



Tech Update

SDWan & Routing

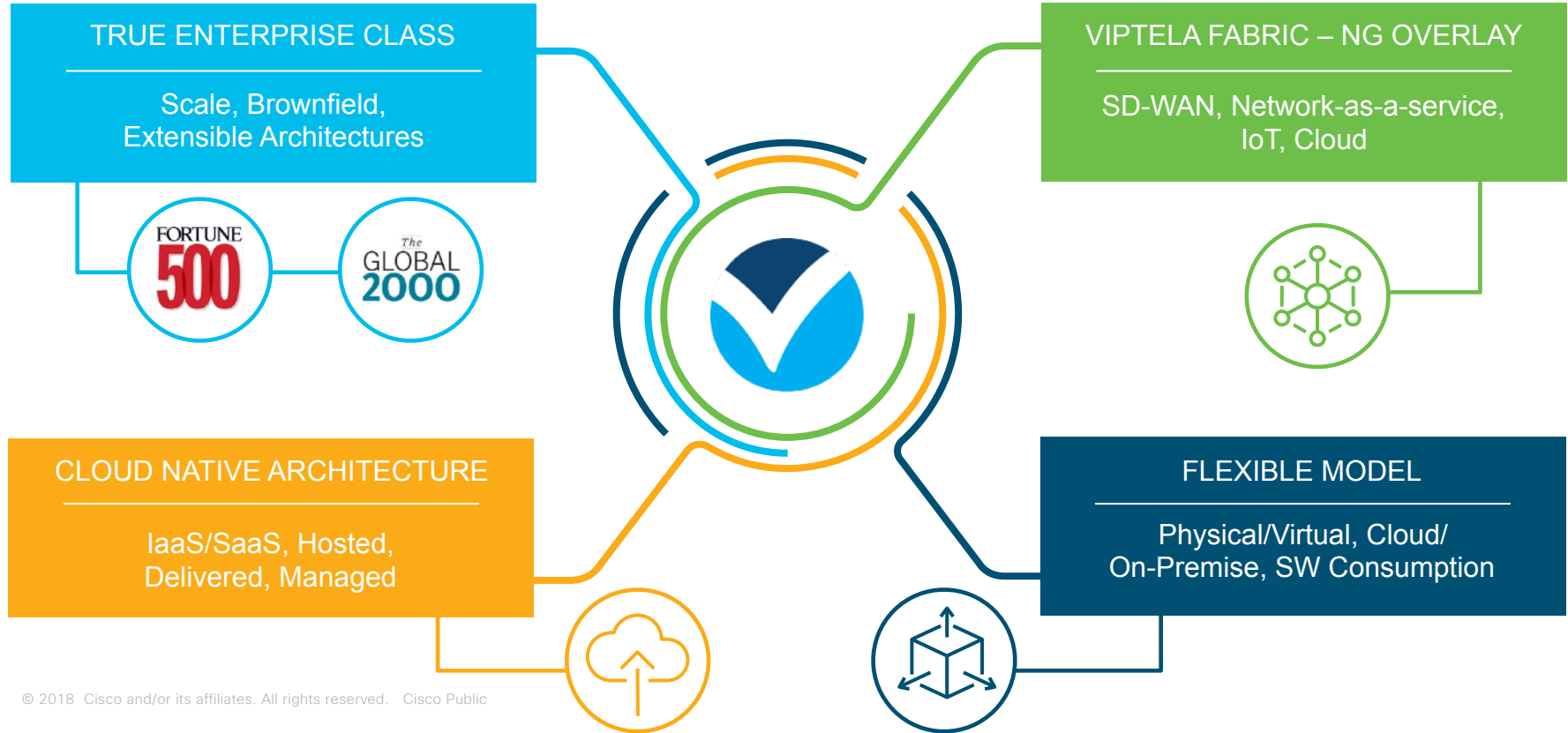
Søren D. Andreassen & Lars L. Granberg
Technical Solution Architect – Systems Engineer

4. September 2018

- SD-WAN
 - Hvad er det nu lige SD-Wan er?
 - Cisco SD-Wan Intro
 - cEdge med demo
 - Nyt i Viptella 18.3
- Routing nyt
 - ISR 1100
 - Recap & Performance tests
 - De nye 1101 small formfactor + hardned
 - Demo af gui
 - ISR 4461 – the big fat box
 - vEdge Hardware platforme

SD-Wan-for-no'tet?

Cisco SDWAN Benefits



Second Wave of SDN Is Coming to the WAN



Apps are moving to the
cloud



New devices
New challenges



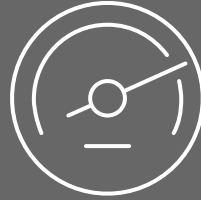
Internet edge moving
to the branch

Managing the network is getting more complex

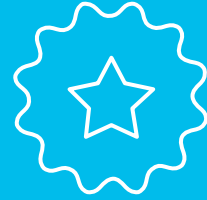
Customers want to...



Simplify WAN/Branch
management



Reduce WAN and
operating costs



Optimize user
experience

Cisco SD-WAN intro

SDWAN

Management Plane

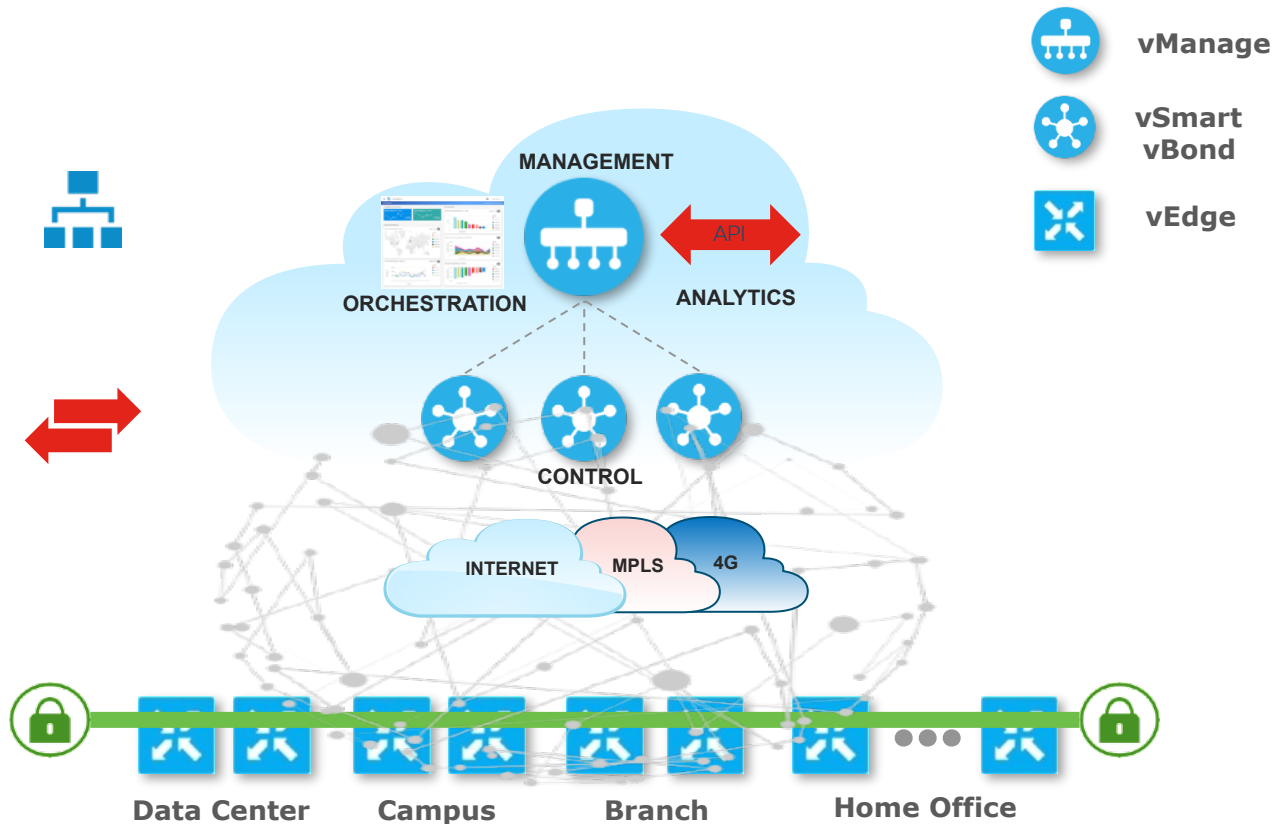
Multi-tenant or Dedicated
Cloud or on-prem

Control Plane

Cloud or on-prem

Data Plane

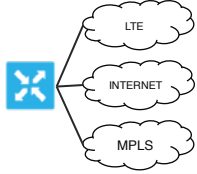
(Physical or Virtual)



Viptela SD-WAN Functions and Capabilities

Connectivity Aspects

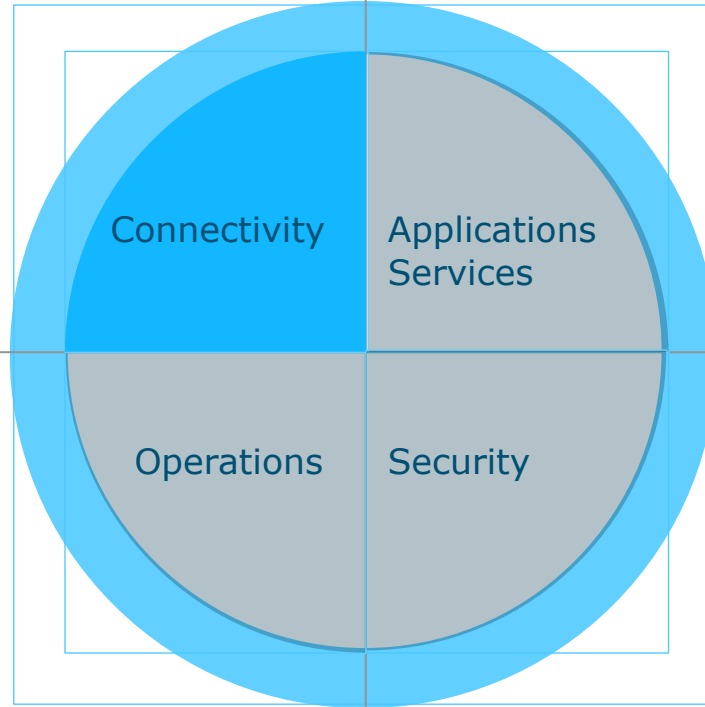
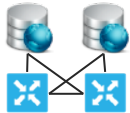
Hybrid WAN



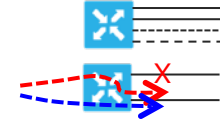
Segmentation/VPNs



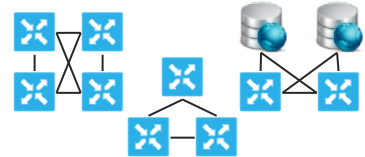
Dynamic Redundancy



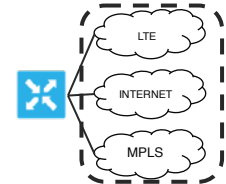
Bandwidth On Demand
Fast Convergence



Dynamic Per-VPN
Topologies



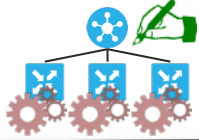
Ubiquitous Data Plane



Viptela SD-WAN Functions and Capabilities

Operations Aspects

Centralized Operations
Distributed Execution



Template-based
Configurations



Programmatic APIs
Open Object Model
NetConf



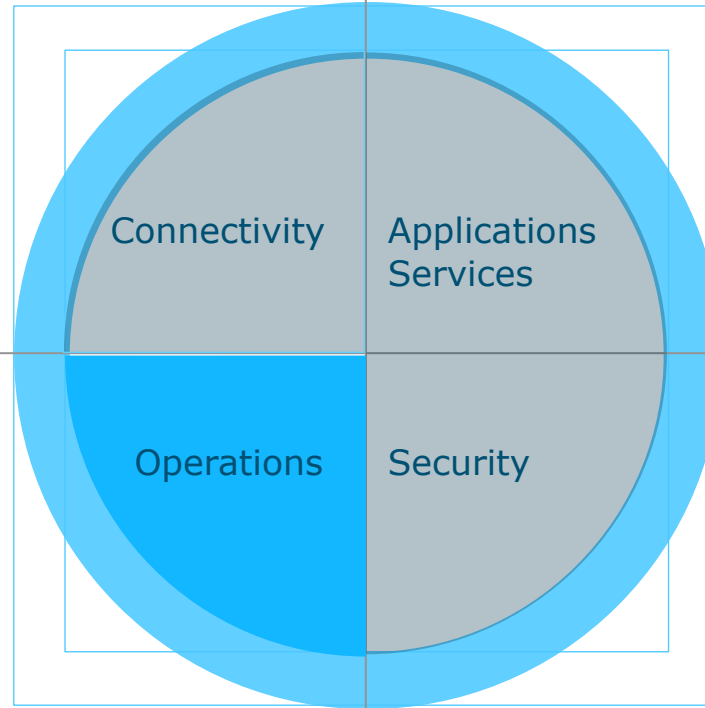
Centralized
Policy Orchestration



Zero Touch Provisioning



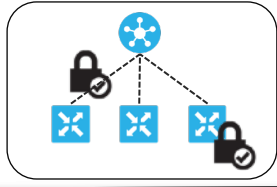
Ad-Hoc
Adds/Moves/Changes



Viptela SD-WAN Functions and Capabilities

Security Aspects

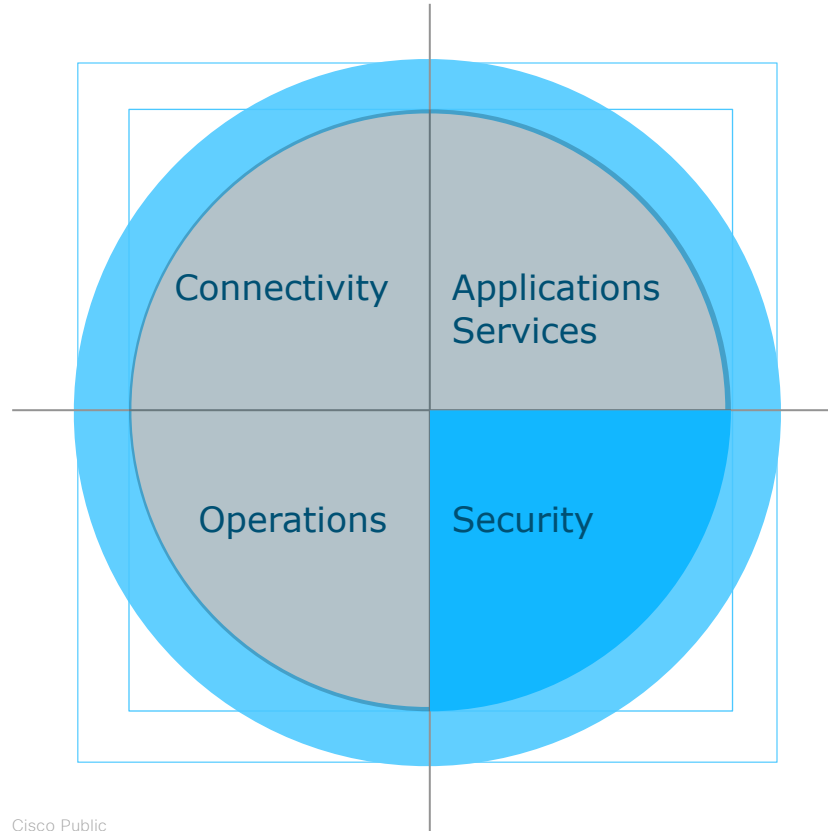
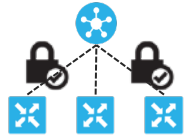
Embedded Security



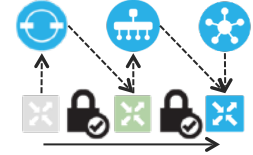
Centralized Device
Auth-DB



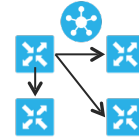
Authenticated/Encrypted
Control Plane



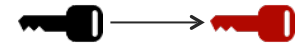
Secure Bring-up



Scalable Data-Plane
Encryption



Automatic Key Rollover



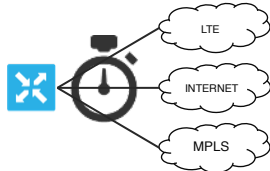
Viptela SD-WAN Functions and Capabilities

