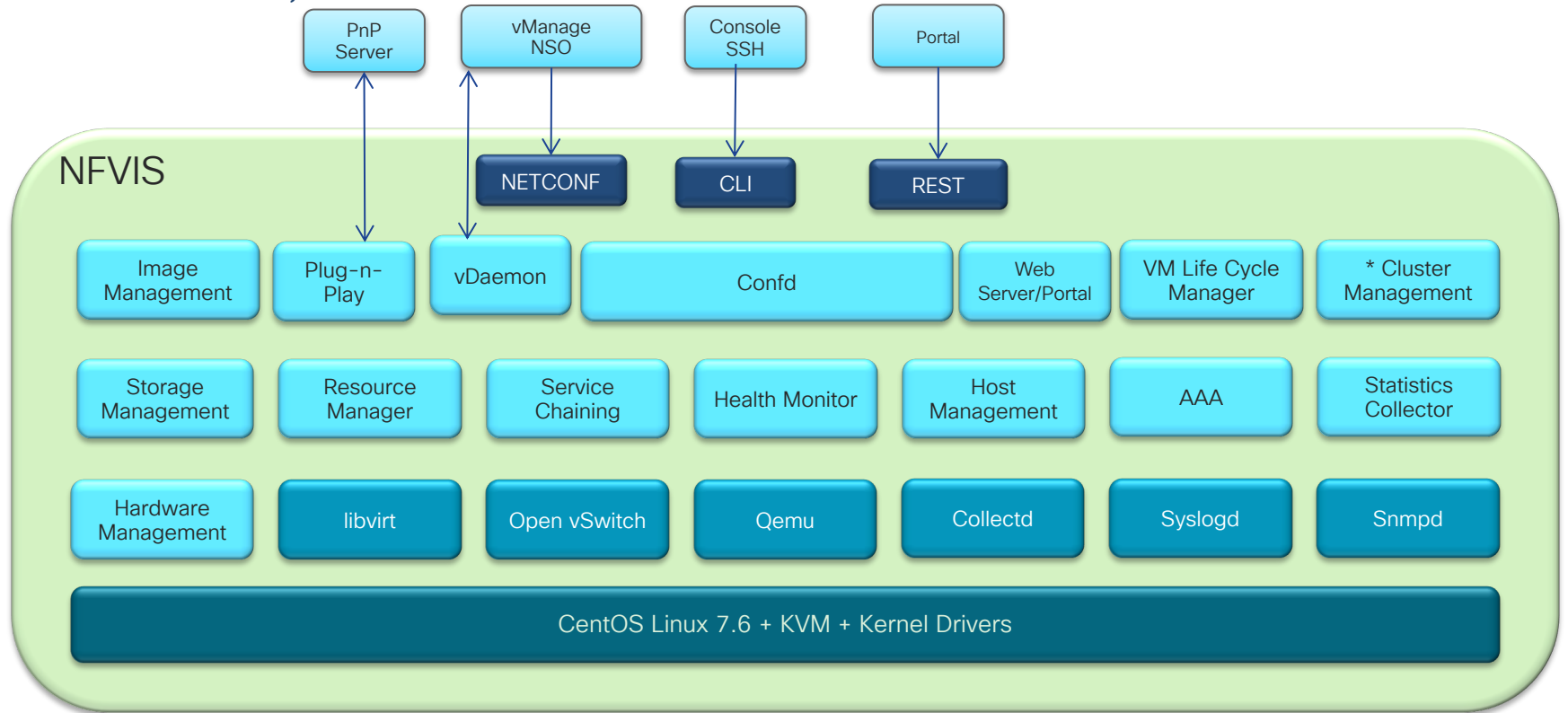
Cisco Network Function Virtualization Infrastructure Software (NFVIS)

