The bridge to possible

Updated Jan 2022

Catalyst 9K-X Access Switches Deep Dive

Customer Connection Briefing

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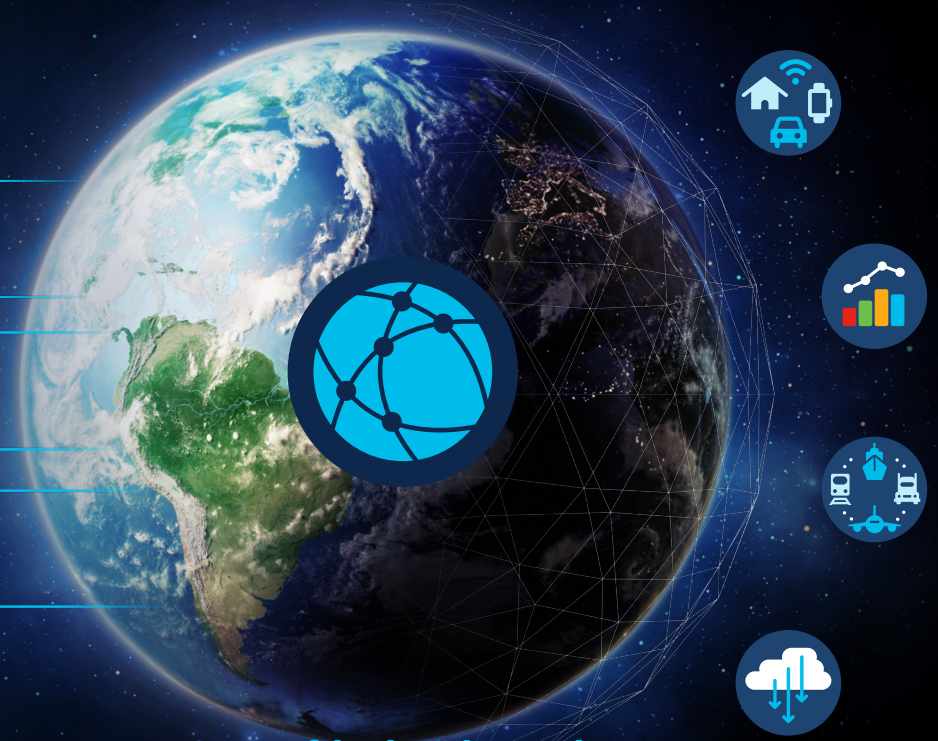
Technical Marketing Engineering

Digital trends shaping the future of business



Hybrid work

Work from home | Work from anywhere | Work from office

Industry 4.0

Wireless | Automation | Internet of Things | AI/ML

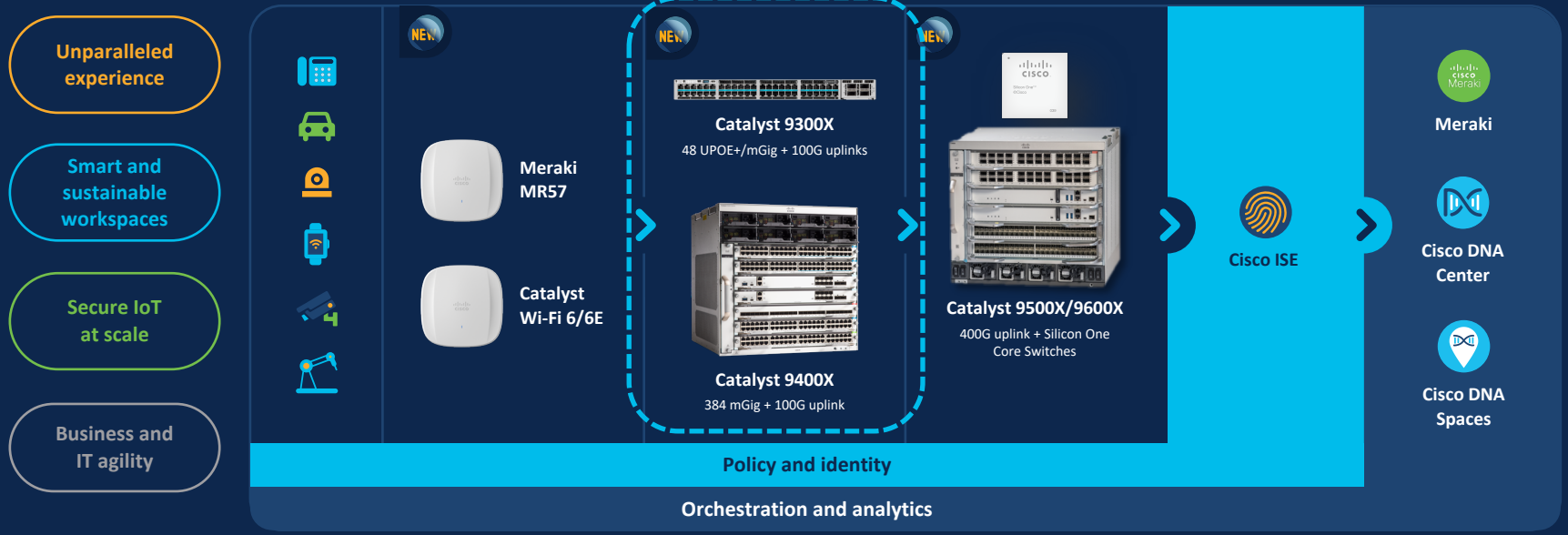
Hybrid cloud

Private cloud | Hybrid cloud | Public cloud

and the network is the core engine of hybrid work

Cisco Wi-Fi 6E and Catalyst 9000X

Enabling better business outcomes end-to-end with simplicity and choice



Cisco access networking stack

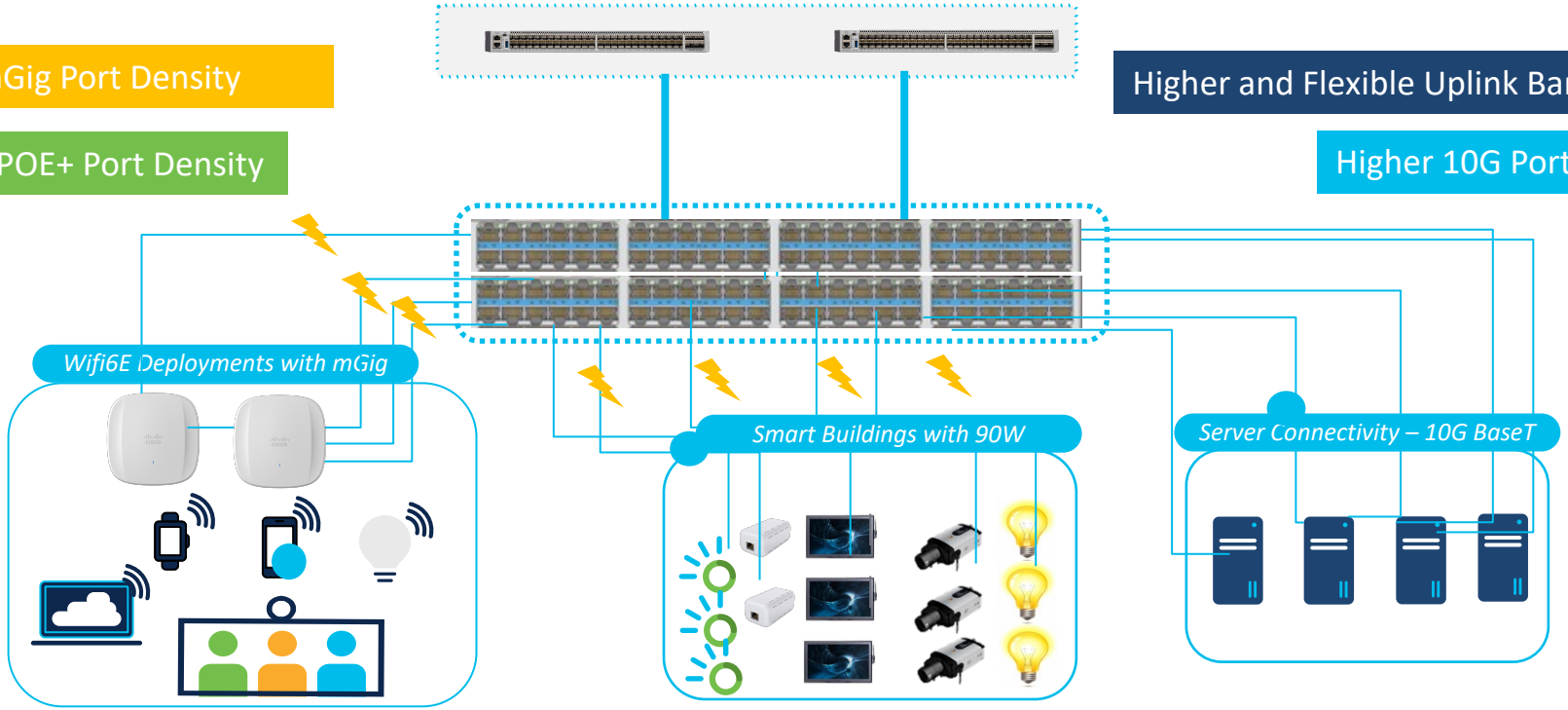
Enterprise Access Trends

Higher mGig Port Density

Higher UPOE+ Port Density

Higher and Flexible Uplink Bandwidth

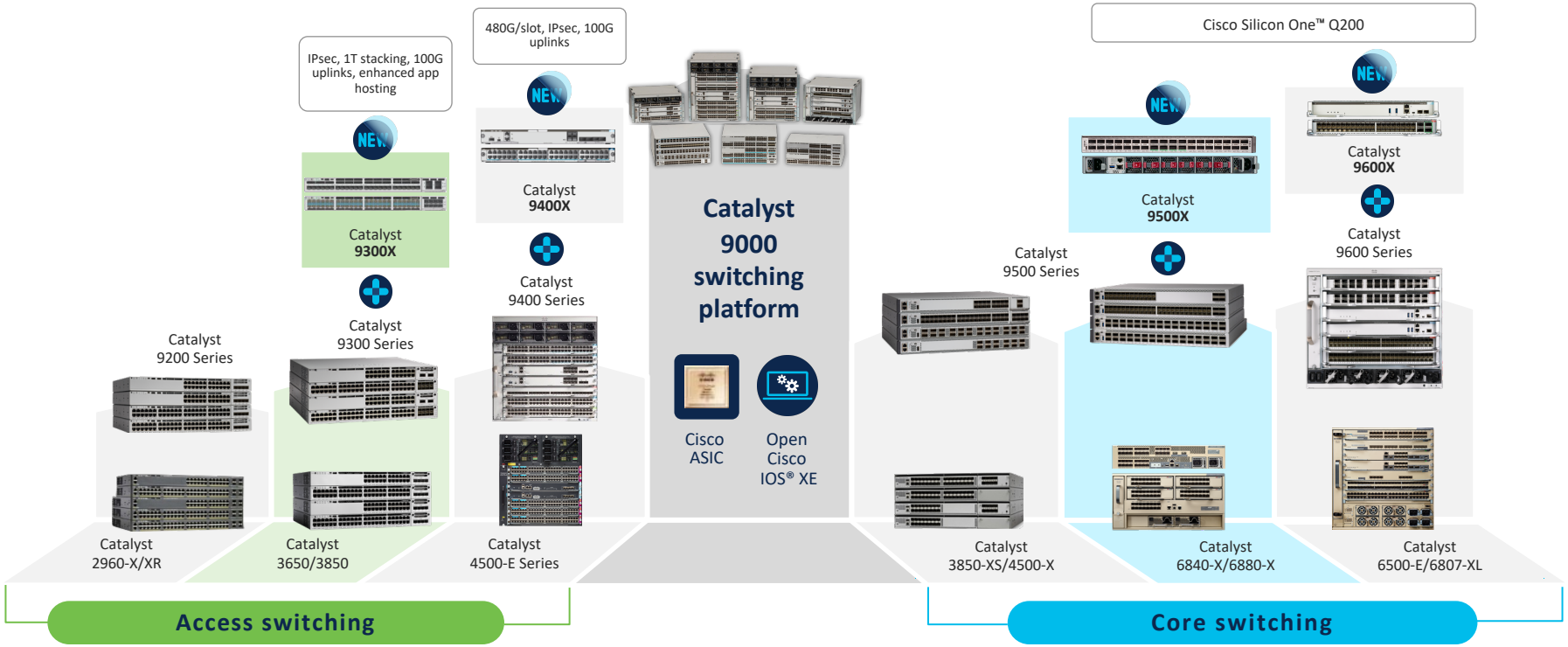
Higher 10G Port Density



New Access requirements for Future Campus

Catalyst 9000X – Expanding industry leadership

Adding the “X factor” to the industry’s leading switching family



Introducing

Catalyst 9300X

Catalyst 9300X – New High Performance Access Switch

Target FCS
Q1CY22
Software
IOS-XE 17.6.1

500GE
Bandwidth

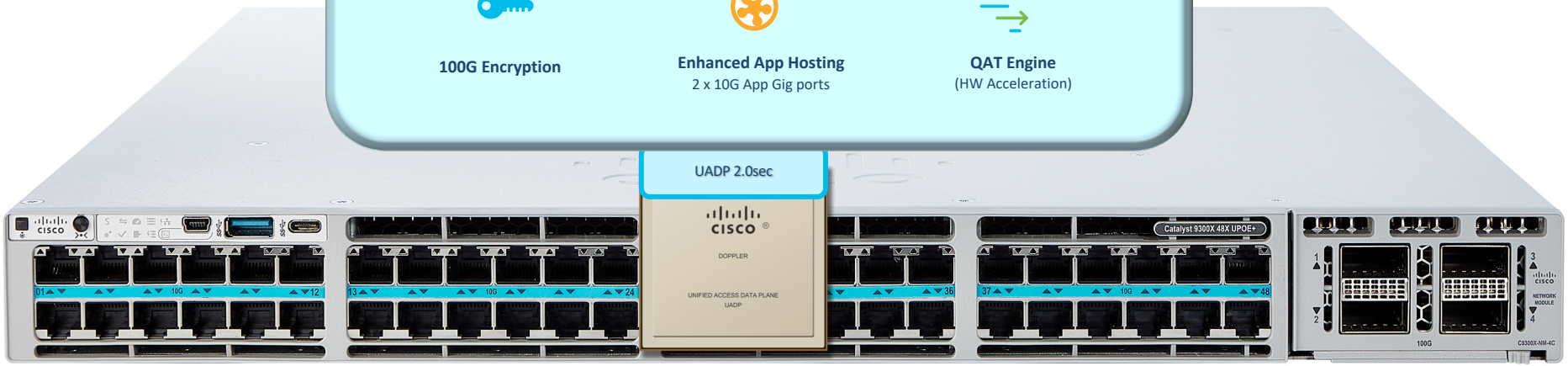
1/2.5/5/10/25/40/100G
Supports Different Speeds

1T
Stacking Capacity

100G Encryption

Enhanced App Hosting
2 x 10G App Gig ports

QAT Engine
(HW Acceleration)



48 x mGig-10G + 90W UPOE+

Flexible Uplink Options

Investment Protection with Catalyst 9300X

External Storage (240GB SSD)

Redundant Fans

Redundant Power

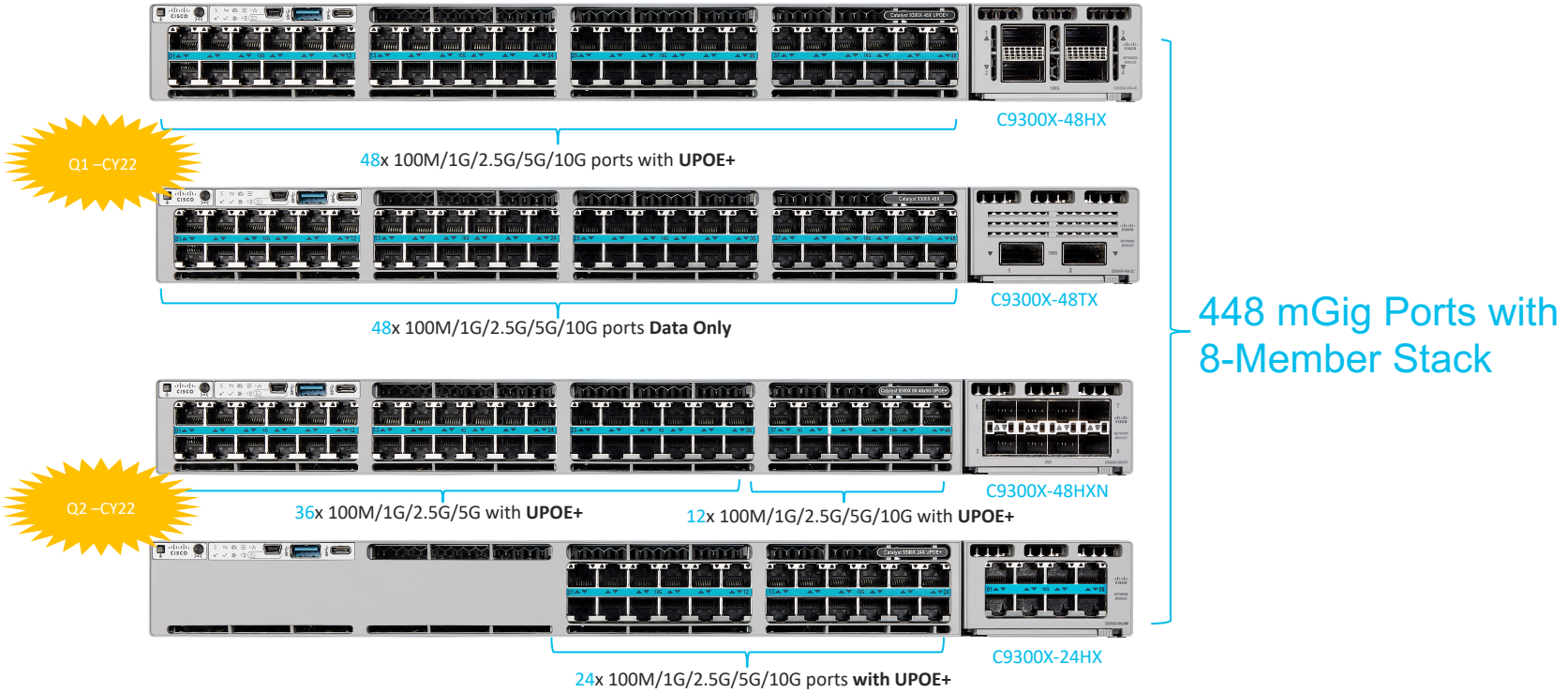
Data Stack Cables

Stackpower Cables

Optional Power Supplies (AC+DC)