Applications and Services Aspects

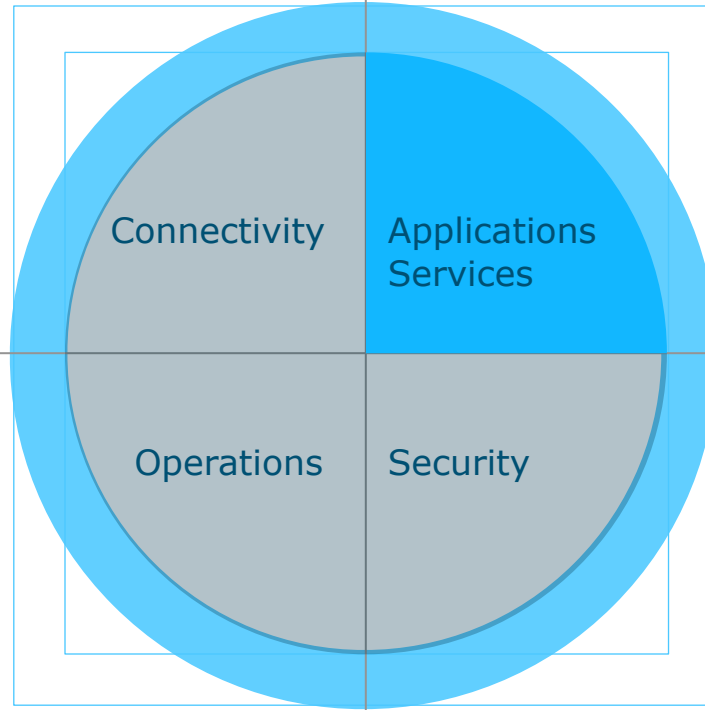
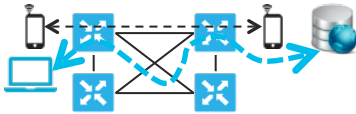
Carrier-style Portfolio



Transport SLA Monitoring



Application-Aware Routing



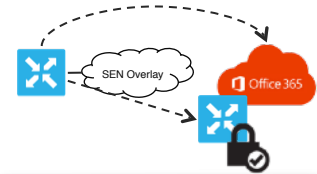
Central Orchestration



Application Layer Analytics



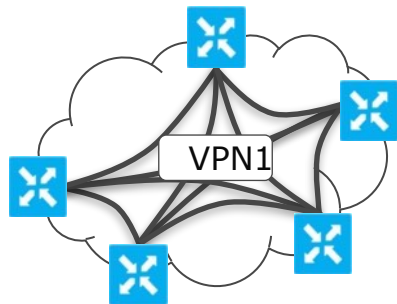
Cloud Services Integration



Application Aware Topologies

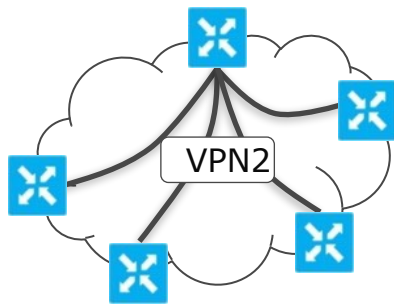
Arbitrary VPN Topologies

Full-Mesh



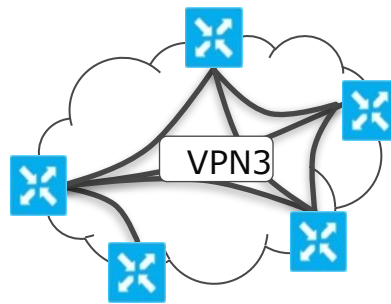
Unified
Communications

Hub-and-Spoke



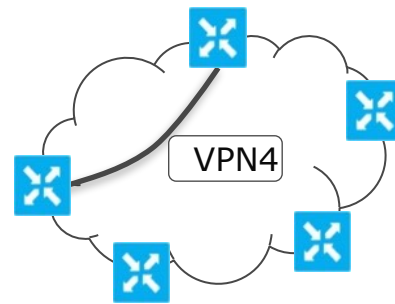
Security
Compliance

Partial Mesh



Regional
Services

Point-to-Point



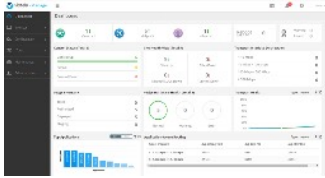
Partner
Connectivity

- Leverage control policies to influence per-VPN topology

Policy Driven WAN Infrastructure

Policy Augmented Dynamic Routing

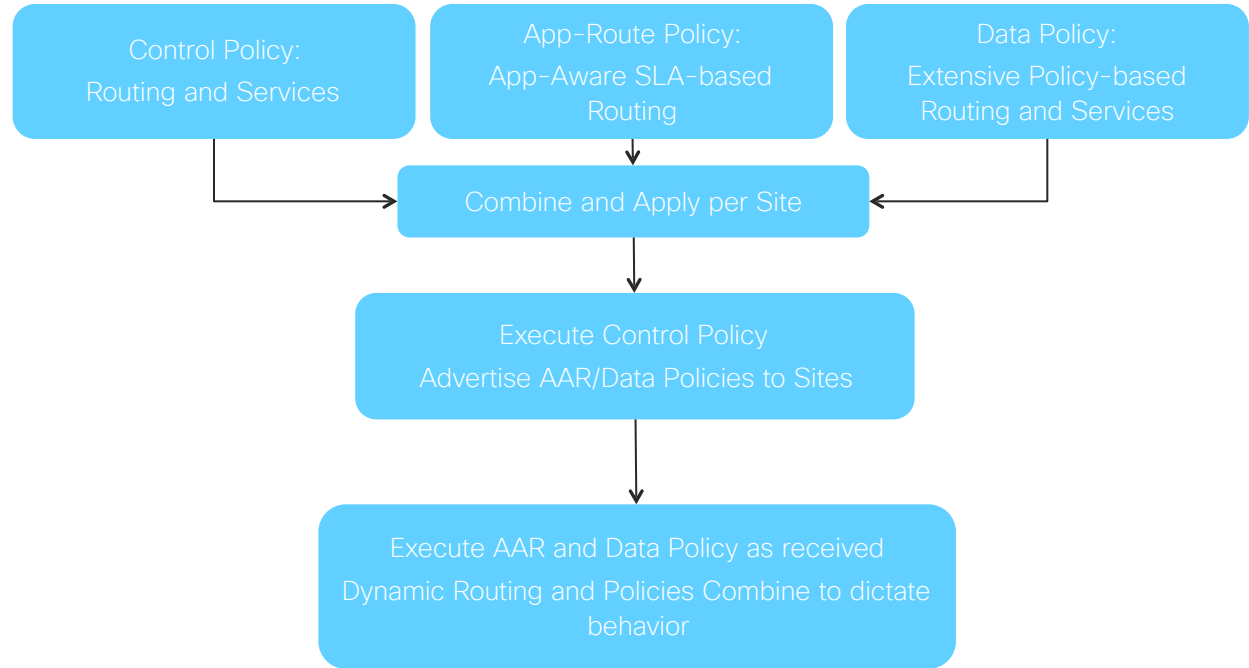
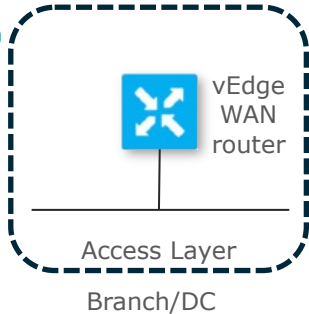
1 vManage GUI – Policy Orchestration



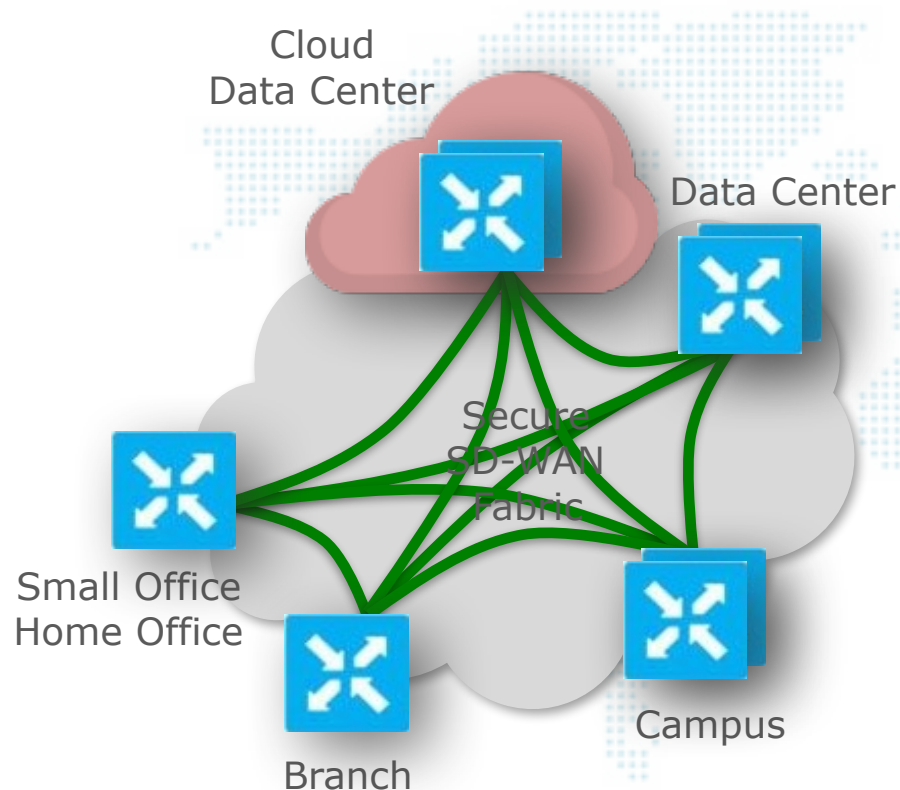
2 vSmart controller – Policy Enforcement/Advertisement



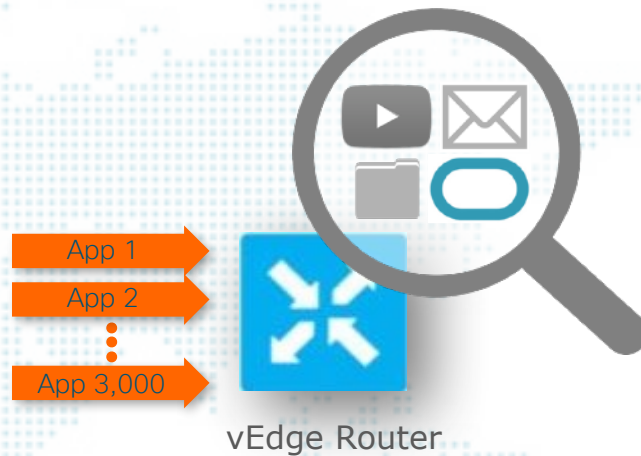
3



Application Visibility



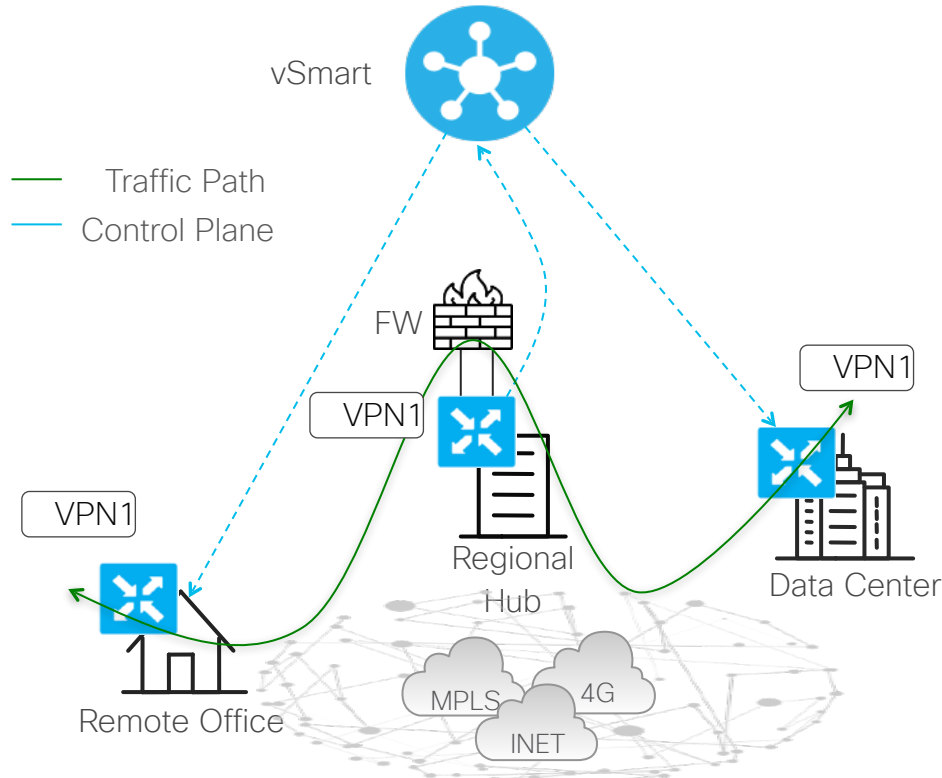
Deep Packet Inspection



- ✓ App Firewall
- ✓ Traffic prioritization
- ✓ Transport selection

Regional Secure Perimeter

Single Service Insertion

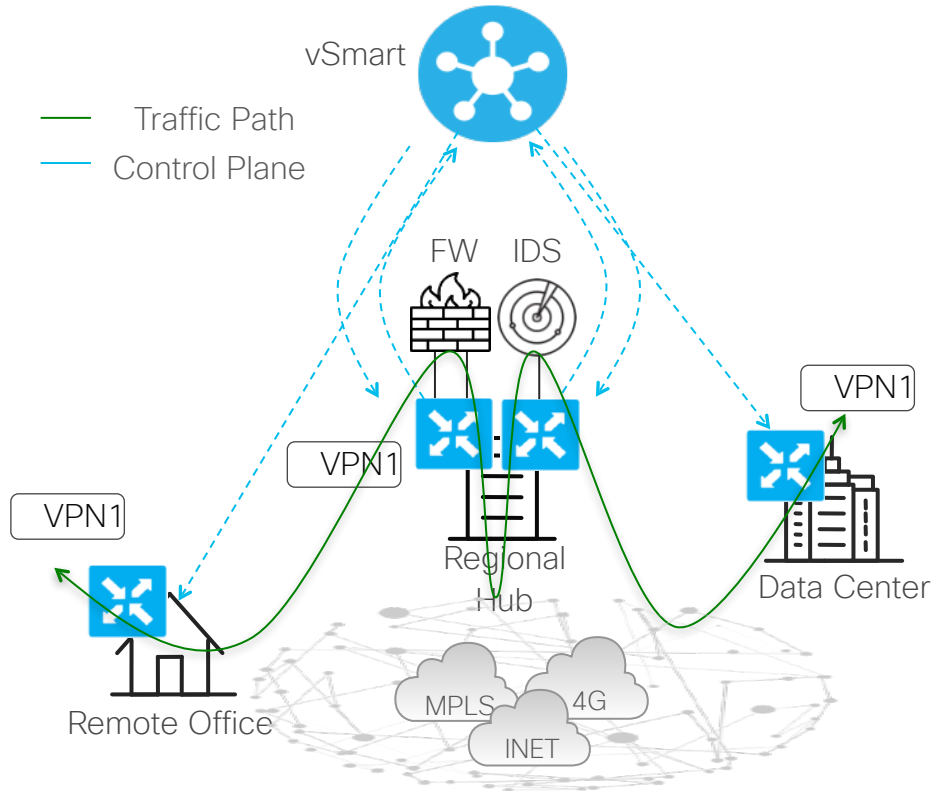


- vEdge router with connected L4-L7 service makes advertisement
 - Service route OMP address family
 - Service VPN label
- Service is advertised in specific VPN
- Service can be L3 routed or L2 bridged
- Service can be singly or dually connected (Firewall trust zones) to the advertising vEdge
- Control or data policies are used to insert the service node into the matching traffic forwarding path
 - Match on 6-tuple or DPI signature
 - Applied on ingress/egress vEdge

* For data policy only. Control policy enforced on vSmart.