Purpose built hypervisor designed specifically for hosting VNFs



NFVIS Architecture

Not Just KVM, Power in software



* Roadmap

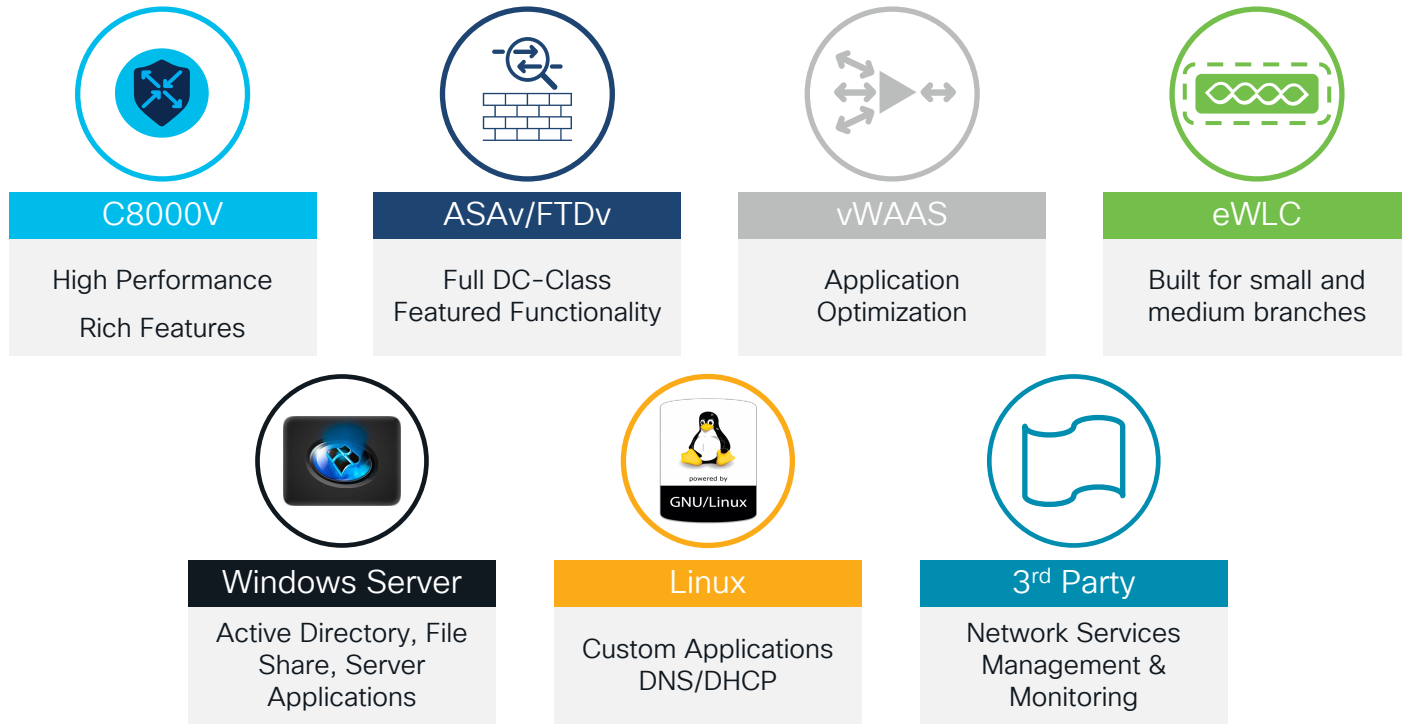
VNF Services

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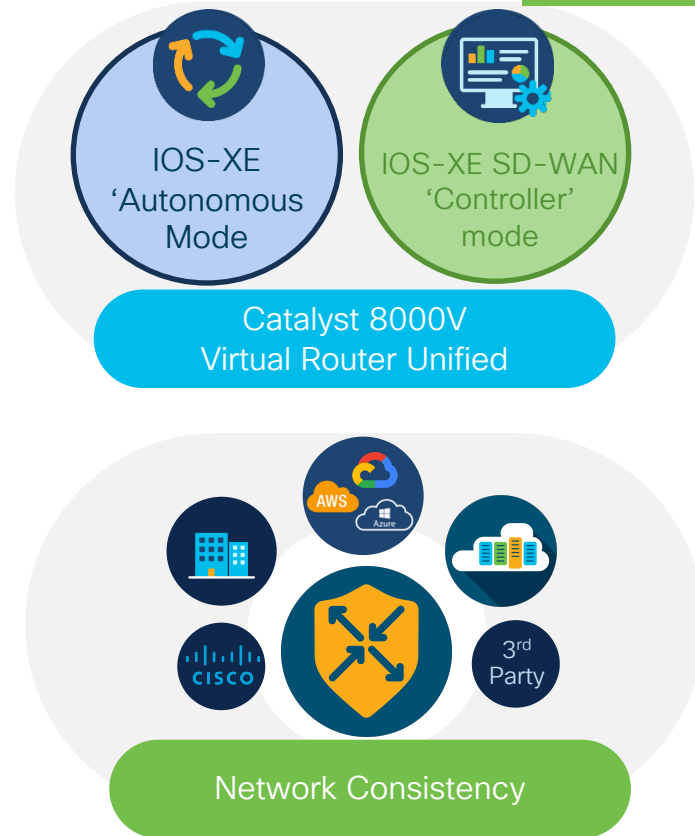
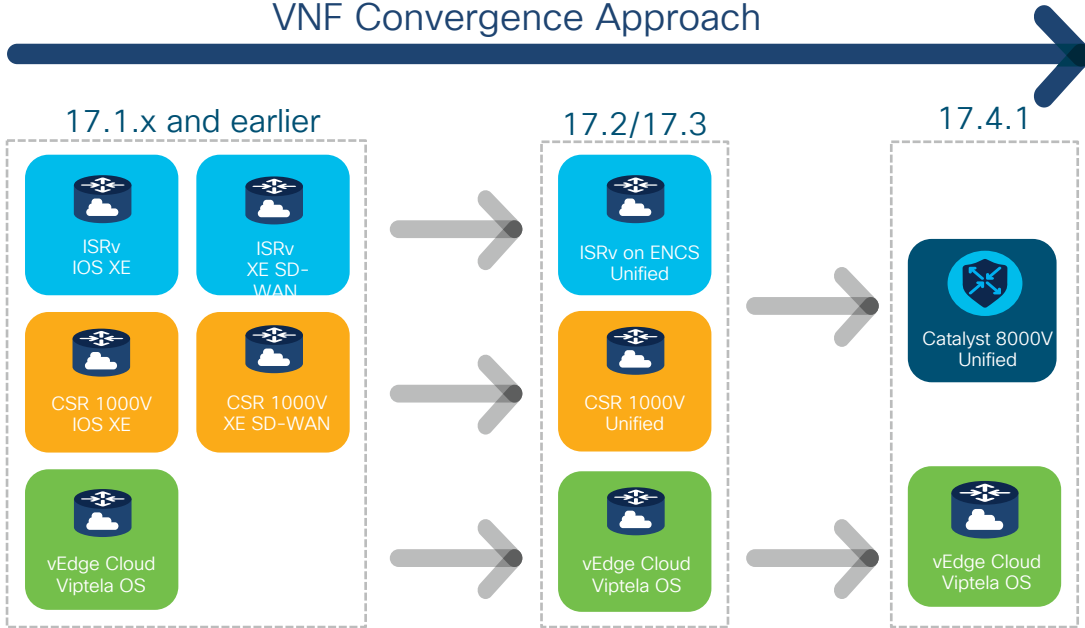
Network Services from Cisco