Common Components and Stacking Backward Compatible with Catalyst 9300

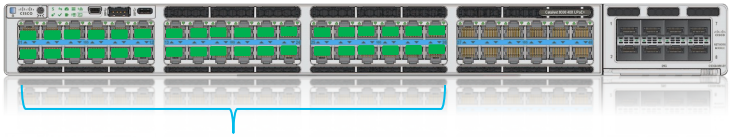
Catalyst 9300X Multigigabit Models



Highest Multigigabit Ports in the Industry with Standalone and StackWise-1T

Highest 90W UPOE+ Density in the Industry

Standalone

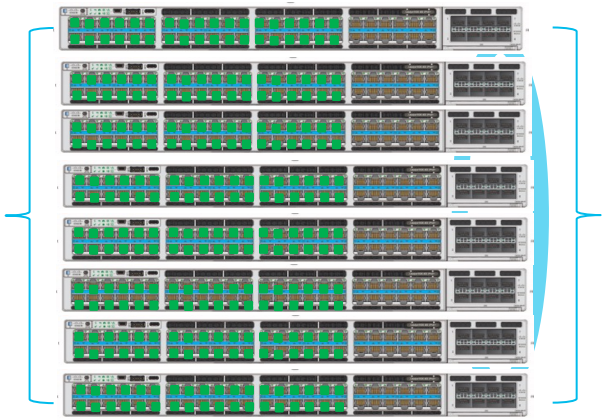


36 Ports of 90W UPOE+ or 48 Ports of 60W UPOE

StackWise

36 Ports of 90W UPOE+ x 8 = 288

48 Ports of 60W UPOE+ x 8 =384



8 Members

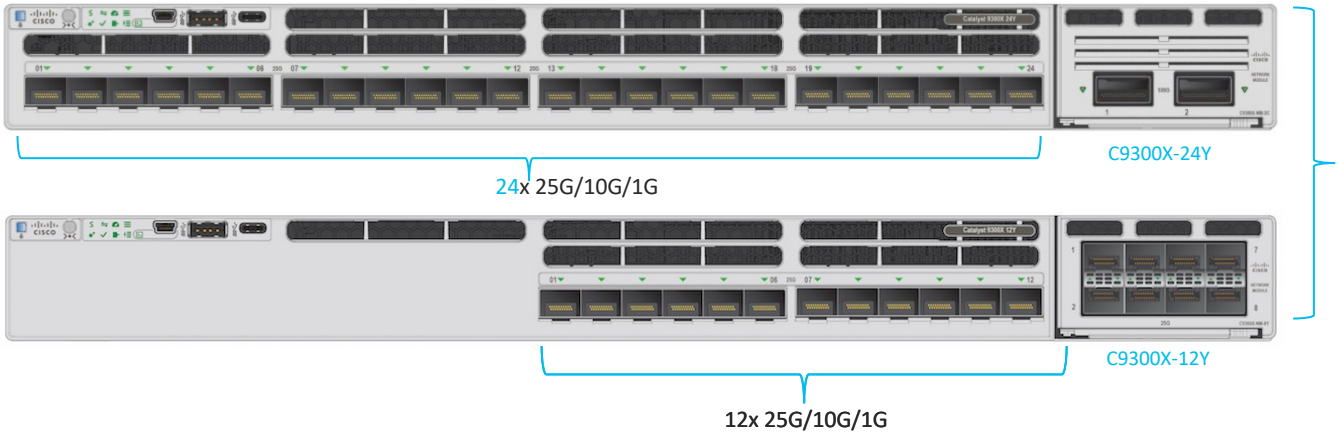
* With Stackpower, configure 4 x 2 members for getting desired PoE Port Density

36 ports of 90W or 48 ports of 60W with 2 x 1900W AC PS/Switch

288 ports of 90W or 384 Ports of 60W with 2 x 1900W AC PS/Switch

Catalyst 9300X High Speed Fiber

Shipping



Stackable with C9300/C9300X

3850 10G Fiber Replacement

Collapsed Access

FTTD

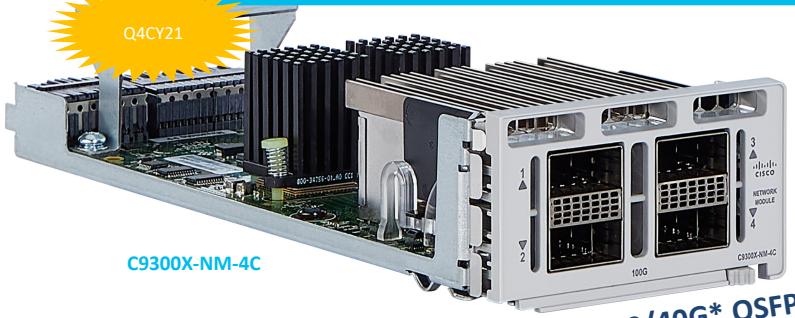
Servers

Bringing Stackable High Speed fiber to the Access

Highest and Flexible Speed Uplink Options in the Industry

100/40G Modular Uplinks

Q4CY21



C9300X-NM-4C

4 x 100/40G* QSFP

*Not Supported on 9300-12Y

Shipping

C9300X-NM-2C

2 x 100/40G QSFP

Multigigabit Uplinks

Q1CY22

C9300X-NM-8M

8 x 10G-mGig

10/25 G Modular Uplinks

Shipping

C9300X-NM-8Y

8 x 25/10/1G**

** Last 4 ports disabled on C9300X-48HXN

C9300X-Only Uplink modules Enabling High Speed and Port Density

Cisco Catalyst 9300 Series

Extended C9300 Family with C9300X Platform

C9300 SKUs with Modular Uplinks

1G Copper ports with PoE/UPOE/UPOE+

48/24 ports ***Data*** 1G

48/24 ports ***UPOE*** 1G

48/24 ports UPOE 1G – **9300B**

48/24 ports ***PoE***+ 1G

48/24 ports ***UPOE***+ 1G

Multigigabit Models with UPOE

48/24 ports mGig

1G Fiber Models

48/24 ports SFP 1G

C9300 Only Modular Uplinks

4x Multigigabit

4x 1G SFP

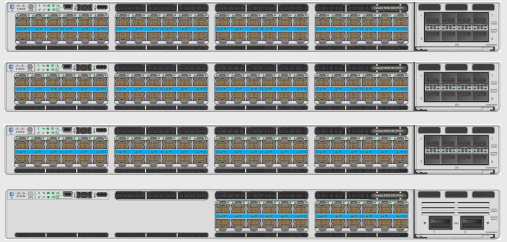
8x 1/10G SFP/SFP+

2x 1/10/25 G SFP/SFP+

2x 40G QSFP

C9300X SKUs with Modular Uplinks

High Density Multigigabit Models with UPOE+



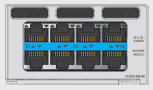
1/10/25G Fiber Models

C9300X Only Modular Uplinks

4x 40/100G

2x 40/100G

8x 10/25G



8x mGig

StackWise and StackPower Cables

Platinum rated power supplies

Modular Fans

Common Components

50CM-1M-3M

30CM-150CM

315W AC

715W AC/DC

1100W AC

1900WAC

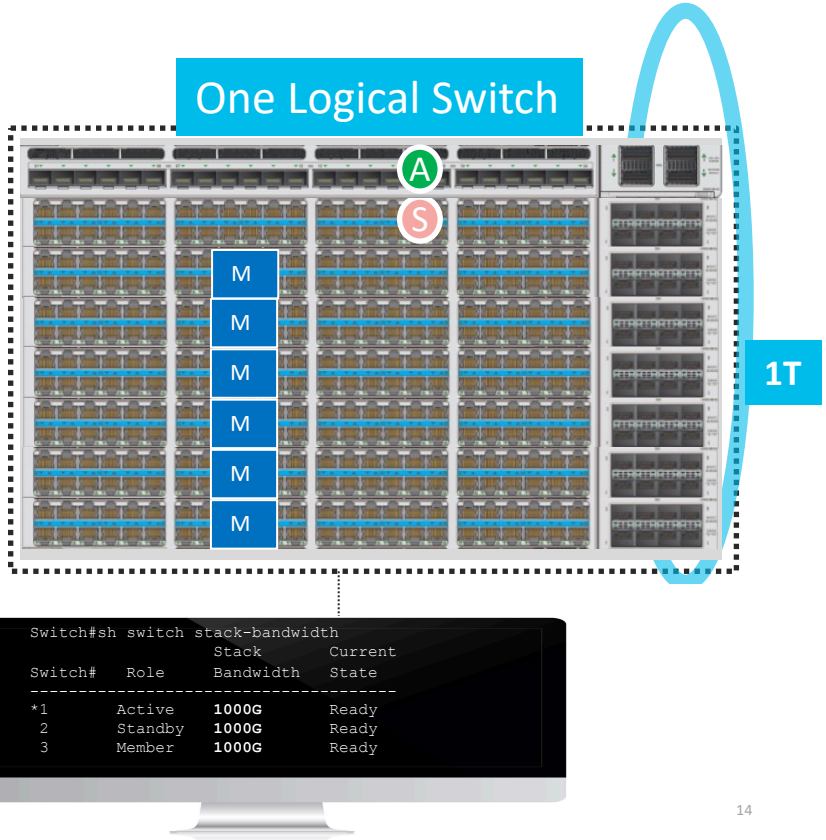
StackWise- 1 Terabit: Highest Stacking Bandwidth in the Industry for C9300X only Stack

8 Individual Switches

C9300X

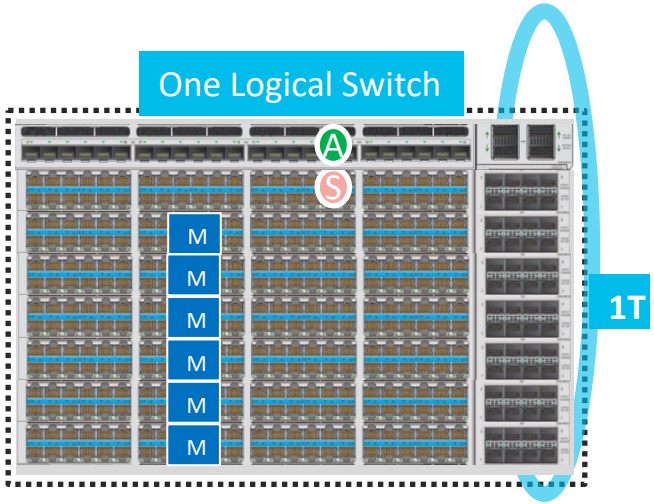
Combined

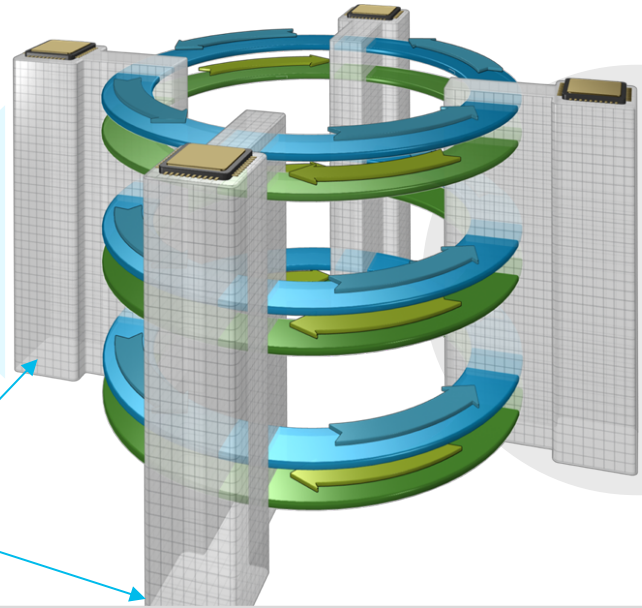
One Logical Switch



Cisco Catalyst 9300X Series Switches

The stack ring – StackWise-1T on all C9300X SKUs



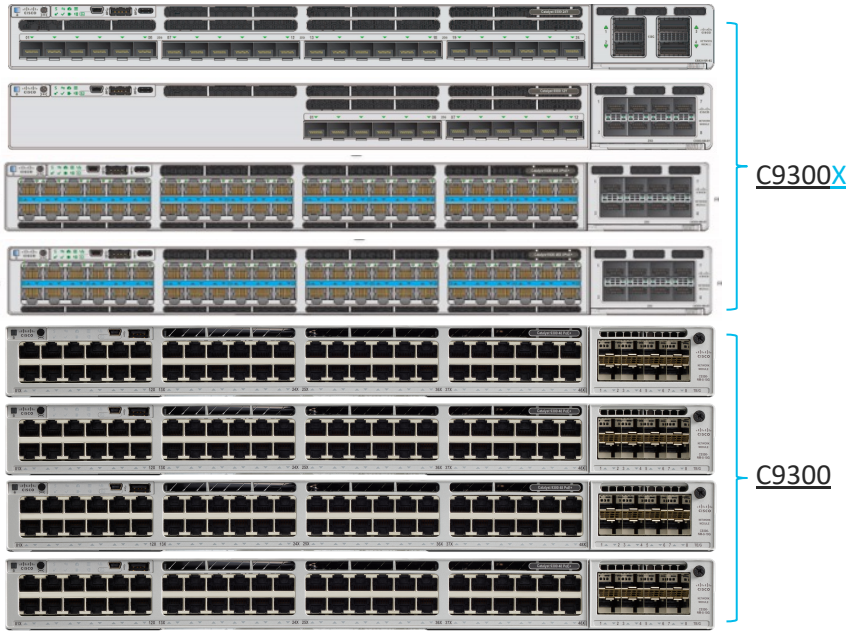


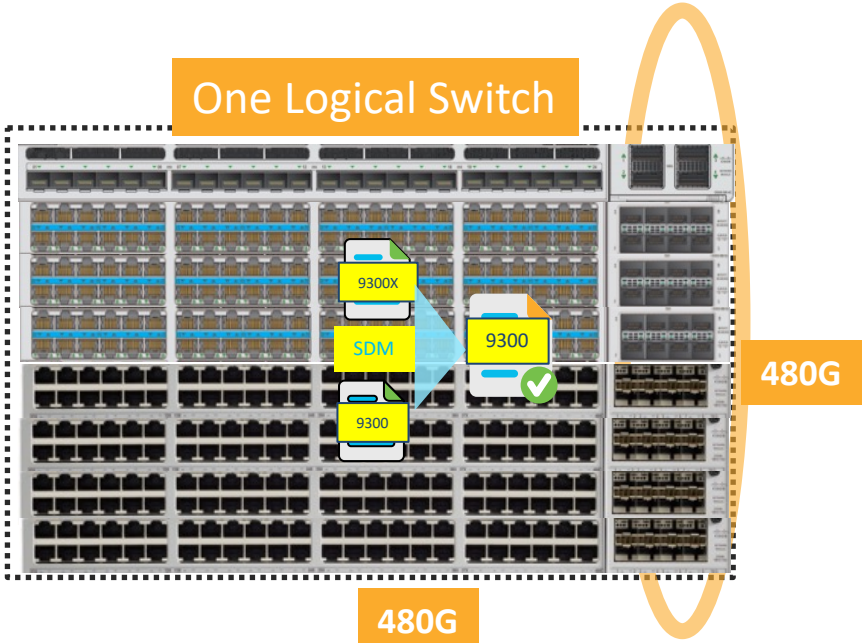
Stack interface of doppler

- 6 rings in total
- 3 rings go east
- 3 rings go west
- Each ring is 90 Gbps
- 540 Gbps unidirectional
- Spatial reuse = 1000 Gbps