Regional Secure Perimeter

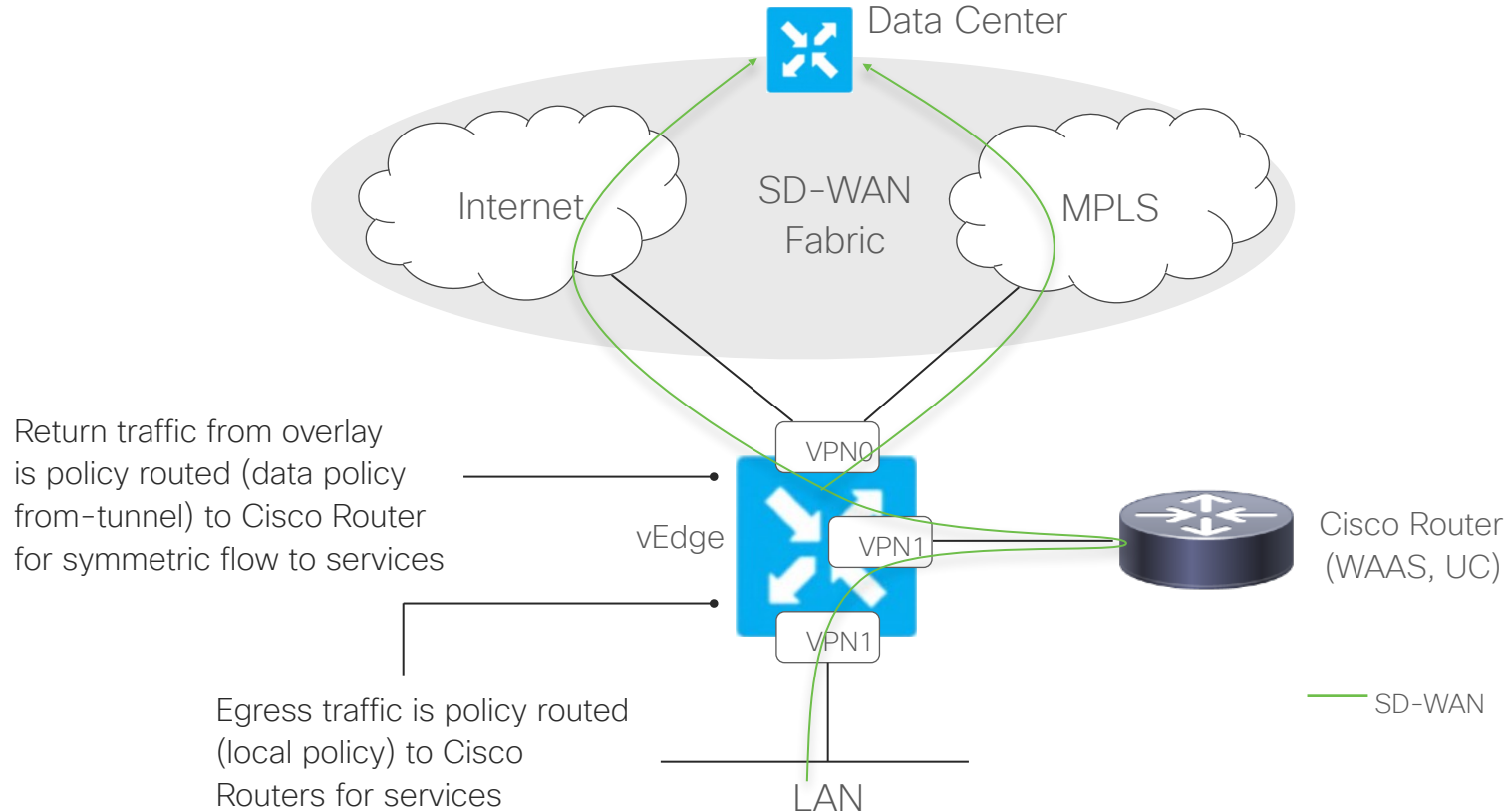
Multiple Services Chaining



- vEdge routers with connected L4-L7 service make advertisement
 - Service route OMP address family
 - Services VPN labels
- Services are advertised in specific VPN
- Services can be L3 routed or L2 bridged
- Services can be singly or dually connected to the advertising vEdges
- Control or data policies are used to insert the service nodes into the matching traffic forwarding path
 - Match on 6-tuple or DPI signature
 - Applied on ingress/egress/service vEdge

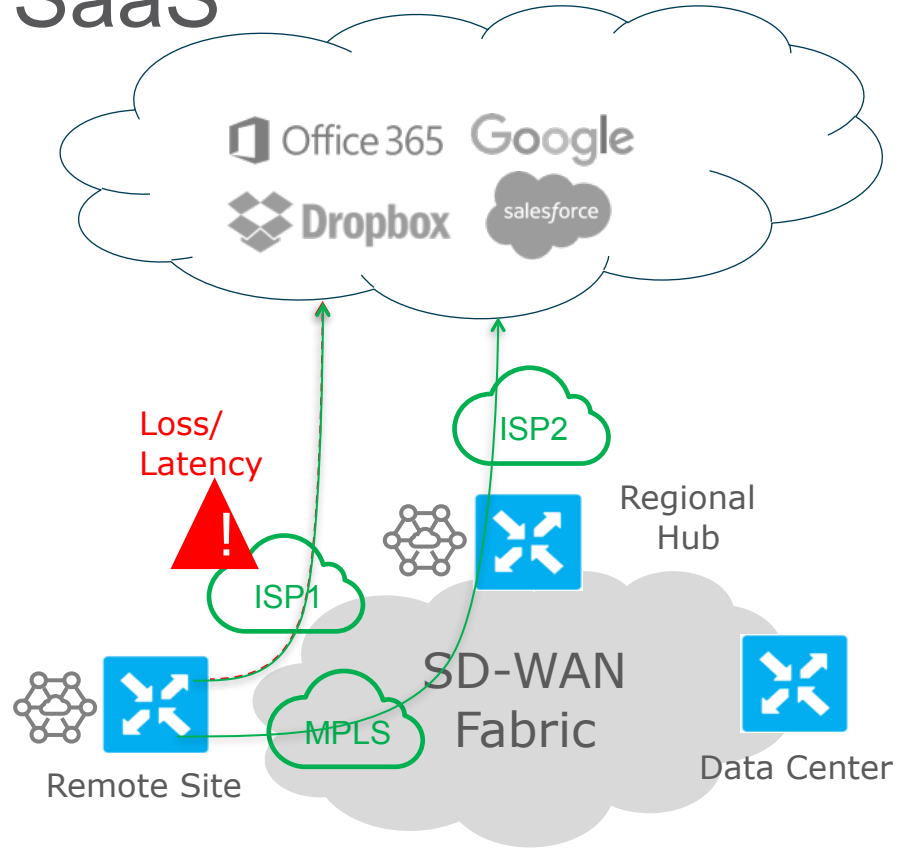
* For data policy only. Control policy enforced on vSmart.
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Services-on-a-Stick

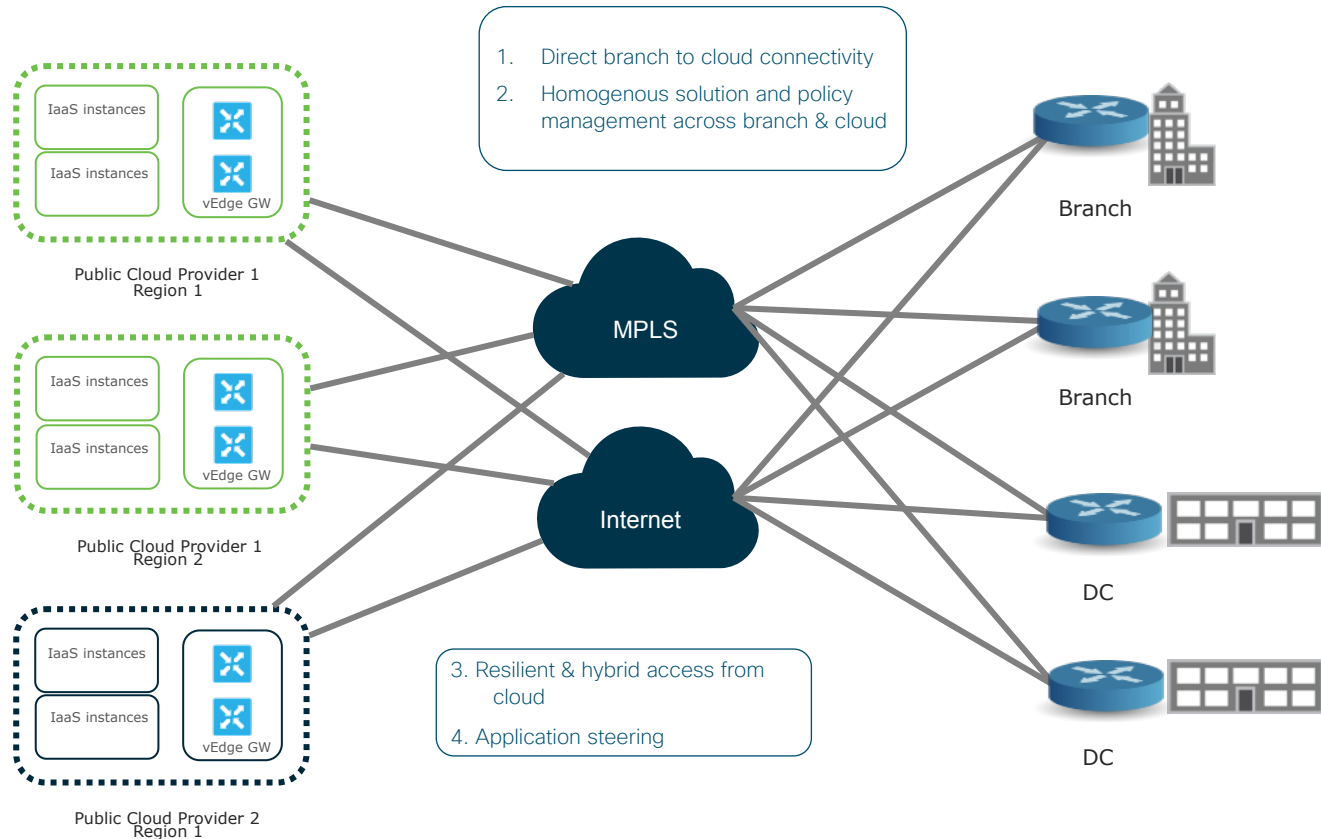


Cloud onRamp for SaaS

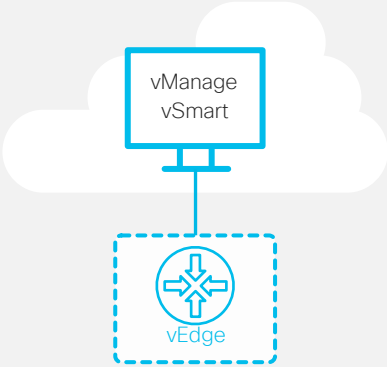
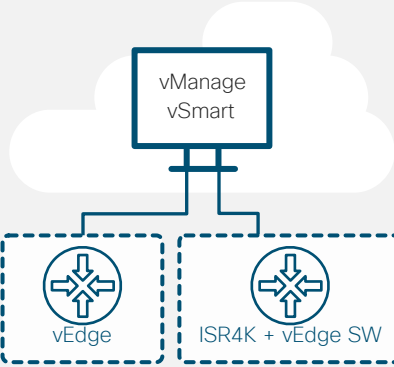
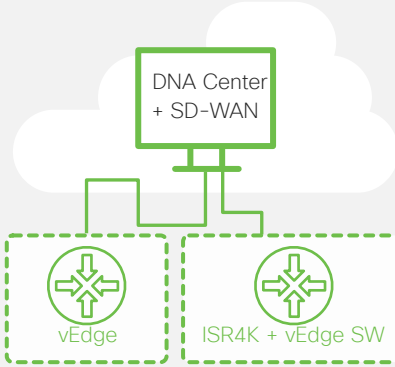
SaaS Optimization



Cloud onRamp for IaaS



Viptela Integration Roadmap: Cisco SDWAN

		Phase 1 No Integration	Phase 2 (Mar/Jul 2018) Platform Integration	Phase 3 (Aug 2018+) Management Integration
Deployment Scenarios				
Benefits		Support and Scale the current sales motion	Viptela SD-WAN on strategic ISR platform	Deliver end-to-end experience with full DNA integration
Details		<u>Platform:</u> - As-is <u>Management:</u> - vManage	<u>Platform:</u> - vEdge capabilities integrated into all IOS-XE platforms (ISR, CSR, ENCS, ASR1K) <u>Management:</u> - vManage for SD-WAN capabilities on IOS-XE	<u>Management:</u> - Cloud hosted DNA Center integrates vManage capabilities - Full DNA Center capabilities (Assurance, Integrated workflows for SD-Access and SD-WAN)

Hardware

SDWAN-XE 16.9.1 : Supported Platforms and Modules

Cisco ASR 1000 series aggregation services routers:

ASR 1001-HX and ASR 1001-X

ASR 1002-HX and ASR 1002-X

Cisco ISR 1000 series integrated services routers:

C1111-8P, C1111-8P LTE EA, and C1111-8P LTE LA

C1117-4P LTE EA and C1117-4P LTE LA

Cisco 4000 series integrated services routers:

ISR 4221

ISR 4321

ISR 4331

ISR 4351

ENCS 5406 / 5408 / 5412 with T1/E1 and 4G NIM modules:

ISRv

16.9.1 (July) : Supported Platforms and Modules

Platform/Modules	ISR1K (1111-8P, 1117-4P)	ISR4K (4221, 4321, 4331, 4351)	ENCS (ISRV on 5412)	ASR1K (1001X/HX, 1002X/HX)
NIM-1/2/4/8MFT-T1/E1	NA	Now	Yes	NA
NIM-VAB-A, NIM-VAB-M	Now Built-in	Now	Nov 2018	NA
NIM-LTEA-EA/LA	Now Built-in	Now	Now	NA
NIM-ES2-4/8	Now Built-in	Now	NA	NA
NIM-1GE-CU-SFP NIM-2GE-CU-SFP	NA	Now	NA	NA
SM-X-4X1G-1X10G SM-X-6X1G	NA	Now	NA	NA

Software

Software capabilities available in July 16.9.1

Protocols

OMP
BGP
OSPF
VRRP

Security

Segmentation
Umbrella Branch
Zone-Based Firewall
DIA (NAT, Split Tunnel,
etc.)

AppExperience

DPI (NBAR2), M&T
App route policy
Cloud-Onramp for IaaS
QoS
- 8 Queues (1 priority & 7 B/W)
- Interface shaper

Software capabilities not available in July 16.9.1

Protocols

Eigrp

HSRP

Multicast

Ipv6

Security

Umbrella auto-registration
Local domain bypass for DIA

AppExperience

WAAS

TCP Optimization

Cloud Onramp for SaaS

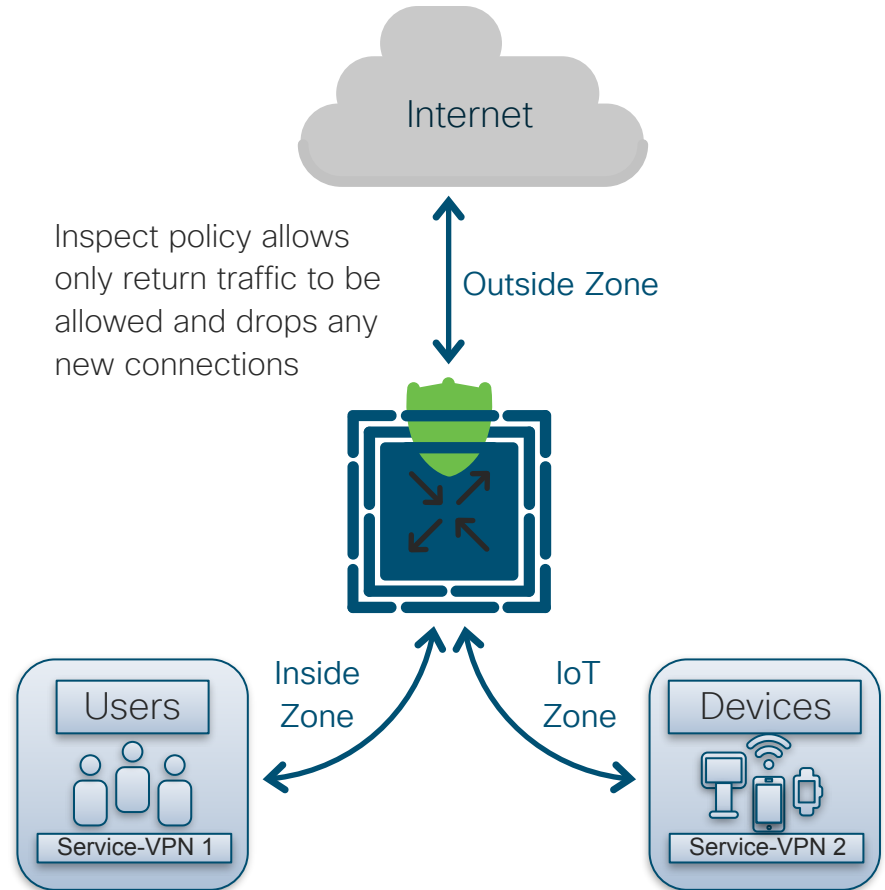
UC- SRTST

PSTN GW

SIP GW

Zone based firewall

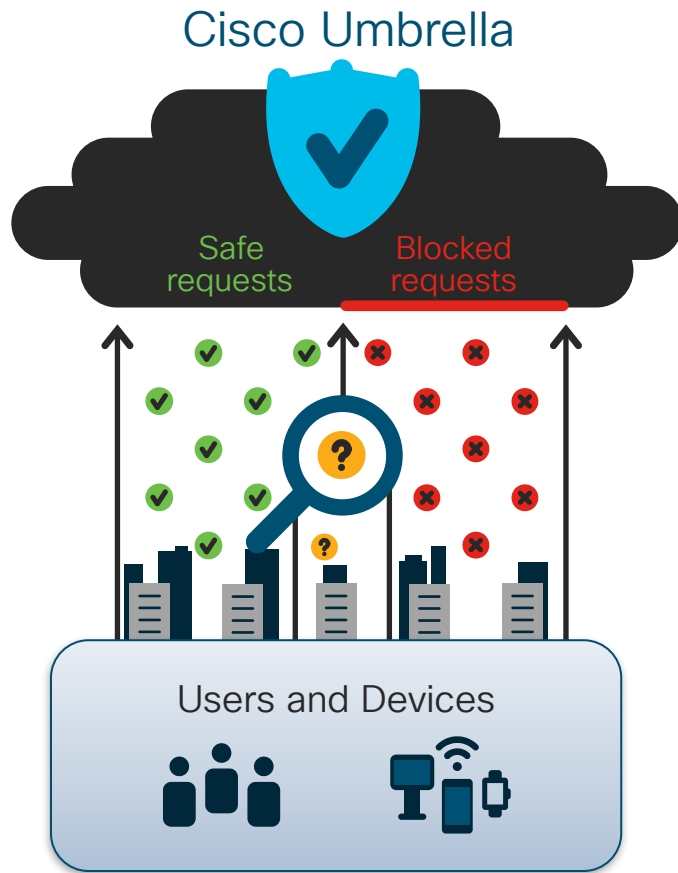
- Prevent lateral movements of threats (e.g. printing service should not create new connections to employee network)
- PCI compliance