Consistent software across physical and virtual



Virtual Router Convergence

VNF Convergence Approach



Open ecosystem for 3rd party VNFs

Customers can call Cisco support for certified 3rd party VNFs



Run 3rd-party VNFs, regardless of certification

3rd party vendors can submit for certification

<http://cisco.com/go/enfv>

Certified



Orchestrator

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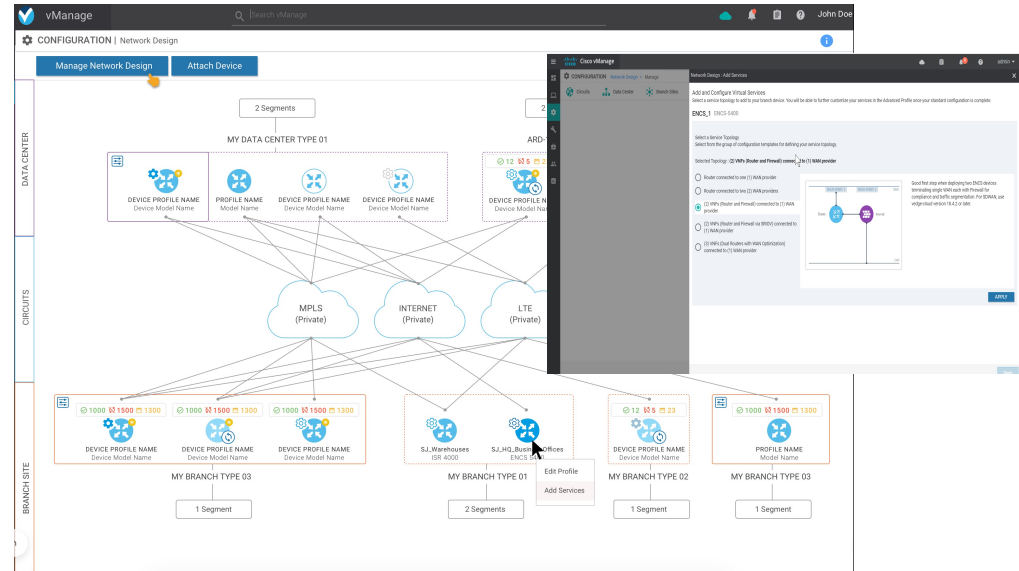
vManage orchestration for SD-Branch



Orchestration
Network Functions
NFVIS
Platform

Single pane of glass operations

- Unified life-cycle management of device and SD-WAN
- Monitoring, assurance and troubleshooting
- Centralized image repository and VNF packaging tools
 - Cisco and 3rd party VNFs



Automated service chaining

Zero-touch provisioning

Cloud delivered orchestrator

Validated network design templates



SD-Branch User Experience

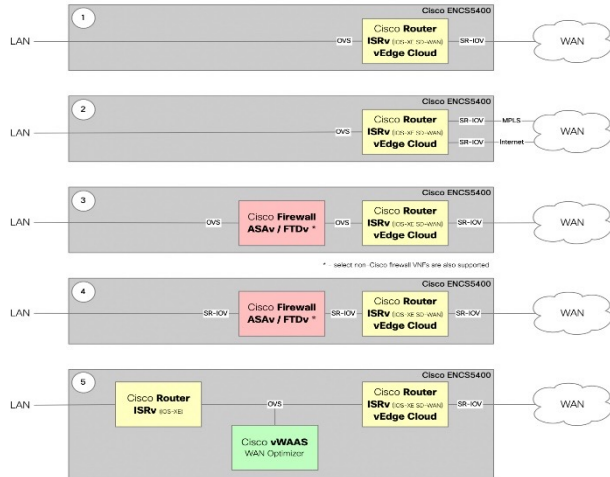
Select Network Design
In vManage



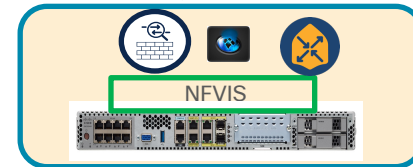
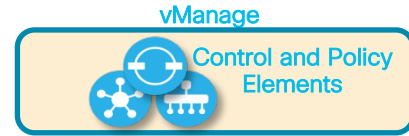
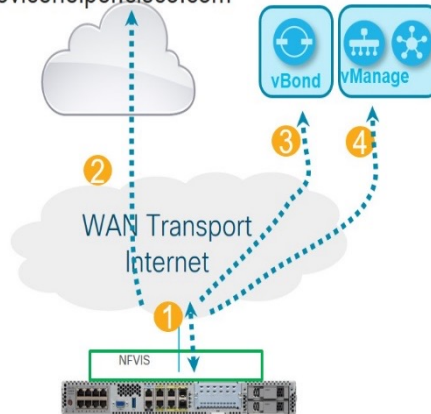
Connect Branch
uCPE Device



Provision SD-Branch
Use Full Service Branch



devicehelper.cisco.com



SD-Branch

Design, Provision and Manage

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vManage SD-Branch automation workflow