Assuming 4x 24-port Cisco® Catalyst® 9300X Series modular uplink models

C9300X and C9300 Stack: Investment Protection

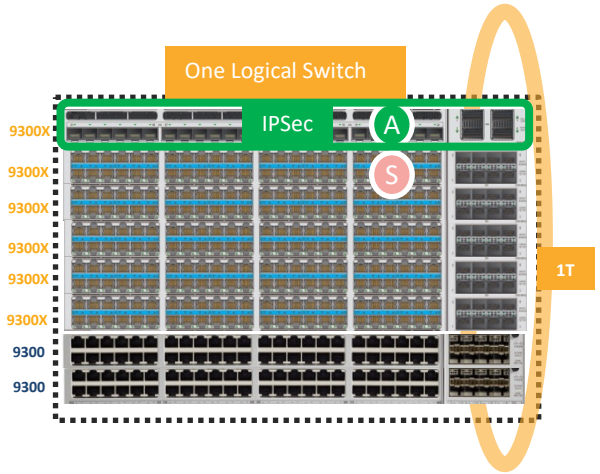




C9300X and C9300* mixed Stack
(Copper and Fiber)

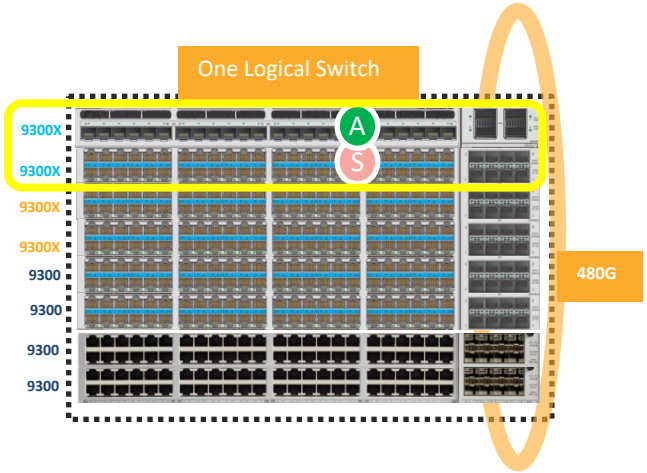
* C9300 B/L Models is not supported in mixed stack

Mixed Stacking (C9300 + C9300X) Considerations



IPSec support with C9300X-only Stack

- IPSec is not supported in Mixed Stack



App-Hosting with 1+1 Mode

- Both Active and Standby roles should be assigned to either C9300X or C9300

C9300- 17.3.2

C9300X- 17.7.1

Extended Fast Software Upgrade

Catalyst® 9300/9300X standalone

#Install add file image activate reloadfast commit

Control plane

Data plane

< 30 seconds of traffic impact

Catalyst 9300/9300X stack

#Install add file image activate reloadfast commit

Active control plane

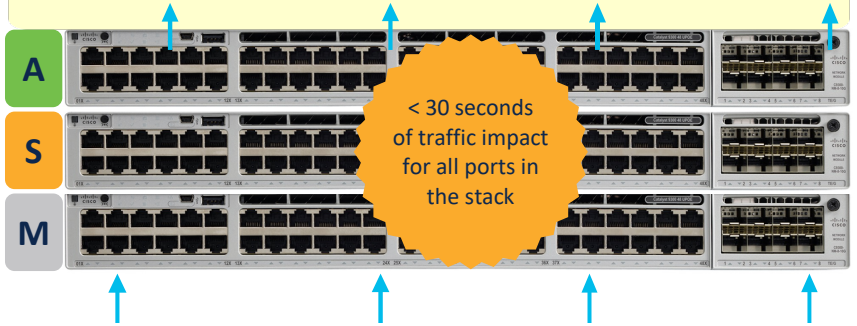
Data plane

A

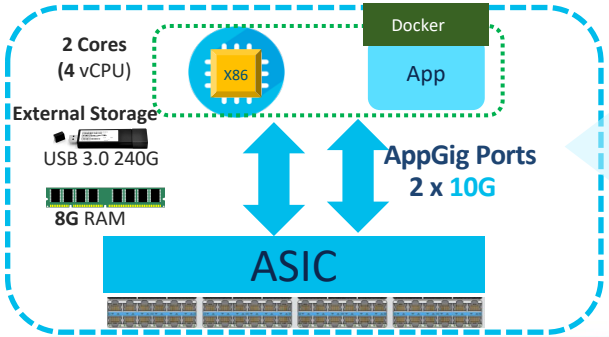
S

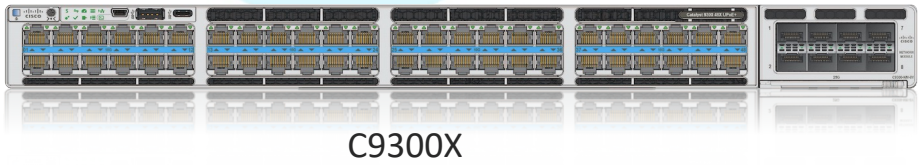
M

< 30 seconds of traffic impact for all ports in the stack

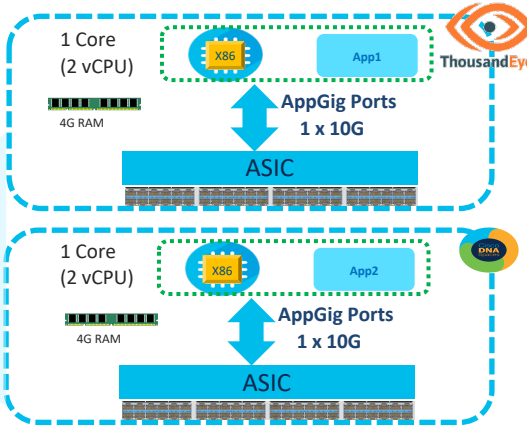


Enhanced Application Hosting Infrastructure on C9300X





C9300X



Cisco Signed Applications

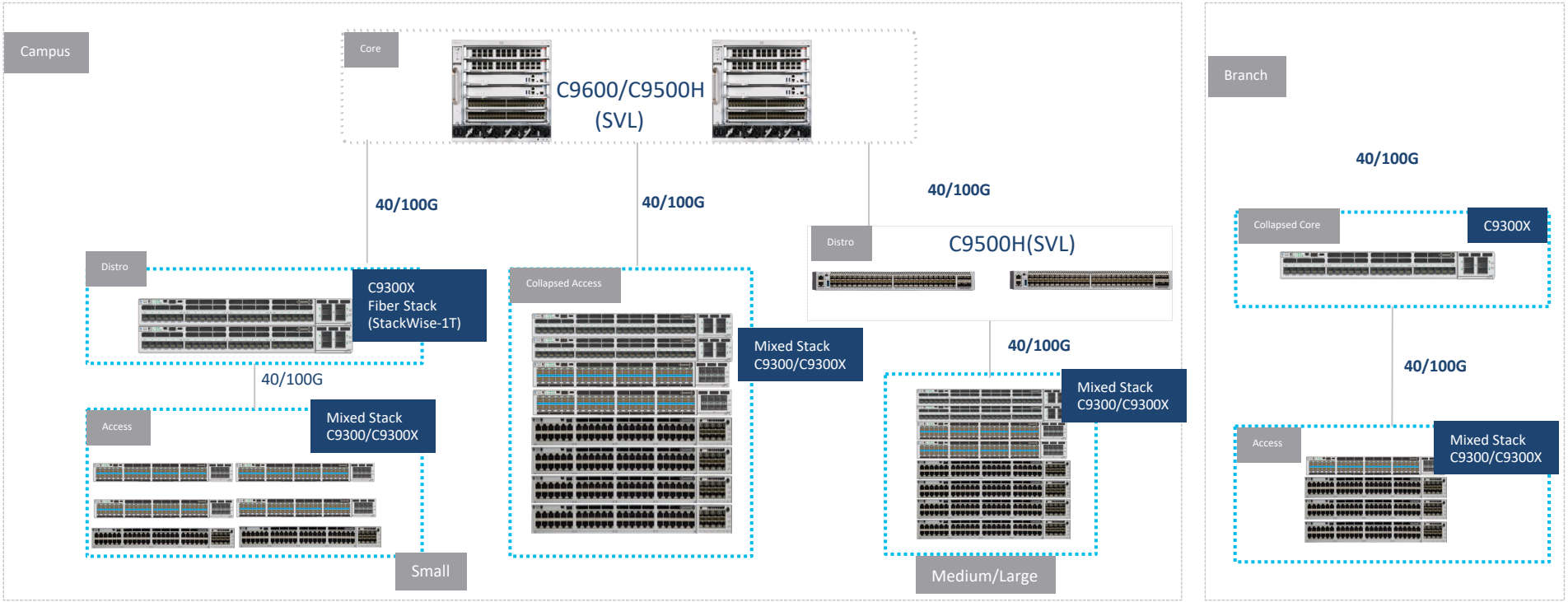
Support for Multiple Docker applications

With Additional RAM Memory and 2 x AppGigabit Ports, multiple Cisco Signed performance savvy Applications can be hosted on C9300X

Hardware Acceleration and Security

QAT is a special engine on the x86 CPU which helps in accelerating the performance of Applications

Flexible Design Options with C9300X



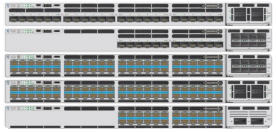
Bringing 10G/25G/40G/100G with StackWise-1 Terabit to Access

C9300X and C9500H Scale

Forwarding and Feature resources			
Features	**Cisco® Catalyst® 9300 Series(Default)**	**Cisco® Catalyst® 9300X Series(Default)**	**Cisco® Catalyst® 9500H Series(Distro)**
MAC addresses	32,000	32,000	82,000
Host/Direct routes	24,000	24,000	114,000(shared with LPM)
IGMP groups	8000	8000	2,000
LPM/Indirect routes	8000	15,000	114,000(Shared with Host Routes)
Multicast routes	8000	8000	16,000
SGTs	8000	8000	32,000
Security ACL	5000	8000	27,000

Customizable Template

Catalyst 9300 Series – Market leading Fixed switches

	Catalyst 9300X	Catalyst 9300	Mixed (Catalyst 9300+C9300X)
			
Deployment Type	High-speed Access and Distribution	Access	Access + Distribution
Stacking	1 Terabit	480G	480G
Stackpower	✔ (+ higher power budget)	✔	✔
HW-based IPSEC	✔	✘	✘
Dense Uplinks	Up to 100G	Up to 40G	Up to 100G
Fiber models	Up to 25G/10G SFP+	Up to 1G SFP	Up to 25G/10G SFP+
Max 10G copper ports (1RU)	48	24	48
App Hosting	✔ (~2x App Hosting capacity)	✔	✔

IBN Innovations

Full SD-Access, Fabric-in-a-Box, Embedded wireless controller

Wired Assurance, SD-Access, AVC, FNF

ETA, Macsec256

On-box App Hosting

HA, Hot Patching, Stackpower, UPOE+

Cloud Integrations: Stealthwatch, Umbrella, DNA Spaces

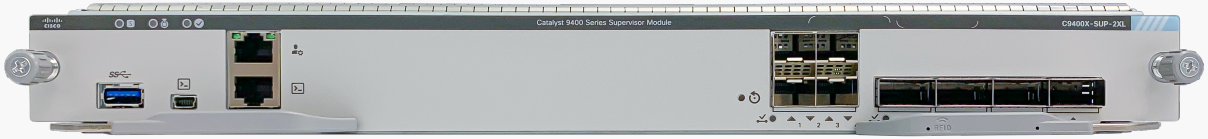
Introducing

Catalyst 9400X

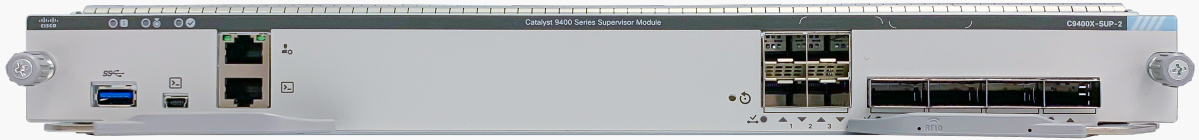
Modular Access delivering ever-increasing value

- ✓ No oversubscription per slot on any chassis (w/ Sup 2XL)
- ✓ Higher non-oversubscribed port density
- ✓ Higher Access Point (AP) Density
- ✓ Perpetual and Fast PoE hardware capable

- ✓ 100 Gbps ports on Supervisors
- ✓ More Active Ports on Supervisors
- ✓ Higher TCAM scale
- ✓ Proven 25 Gbps value



Catalyst 9400 SUP 2XL



Catalyst 9400 SUP 2

Catalyst 9400 SUP 1/1XL

Cisco Catalyst 9400X

New Supervisor 2/2XL powered by Cisco UADP 3.0sec ASIC

Up to 240G bandwidth

1/2.5/5/10/25/40G Supports Different Speeds

Forwarding + ACL Scale
Up to **96K MACs**
Up to **64K Routes**

Up to 32 MB (2 x 16MB) packet buffer

UADP 2.0XL

Sup-1/1XL

240/120/80Gbps/Slot with Sup-1XL (4/7/10 Slot Chassis)
80Gbps/Slot with Sup-1 (All Chassis)