Cisco Umbrella

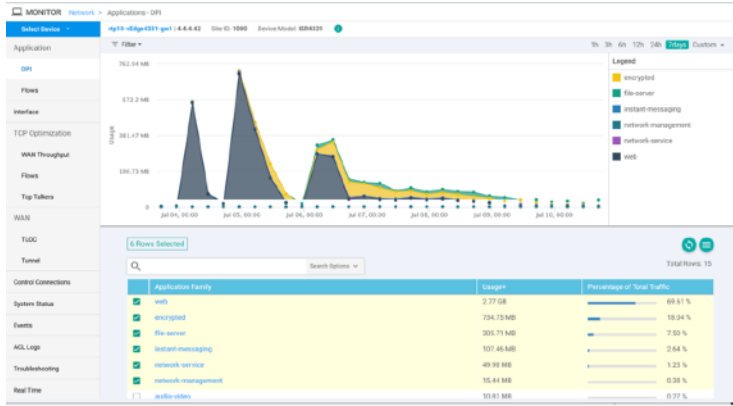
DNS-layer Enforcement

- Threat protection against malware, phishing, and unacceptable requests by blocking based on DNS requests

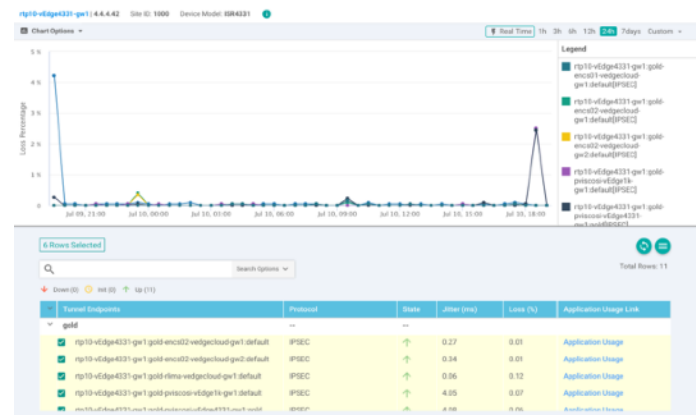


Monitoring & Troubleshooting

Application visibility



Monitoring – BFD stats



Real time troubleshooting

rpl0-vdage4331-gw1: 4.4.4.42 Site ID: 1000 Device Model: ISR4331

Device Options: QoS Received Routers

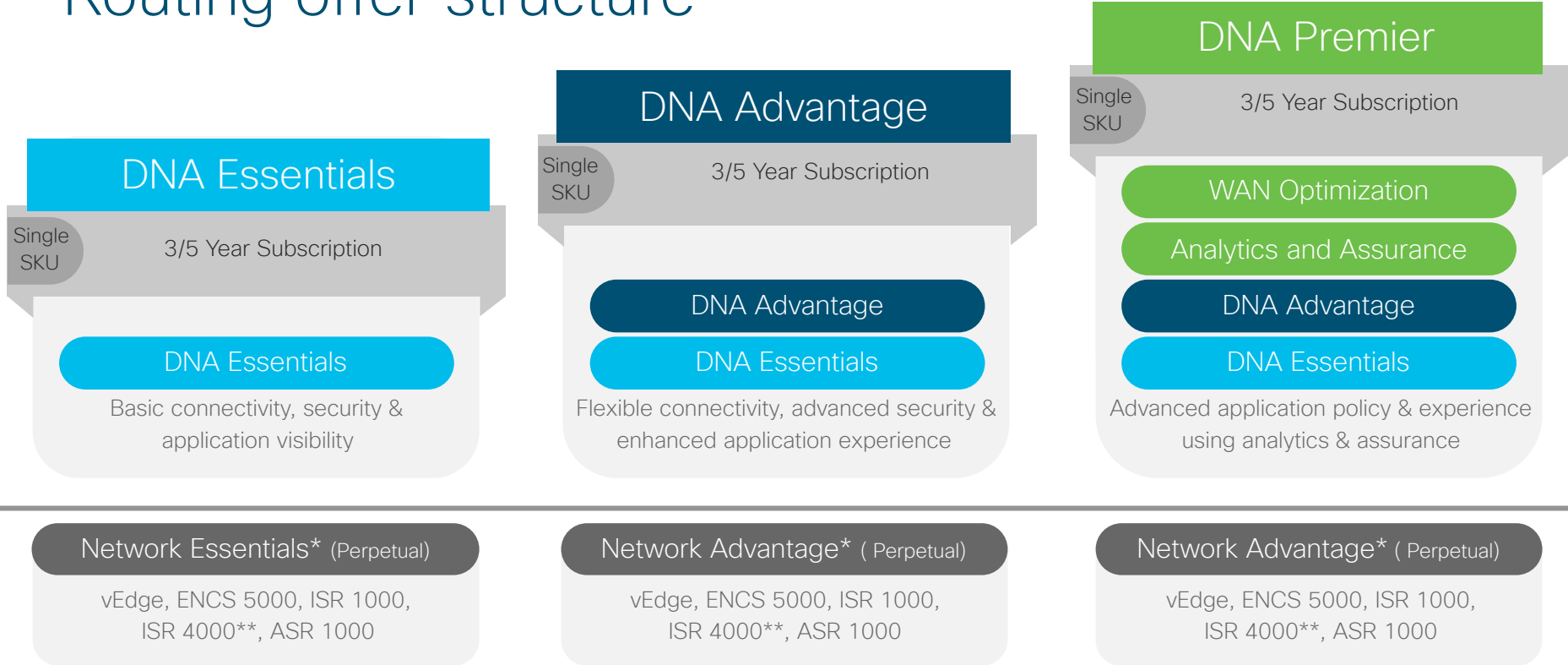
Filter: Search Options

Total Rows: 42

Address Family	VPN ID	Prefix	From Peer	Path ID	Label	Status	Attribute Type	Time (s)	Time (s)
ipvr6	1	0.0.0.0/3	0.0.0.0	43	10001	C Red R	Installed	4.4.4.42	gold
ipvr6	1	0.0.0.0/3	4.4.4.33	138	10001	R	Installed	4.4.4.48	gold
ipvr6	1	10.0.1.255.15...	4.4.4.33	131	10002	C I R	Installed	4.4.4.46	default
ipvr6	1	10.0.1.255.15...	4.4.4.33	134	10002	C I R	Installed	4.4.4.47	default
ipvr6	1	10.0.1.255.17...	4.4.4.33	133	10002	C I R	Installed	4.4.4.34	default
ipvr6	1	10.0.1.255.17...	4.4.4.33	132	10002	C I R	Installed	4.4.4.36	default
ipvr6	1	10.0.1.255.18...	4.4.4.33	137	10002	C I R	Installed	4.4.4.35	mgpls
ipvr6	1	10.0.1.255.18...	4.4.4.33	147	10002	C I R	Installed	4.4.4.38	default
ipvr6	1	10.1.50.57.13...	4.4.4.33	152	10001	C I R	Installed	4.4.4.48	gold
ipvr6	1	10.1.50.57.14...	0.0.0.0	43	10001	C Red R	Installed	4.4.4.42	gold
ipvr6	1	10.1.51.24.64...	4.4.4.33	136	10002	C I R	Installed	4.4.4.35	mgpls
ipvr6	1	10.1.51.24.72...	4.4.4.33	135	10002	C I R	Installed	4.4.4.35	mgpls
ipvr6	1	10.1.51.24.80...	4.4.4.33	134	10002	C I R	Installed	4.4.4.35	mgpls
ipvr6	1	10.1.51.24.16...	4.4.4.33	146	10002	C I R	Installed	4.4.4.38	default
ipvr6	1	10.1.51.24.20...	4.4.4.33	145	10002	C I R	Installed	4.4.4.38	default
ipvr6	1	10.1.51.24.21...	4.4.4.33	144	10002	C I R	Installed	4.4.4.38	default
ipvr6	1	10.1.51.24.22...	4.4.4.33	143	10002	C I R	Installed	4.4.4.38	default

Licensing

Routing offer structure



*Network Essentials and Advantage are perpetual and not required for vEdge.

**Limited availability through EFT in March. ISR 4331 can be cloud managed through vManage. Other platforms to follow.

Software Support included in all subscriptions
Management flexibility: On -prem or cloud based

Capabilities for Cloud Managed through vManage

DNA Essentials

Connectivity

VPN Overlay, Topology: Hub-n-spoke,
NAT, Split tunnel,
2 VPNs: 1 transport, 1 service side
VPN with L2 or L3

Security

Encryption: AES-256,
Policy support: Local ACL only, Data policy

Application Experience

QoS (classification, policing, remarking,
scheduling), App-aware routing (5 tuple only), DPI
for visibility, App visibility (name, throughput)

Management

Viptela vManage platform, Zero Touch Provisioning,
Day 0 , day 1, day N Changes

3,5 Year Terms

DNA Advantage (Include DNA Essentials)

Connectivity

Service-side routing, Mesh topology, Multicast
VPNs: 5 (1 transport, 4 service side)

Security

Control policy
Advanced policies: Service chaining, extranet

Application Experience:

DPI for app-aware routing and policies
SaaS on-ramp (was CloudExpress)
TCP Optimization

Management & Orchestration

End to end SD-WAN policy orchestration,
network and application trouble shooting

3,5 Year Terms

DNA Premier (Include DNA Essentials & DNA Advantage)

Connectivity: VPNs: Up to system scale

Advanced Application Experience

WAN Full stack WAAS

Analytics:

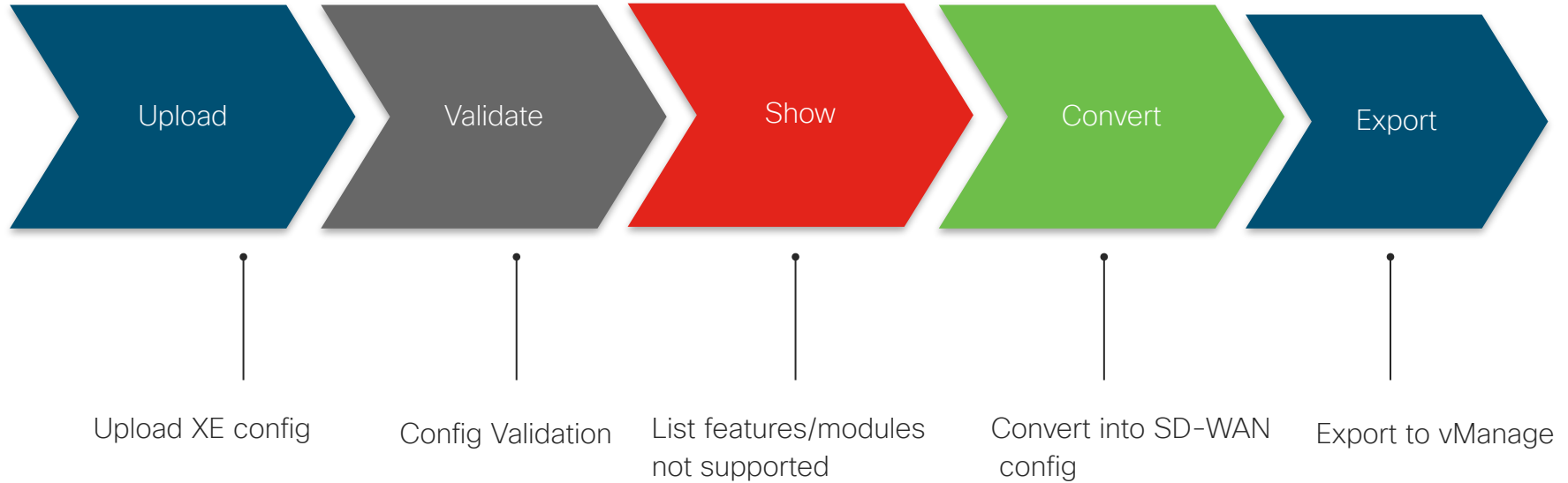
VAalytics platform

3,5 Year Terms

Platforms Supported Now: vedge
Platforms Support Post July: ISR, ASR, ENCS

Migration

Config tool



Upload



DashboardUploadHelp | About | admin ▾

Upload a file



Manually select a file below or
Drag and drop it here.

 Browse for a file

Back

Cancel

Upload

Verify

Modify

Convert

Export

Next

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Validate & Show

[Dashboard](#)[Upload](#)[Help](#) | [About](#) | [admin](#) ▾

Parse & Verify

Uploaded File: Sample Kaiser ISR config

Verify **supported** / **unsupported** feature config

```
227 policy-map QOS6-CHILD
228 class VOICE
229   priority percent 20
230 class VIDEO
231   bandwidth percent 20
232   queue-limit 300 packets
233 class CRITICAL-DATA
234   bandwidth percent 16
235   queue-limit 300 packets
236 class BULK-DATA
237   bandwidth percent 20
238   queue-limit 300 packets
239 class SCAVENGER
240   bandwidth percent 1
241 class class-default
242   bandwidth percent 23
243   queue-limit 400 packets
244 policy-map QOS6-PARENT20EVC
245 class class-default
246   shape average 20000000
247   service-policy QOS6-CHILD
248 policy-map QOS6-LAN-IN
```



Features

Interfaces

BGP >

POLICY-MAP ▾

```
bandwidth percent 20
queue-limit 300 packets
class CRITICAL-DATA
bandwidth percent 16
queue-limit 300 packets
class BULK-DATA
```

CONTROLLER >

LOGGING >

Back

Cancel

Upload

Verify

Modify

Convert

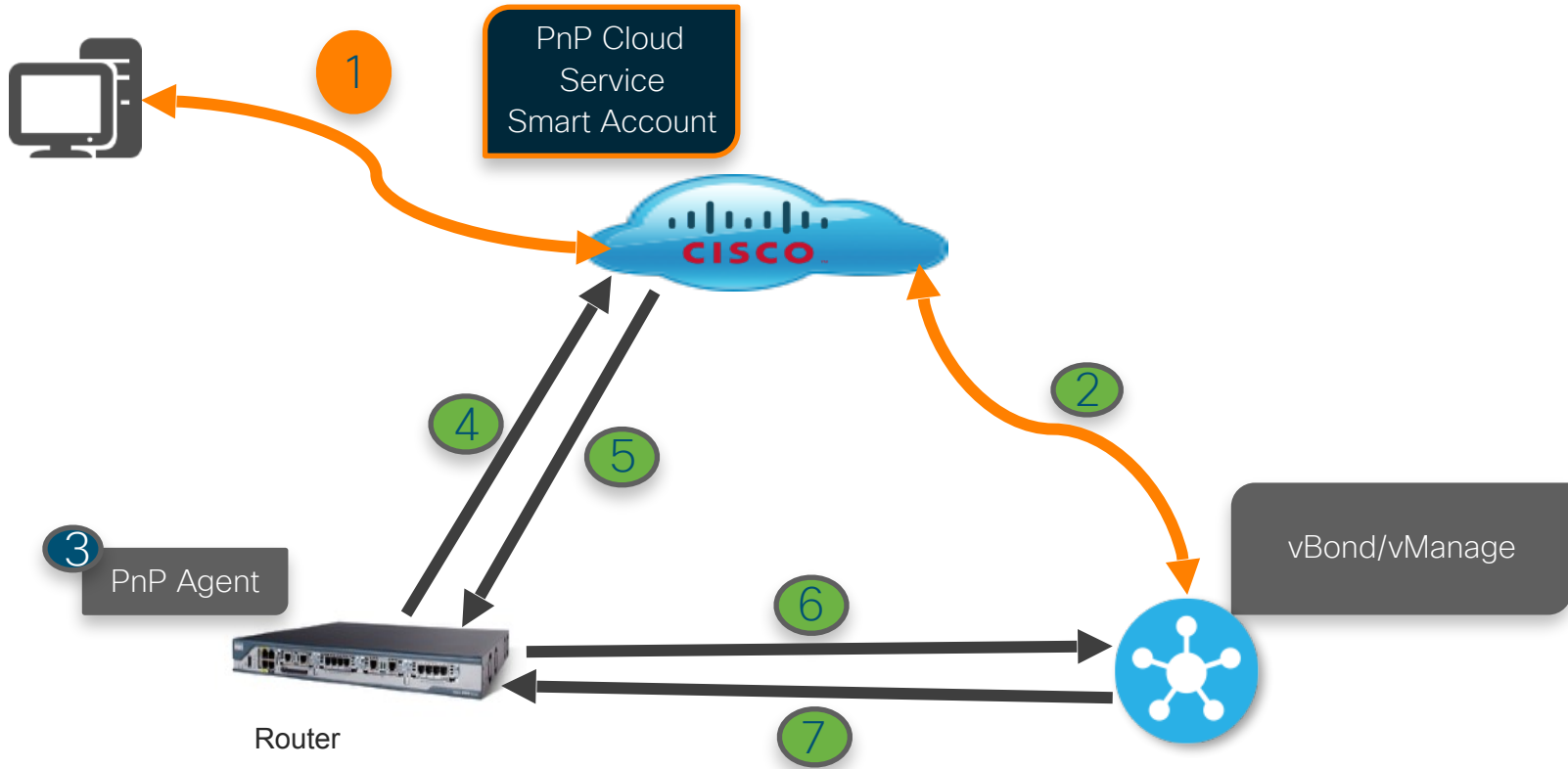
Export

Next

Demo

Konverter ISR4331 til
SDWAN-XE

SDWAN cloud PnP/ZTP



Check Rommon version, minimum 16.7(3r)

Router#sh rom-monitor 0

System Bootstrap, Version **15.4(3r)S1**, RELEASE SOFTWARE (fc1)
Copyright (c) 1994-2014 by cisco Systems, Inc.