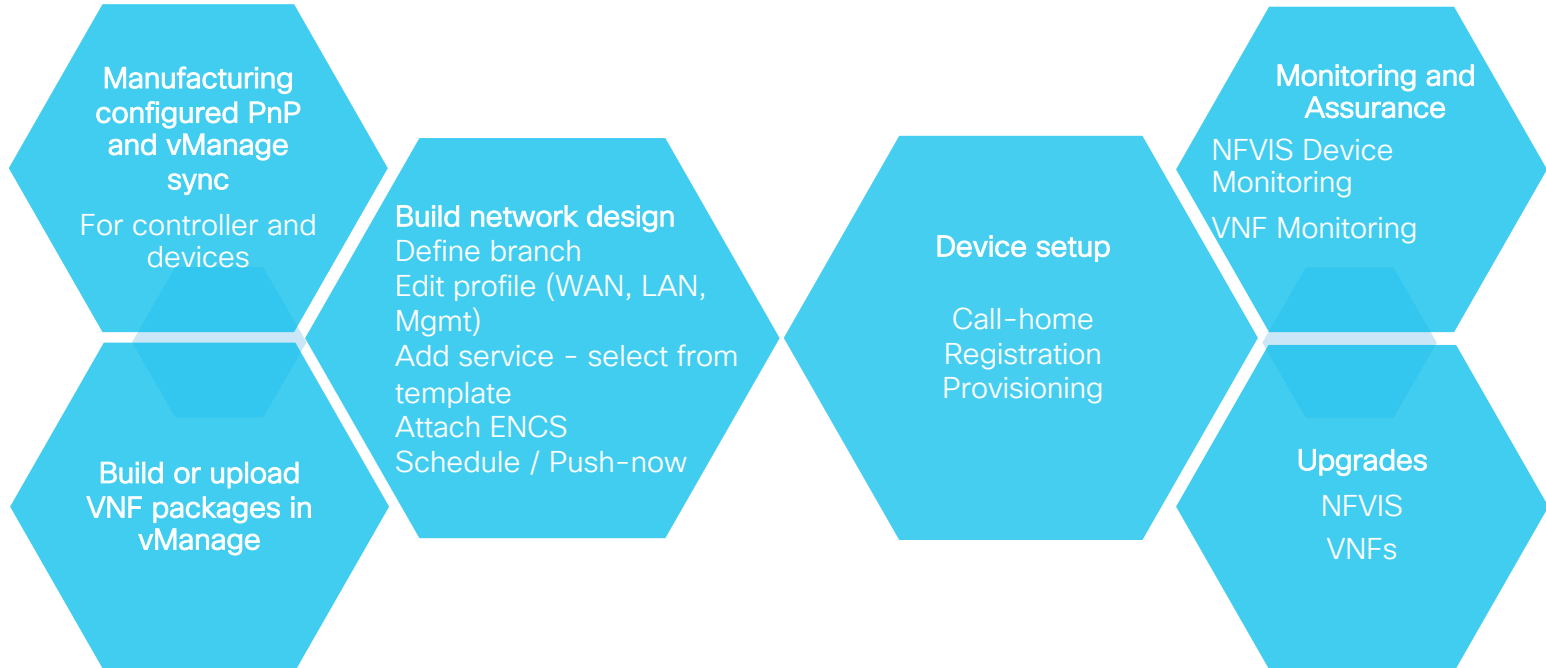
Plan



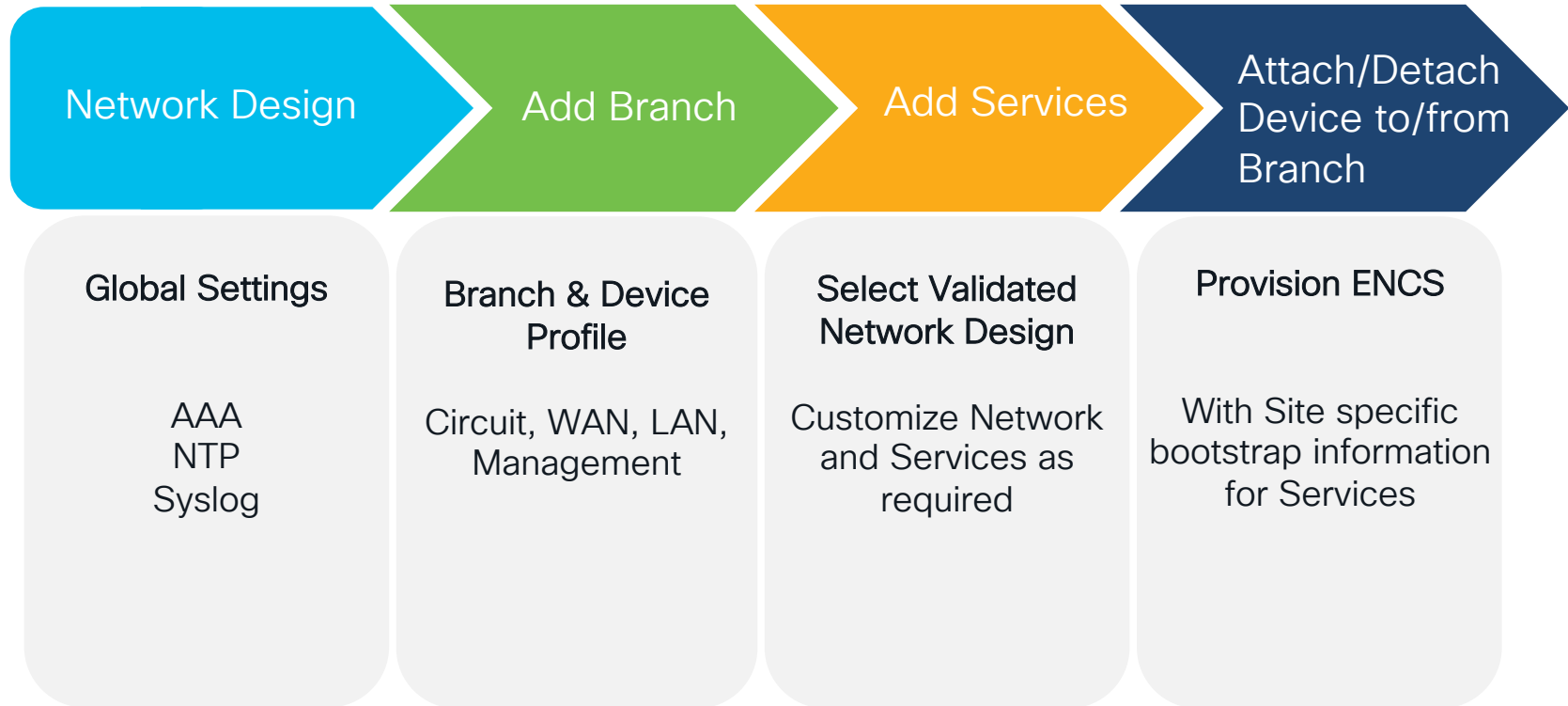
Deploy



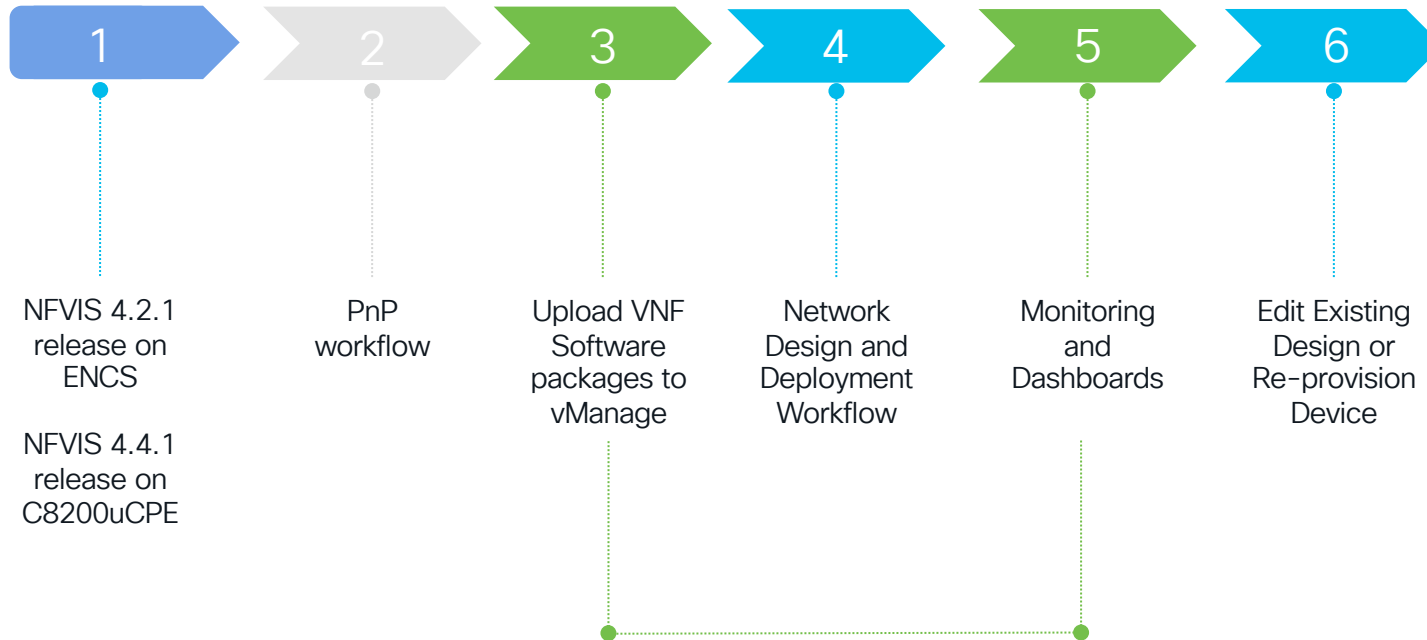
Monitor and Manage



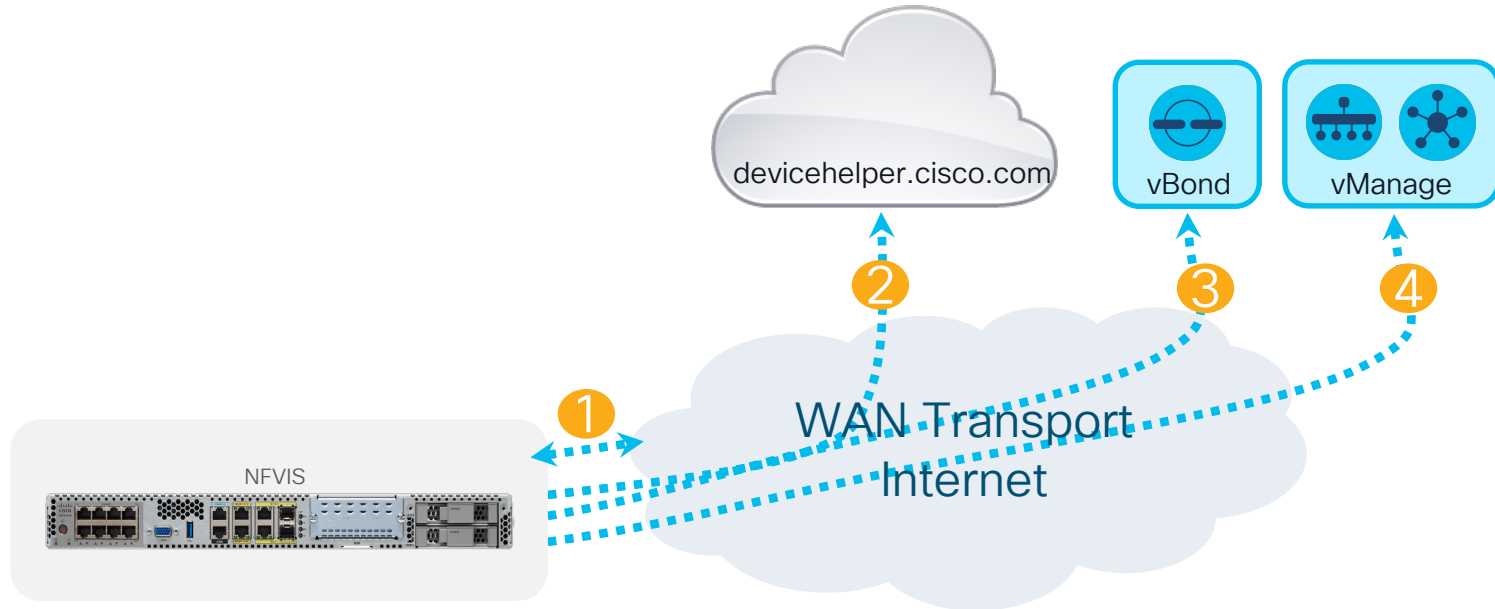
Network Design Procedure in vManage



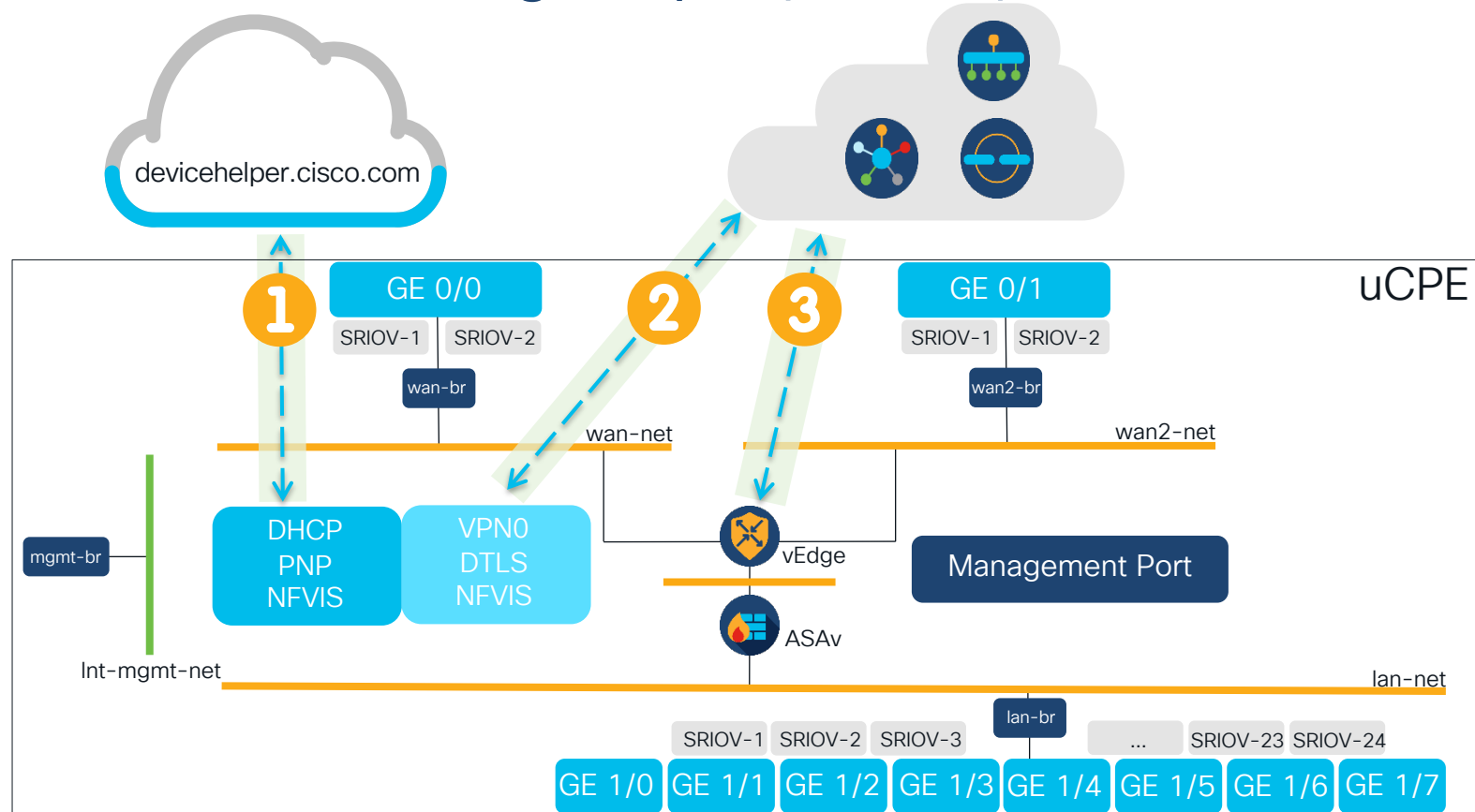
vManage SD-Branch Workflow



uCPE Onboarding steps



uCPE Onboarding steps (contd.)



Video

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The footer features the Cisco Live! logo on the left, which consists of the word "CISCO" in a sans-serif font and "Live!" in a script font. To the right of the logo is a decorative graphic of overlapping, semi-transparent shapes in various colors including blue, yellow, red, green, and orange, creating a vibrant, abstract design.

SD-Branch Design, Provision, Manage Demo Video

The screenshot displays the Cisco vManage dashboard interface. The browser address bar shows the URL `172.19.160.195/#/app/dashboard`. The dashboard is titled "DASHBOARD | MAIN