UADP 3.0sec

NEW

Sup-2/2XL

480Gbps/Slot with Sup-2XL
240Gbps/Slot with Sup-2

Up to 1.6T Bandwidth

1/2.5/5/10/25/40/100G Supports Different Speeds

Increased Forwarding + ACL Scale
Up to **128K MACs***
Up to **256K Routes***

Up to 36 MB Unified packet buffer

Up to 100G Encryption
IPSec*, WAN-MACsec*

Customizable Templates for higher Scale*

* Hardware Capable, Software Support not committed

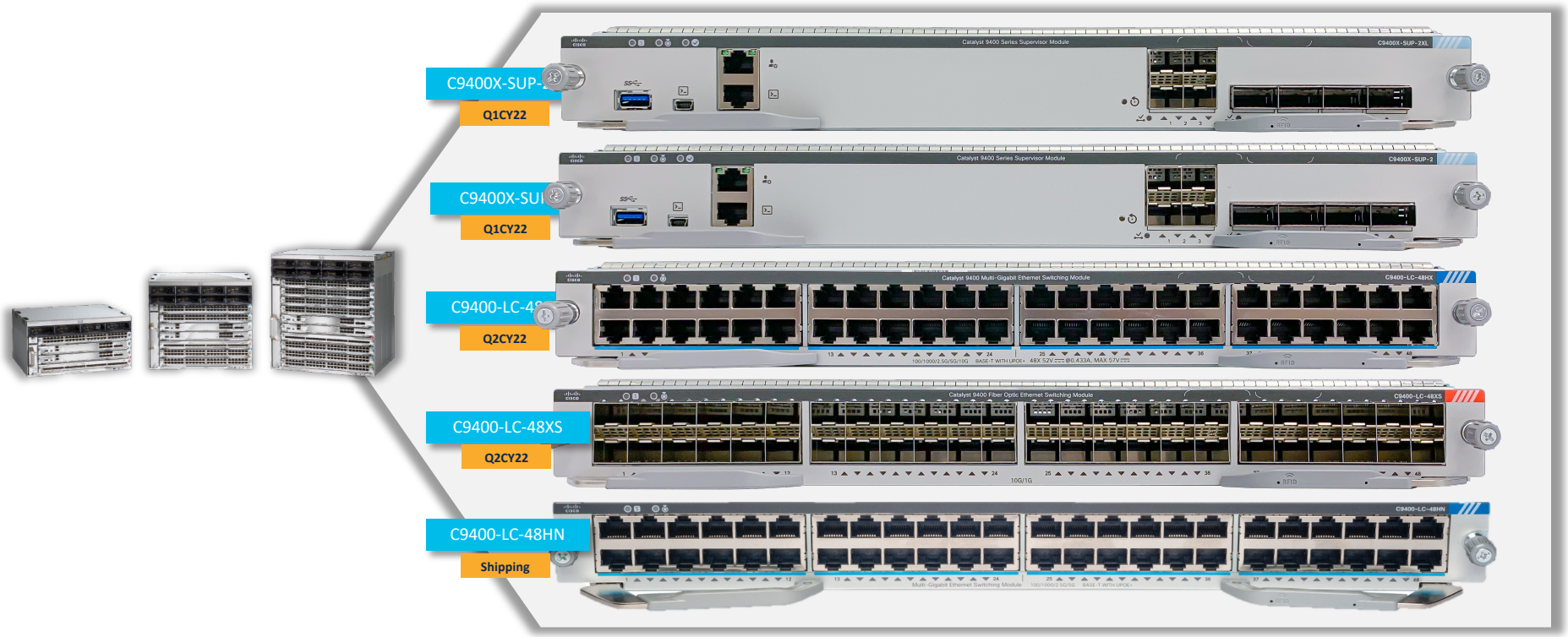
Unmatched Flexibility

Maximum Investment Protection

100G Leadership in Access

Same Series, Chassis options – New SUPs and Line cards

Same Chassis with New Supervisors and Line cards



NOTE: Same Supervisor model required in Dual SUP/SSO configuration

C9400X-SUP-2 / 2XL

Gen2 Supervisor Modules with UADP 3.0sec

4.8 Tbps

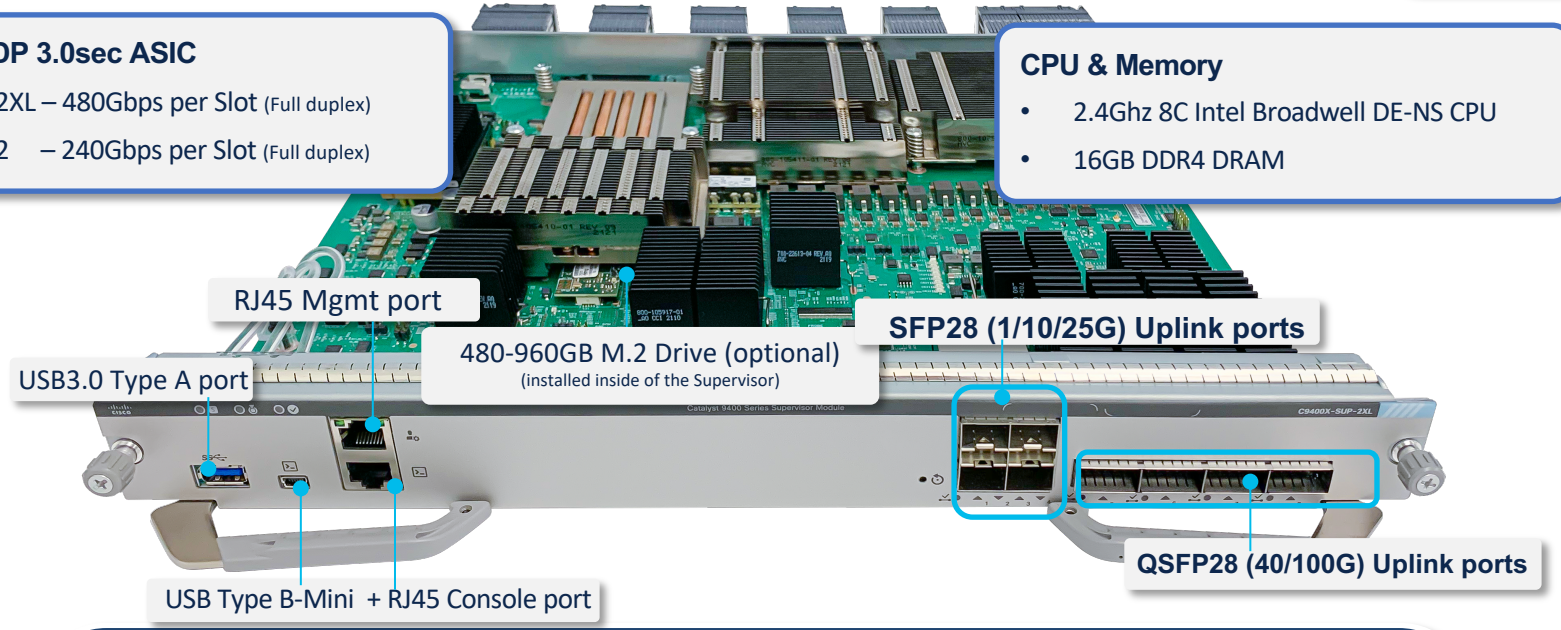
Target FCS
Q1CY22
Software
IOS-XE 17.7.1

3x UADP 3.0sec ASIC

- Sup 2XL – 480Gbps per Slot (Full duplex)
- Sup 2 – 240Gbps per Slot (Full duplex)

CPU & Memory

- 2.4Ghz 8C Intel Broadwell DE-NS CPU
- 16GB DDR4 DRAM

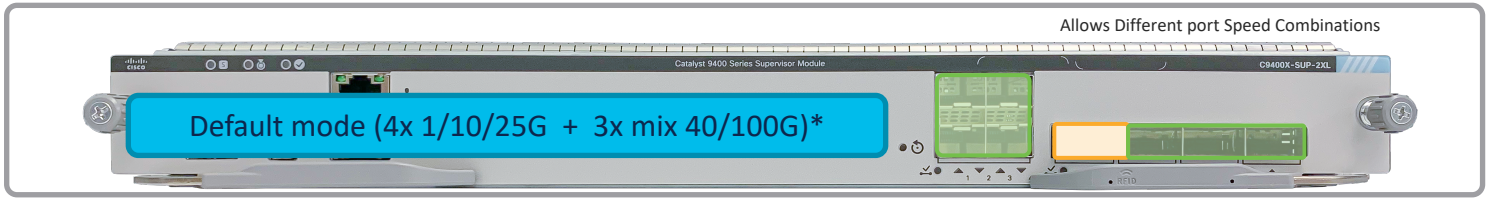


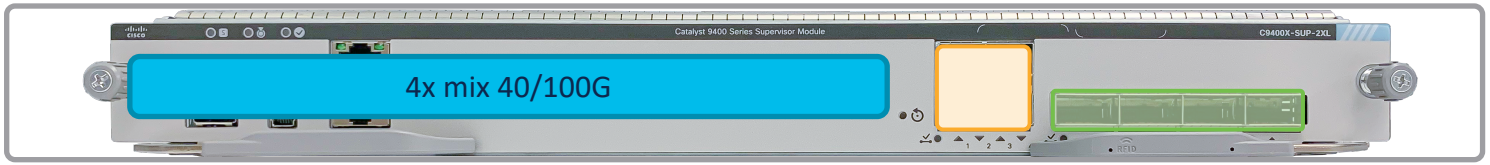
Sup1-XL Feature Parity at FCS

Exceptions
(Roadmapped)

- StackWise Virtual
- Perpetual and Fast PoE
- MACSEC HA on LC
- MACSEC XPN Support on SUP
- Auto Neg on Passive cable

Sup 2 / 2XL Uplinks – Single Supervisor

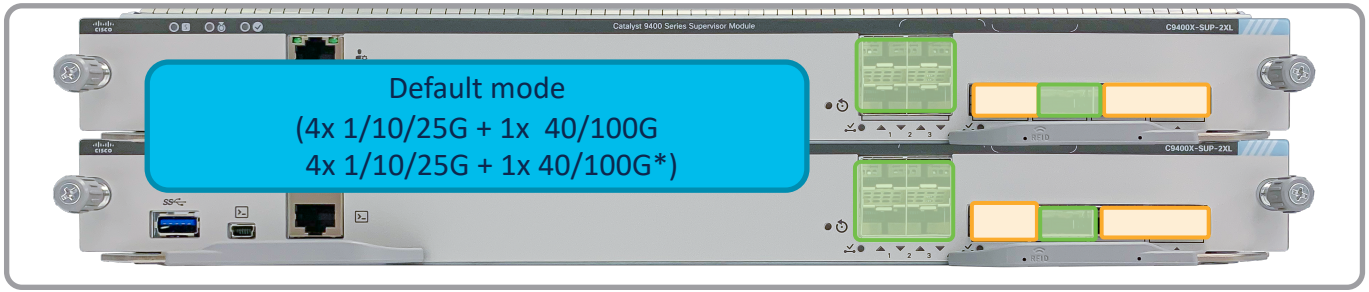


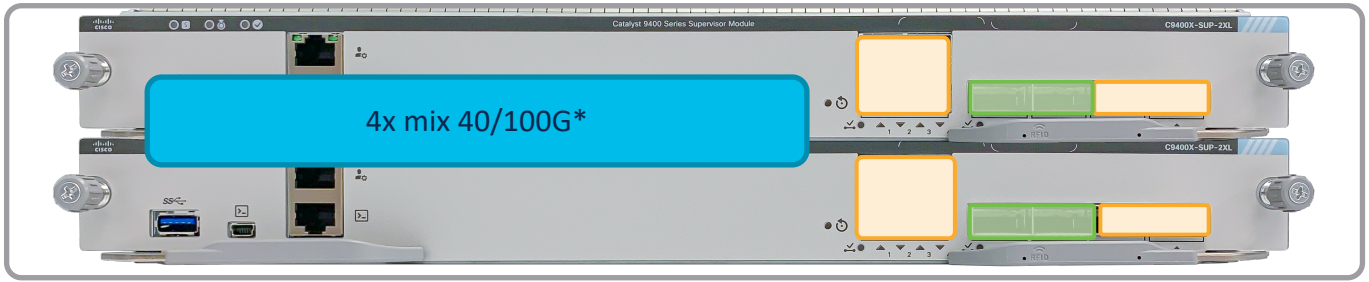


Active **Disabled**

*QSA and Breakout support on Roadmap

Sup 2 / 2XL Uplinks – Dual Supervisors

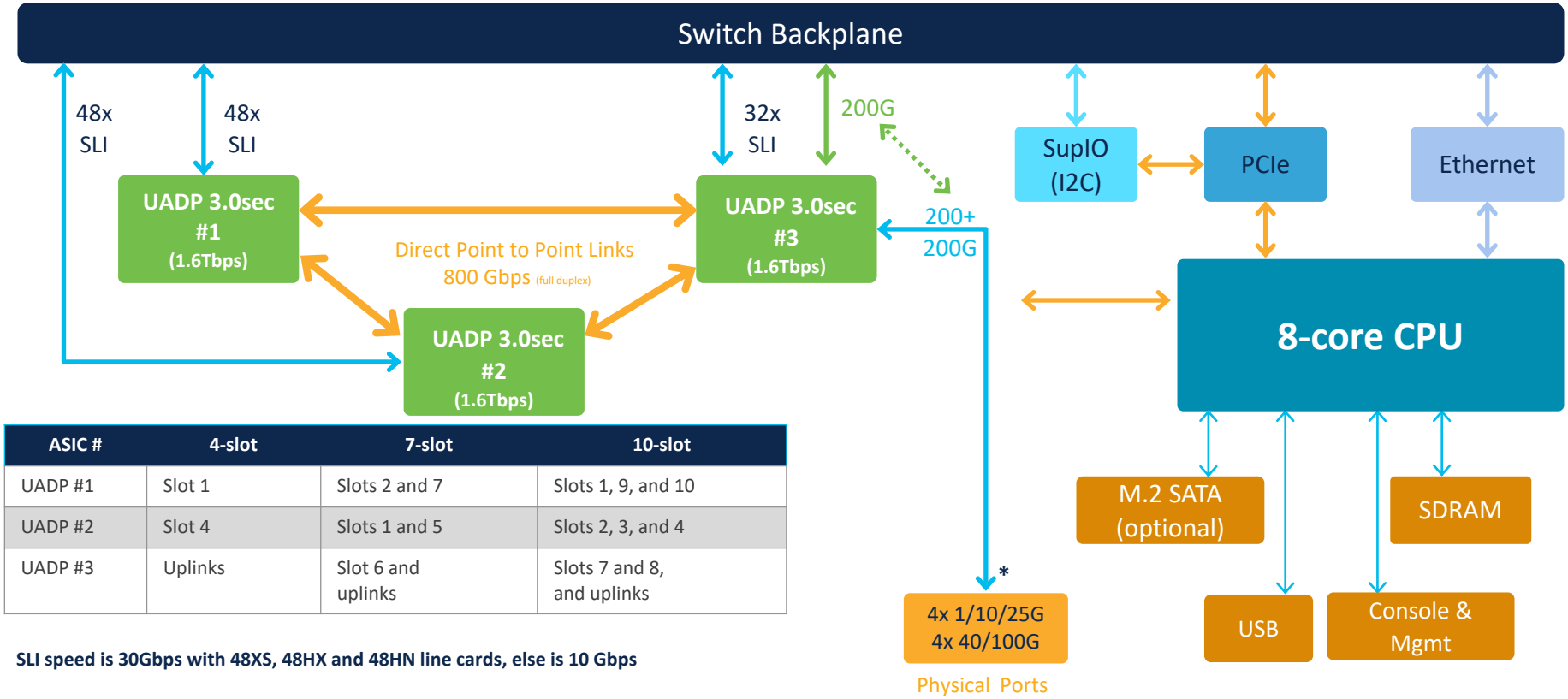




Active **Disabled**

*QSA and Breakout support on Roadmap

Sup 2 / 2XL Block Diagram



ASIC #	4-slot	7-slot	10-slot
UADP #1	Slot 1	Slots 2 and 7	Slots 1, 9, and 10
UADP #2	Slot 4	Slots 1 and 5	Slots 2, 3, and 4
UADP #3	Uplinks	Slot 6 and uplinks	Slots 7 and 8, and uplinks

SLI speed is 30Gbps with 48XS, 48HX and 48HN line cards, else is 10 Gbps

Introducing Catalyst 9400 Gen 2 Line Cards

Target FCS
Q2CY22
Software
IOS-XE 17.8.1

Higher Bandwidth & Higher Density Line Cards

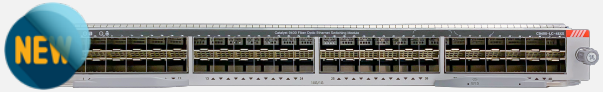
C9400-LC-48HX
(48 x 10G mGig UPOE+)

C9400-LC-48HN
(48 x 5G mGig UPOE+)

Up to 384 mGig Ports at Line rate w/ Sup2XL
All ports support 90W UPOE+/802.3BT

C9400-LC-48UX
(24 x mGig UPOE+24 x UPOE)
Up to 192 mGig Ports with Oversubscription w/ Sup1

Access



C9400-LC-48XS
(48 x 10G SFP+)

Up to 384 10G Fiber Ports at Line rate w/ Sup2XL

C9400-LC-24XS
(24 x 10G SFP+)
Up to 192 10G Ports with Oversubscription w/ Sup1

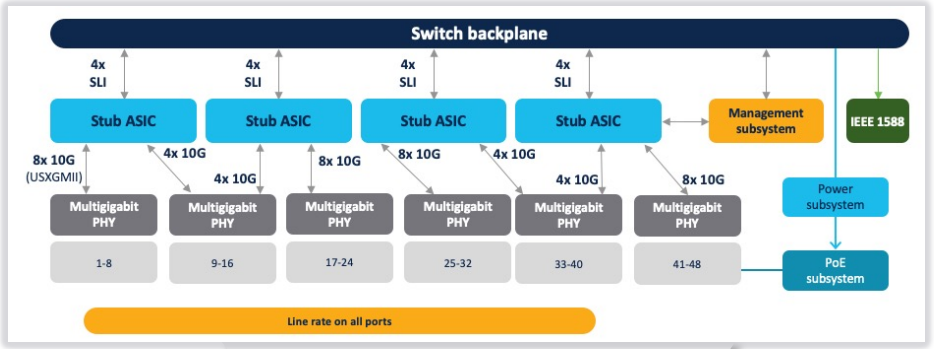
Aggregation

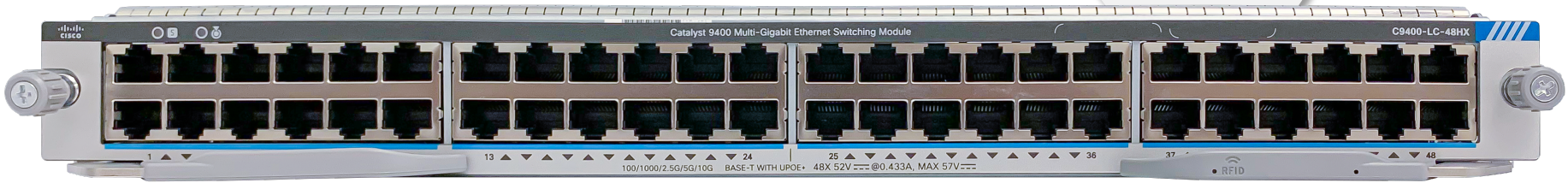
New Line Cards are supported only on Supervisor-2/2XL

C9400-LC-48HX

Gen2 Access Line Card – 48 x 10G mGig w/ UPOE+

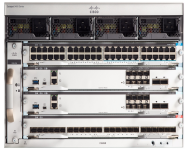
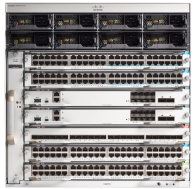
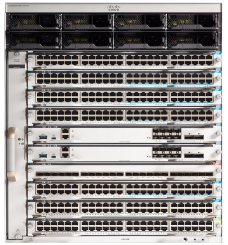
- **480 / 240 Gbps bandwidth with C9400-SUP-2XL / 2**
- **48x RJ45 ports, 1/2/5/10Gbase-T**
- **4x Cisco UADP Stub ASICs**
  - 120Gbps per stub ASIC
  - Hitless Switchover
  - IEEE 1588 & PTPv2
- **6x Octal mGig PHYs**
  - Nbase-T mGig Autonegotiation





Concurrent 60W/90W POE Port Density with C9400-LC-48HX

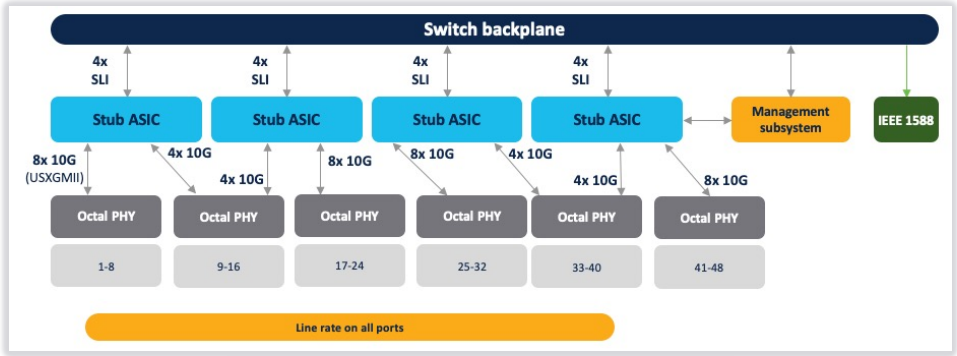
With **3200W** Power Supply in Combined Mode(Fully loaded PSUs):