Router#**copy http://dulong.dk/cisco/isr4200_4300_rommon_167_3r_SPA.pkg flash:**
Destination filename [isr4200_4300_rommon_167_3r_SPA.pkg]?
Accessing http://dulong.dk/cisco/isr4200_4300_rommon_167_3r_SPA.pkg...
Loading http://dulong.dk/cisco/isr4200_4300_rommon_167_3r_SPA.pkg !!!!!!!!!!!!!!!
2606028 bytes copied in 2.150 secs (1212106 bytes/sec)
Router#

Upgrade Rommon version

```
Router#upgrade rom-monitor file bootflash:isr4200_4300_rommon_167_3r_SPA.pkg R0
```

ROMMON upgrade complete.

To make the new ROMMON permanent, you must restart the RP.

```
Router#
```

Download SDWAN Rootcert og software

Router#

```
Router#copy http://dulong.dk/cisco/RootCert.crt flash:
```

Destination filename [RootCert.crt]?

Accessing [http://dulong.dk/cisco/RootCert.crt...](http://dulong.dk/cisco/RootCert.crt)

Loading <http://dulong.dk/cisco/RootCert.crt>

1294 bytes copied in 0.037 secs (34973 bytes/sec)

Router#

Router#copy http://dulong.dk/cisco/isr4300-ucmk9.16.9.1.SPA.bin flash:

Destination filename [isr4300-ucmk9.16.9.1.SPA.bin]?

Accessing <http://dulong.dk/cisco/isr4300-ucmk9.16.9.1.SPA.bin...>

Loading <http://dulong.dk/cisco/isr4300->

[illegible]

421341703 bytes copied in 332.159 secs (1268494 bytes/sec)

Check at der er 1 5 GB ledig space til XE SD-WAN!

Find Router Serial#, PID, Certificate Serial#

Router#**show crypto pki certificates CISCO_IDEVID_SUDI**

Certificate

Status: Available

Certificate Serial Number (hex): **021C35FD**

Certificate Usage: General Purpose

Issuer:

cn=ACT2 SUDI CA

o=Cisco

Subject:

Name: ISR4331-B/K9

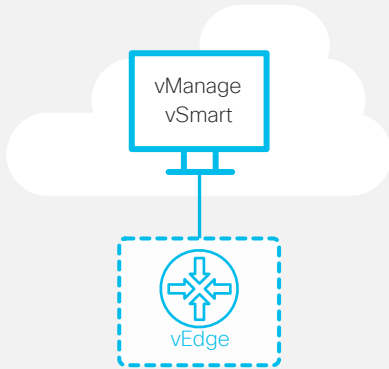
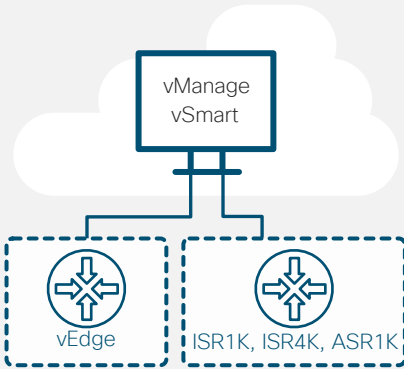
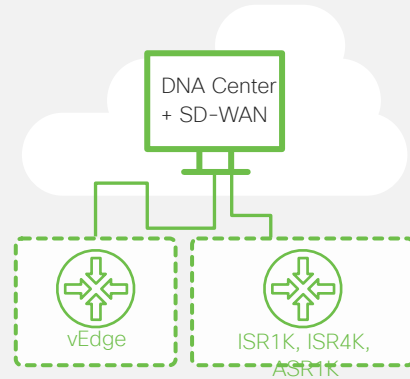
Serial Number: PID:**ISR4331-B/K9** SN:**FDO2147333K**

cn=ISR4331-B/K9

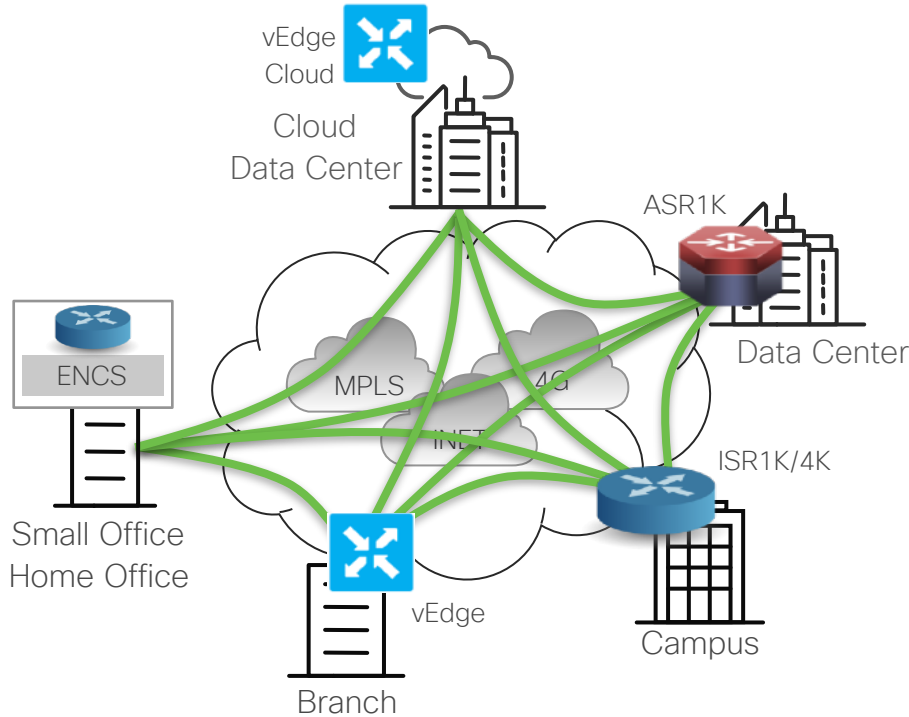
Demo, SDWAN redirect på Cisco cloud PnP server

Nyt i Viptela 18.3/SDWAN-
XE 16.9.1

Viptela Integration Roadmap: Cisco SDWAN

		Phase 1 No Integration	Phase 2 (Mar/Jul 2018) Platform Integration	Phase 3 (Aug 2018+) Management Integration
Deployment Scenarios				
Benefits		Support and Scale the current sales motion	Viptela SD-WAN on strategic ISR/ASR platform	Deliver end-to-end experience with full DNA integration
Details		<u>Platform:</u> - As-is <u>Management:</u> - vManage	<u>Platform:</u> - vEdge capabilities integrated into all IOS-XE platforms (ISR, CSR, ENCS, ASR1K) <u>Management:</u> - vManage for SD-WAN capabilities on IOS-XE	<u>Management:</u> - Cloud hosted DNA Center integrates vManage capabilities - Full DNA Center capabilities (Assurance, Integrated workflows for SD-Access and SD-WAN)

Cisco SD-WAN Platform Diversity



Note: vEdges must run 17.2.1 code or newer

- ISR1K
 - 1111-8P, 1117-4P and more
- ISR4K
 - 4221, 4321, 4331, 4351
- ASR1K
 - 1001X, 1001HX, 1002X, 1002HX
- ENCS 5406/5408/5412
 - IOSv
- Interfaces
 - NIM-1/2/4/8MFT-T1/E1
 - NIM-VAB-A, NIM-VA-B, NIM-VAB-M
 - NIM-LTEA-EA/LA

Software Capabilities NOT Available in 16.9.1

Protocols

EIGRP
HSRP
Multicast
IPv6

Security

Umbrella Auto-Registration
Local Domain Bypass for DIA

App Experience

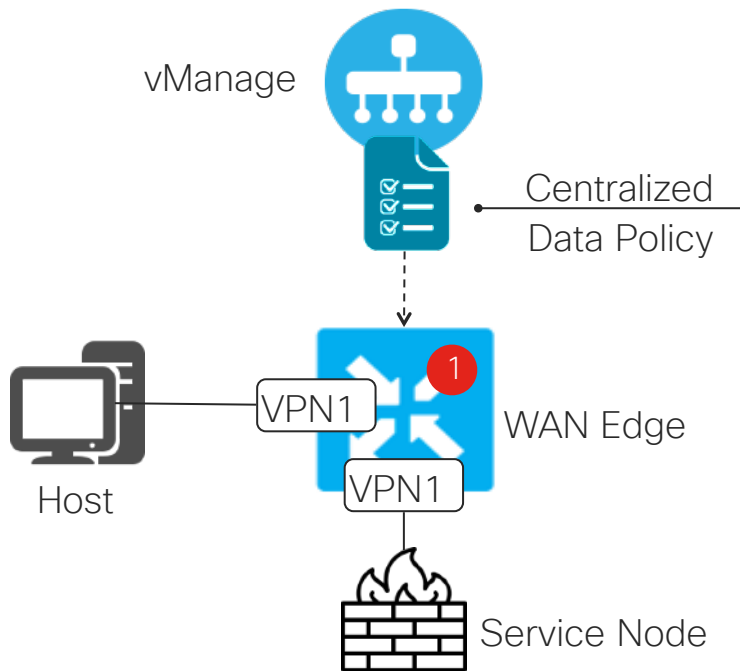
WAAS
TCP Optimization
Cloud Onramp for SaaS
Voice Features

Local Service Tracking

Local Service Tracking

- Pre-18.3, when service insertion was defined using local service node, traffic would blackhole in case the interface toward the service node went down
- With 18.3 local service tracking, when service insertion is defined using local service node, traffic can bypass the service node (follow routing) in case the interface toward the service node goes down. It can also be forced to blackhole in this case.

Local Service Tracking



Match: <Address|Port|Application>

Action: Set Service <Service ID> Local



Default – If WAN Edge interface toward service is down, fallback to routing

Restrict – If WAN Edge interface toward service is down, blackhole

Note: No service monitoring

1 Service defined in the VPN1 on the WAN Edge

Local Service Tracking Configuration



Service Chaining

Sequence Rule

Drag and drop to re-arrange rules

Match Conditions

Destination Data Prefix List: DataCenterPrefix

Destination: IP

Actions

Accept

Service: Type Firewall

VPN

TLOC IP:

Color:

Encapsulation:

TLOC List

Local true

Restrict true

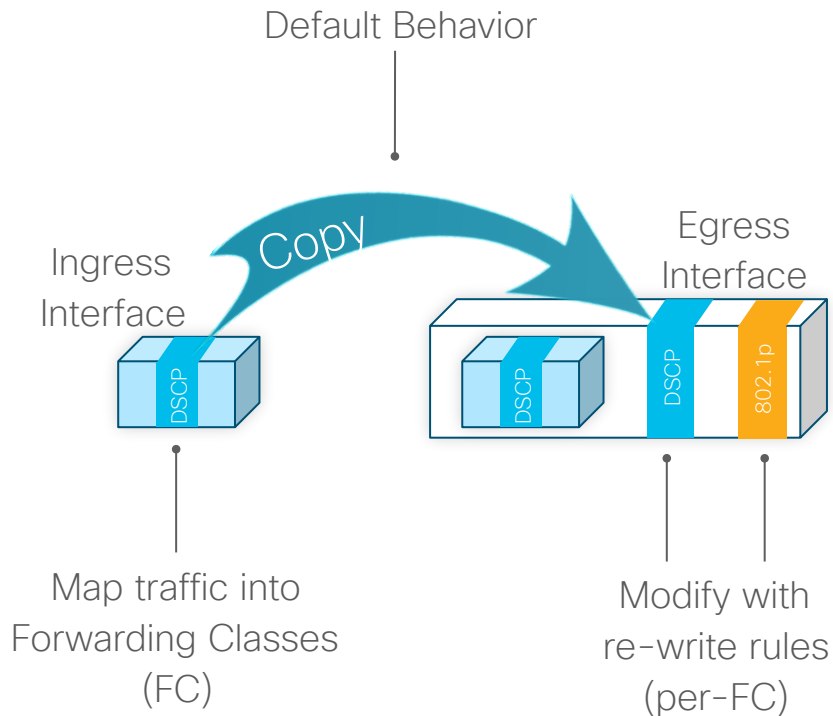
Data Policy Local Service Insertion

CoS (802.1p) Marking

COS (802.1p) Marking and Re-marking

- Pre-18.3, in case of Layer 2 transports, all frames are marked with COS 0
- With 18.3 COS (802.1p) marking, frames can be marked with custom COS value before being sent to Layer 2 transports

COS (802.1p) Marking and Re-marking



- Comply with service providers provisioned classes of service for Layer 2 transports
- 802.1p Class of Service value is set using re-write rules applied to the egress tunnel interface
 - Define with local data policy, apply with configuration templates
- Can co-exist with DSCP markings/re-markings of inner and outer IP headers

802.1p COS Marking Configuration

Add Rule

Class

Select Class

Priority

Select Priority

DSCP

0-63

Layer 2 Class of Service

0-7

Save Rule

Cancel

Add Re-Write Rule

Local Data Policy

CONFIGURATION | POLICIES

Add Rewrite Policy

Name

RewritePolicy

Description

Rewrite 802.1p on Egress

Add Rewrite Rule

Search Options

Class Name	Priority	DSCP	Layer 2 Class of Service
StrictPriority	High	--	5
HighPriority	High	--	3
LowPriority	Low	--	0

802.1p COS Marking Configuration

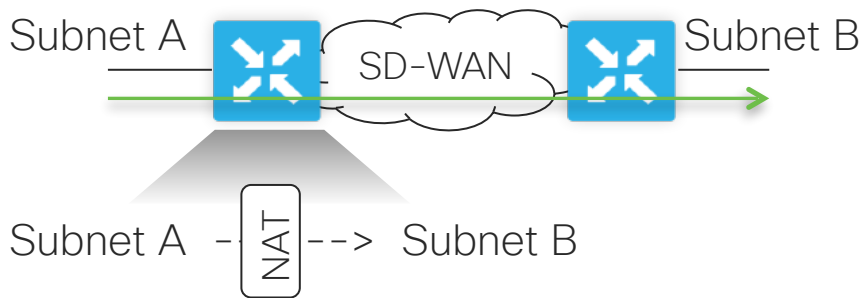
WAN Edge Configuration Template

ACL/QOS	
Shaping Rate (Kbps)	 ▼
QoS Map	 ▼
Rewrite Rule	 ▼ RewritePolicy

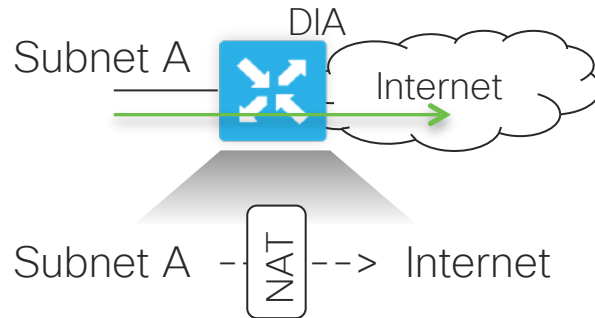
NAT Pool for Direct Internet Access

Supported NAT Types Prior to 18.3

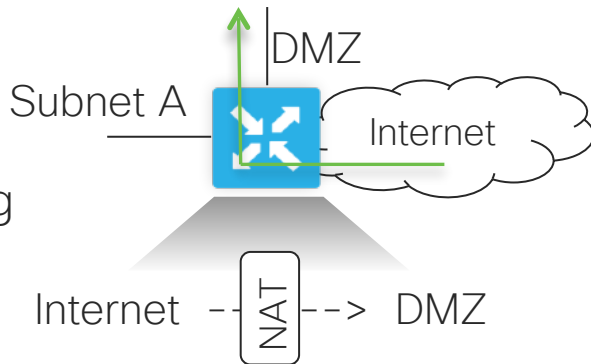
Service Side NAT



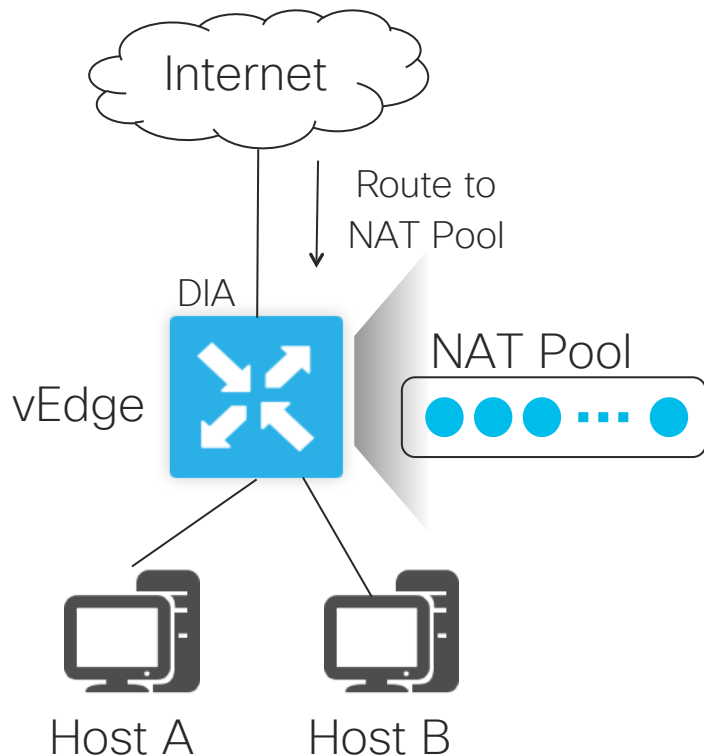
DIA NAT



Port Forwarding



NAT Pool for Direct Internet Access



- NAT Pool is defined on vEdge router DIA interface
 - Should be routable from Internet
- For each DIA connection using different host source IP address, vEdge router chooses new IP address from the NAT Pool
 - Can statically map to one of the NAT Pool IP addresses
- When NAT Pool IP addresses are exhausted, vEdge router performs “overload” into the first NAT Pool IP address
 - Port Address Translation