DASHBOARD" and features a left-hand navigation menu with options like "Main Dashboard", "VPN Dashboard", "Security", "Monitor", "Configuration", "Tools", "Maintenance", "Administration", and "vAnalytics".

The main content area includes several key performance indicators (KPIs) at the top:

- vSmart - 1 (up arrow)
- WAN Edge - 2 (up arrow)
- vBond - 1 (up arrow)
- vManage - 1 (up arrow)
- Reboot Last 24 hrs: 0
- Warning Invalid: 0

Below the KPIs are several data panels:

- Control Status (Total 3):** A bar chart showing 3 Control Up, 0 Partial, and 0 Control Down.
- Site Health (Total 2):** A list showing 0 sites with Full WAN Connectivity, 0 sites with Partial WAN Connectivity, and 2 sites with No WAN Connectivity.
- Transport Interface Distribution:** A bar chart showing 0 sites for each category: < 10 Mbps, 10 Mbps - 100 Mbps, 100 Mbps - 500 Mbps, and > 500 Mbps.
- WAN Edge Inventory:** A table with the following data:

Total	105
Authorized	105
Deployed	2
Staging	0
- WAN Edge Health (Total 2):** Three circular gauges showing 1 Normal, 1 Warning, and 0 Error.
- Transport Health:** A section with a "Type: By Loss" dropdown and a "View Percent Utilization" link.
- Top Applications:** A section with "No data to display".
- Application-Aware Routing:** A table with columns for Tunnel Endpoints, Avg. Latency (ms), Avg. Loss (%), and Avg. Jitter (ms), with "No data available" displayed below.

vManage SD-Branch Planning Step Actions

FYI

Step 1 uCPE Release Prerequisite

1. Power-on ENCS
2. Connect WAN to SP
3. Configure system settings to enable CIMC access
4. Upload NFVIS image to CIMC
5. Host-map ISO image
6. Power-cycle server through CIMC

Step 2 uCPE and vSDWAN Device list

- Option A
1. Manufacturing populates uCPE device serial numbers into smart virtual account, ready to authenticate device SUDI.
 2. Smartsync to vManage
- Option B
1. Download CSV template, Update and Upload CSV file with list of device serial numbers and device cert ID
 2. Smartsync to vManage