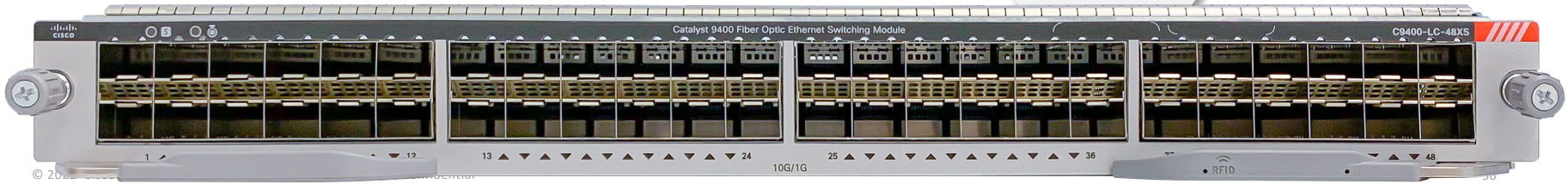
	C9404	C9407	C9410
			
Total Ports	**96 ports**	**240 ports**	**384 ports**
UPOE + 90W	**96 ports** **(Fully loaded chassis)**	**226 ports** **(Up to 4 fully loaded LCs + 34 Ports)**	**224 ports** **(Up to 4 fully loaded LCs + 32 Ports)**
UPOE 60W	**96 ports** **(Fully loaded chassis)**	**240 ports** **(Fully loaded chassis)**	**336 ports** **(Up to 7 fully loaded LCs)**

C9400-LC-48XS

Gen2 Aggregation Line Card – 48 x 10G Fiber

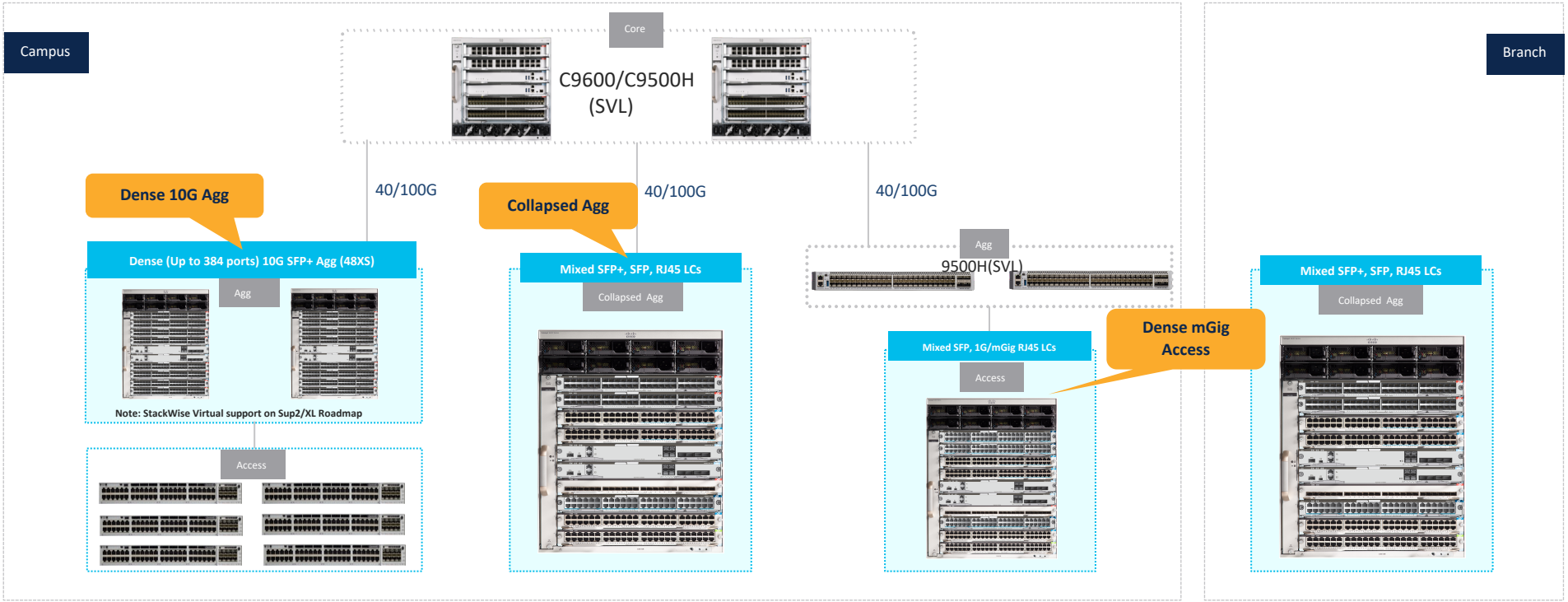
- **480 / 240 Gbps bandwidth with C9400-SUP-2XL / 2**
- **48x SFP+ ports, 1/10GE**
- **4x Cisco UADP Stub ASICs**
  - 120Gbps per stub ASIC
  - Hitless Switchover
  - IEEE 1588 & PTPv2
- **6x Octal Fiber PHYs**
  - 10GE Fiber Autonegotiation





Catalyst 9400 Deployment Flexibility

C9400X enables dense 10G SFP+ aggregation and multigigabit access use cases



Bandwidth Boost with Gen2 Supervisors

Cisco C9400 SUP 1/1XL | Cisco C9400X SUP2 | Cisco C9400X SUP2XL

	Type	C9404R	C9407R	C9410R	C9404R/C9407R/C9410R	C9404R/C9407R/C9410R
New **C9400-LC-48HX**	UPOE+	-	-	-	240	480
New **C9400-LC-48XS**	Fiber	-	-	-	240	480
C9400-LC-48UX	UPOE	80 / 240	80 / 120	80	240	240
C9400-LC-24XS	Fiber	80 / **240**	80 / 120	80	240	240
C9400-LC-48HN	UPOE+	80 / 120	80 / 120	80	240	240

Not Supported

Bandwidth in Gbps **Bold** indicates Line Rate

3x Bandwidth Uplift for Gen1 LCs (**80G -> 240G**) on **10 Slot Chassis w/ SUP2XL**

2x Bandwidth Uplift for Gen1 LCs (**120G -> 240G**) on **7 Slot Chassis w/ SUP2XL**

FYI

C9400X vs. C9400 - Physical

Cisco C9400X (UADP 3.0sec)

Cisco C9400 (UADP 2.0XL)

	LC-48HX	LC-48XS	LC-48HN	LC-48UX	LC-24XS	LC-48S
CPU (number)	2.7GHz Intel 8C (BDW D-1564N)		2.4GHz Intel 4C (BDW D-1530)			
DRAM (type)	16GB DDR4		16GB DDR3			
ASIC (number)	UADP3.0sec x3		UADP2.0XL x3			
Capacity (chassis)	4.8T		960G			
Capacity (per slot)	480G		240G (9404) / 120G (9407) / 80G (9410)			
1G max	96/192/384	96/192/384	96/192/384	96/192/384	48/96/192	96/192/384
5G max	96/192/384	--	96/192/384	48/96/192	--	--
10G max	96/192/384	96/192/384	48/96/192	48/96/192	48/96/192	--
25G max	8 (Sup)	8 (Sup)	4 (Sup)	4 (Sup)	4 (Sup)	4 (Sup)
40G max	4 (Sup)	4 (Sup)	4 (Sup)	4 (Sup)	4 (Sup)	4 (Sup)
100G max	4 (Sup)	4 (Sup)	--	--	--	--

FYI

C9400X vs. C9400 - Features

C9400X (UADP 3.0sec)

C9400 (UADP 2.0XL)

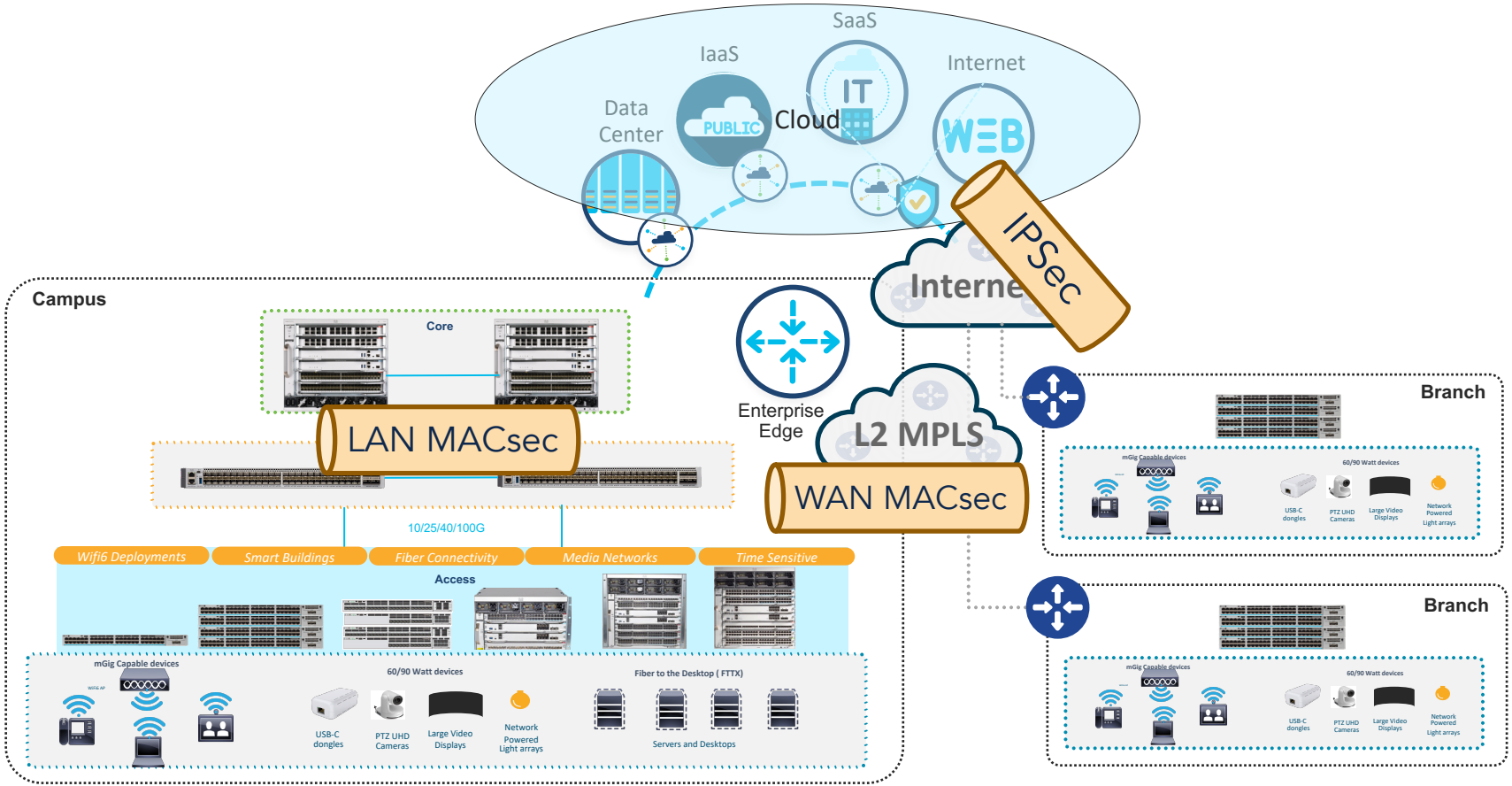
	Default (Core)	Maximum (Custom)*	Default (Access)	Maximum (Core)
MAC Addresses	**80K**	128K	**96K**	16K
IP Host Routes	**212K** (LPM+Host)	256K (LPM+Host)	**48K**	32K
Multicast L2 groups	**16K**	32K	**16K**	16K
Multicast L3 routes	**32K**	32K	**16K**	16K
IP LPM Routes	**212K** (LPM+Host)	256K (LPM+Host)	**64K**	64K
MPLS Labels	**32K**	64K	**12K**	16K
SGT/OG Labels	**32K**	64K	**8K**	8K
NAT Sessions	**4K**	16K	**2K**	2K
Sec ACL Entries	**12K** (input) + **15K** (output)	27K (input) + 18K (output)	**18K** (shared)	18K (shared)
QoS ACL Entries	**8K** (input) + **8K** (output)	27K (input) + 18K (output)	**18K** (shared)	18K (shared)
PBR ACL Entries	**16K**	16K	**2K**	2K

* SW Roadmap (FCS+)

Enhanced Usecases with Catalyst 9000 switches

1. Security
2. Smart Buildings
3. Application Hosting
4. ThousandEyes
5. More IOS XE Features

End-to-End Security for Campus



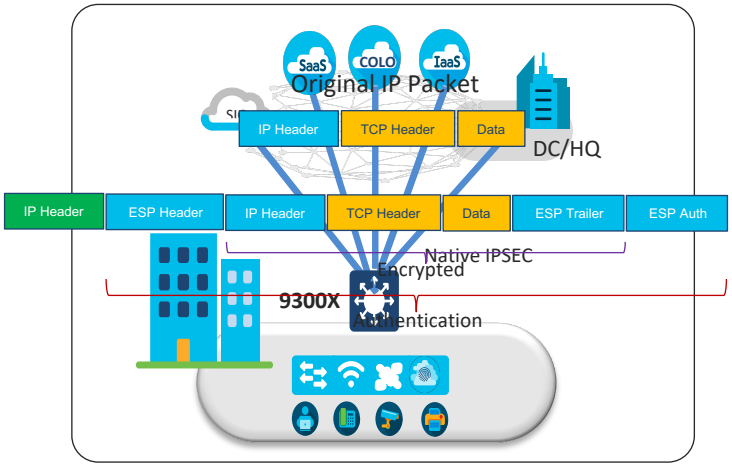
IPsec
Enabled by C9K-X Access

Catalyst 9300X – Purpose built for the **New Edge**

IOS-XE 17.6.2 / 17.7.1

With DNA-A license
(HSEC Key for Export Control)

Cisco Catalyst 9300X



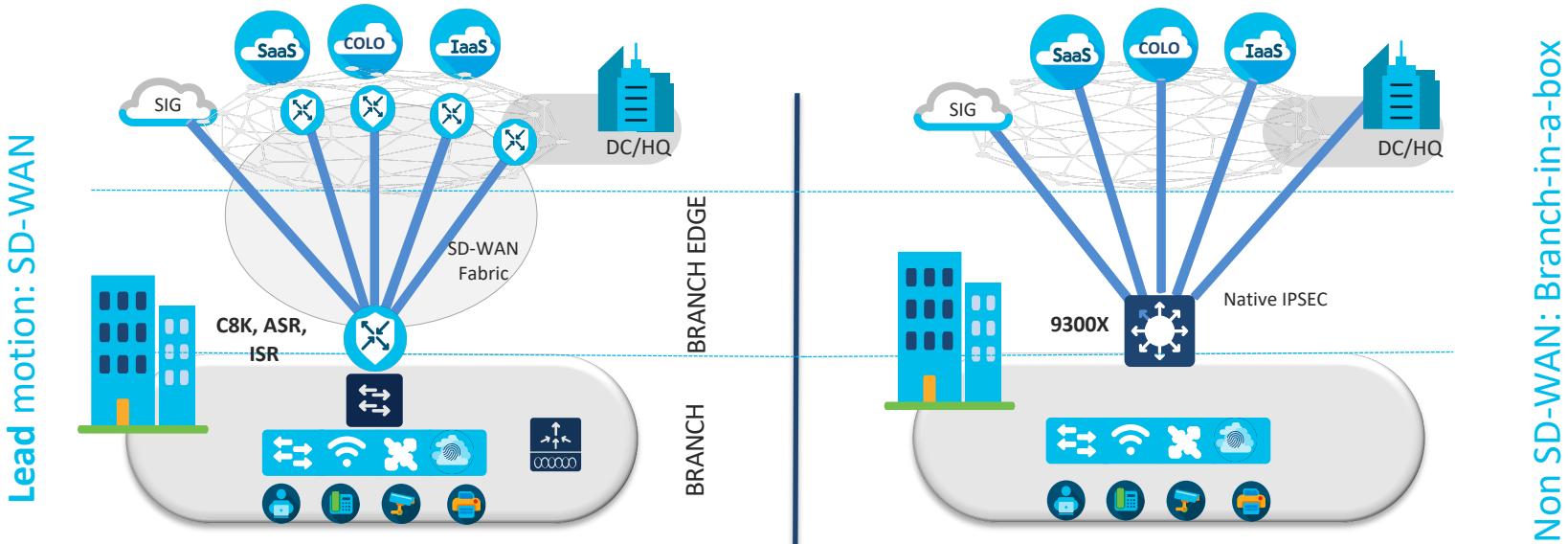
Encryption	Authentication
AES-128-CBC	HMAC/SHA1
AES-128/256-GCM	GMAC
Tunnel Mode	
Encapsulation - ESP	
IKEv2	

- Static Virtual Tunnel Interface
- IPv4/IPv6
- OSPF/BGP
- PBR + Set Interface *
- NAT Traversal *
- Multicast Routing*
- L3 segmentation over IPSEC*
- L2 Extension over IPSEC*