NAT Pool for Direct Internet Access Configuration

The screenshot displays the 'CONFIGURATION | TEMPLATES' interface. The 'Feature' tab is active, showing the 'VPN Interface Ethernet' feature template. The 'NAT' tab is selected among others like 'Basic Configuration', 'Tunnel', 'VRRP', 'ACL/QoS', 'ARP', and '802.1X'. Under the 'NAT' tab, there are two sections: 'PORT FORWARD' and 'STATIC NAT'. The 'STATIC NAT' section is active, showing a 'New Static NAT' button and three configuration fields: 'Source IP Address' (192.168.1.10), 'Translated Source IP Address' (10.0.0.5), and 'Source VPN ID' (1). Above these, the 'NAT Pool Range' is defined with 'NAT Pool Range Start' (10.0.0.1) and 'NAT Pool Range End' (10.0.0.10).

Field	Value
NAT Pool Range Start	10.0.0.1
NAT Pool Range End	10.0.0.10
Source IP Address	192.168.1.10
Translated Source IP Address	10.0.0.5
Source VPN ID	1

NAT Pool Range

Static Mapping
(optional)

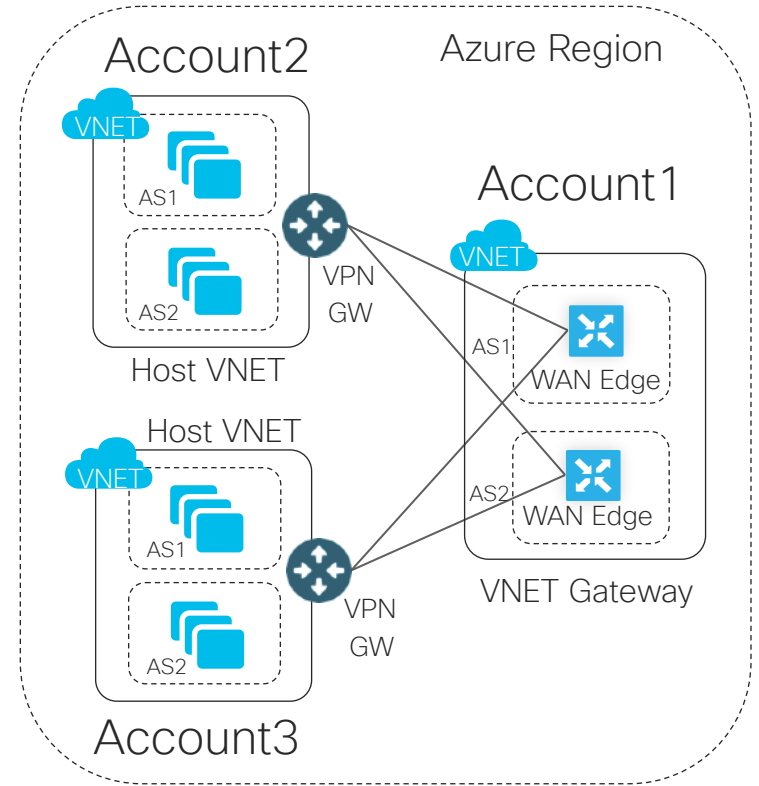
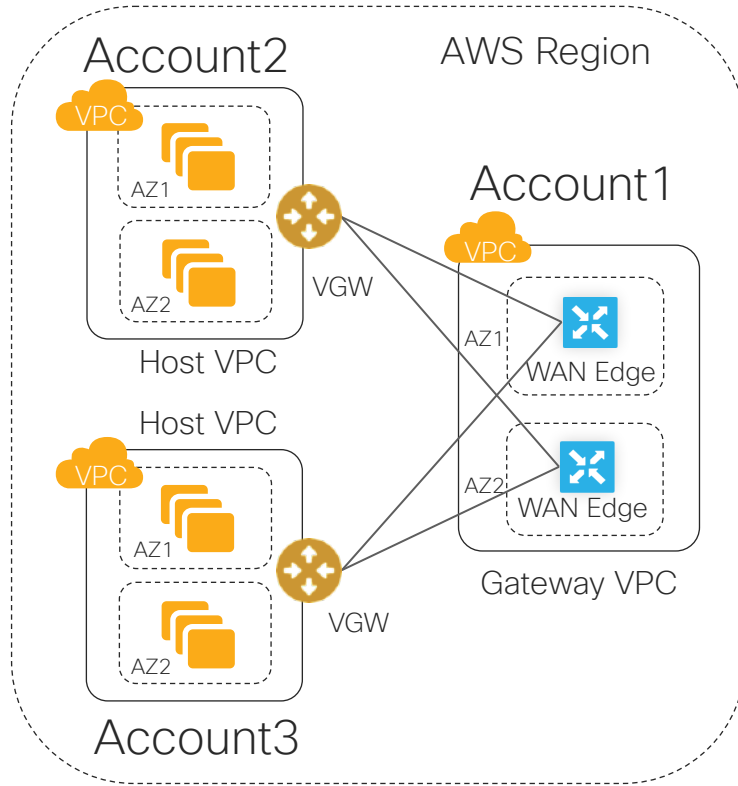
Transport Side Interface Configuration Template

Cloud onRamp for IaaS Multi Account

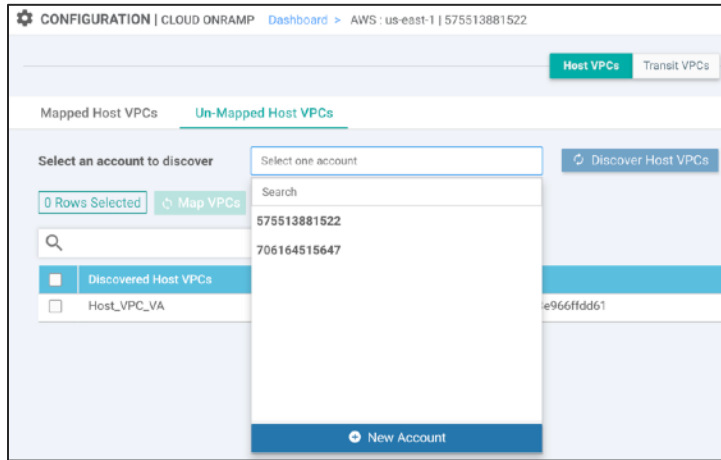
Cloud onRamp for IaaS – Multi Account

- Pre-18.3, Gateway VPCs/VNets and host VPCs/VNets must reside in the same AWS/MS-Azure account
- With 18.3 Multi Account, Gateway VPCs/VNets and host VPCs/VNets can reside in a different AWS/MS-Azure accounts

Cloud onRamp for IaaS – Multi Account

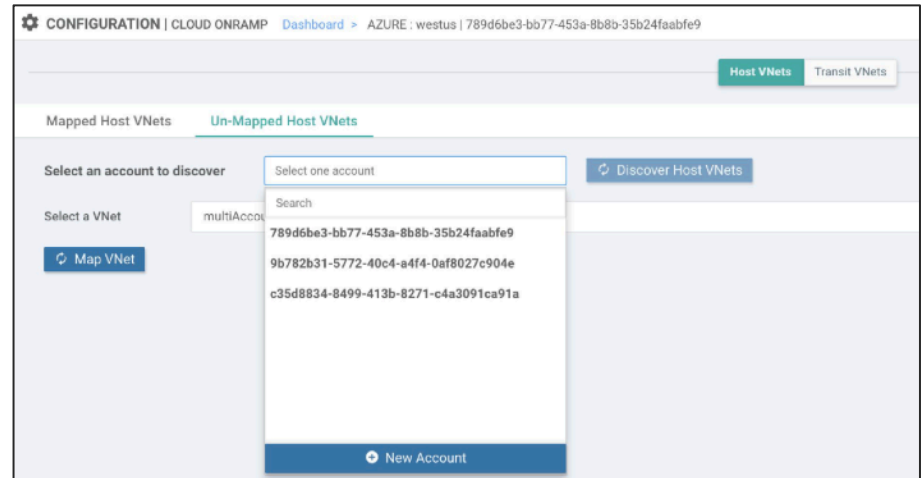


Cloud onRamp for IaaS – Multi Account Configuration



Cloud onRamp for AWS

Cloud onRamp for Azure



Custom Gateway VPC/VNet
CIDR

Custom Gateway VPC/VNet CIDR

- Pre-18.3, Gateway VPCs/VNets were instantiated with an assigned CIDR of 10.0.0.0/16
- With 18.3 custom gateway VPCs/VNets CIDRs, each Gateway VPC/VNet can be instantiated with its own CIDR block. Could be used in conjunction with VPC/VNet peering.

Custom Gateway VPC/VNet CIDR Configuration

Add Transit VPC

Transit VPC Name

Name

Device Information

WAN Edge Version

Select Version *

Size of Transit VPC

Select Bandwidth *

Device 1

Device UUID

Device 2

Device UUID

Advanced

▼

Transit VPC Subnet

192.168.1.0/24

Cloud onRamp Gateway VPC Wizard

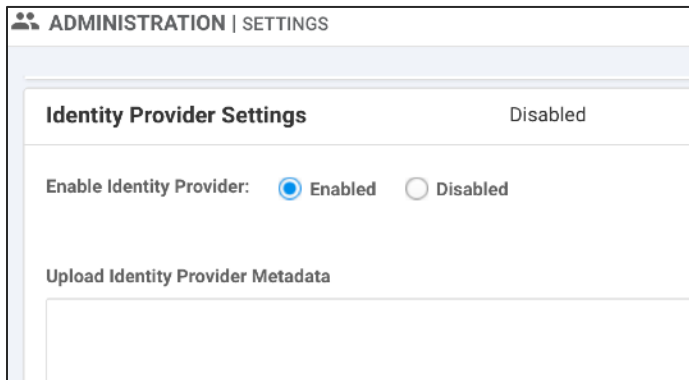
SSO Integration

SSO Integration

- Pre-18.3, authentication into vManage GUI was controlled by either local user database or external authentication system linked to through RADIUS/TACACS. Did not support multitenant authentication with RADIUS/TACACS.
- With 18.3 SSO support, authentication into vManage GUI can now be integrated with a corporate SSO servers. Supports multitenant authentication.

SSO Integration Configuration

1. Administrator enables SSO via the vManage settings page
2. Administrator gets metadata from identity provider and uploads it to vManage
3. Administrator downloads vManage metadata and uploads it to the identity provider



The screenshot shows the 'ADMINISTRATION | SETTINGS' page in vManage. Under the 'Identity Provider Settings' section, the status is 'Disabled'. There are two radio buttons: 'Enabled' (selected) and 'Disabled'. Below this is a section titled 'Upload Identity Provider Metadata' with a text input field.



[Click here](#) to download SAML metadata

vManage Alarms Email Notifications

vManage Alarms Email Notifications

- Pre-18.3, Cisco vManage did not support any email notifications
- With 18.3 vManage alarms emails notification, vManage can initiate email notifications for alarms with different severity and for devices of choice

vManage Alarms Email Notifications

ADMINISTRATION | SETTINGS

Email Notifications Enabled

Enable Email Notifications: ☒ Enabled ☐ Disabled

Security: ☐ None ☐ SSL ☒ TLS

SMTP Server: SMTP Port:

From address: Reply to address:

☒ Use SMTP Authentication

Username/Email Address: Password:

Save **Cancel**

vManage Settings

MONITOR [Alarms](#) > Email Notifications

Name:

Notification Configuration

Severity:

Alarm Name:

Account Details

Email: [1 Email](#)

Alarm Severity and
Alarm Name Selection

vManage Alarms Email Notifications

Notification Configuration

Select Devices

☐ All Devices ☒ Custom

Attach device from the list below

Available Devices

All ▼

Q

Host Name	Device IP
AWS-Direct	1.1.2.5
AWS-Gateway-East	1.1.1.11
AWS-Gateway-East	1.1.1.10

☒ WebHook

Username

Password

WebHook URL

Webhook
Callback

Device
Selection

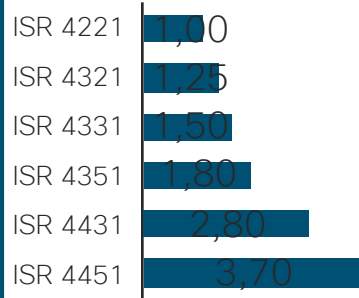
ISR4K Innovations

More Performance, More Platform options and More Simplicity on the ISR

More Performance

Booster license takes the shaper of ISR 4000

Booster speed (Gbps)



More XE Platforms

C110x - New fixed configuration & fanless XE routers



More XE Platforms

ISR4461 - Multigig 3RU
ISR4k



More Simplicity

SDWAN XE integration on IOS XE



ISR 4000 Boost

What performance level are you looking for?