Step 3 VNF Image repository

1. Login to vManage
 2. Goto Maintenance->SW Image repository
 3. Upload Cisco VNF image packages for vbranch from CCO
- Alternately, build the VNF package using vManage

vManage SD-Branch Design, Provision, Manage Actions

Step 4 Network Design and Provision Device

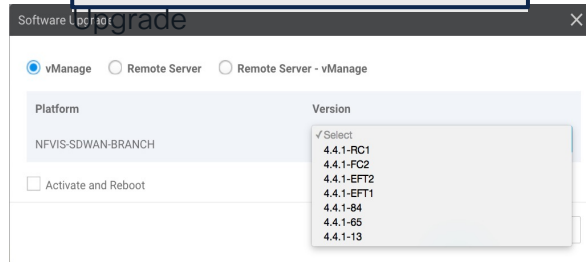
1. Goto Configuration->Network Design
2. Click Manage Network Design -> Global Parameters->CEDGE->Cisco AAA->change admin password
3. Click Manage Network Design -> Add WAN circuit
4. Click Manage Network Design -> Create Branch site -> select WAN circuits, add LAN segments
5. Click branch site -> **Create profile** -> add configuration for WAN, LAN and management
6. Click branch site -> **Add service**
 - a. Select Topology
 - b. Use pre-defined network mapping
 - c. Customize network topology via Add/Edit services/Network
7. Click branch site -> **Add CLI configuration** for NFVIS
8. Click Attach device -> click Branch Site -> click Add devices .
 - a. Update device variables manually or via csv,
 - b. preview config
 - c. click configure device
8. Click Notepad icon on top right corner to Monitor task status

uCPE device at remote site could arrive at a later date and will onboard zero touch due to pre-staging actions in vmanage.

Step 5 Manage and Monitor

1. Use dashboard for monitoring connections
2. Device and VNF monitoring
 - a. Goto Monitor -> Network -> Choose device -> Select available options

Platform/NFVIS Software



Step 6 Day N Changes

1. Click Attach device->click branch site ->Detach device
 2. Using add-on CLI, edit device configuration
 3. Template push for ISRv Day-N configuration
 4. Re-attach device
- Note : Use primary and backup ND templates for adding ND on ENCS (no service changes)

New Provisioning of existing device

Simulate offline device -> Invalidate -> Delete -> Factory reset
Simulate online device->Detach ->Factory reset

Validated Use-cases

Single Service

Network Design : Add Services

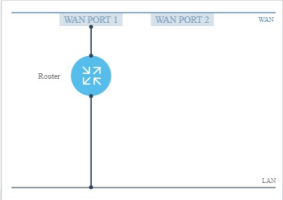
Add and Configure Virtual Services
Select a service topology to add to your branch device. You will be able to further customize your services in the Advanced Profile once your standard configuration is complete.

alpha ENCS-5400

Select a Service Topology
Select from the group of configuration templates for defining your service topology.

Selected Topology : Router connected to one (1) WAN provider

- Router connected to one (1) WAN provider
- Router connected to two (2) WAN providers
- (2) VNFs (Router and Firewall) connected to (1) WAN provider
- (2) VNFs (Router and Firewall via SRIOV) connected to (1) WAN provider
- (3) VNFs (Dual Routers with WAN Optimization) connected to (1) WAN provider



Good first step when deploying two ENCS devices terminating single WAN each. For SDWAN, use vedge-cloud version 18.4.2 or later.

APPLY

Network Design : Add Services

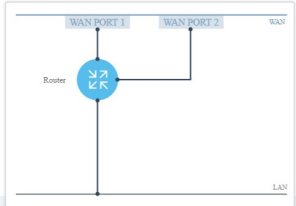
Add and Configure Virtual Services
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alpha ENCS-5400

Select a Service Topology
Select from the group of configuration templates for defining your service topology.

Selected Topology : Router connected to two (2) WAN providers

- Router connected to one (1) WAN provider
- Router connected to two (2) WAN providers
- (2) VNFs (Router and Firewall) connected to (1) WAN provider
- (2) VNFs (Router and Firewall via SRIOV) connected to (1) WAN provider
- (3) VNFs (Dual Routers with WAN Optimization) connected to (1) WAN provider



Good first step when deploying a single ENCS device terminating 2 WANs. For SDWAN, use vedge-cloud version 18.4.2 or later.

APPLY

Validated Use-cases

Multiple Services

Network Design : Add Services

Add and Configure Virtual Services
Select a service topology to add to your branch device. You will be able to further customize your services in the Advanced Profile once your standard configuration is complete.

beta ENCS-5400

Select a Service Topology
Select from the group of configuration templates for defining your service topology.

Selected Topology : (2) VNFs (Router and Firewall) connected to (1) WAN provider

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- (3) VNFs (Dual Routers with WAN Optimization) connected to (1) WAN provider

Router + Firewall

Good first step when deploying two ENCS devices terminating single WAN each with Firewall for compliance and traffic segmentation. For SDWAN, use vedge-cloud version 18.4.2 or later.

APPLY

Network Design : Add Services

Add and Configure Virtual Services
Select a service topology to add to your branch device. You will be able to further customize your services in the Advanced Profile once your standard configuration is complete.

beta ENCS-5400

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Selected Topology : (2) VNFs (Router and Firewall via SRIOV) connected to (1) WAN provider

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- (2) VNFs (Router and Firewall via SRIOV) connected to (1) WAN provider
- (3) VNFs (Dual Routers with WAN Optimization) connected to (1) WAN provider

Router + Firewall Best Perf

Maximum throughput design option, ensure that the VNFs support igbvf and i40evf driver. Good first step when deploying two ENCS devices terminating single WAN each with Firewall for compliance and traffic segmentation. For SDWAN, use vedge-cloud version 18.4.2 or later.

APPLY

Network Design : Add Services

Add and Configure Virtual Services
Select a service topology to add to your branch device. You will be able to further customize your services in the Advanced Profile once your standard configuration is complete.

beta ENCS-5400

Select a Service Topology
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Selected Topology : (3) VNFs (Dual Routers with WAN Optimization) connected to (1) WAN provider