* Roadmap

Lead with SD-WAN for Branch WAN Edge

Branch consolidation with Catalyst 9300X for select Lean Branches

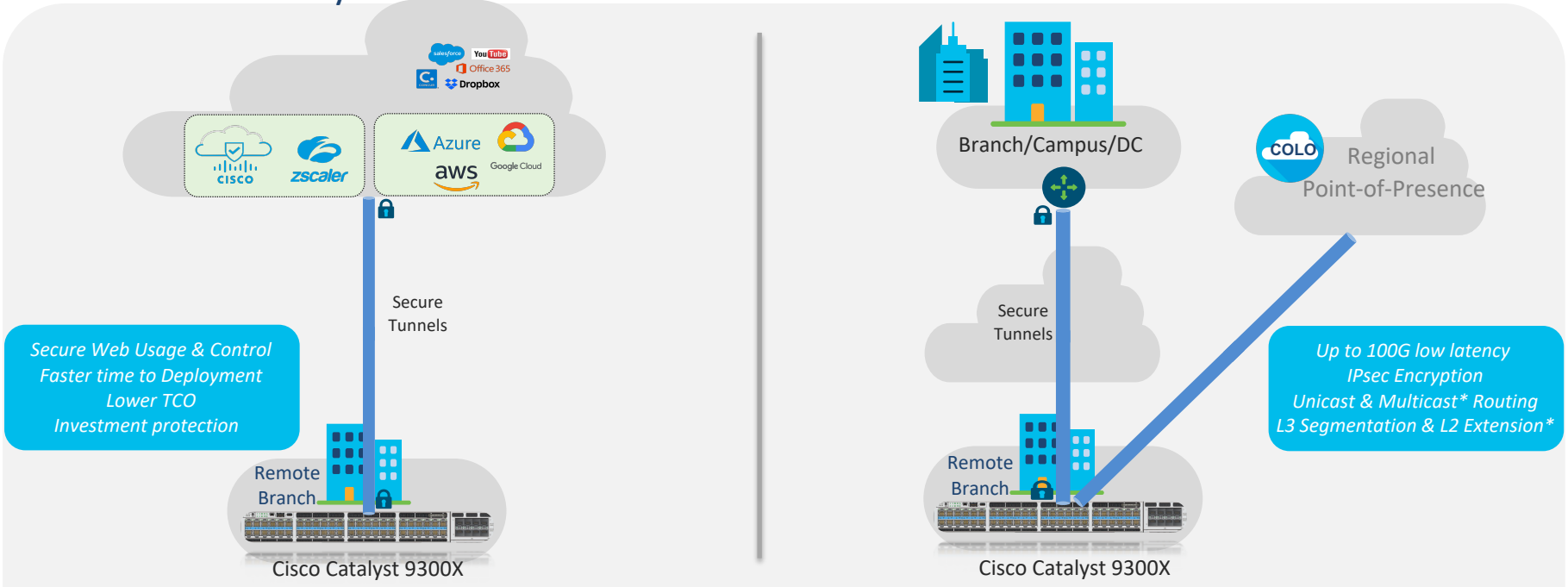


- *Diverse WAN needs (full mesh, hub & spoke topologies)*
- *Large WAN Scale & Fully Automated workflows*
- *Robust Cloud Onramp / SASE integrations*
- *Rich App Performance & Optimization*
- *Multi-tenancy / Integrated Security*

- *Lean branch – Security, SaaS, apps in Cloud*
- *High-speed standards-based connectivity (lower scale)*
- *Box consolidation – Switching, Wireless (WLC), Routing*
- *Edge Computing – Lightweight Apps*
- *Dense ports, copper/fiber, Stackwise 1T, mGig/UPOE+*

Catalyst 9300X – Purpose built for the **New Edge**

Secure connectivity to anywhere



Site-to-Cloud

Standards based IPSEC for secure Direct Internet Access & Cloud Native Workloads

Site-to-Site

100G Line-rate IPsec encryption with low latency forwarding

* Roadmap

Catalyst 9k Edge – Automation & Monitoring

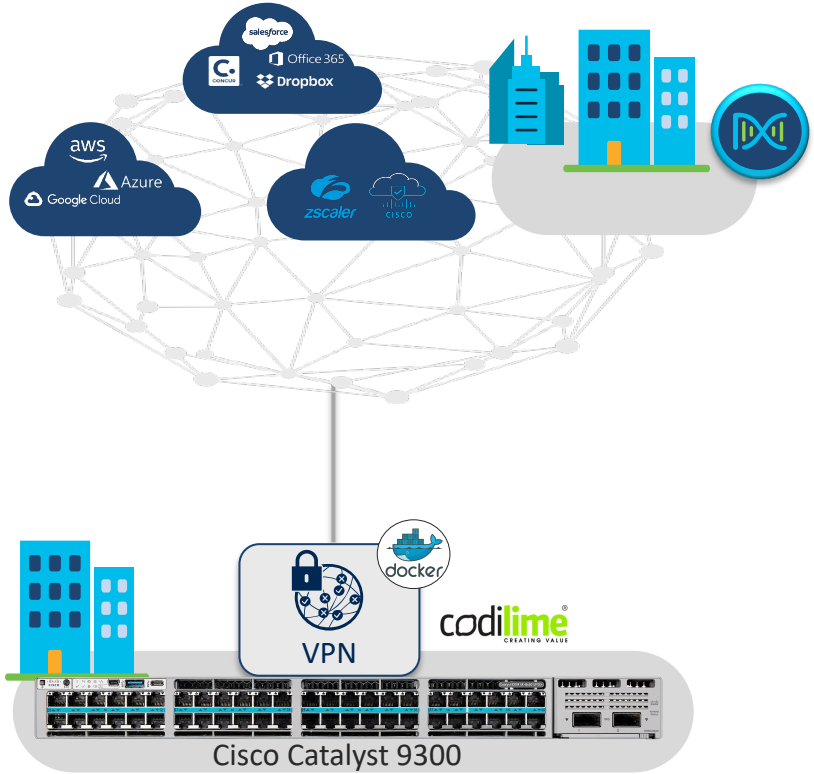
*BETA
Q2CY22

	Turnkey*	DIY
		 
Day 0: Onboarding	DNA Center	ZTP
Day 1: Tunnel Provisioning	DNA Center	NETCONF/RESTCONF, Python, Ansible, Terraform, CLI
Day N: Tunnel Monitoring	DNA Center	SNMP, Telemetry

New IPsec App enabled via App-Hosting

Purpose built for IPsec

Target Launch:
Q1CY22
IOS-XE: 17.8.1



- ✓ VPN Application hosted on Cat9k
- ✓ Runs in Docker container
- ✓ Web UI for IPSEC config
- ✓ Life Cycle Management via DNA Center
- ✓ HW & SW IPSEC - C9300X
- ✓ SW IPSEC - C9300/9300L
- ✓ Will be available on Devnet

docker

- Minimal resources required
  - 1 CPU core
  - < 1 GB memory
- 200-500M throughput
- QAT for higher throughput*

Open Source

IPSEC VPN

strongSwan

Routing

FRROUTING

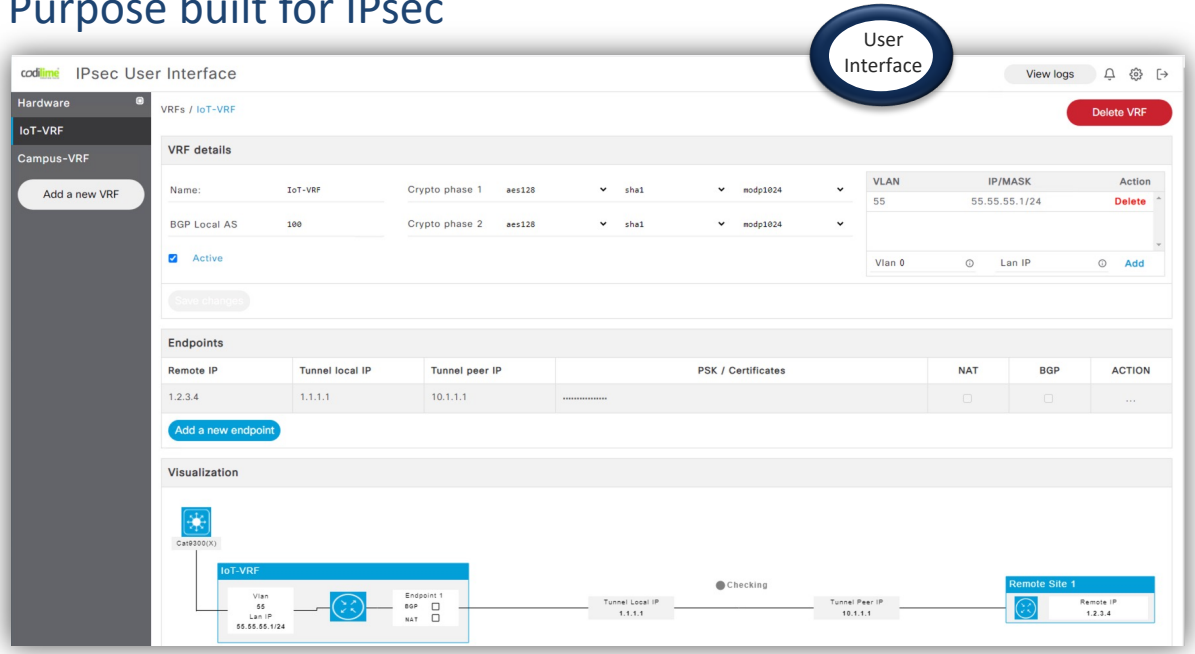
Expands **IPsec** capabilities to all **9300 models** at lower throughput

* On 9300X Models

Reference

IPsec delivered via App-Hosting

Purpose built for IPsec



- ✓ Rich IPSEC algorithms
- ✓ Invokes HW IPsec on 9300X
- ✓ PSK and X.509 certificate support
- ✓ VRF Aware
- ✓ NAT
- ✓ NAT-T
- ✓ BGP, OSPF
- ✓ BFD
- ✓ DSCP maintained in IPSEC header
- ✓ YANG model with REST API
- ✓ Interop with AWS, GCP, Azure
- ✓ Interop with Umbrella, Zscaler
- ✓ Interop with Cisco Catalyst8000 series, ISR/ASR, Juniper

App will be available on Devnet

Application built by Codilime

codilime® CREATING VALUE

CISCO DEVNET LEARN CODE INSPIRE CONNECT

C9300X: HW & SW IPSEC
C9300/9300L: SW IPSEC

IPSec Site-to-Site / Point-to-Point with PSK

Site A

IKEv2

```
crypto ikev2 proposal sitetosite
        encryption aes-cbc-256
        integrity sha512
        group 19 20 21
crypto ikev2 nat keepalive 20
crypto ikev2 dpd 10 5 periodic
```

IKEv2 Policy

```
crypto ikev2 policy hun_ipsec
        match address local 172.16.0.12
        proposal sitetosite
crypto ikev2 policy peers
      match fvrf any
      proposal sitetosite
```

IKEv2 Peer

```
crypto ikev2 keyring auth-keyring
      peer 172.16.0.24
            address 172.16.0.24
            pre-shared-key C1sc0dna
```

IKEv2 Peer Profile

```
crypto ikev2 profile auth_Hun
        match identity remote address 172.16.0.24 255.255.255.255
        identity local address 172.16.0.12
        authentication remote pre-share
        authentication local pre-share
        keyring local auth-keyring
        no config-exchange request
```

Site B

IKEv2

```
crypto ikev2 proposal sitetosite
        encryption aes-cbc-256
        integrity sha512
        group 19 20 21
crypto ikev2 nat keepalive 20
crypto ikev2 dpd 10 5 periodic
```

IKEv2 Policy

```
crypto ikev2 policy hun_ipsec
        match address local 172.16.0.24
        proposal sitetosite
crypto ikev2 policy peers
      match fvrf any
      proposal sitetosite
```

IKEv2 Peer

```
crypto ikev2 keyring auth-keyring
      peer 172.16.0.12
            address 172.16.0.12
            pre-shared-key C1sc0dna
```

IKEv2 Peer Profile

```
crypto ikev2 profile auth_Hun
        match identity remote address 172.16.0.24 255.255.255.255
        identity local address 172.16.0.12
        authentication remote pre-share
        authentication local pre-share
        keyring local auth-keyring
        no config-exchange request
```

Step:

1

2

3

4

Supported IKEv2 Proposal (Software)

IKEv2 (SW) proposal	Encryption	Integrity	Deffie Helman
Models supported	• des* • 3des* • aes-cbc-128 • aes-cbc-192 • aes-cbc-256 • aes-gcm-128 • aes-gcm-256	• md5* • sha1* • sha256 • sha384 • sha512	• 1 – 768 MODP* • 2 – 1024 MODP* • 5 – 1536 MODP* • 14 – 2048 MODP • 15 – 3072 MODP • 16 – 4096 MODP • 19 – 256 ECP • 20 – 384 ECP • 21 – 521 ECP • 24 – 2048 (256 sub groups) MODP

* - CLI will show that these options are deprecated on Cat 9300X

IPSec Site-to-Site / Point-to-Point

Step:	Site A	Site B
5	Transform Set crypto ipsec transform-set auth-ipsec esp-gcm 256 mode tunnel	Transform Set crypto ipsec transform-set auth-ipsec esp-gcm 256 mode tunnel
6	IPSec Profile crypto ipsec profile auth-ipsecprofile set security-association lifetime seconds 28800 set security-policy limit 1 *(optional)* set transform-set auth-ipsec set ikev2-profile auth_Hun	IPSec Profile crypto ipsec profile auth-ipsecprofile set security-association lifetime seconds 28800 set security-policy limit 1 *(optional)* set transform-set auth-ipsec set ikev2-profile auth_Hun
7	Physical Port interface HundredGigE1/1/1 no switchport ip address 172.16.0.12 255.255.255.0 load-interval 30	Physical Port interface HundredGigE1/1/1 no switchport ip address 172.16.0.24 255.255.255.0 load-interval 30
8	Create IP in IP tunnel interface Tunnel1 ip address 30.30.30.12 255.255.255.0 tunnel source HundredGigE1/1/1 tunnel mode ipsec ipv4 tunnel destination 172.16.0.24 tunnel protection ipsec profile auth-ipsecprofile	Create IP in IP Tunnel interface Tunnel1 ip address 30.30.30.24 255.255.255.0 tunnel source HundredGigE1/1/1 tunnel mode ipsec ipv4 tunnel destination 172.16.0.12 tunnel protection ipsec profile auth-ipsecprofile
9	Routes ip routing ip route 10.10.10.0 255.255.255.0 30.30.30.24 ip route 24.24.24.24 255.255.255.255 30.30.30.24	Routes ip routing ip route 10.10.10.0 255.255.255.0 30.30.30.24 ip route 24.24.24.24 255.255.255.255 30.30.30.24

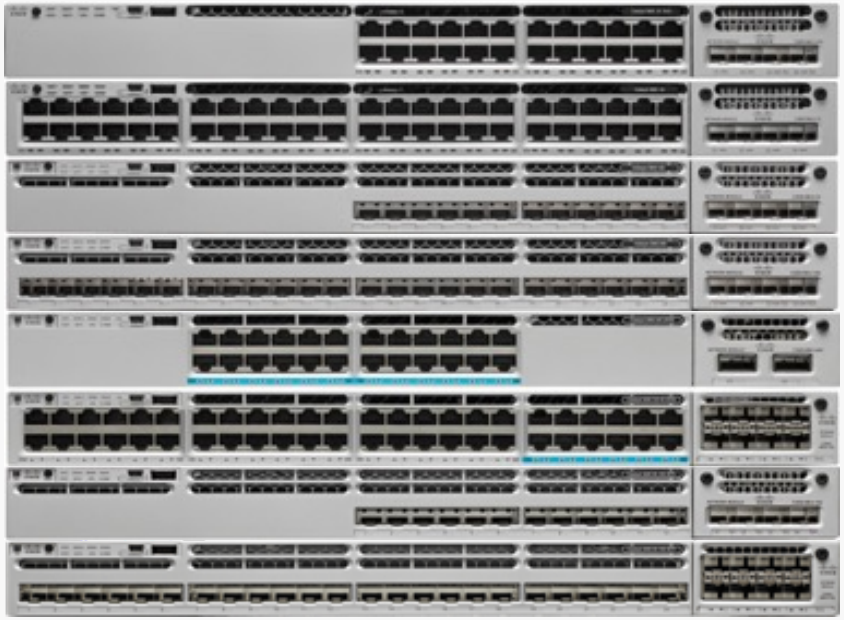
Supported Transform Sets (Hardware)

Transform SET (HW) Encryption	Bandwidth
esp-aes + esp-sha-hmac	Up to 15 Gbps
esp-gcm 128 (gmac is derived)	Up to 100 Gbps
esp-gcm 256 (gmac is derived)	Up to 100 Gbps

IPsec support in stacking

- IPsec is supported in Catalyst® 9300X-only stack
- Distributed IPsec processing is not supported
- Active switch will process IPsec encapsulation and decapsulation
- High availability, xFSU are not supported
- IPsec tunnels will reset during failovers