Three Performance Levels:

	Deterministic	Deterministic	In the wild
Platform	Factory Default	Performance License	Boost License
4451	1Gbps	2 Gbps @ 19% CPU	4 Gbps* @ 35% CPU
4431	500Mbps	1 Gbps @ 18% CPU	4 Gbps* @ 62% CPU
4351	200Mbps	400 Mbps @ 17% CPU	2 Gbps* @ 45% CPU
4331	100Mbps	300 Mbps @ 16% CPU	2 Gbps* @ 53% CPU
4321	50Mbps	100 Mbps @ 8% CPU	2 Gbps* @ 68% CPU
4221	35Mbps	75 Mbps @ 8% CPU	1.4 Gbps @ 94% CPU

*

Test results for IP Routing @ IMIX
Clocked interface speed was the limit.
Tested with one onboard interface pairs on 4300 = 2 Gbps
Tested with two onboard interface pairs on 4400 = 4 Gbps
Room for higher throughput with more interfaces or additional services with maintained throughput

- Throughput gains when previously hitting the Performance license limit**
 - IPSec 256 AES with IMIX in Boost
 - 4331 @ 565 Mbps = 2x throughput compared to 300 Mbps Perf license
 - 4451 @ 1.6 Gbps = Same throughput as with 2 Gbps Perf license

** Applicable to most ISR4k platforms and test cases. Exceptions exist for 4331 and 4351 in that Boost repurposes cores on 4331 & 4351

Boost License: Unthrottling the performance

```
stefs_Sword(config)#platform hardware throughput level ?  
  100000  throughput in kbps  
  300000  throughput in kbps  
  boost   Enables unthrottled throughput traffic
```

```
stefs_Sword#sh pla ha throughput level  
→ The current throughput level is unthrottled
```

Gotcha's

ISR4k – Dataplane core allocation

	Factory Default		With Performance License		With Boost License	
	Dataplane Cores	Max Throughput	Dataplane Cores	Max Throughput	Dataplane Cores	Throughput unshaped
4221	1 x PPE + 1 x I/O	35 Mbps	1 x PPE + 1 x I/O	75 Mbps	1 x PPE + 1 x I/O	Up to 1.2 Gbps
4321	1 x PPE + 1 x I/O	50 Mbps	1 x PPE + 1 x I/O	100 Mbps	1 x PPE + 1 x I/O	Up to 1.5 Gbps
4331	2 x PPE + 1 x I/O	100 Mbps	3 x PPE + 1 x I/O	300 Mbps	5 x PPE + 1 x I/O	> 2 Gbps
4351	2 x PPE + 1 x I/O	200 Mbps	3 x PPE + 1 x I/O	400 Mbps	5 x PPE + 1 x I/O	> 2 Gbps
4431	3 x PPE + 1 x I/O	500 Mbps	5 x PPE + 1 x I/O	1 Gbps	5 x PPE + 1 x I/O	> 4 Gbps
4451	5 x PPE + 1 x I/O	1 Gbps	9 x PPE + 1 x I/O	2 Gbps	9 x PPE + 1 x I/O	> 4 Gbps

- PPE
 - Packet Processing Engine = Packet Forwarding Core
- I/O Core
 - In/Out Scheduling, Buffering & Queueing + Crypto Assist on 4300/4221
- Encryption
 - 4400
 - Each PPE holds crypto assist resource
 - 4300/4221
 - Crypto assist centralized to I/O core

ISR1000 recap

Introducing the Cisco 1100 Series Integrated Services Routers



Robust Performance

- Dedicated core for data plane
- Separate crypto engine

Innovation

- Multi-core architecture
- LTE Advanced
- 802.11ac Wave 2 & Mobility Express
- Next-generation DSL

Future Proof Architecture

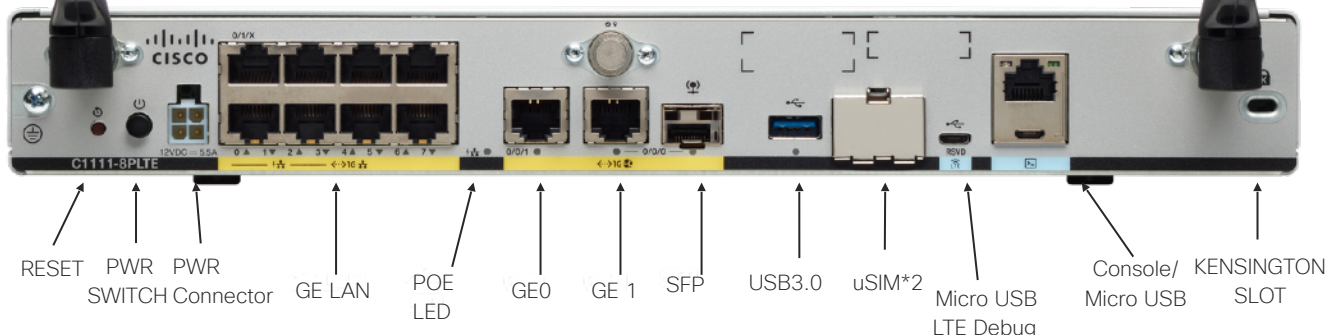
- IOS XE
- High performance for future bandwidth needs
- Support for the latest WAN and LAN technology

C1100-8P Ethernet + LTE + WLAN Back Panel

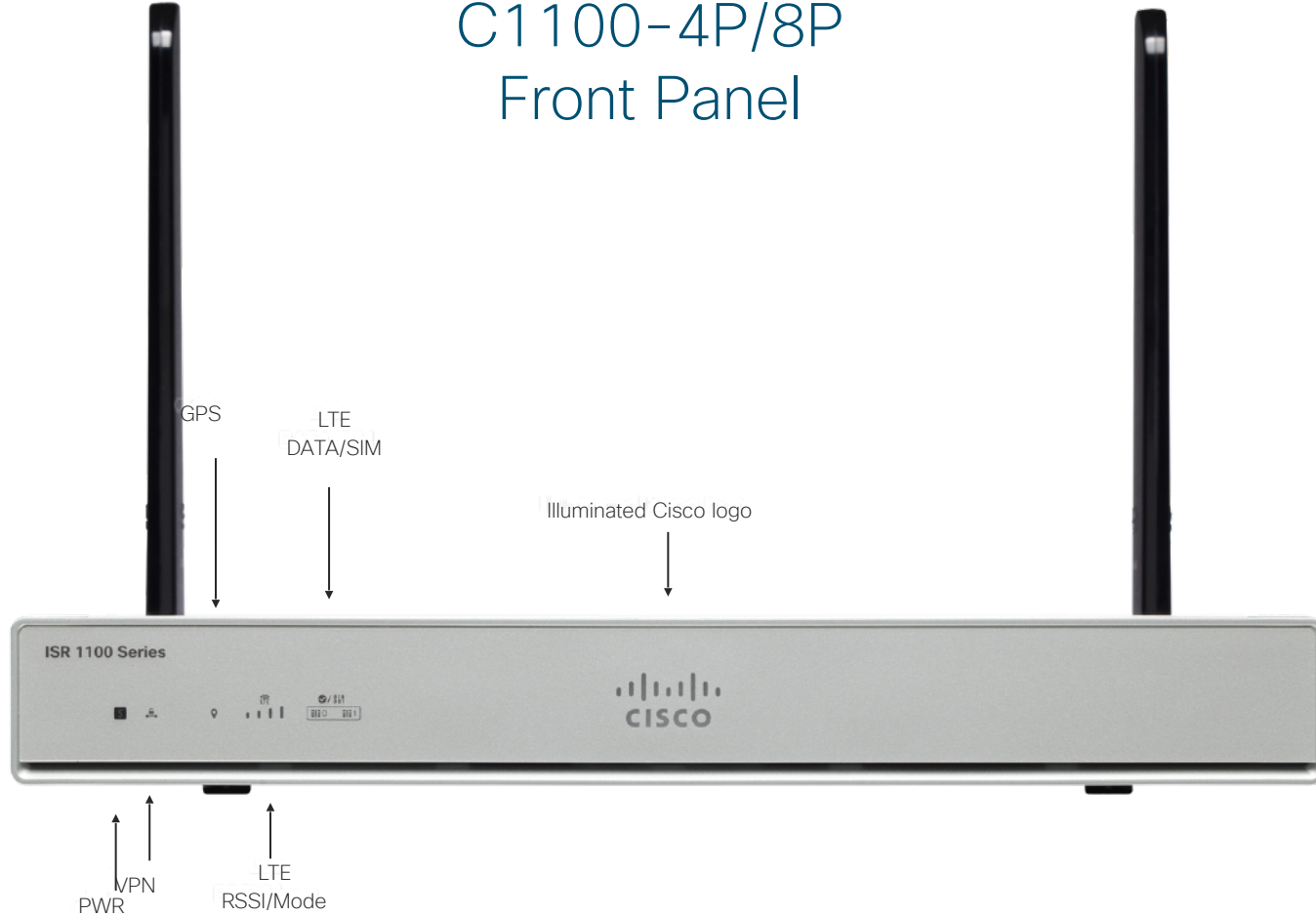
LTE
Antenna →

←
LTE
Antenna

GPS Antenna
↓



C1100-4P/8P Front Panel



Portfolio Overview

Product Overview

	C1100-4P	C1100-8P
WAN Ethernet	1 GE/SFP*	1GE/SFP+
	1GE/SFP & 1GE	1GE/SFP+ & 1GE
LTE Advanced	Yes	Yes
SFP/SFP+	Yes/No	Yes/Yes
VDSL2/ ADSL2/2+	Yes	Roadmap
802.11ac Wave 2 Dual Radio	Yes	Yes
Managed Switch Ports	4 GE	8 GE
Voice	No	No
VLANs (Wired and Wireless)	32	32
Switching Capacity	Line-rate	Line-rate
Internal PoE Option	1 PoE+ / 2 PoE	2 PoE+ / 4 PoE

* All C1100-4P with DSL offer only one WAN port with 1GE/SFP

Product Overview

	C1100-4P	C1100-8P
CPU*	4 cores*	4 cores**
Flash (fixed)	4GB	4GB
DRAM (fixed)	4GB	4GB
USB Ports	1 (USB 3.0)	1 (USB 3.0)
Console	RJ45 + Micro USB	RJ45 + Micro USB
Dimension	12.7" (W) x 9.0" (D) x 1RU (H)	12.7" (W) x 9.0" (D) x 1RU (H)
Operating Temperature	0-40°C	0-40°C
Rack/Wall Mounting	Yes	Yes

* The C11000-8P is clocked at a higher CPU rate than the C1100-4P

** Only three cores in use at the moment. More details will follow on the unused core

ISR 1100 Naming Convention

1. Prefix

“C” = Standard Product ID (PID) prefix

2. Product Number

The second portion of Product ID after the hyphen identifies the number of LAN ports:

- “-4P” = 4 LAN ports
- “-8P” = 8 LAN ports

The last digit on the first portion of Product ID identifies the onboard GE and DSL WAN interfaces:

- “1111” = Two GE WAN interfaces
- “1116” = One GE WAN Interface and One DSL Interface with VDSL/ADSL2+ Annex B & J over ISDN
- “1117” = One GE WAN Interface and One DSL with VDSL/ADSL2 + Annex A or M over POTS

3. Product Capabilities

Wireless LAN:

- “WE” = -E Wireless Domain
- “WB” = -B Wireless Domain
- “WA” = -A Wireless Domain
- “WZ” = -Z Wireless Domain
- “WN” = -N Wireless Domain
- “WQ” = -Q Wireless Domain
- “WH” = -H Wireless Domain
- “WR” = -R Wireless Domain
- “WF” = -F Wireless Domain
- “WD” = -D Wireless Domain

Wireless WAN:

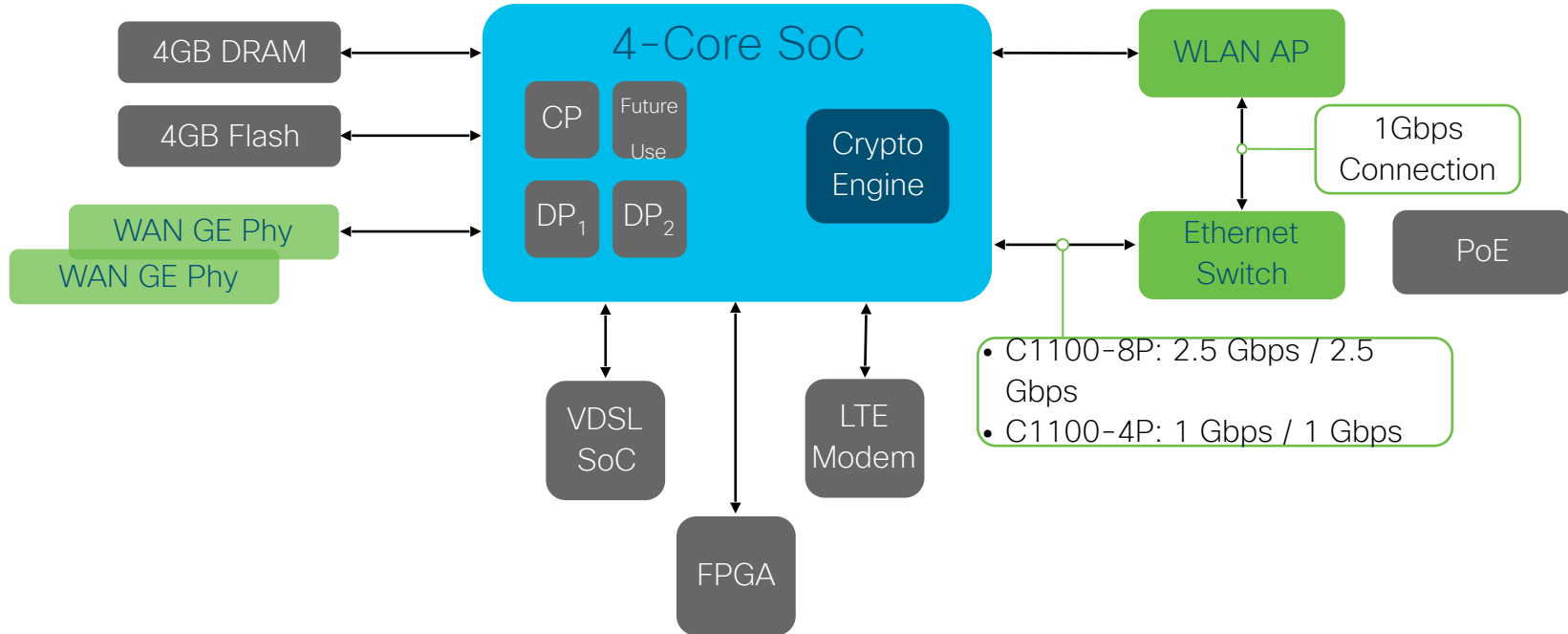
- “LTEEA” = LTE for US, Europe, Canada and Middle East
- “LTELA” = LTE for APJ and some providers in LATAM

From ISR 800 to ISR 1100

	C880	C890	C1100-4P	C1100-8P
Operating System	IOS Classic		IOS XE	
Dual Ethernet WAN	No	Yes	Yes	Yes
LTE Advanced	No	No	Yes	Yes
SFP/SFP+	No	Yes/No	Yes/No	Yes/Yes
VDSL2	Yes	Yes	Yes	Roadmap
ADSL2/2+	Yes	Yes	Yes	Roadmap
G.SHDSL	Yes	Yes	Roadmap	Roadmap
G.FAST/VDSL2 35b	No	No	No	Roadmap
802.11ac Wave 2	No	No	Yes	Yes
LAN Ports	4 FE	8 GE	4 GE	8 GE
VLAN	25	25	32	32
Internal PoE Option	2 PoE	4 PoE	1 PoE+ / 2 PoE	2 PoE+ / 4 PoE

Hardware Overview

C1100 Hardware Diagram



C1100 PoE Overview

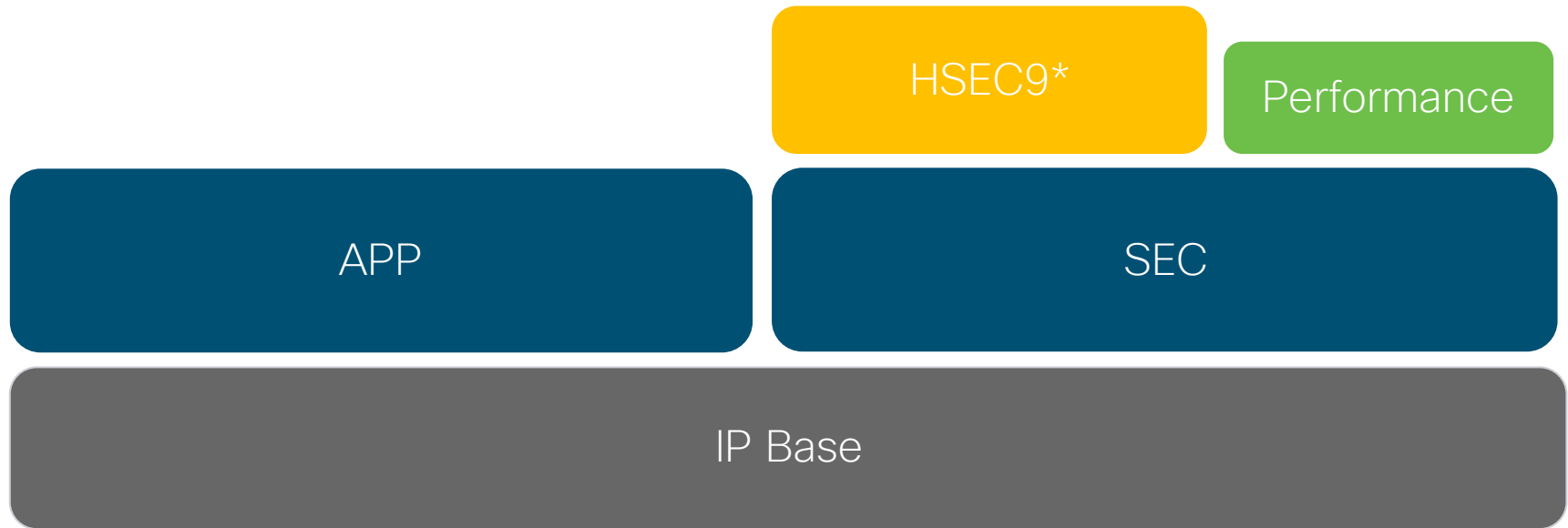


- PoE is supported only on the designated ports
- A PoE daughter card and appropriate power supply are required
 - C1100-4P: ISR-1100-POE2 with 115W Power Supply
 - C1100-8P: ISR-1100-POE4 with 125W Power Supply*

* PoE is not orderable in the US for the C1100-8P due to some compliance issue. Please wait for further notice

Licensing Overview

Licensing Packaging Model



* Available from IOS XE 16.7.1

Licensing Packaging Overview

- Feature Licensing Packaging Structure
 - Feature parity with the ISR 4000 on IP Base, APP, and SEC
- Non-crypto traffic has no shaper and requires no additional license to increase performance
- IPsec Crypto throughput shaped at 50 Mbps without Performance License
- Its either Performance License or HSEC9 license
- Performance License raises the bar on the shaper for crypto throughput beyond 50 Mbps
 - C1100-4P: Crypto throughput shaped at 150 Mbps with Performance License
 - C1100-8P: Crypto throughput shaped at 250 Mbps with Performance License
- HSEC9 License will allow the maximum throughput levels by disabling the shaper on crypto traffic
 - C1100-4P & C1100-8P: Crypto throughput up to 350 Mbps with HSEC9