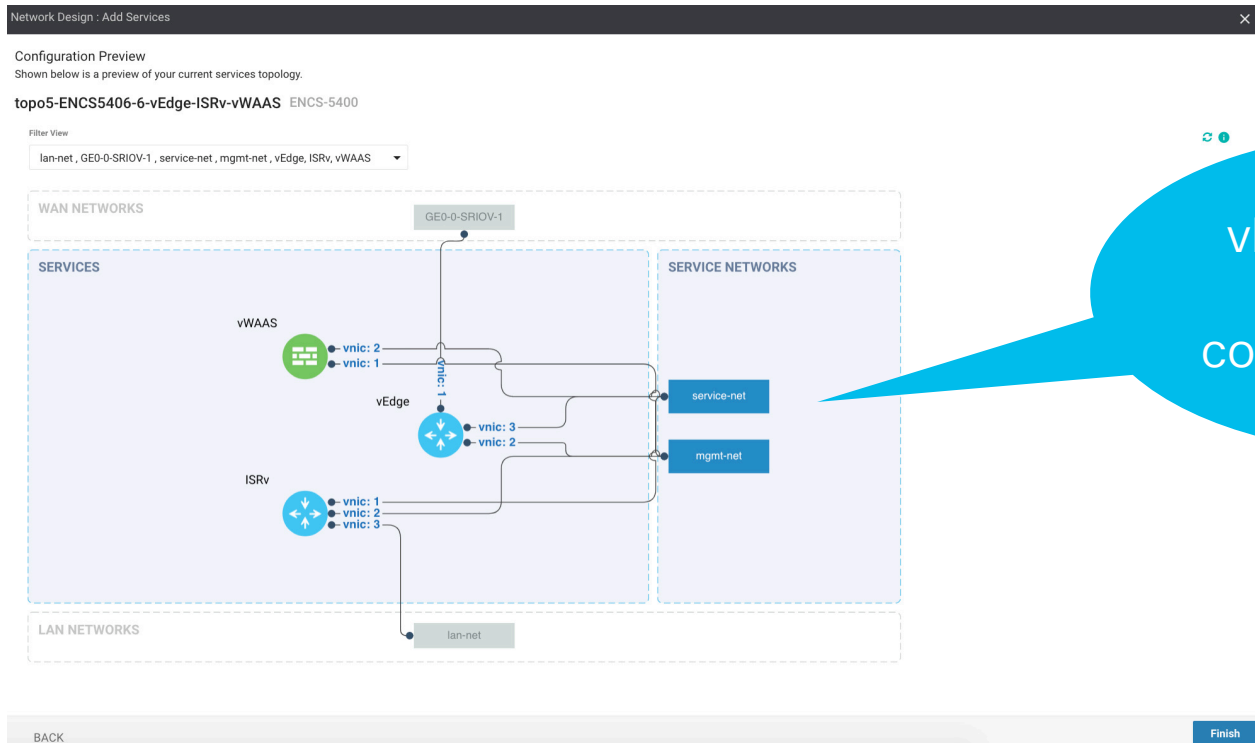
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- (2) VNFs (Router and Firewall via SRIOV) connected to (1) WAN provider
- (3) VNFs (Dual Routers with WAN Optimization) connected to (1) WAN provider

Router + Firewall + WAAS

When deploying two ENCS devices with WAN Optimization and Appnav Cluster, extend the service-net to LAN. For SDWAN, use vedge-cloud version 18.4.2 or later.

APPLY

Visual Topology View



vNIC sequence
and
connection clarity

Network Design Customization

Network Design : Add Services

Add and Configure Virtual Services

Select a service topology to add to your branch device. You will be able to further customize your services in the Advanced Profile once your standard configuration is complete.

alpha ENCS-5400

Selected Topology: Router connected to two (2) WAN providers

Services Networks

Add Service
 Service Type: Other
 Service Name: Linux
 Image Package: OTHER_redHat_rhel7-server_linux.tar.gz

Resource Profile
 CPU: 1 Memory: 2048 MB Disk: 4 GB Deployment Disk: Datastore 2(External)

VNIC ID: 0 Connected To: lan-net

Search Options

Total Rows: 5

Service Name	Type	Resource Profile	Networks	Action
ROUTER_1	Router	CPU: 2 vCPUs, Memory: 4096 MB, Disk: 8 GB	5 Interface(s)	

Add
Network(s)

Add
Service(s)

Network Design : Add Services

Add and Configure Virtual Services

Select a service topology to add to your branch device. You will be able to further customize your services in the Advanced Profile once your standard configuration is complete.

alpha ENCS-5400

Selected Topology: Router connected to two (2) WAN providers

Services Networks

Search Options

Total Rows: 6

Service Name	Type	Resource Profile	Networks	Action
ROUTER_1	Router	CPU: 2 vCPUs, Memory: 4096 MB, Disk: 8 GB	5 Interface(s)	
			int-mgmt-net (VNIC ID 0)	
			GEO-0-SRIOV-1 (VNIC ID 1)	
			mgmt-net (VNIC ID 2)	
			lan-net (VNIC ID 3)	
			GEO-1-SRIOV-1 (VNIC ID 4)	
Linux	Other	CPU: 1 vCPUs, Memory: 2048 MB, Disk: 4 GB	1 Interface(s)	
			lan-net (VNIC ID 0)	

vManage SD-Branch features

Supported features	
VNF Packaging Tool	Cisco and Thirdparty
Network Design(ND)	Single/Dual Device
ND Global Settings	AAA, NTP, Syslog
ND Device Configuration	WAN, LAN, Mgmt
ND Device->Services Configuration	Router Router+Firewall Router+Firewall+WAAS AND Other service/network customization Addon CLI Template Visual Topology representation
Supported Device	ENCS5400, C8200 uCPE
Zero Touch Provisioning	SUDI Device Auth and Day0 Configuration
Monitoring	VNF and Device Health

SD-Branch Key takeaways

- Cisco offers complete solution across all four components
 - Hardware, Network Hypervisor, VNF, Orchestrator
- NFVIS4.4.1 on C8200uCPE, ENCS enables zero-touch integration with vManage
- Virtual form factor SD-WAN on C8200 uCPE, ENCS is a production-ready alternative to physical router SDWAN deployment

CCO Document reference

[NFVIS 4.x Configuration Guide](#)

[SD-Branch Deployment Guide](#)

Why Cisco SD-Branch?



Purpose Built superior quality uCPE hardware and software



Cisco Validated Designs, Best of breed networks with NFV ecosystem support



Programmability and Automation, Security, Serviceability, Solution level TAC support

Continue your education



Demos in the Cisco campus



Meet the engineer 1:1 meetings



Walk-in labs



Related sessions





The bridge to possible

Thank you

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