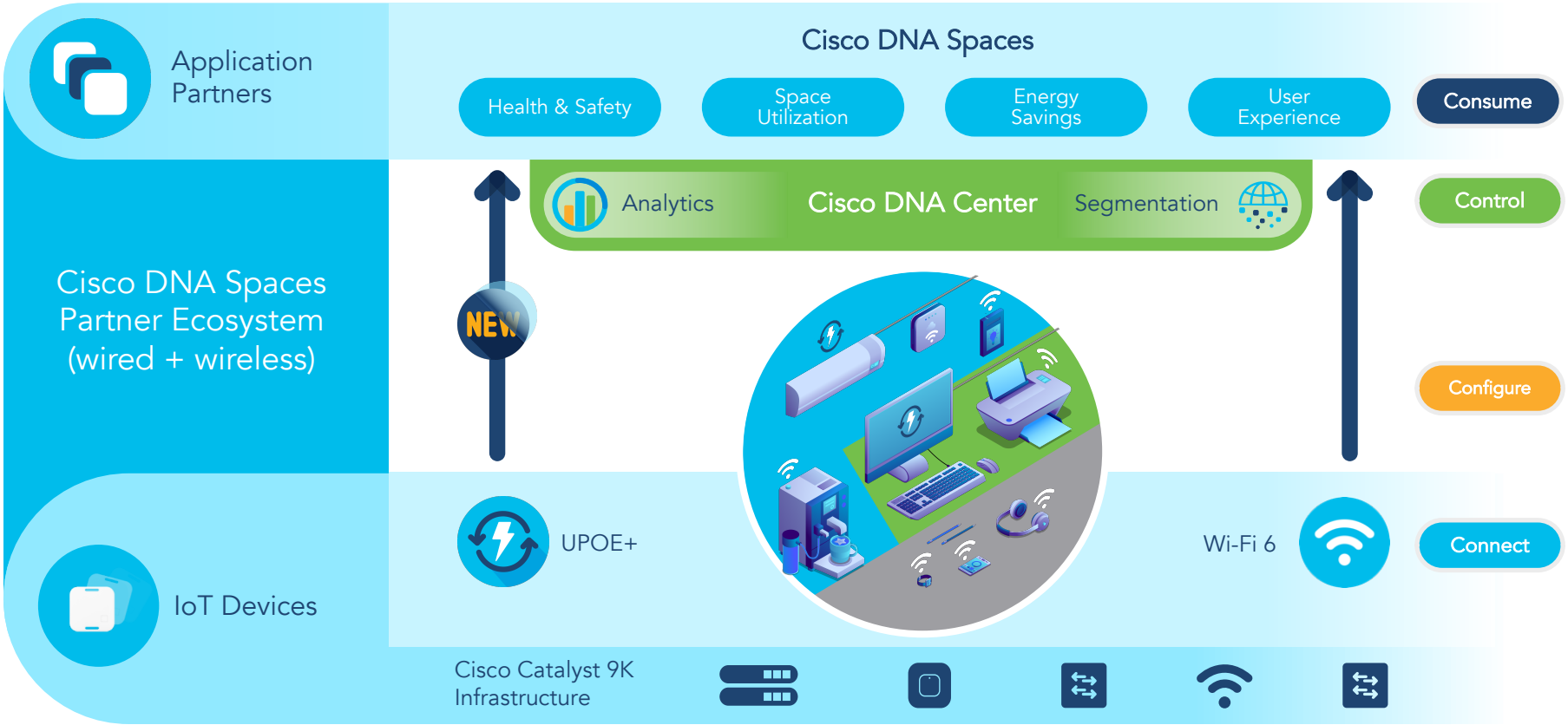
Catalyst 9300X stack



Smart Buildings
Enabled by C9K-X Access

Image Source: www.cartoonstock.com

Catalyst Powered Smart Buildings



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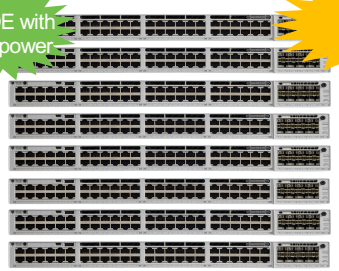
Connect: 90W across Catalyst 9000 Switching

90W
UPOE+

IEEE 802.3bt
Type 1-4

P/FPOE with Stack power

256 90W ports in a stack



C9300-24/48H

1900W AC PSU

260 90W ports

4-Slot

7-Slot

10-Slot

C9400-LC-48H

C9400-LC-48HN

NEW Q1CY22

C9300X-48HX

48x mGig + 48 **UPOE+** ports

C9300X-48HXN

36x upto 5G + 12x mGig + 48 **UPOE+** ports

C9300X-24HX

24x mGig + 24 **UPOE+** ports

NEW H1CY22

SUP2/XL P/FPOE Capable

C9400-LC-48HX

Perpetual PoE

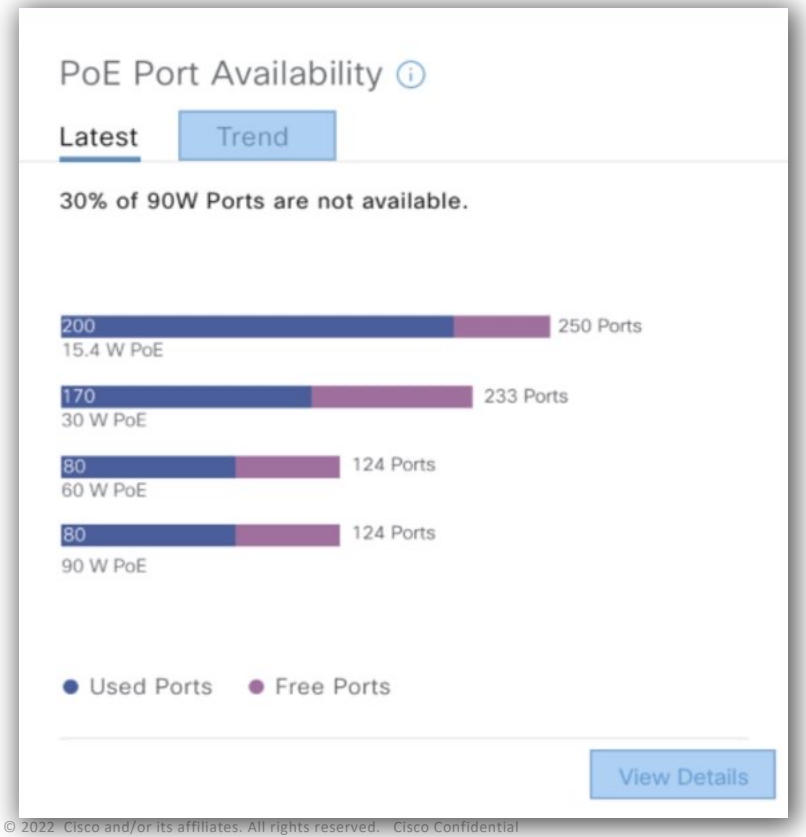
Fast PoE

Configurable Port Priorities

Cisco StackPower

Analytics: New insights with PoE Assurance

DNAC 2.2.3



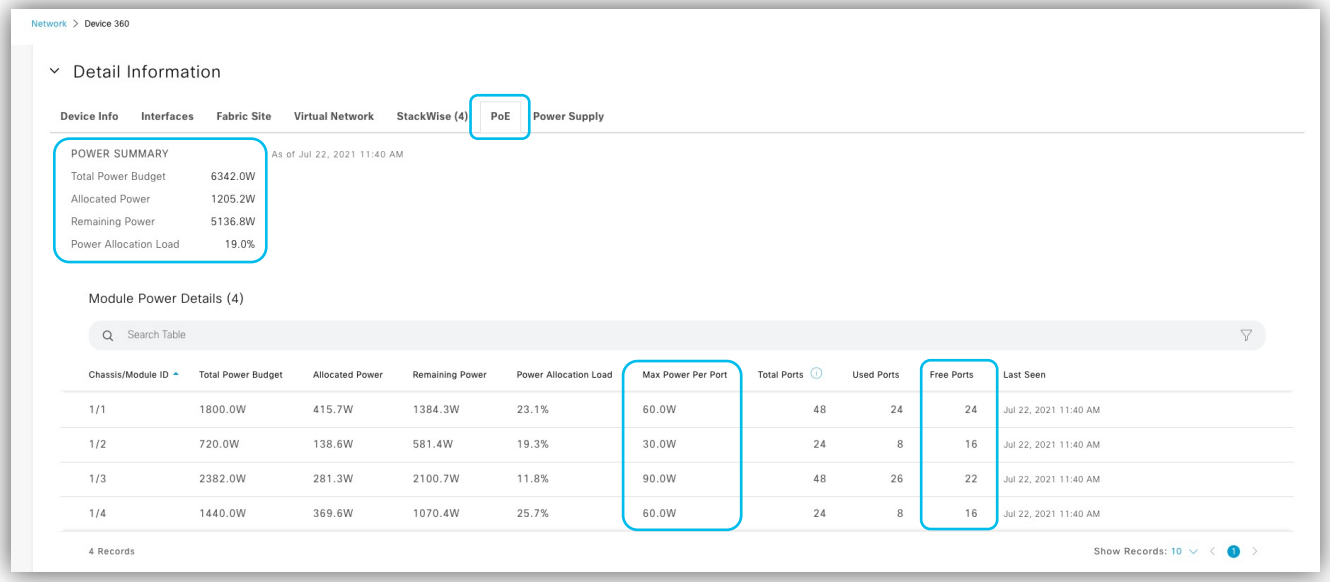
Use Case

How many PoE ports per each power range are used and how many are available for future planning ?

- ✓ Used Vs Available PoE ports per Power range
- ✓ Provides PoE usage trend
- ✓ View top location, top switch, top PD types

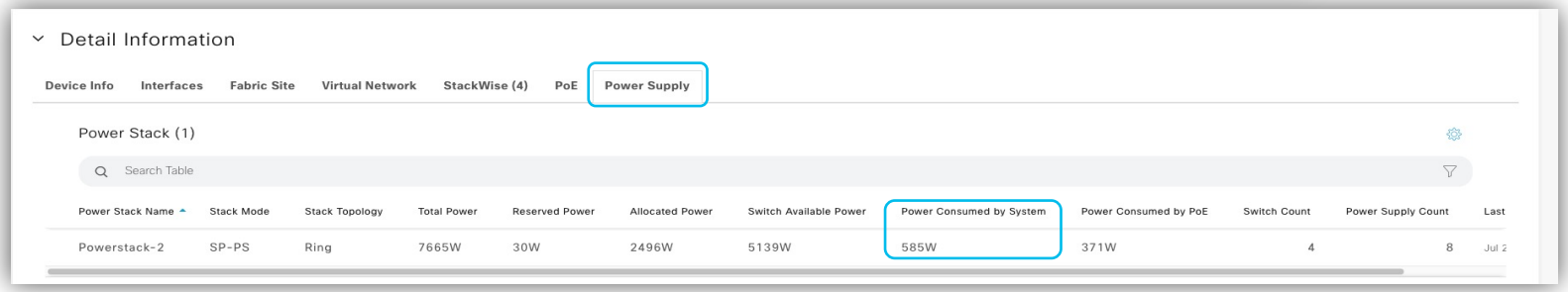
Analytics: New insights with Device 360

DNAC 2.2.3

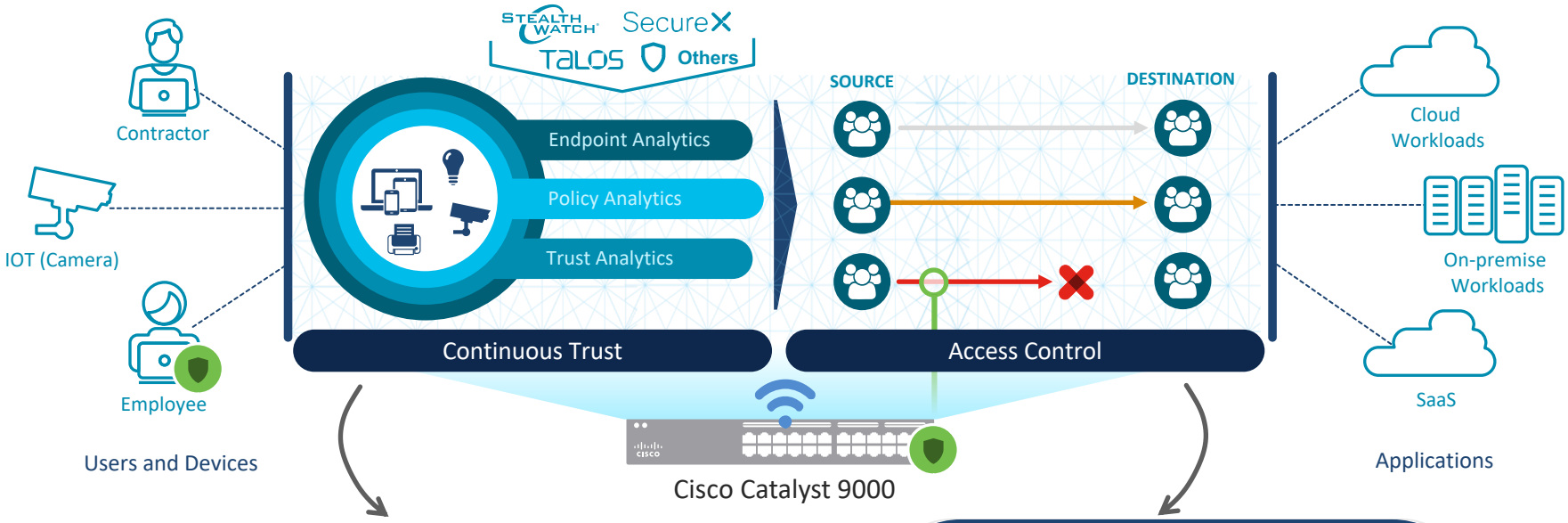


- Lack of visibility into power consumed by the system and details around used and free ports per switch

- Provide overall Power Budget switches in a stack
- Provide power Budget for each switch
- Provide PoE interfaces for each switch with detailed PoE info



Secure: C9K enabling Continuous Trusted Access



Network based Trust

Talos and AI powered advanced IoT posture assessment enabled by Catalyst 9K

Micro Segmentation

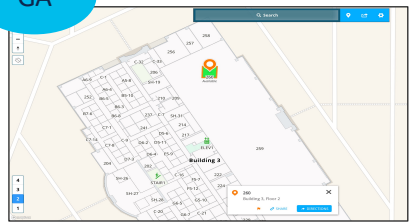
C9K enforces policies based on SGT assignment and controls the access per the trust ranking