Licensing Packaging Overview

Licensing Package	Features*	Use case
IP Base	NAT, DHCP, BGP, QoS	Basic internet connectivity
IP Base + APP	MPLS, IP SLA Probes, PfR, AVC	Branch on MPLS
IP Base + SEC	IPSec, DMVPN, ZBFW	Branch over the internet
IP Base + SEC + Performance	Faster IPSec throughput up to 250 Mbps	VDSL2 or higher internet connection
IP Base + SEC+ APP	IWAN	Dual WAN with application load-balancing
IP Base + SEC + APP + Performance	IWAN throughput up to 250 Mbps	IWAN branch with high throughput
IP Base + SEC + HSEC	IPsec throughput beyond 250 Mbps	Branch with Ethernet or Fiber
IP Base + SEC + APP + HSEC	IWAN throughput beyond 250 Mbps	IWAN branch with ultrafast throughput

*Please refer to Appendix A for more on software features

Performance

Performance Overview

LAN to WAN Traffic Profiles	C1100-4P	C1100-8P
CEF IMIX	1,200 Mbps	1,730 Mbps
IPsec (AES256) IMIX*	240 Mbps	340 Mbps
NAT IMIX	660 Mbps	960 Mbps
HQoS IMIX	670 Mbps	960 Mbps
ACL+NAT+HQoS	355 Mbps	510 Mbps

* IPsec (AES256) IMIX is measured with HSEC installed on the router

ISR1100 What's new

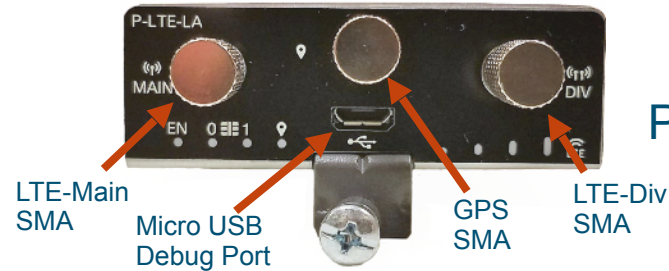
Introducing C1101 family



Super Compact Form Factor

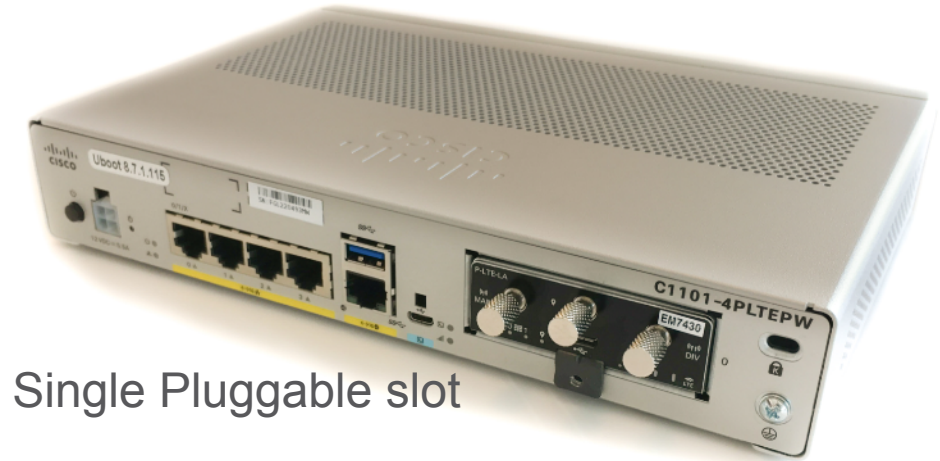


Single Pluggable slot



Pluggable WWAN

Introducing C1101



Single Pluggable slot

Super Compact Form Factor

SKU	Description	Target FCS
C1101-4P	Super compact format – No LTE	July 2018
C1101-4PLTEP	Compact – Single Pluggable Slot	Aug 2018
C1101-4PLTEPWX	As C1101-4PLTEP + Embedded 802.11ac WiFi	Aug 2018

C1101 at a glance

- Multi-core architecture and IOS code base same as C1111-4P
 - Same performance and scaling
 - Same License & SW Tech package structure
 - Same CAT6 LTE Advanced EM7XX technology and features
- KEY Differences from C1111-4P
 - Interface: One GE WAN, No PoE on ports, No SFP option
 - Smaller form factor with WWAN LTE Pluggable Technology
 - uPOE power injector splitter option
 - Micro USB to RJ45 console port



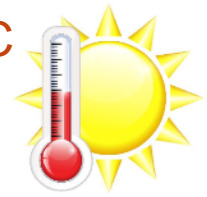
On popular request:

C1k M2M Series

Extended temperature range

C1109 M2M Series platforms

Up to +55 C



Compact form factor



1 x WAN, 2 x LAN,
Cat4 LTE
0C to +50C

Dual Pluggable slot



1 x WAN, 4 x LAN, Cat4/6 LTE & Wifi 802.11 ac
-15C to +55C



Down to -15 C



C1109 M2M Series Roadmap



C1109-2PLTEXX



C1109-4PLTE2P

C1109-4PLTE2PWX



SKU	Description	Target FCS
C1109-2PLTEXX	Compact form factor Fixed Embedded CAT4 LTE 0-50C extended temperature	Sep 2018
C1109-4PLTE2P	Dual Pluggable slots -15 to 55C extended temperature	Sep 2018
C1109-4PLTE2PWX	Dual Pluggable slots Embedded 802.11ac WiFi -15 to 55C extended temperature	Sep 2018

C110x family at a glance

- C110x belongs to the C1100 family and uses the same architecture and code base.
- C1101-4P and C1109-4P SKUs support pluggable modules which can be replaced in the field by the customer.
- Dual LTE pluggable modules supported on C1109-4PLTE2P SKUs
- Supported pluggables in the pipeline
 - LTE (Cat 6 (EM74xx) and Cat 4 (WP76xx))
- Wifi SKUs support Wifi 802.11 ac module as an alien module. Same as C111x
- Interface Numbering same as C111x
- C1101 and C1109 can both be powered by uPoE – uPoE Splitter on the roadmap
- Micro USB console – C1101 and C1109 will support only micro-USB console interface.

Management Tool Demo

ISR 4461

ISR 4461

The most scalable, highest performing ISR to-date

Key specs

Performance and capability

- Multi Gbps Throughput
- 1.5 / 3Gbps / Boost (10+)
- Up to 7 Gbps IPsec
- 8 GB RAM, 16GB Flash
- IOS-XE or SD-WAN

Form factor and scalability

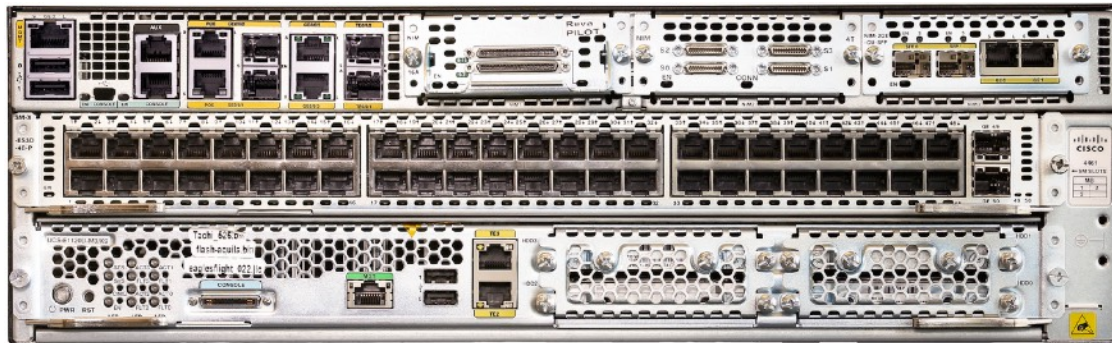
- 3RU and 19" depth
- 2 x 10Gbps + 4 x 1Gbps
- 2 x PoE ports (on the 1G ports)
- 3xSM slots (3SW, 2DW, 2SW + 1DW)
- 3xNIM slots
- Power supply options: 1000W, 650W and 450W DC
- Support for redundant power supply

Front panel connectivity

- USB storage, RJ45 console, Aux
- WAN MACSec on all ports

EFT started

FCS targeted for October time frame



Branch in a Box with
Network, UC, Security,
Compute and Storage
all in one platform

Enterprise NFV running
10+VNFs on 24 cores of
UCS E-Series and
NFVIS

Cisco vEdge HW platforms

SD-WAN Platforms

Branch virtualization

ENCS 5100



- Up to 250Mbps

ENCS 5400



- 250Mbps – 2GB

Public Cloud



Microsoft
Azure



SD-WAN

vEdge 100



- 100 Mbps
- 4G LTE & Wireless

vEdge 1000



- Up to 1 Gbps
- Fixed

vEdge 2000



- 10 Gbps
- Modular

Branch Services

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-1000 and vEdge-2000 Routers

Hardware Specification

vEdge 1000



vEdge 2000



vEdge 5000



- 1 Gbps AES-256
- 1RU, standard rack mountable
- 8x GE SFP (10/100/1000)
- TPM chip
- 3G/4G via USB (or) Ethernet
- Security, QoS
- Dual Power supplies (external)
- Low power consumption

- 10 Gbps AES-256
- 1RU, standard rack mountable
- 4x Fixed GE SFP (10/100/1000)
- 2 Pluggable Interface Modules
- 8 x 1GE SFP (10/100/1000)
- 2 x 10GE SFP+
- TPM chip
- 3G/4G via USB (or) Ethernet
- Security, QoS
- Dual power supplies (internal)
- Redundant fans

- 20 Gbps AES-256
- 1RU, standard rack mountable
- 4 NIMs (Network Interface Modules)
- 8 x 1GE SFP (10/100/1000)
- 4 x 10GE SFP+
- TPM chip
- 3G/4G via USB (or) Ethernet
- Security, QoS
- Dual power supplies (internal)
- Redundant fans

vEdge-100 Routers

Hardware Specification

vEdge 100



- 100 Mbps AES-256
- 5x 1000Base-T
- TPM chip
- Security, QoS
- External AC PS
- Kensington lock
- Fan-less
- 9" x 1.75" x 5.5"
- GPS

vEdge 100m



- 100 Mbps AES-256
- 1RU
- 5x 1000Base-T
- 1x POE port
- 2G/3G/4G LTE
- Internal AC PS
- 1x USB-3.0
- TPM Board-ID
- Kensington lock
- Low power fan
- GPS

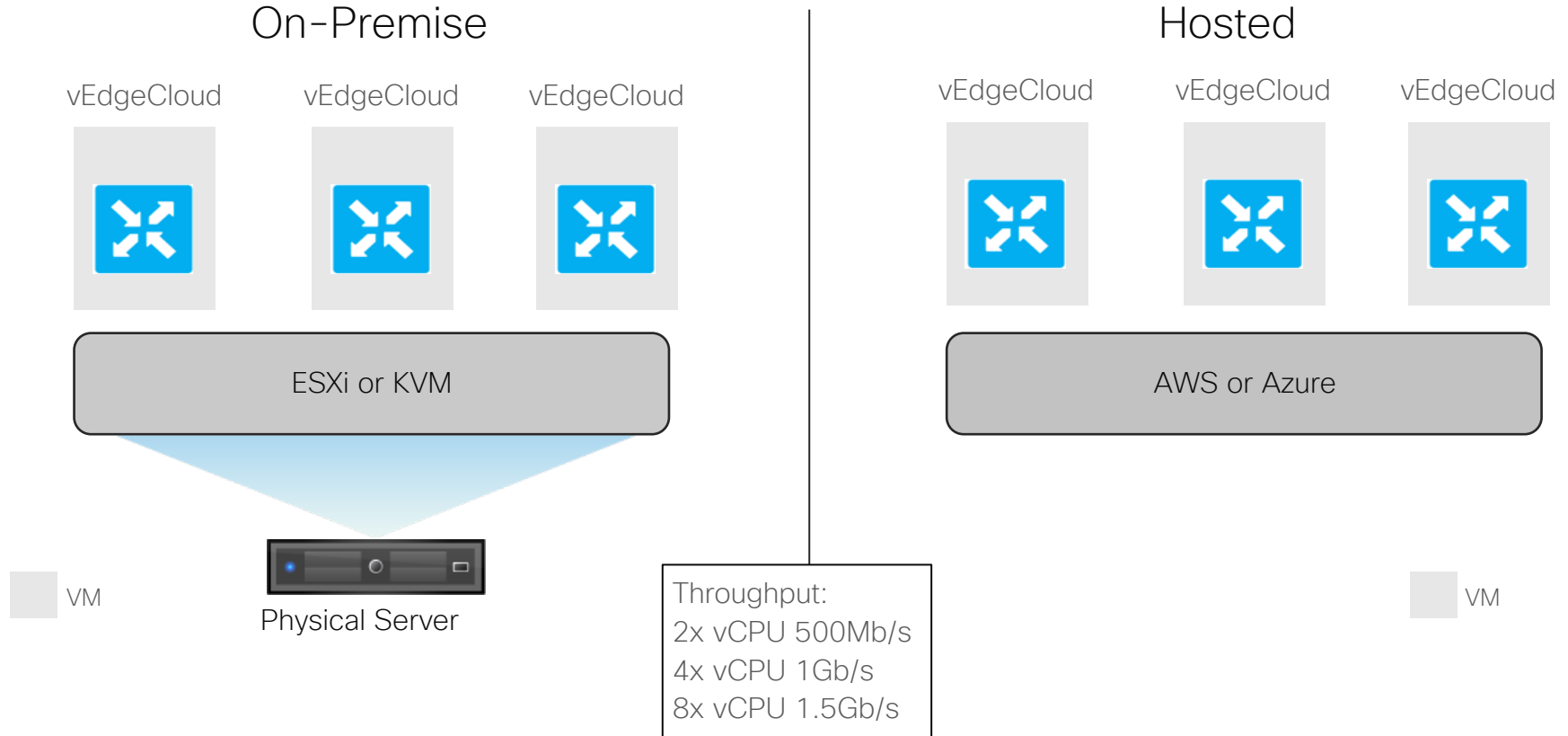
vEdge 100mw



- 100 Mbps AES-256
- 1RU
- 5x 1000Base-T
- 1x POE port
- 2G/3G/4G LTE
- 802.11a/b/g/n/ac
- Internal AC PS
- 1x USB-3.0
- TPM Board-ID
- Kensington lock
- Low power fan
- GPS

vEdge Cloud Virtual Routers

Deployment Methodology



Mere SD-wan

Vil du vide endnu mere om SD-wan

Cisco Live US '18

- [SD-WAN Routing Migrations - BRKRST-2095](#)
- [Migration to Next-Gen Cisco SD-WAN - BRKCRS-2111](#)
- [Serviceability for Next Generation SD-WAN - BRKCRS-2112](#)
- [Getting Poor Cloud performance? Cisco SD-WAN is Here for You - PSOEWN-1100](#)
- [Next-Gen SD-WAN \(Viptela\) Deployment, Monitoring, and Troubleshooting - BRKRST-2093](#)
- [Cisco SD-WAN \(Viptela\) Data Center and Branch Integration Design - BRKRST-2091](#)
- [Introduction to Next-Gen SD-WAN \(Viptela\) Architecture - BRKRST-2092](#)
- [Cloud-Ready WAN for IAAS and SAAS with Cisco Next-Gen SD-WAN - BRKCRS-2113](#)
- [Delivering Cisco Next Generation SD-WAN with Viptela - BRKCRS-2110](#)

Naryan's youtube channel.

<https://www.youtube.com/channel/UCUnvcD6xXOc6rlb7MgR79RA/videos>

dCloud

- [Cisco 4D SD-WAN \(Viptela\) v2](#)

Kontakt os for at få adgang til et demo lab på dcloud.

Kommende arrangementer

CVU & Techupdates

September

Dato	Seminar/event	Målgruppe	Sted
4. og 6.	Cisco Tech Update – Router og SDWAN	Slutkunder/Partnere	Aarhus & København
12.	Cisco Virtual Update – Prime Infrastructure migration til DNA Center	Slutkunder/Partnere	Online
18.	Cisco Virtual Update – Video Endpoints	Slutkunder/Partnere	Online
26.	Cisco Virtual Update – UCS Server	Slutkunder/Partnere	Online

Oktober

Dato	Seminar/event	Målgruppe	Sted
2. og 4.	Cisco Tech Update – ACI Anywhere design & deployment samt Nexus hardware	Slutkunder/Partnere	Aarhus & København
10.	Cisco Virtual Update – Wireless	Slutkunder/Partnere	Online
23.	Cisco Virtual Update – On-prem video conferencing	Slutkunder/Partnere	Online
24.	Cisco Virtual Update – Cisco ISE nye posture features og ISE-PIC	Slutkunder/Partnere	Online
30.	Cisco Tech Update – Firepower 6.3 med Multi-instance og Cisco Visibility	Slutkunder/Partnere	Aarhus

Evaluering

Slut med papir

Kommer ud til jer på email i morgen.

HUSK at udfylde.