Indoor IoT Services with C9K & DNA Spaces

User Experience

Conference Room Booking

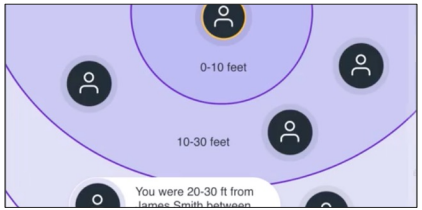
GA



PoE lights & Sensors

Safety &

Density Triggers

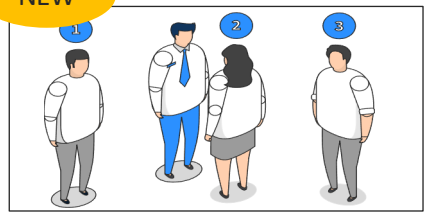


Wireless LAN Controller

Real Estate

Device/People Counting

NEW



Wireless LAN Controller

Automation & Optimization

Environmental Monitoring & Asset location

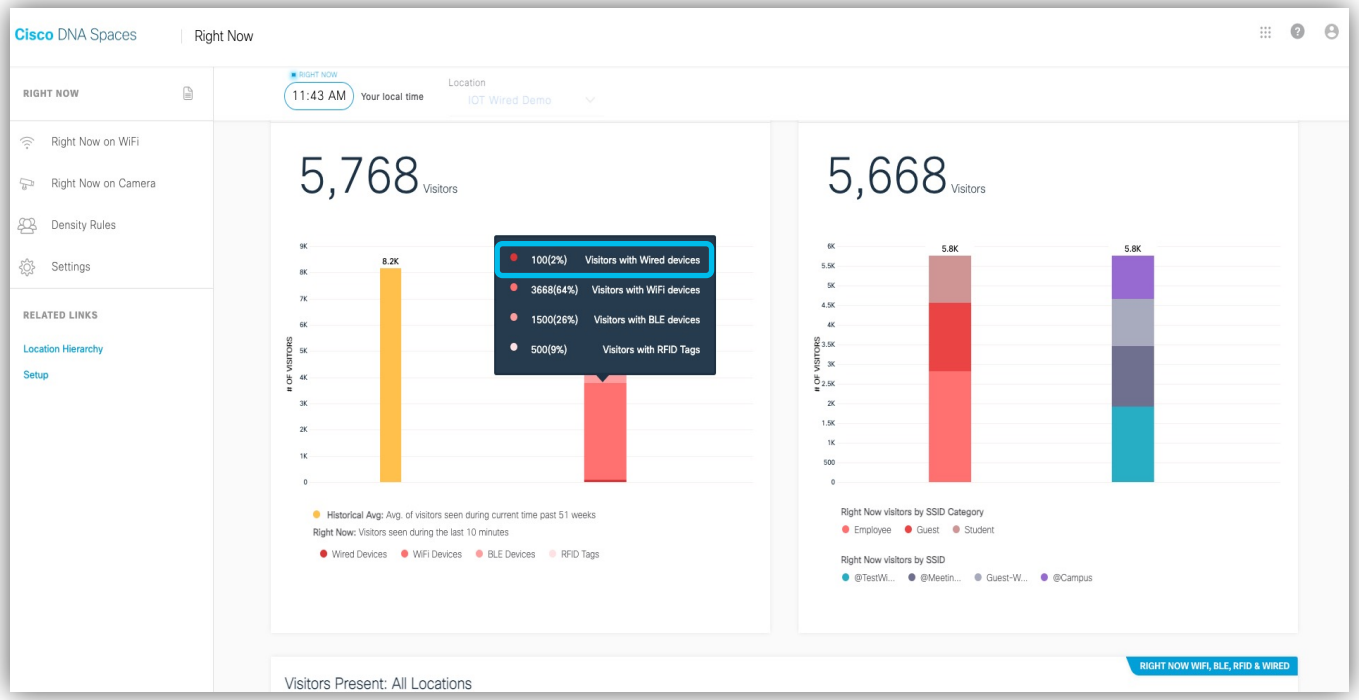
NEW

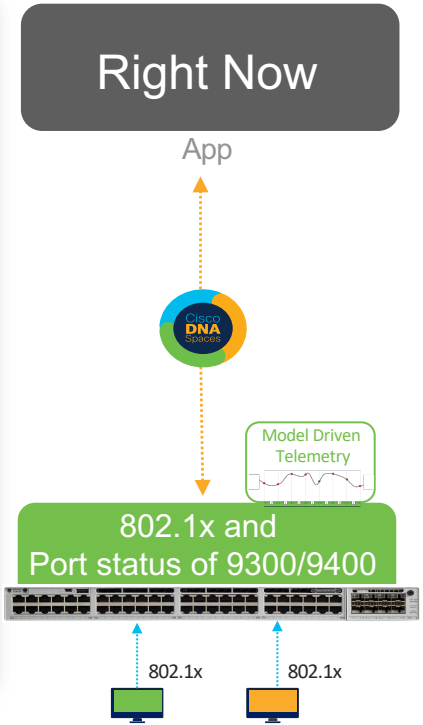
POE sensors / HVAC

Cisco Catalyst 9K

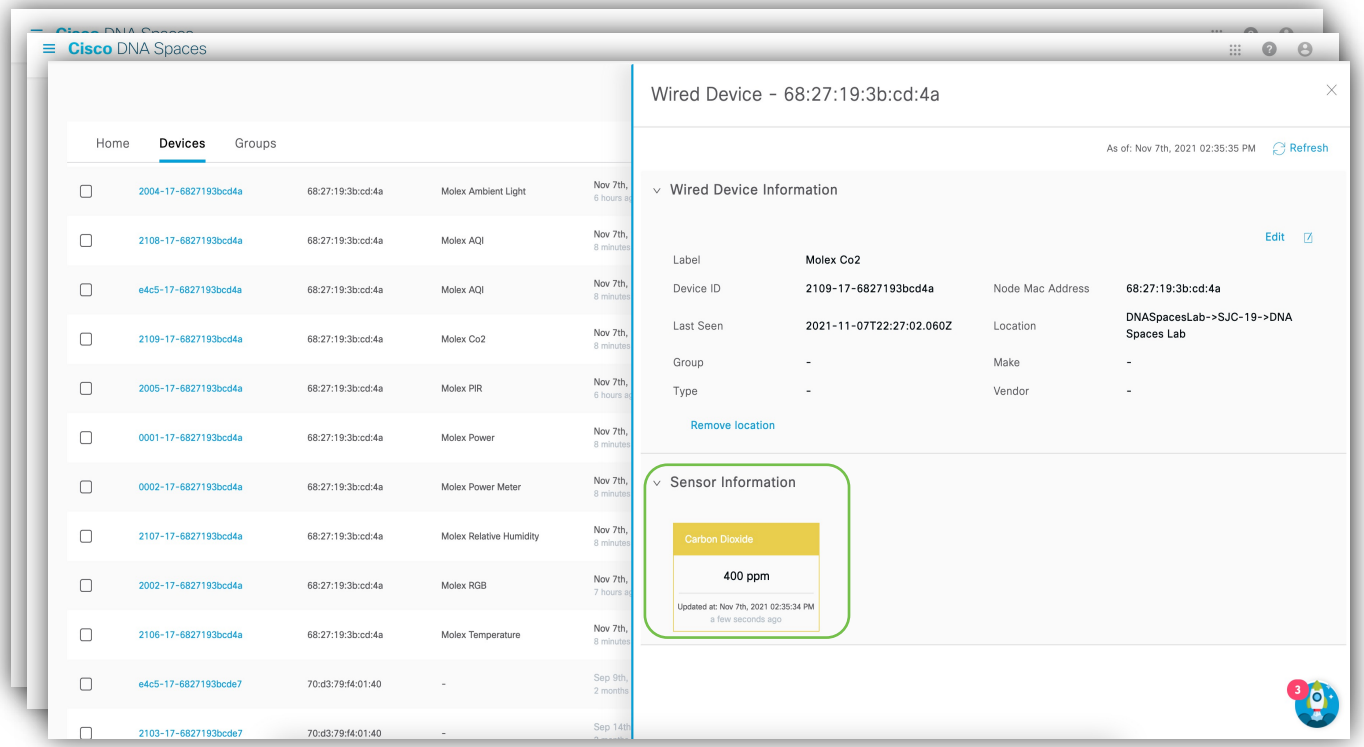
Cisco DNA Spaces

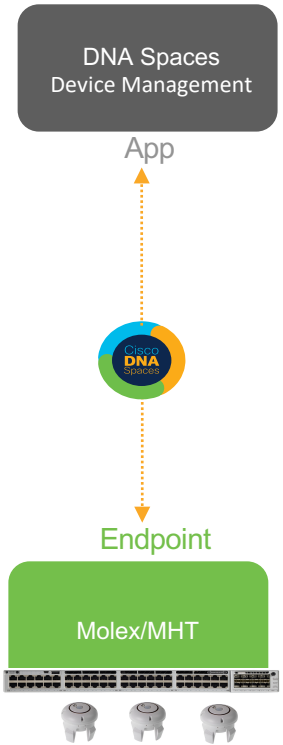
Indoor IoT Services: People Counting





Indoor IoT Services: Environmental Monitoring





Future of work with Smart Building Framework

Challenge

- Showcase smart buildings that define the future of work
- How will ‘the office of the future’ will improve experience, increase collaboration and reduce power usage, reduce carbon emission reduction by 2050.
- Showcase a state of art lab of smart building technologies

Future of work with Smart Building Framework

Smart building Framework

- ***Connect***
  - ✓ Catalyst 9K 90W switches and APs
- ***Configure***
  - ✓ Meraki surveillance cameras
  - ✓ WEBEX room kits, deskpros
  - ✓ Molex & Igor PoE lights/sensors
  - ✓ Mecho & Somfy shade control
  - ✓ VAV HVAC control
  - ✓ Smart energy metering PDU
  - ✓ 90W USB-C dongles
  - ✓ 90W connected desks (prototype)
- ***Control***
  - ✓ Cisco SDA endpoint analytics and PoE Assurance
- ***Consume***
  - ✓ Cisco DNA spaces workspace application

Business outcomes

LED Building Alignment	✓
WELL Building Alignment	✓
Consistent End User Experience	✓
Touchless Room Control	✓
Integrated Base Building Control	✓
People Count and Density Monitoring	✓
People Count Data to BMS	✓
Air Quality Monitoring and Display	✓
IT Ops Model Reinvention	✓
USB-C Adoption	✓
Low Voltage Connected Desk	✓
Flexible Technology Swap Out	✓

Application Hosting
on
Catalyst 9000

New strategic capabilities with App Hosting on C9K Switches

Existing Hardware

Managed via CLI or DNA-C

Real Time Processing

Lower Latency

Save Bandwidth

IT Operations and Monitoring Tools

Consolidate Physical Infrastructure

ThousandEyes

kibana

WIRESHARK

perfSONAR powered

Security Agents and Functions

Enhance Visibility & Security Enforcement

codilime

Attivo NETWORKS

TRAPX SECURITY

Cloud Gateways with Serverless Edge Compute

Reduce App Latency & Optimize App Traffic

Cybervision

Cisco DNA Spaces

NS1.

Alleantia

Customer Specific Applications

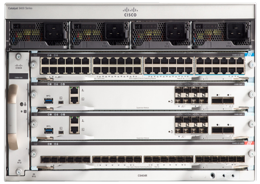
3rd Party App Hosting

Rich ecosystem partnership with 25+ certified apps and 200+ active customer

App Hosting now supported across Catalyst 9000 Family

Run Docker based containers anywhere in your network

C9300/L

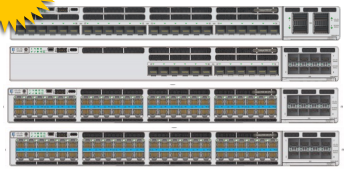


C9400–Sup1

C9500H

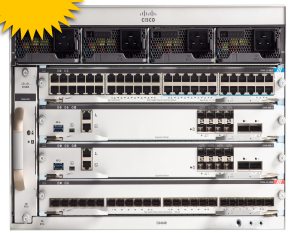
C9600-Sup1

NEW



C9300X

NEW



C9400X–Sup2

NEW

C9500X

NEW

C9600X-Sup2

Refer to Deployment guides for implementation & details

*All Catalyst 9000's except C9200

Enhanced App Hosting with C9000-X Series

	Resource type	Catalyst 9300	Catalyst 9300-X	Catalyst 9400	Catalyst 9400-X	Catalyst 9500	Catalyst 9500-X	Catalyst 9600	Catalyst 9600-X
Networking	AppGig Port	1x1G	**2x10G**	1x1G	**2x10G**	Mgmt Port*	**2x10G**	Mgmt Port*	Mgmt Port* (2x10G CPU ports)
Resources	Memory	2GB	**8GB**	8GB	8GB	8GB	8GB	8GB	8GB
	CPU	1 core	**2 core**	1 core	1 core	1 core	1 core	1 core	1 core
	Storage	240GB (USB3.0/SSD)	240GB (USB3.0/SSD)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)	480-960GB (SATA)

* Using loopback with any external ports

Catalyst 9300-X

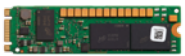
USB 3.0
240GB

Back panel

Catalyst 9400-X

M2 SATA
480/960GB

Plug into removable SUP



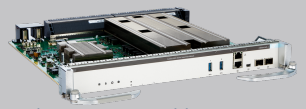
Catalyst 9500-X

M2 SATA
480/960GB

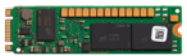
Back panel

Catalyst 9600-X

M2 SATA
480/960GB



Plug into removable SUP

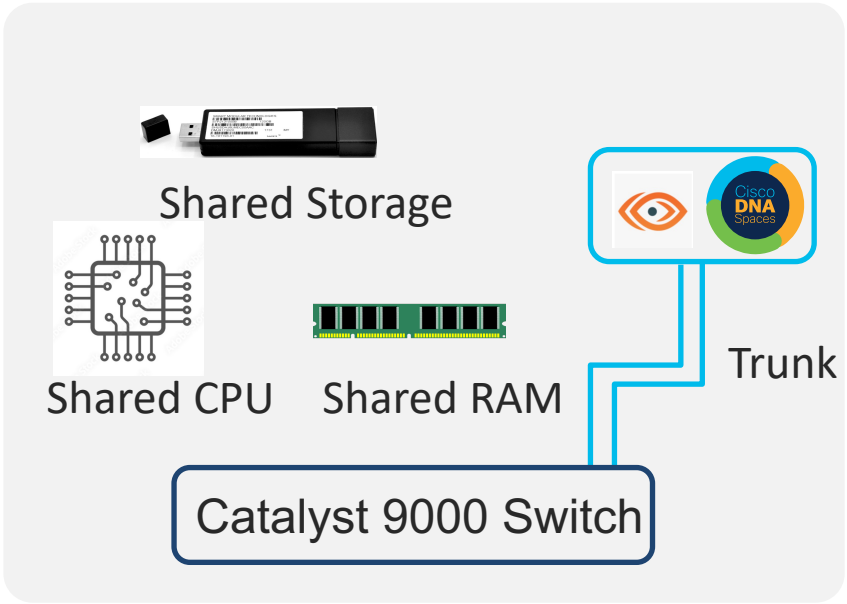


Multiple Applications Support on Catalyst 9K

17.5.1

Requirements :

- **Cisco Signed Applications Only**
  (ex. ThousandEyes, IoT Gateway)
- Must use SSD Storage
- Enough HW resources should be available to run all applications
- AppGigabitEthernet ports config must not create a conflict between the apps



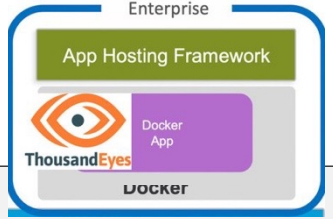
HW resource can be customized via DNA-C and CLI

ThousandEyes
with
C9K Switching

ThousandEyes Integration Benefits with C9K

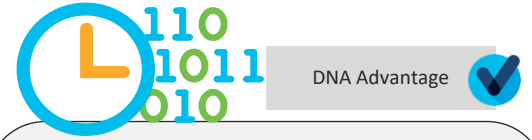
New and Existing Catalyst 9300 and 9400 switches now include ThousandEyes

App Hosting: No Extra Hardware



- Run ThousandEyes agent natively on your 9300/9400 switches
- Out of the box access to ThousandEyes for new switches

DNA Subscription Benefits



- Each DNA-A License includes 22 ThousandEyes Units
- Pool entitled test capacity to deploy anywhere within your network

Data Visualization

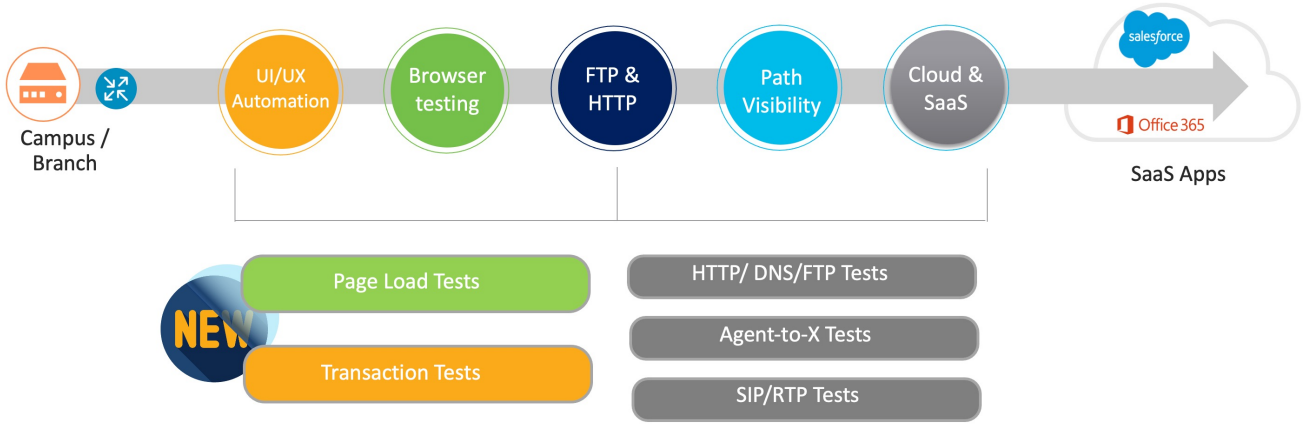
- Free access to ThousandEyes SaaS-based management platform
- Access to Dashboards, alerts and reporting tools

More than 1000+ C9K Customers already deployed TE Agent on C9K Switches in past 9 months

BrowserBot: Providing insights into Browsing Experience

Available With ThousandEyes 4.0

17.6.1

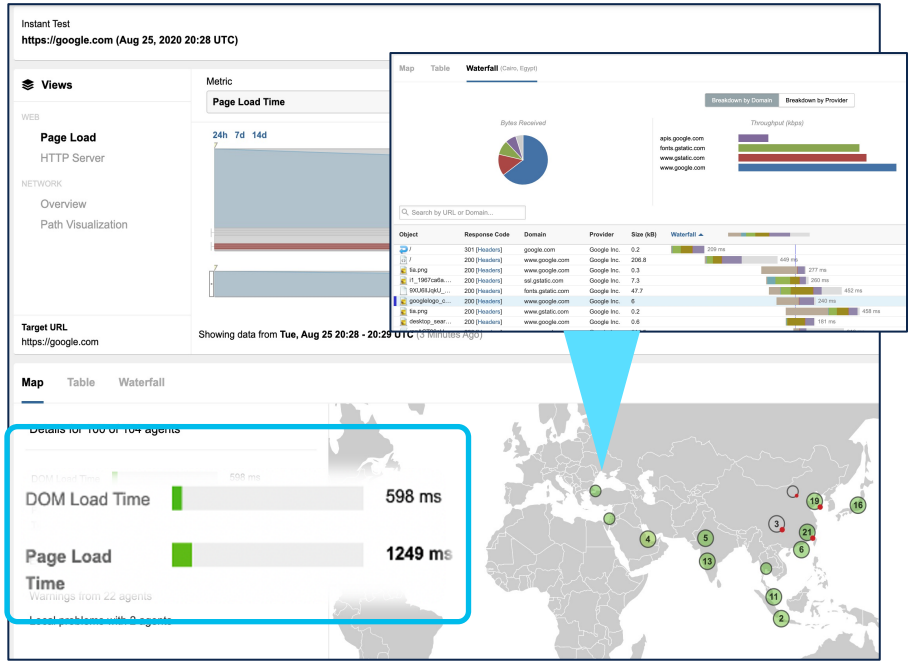


TE 4.0 Specifications	
CPU	1 Core
RAM	2GB
Storage	SSD
IOS	17.6.1
Tests	All TE tests

BrowserBot Tests

Page Load Tests

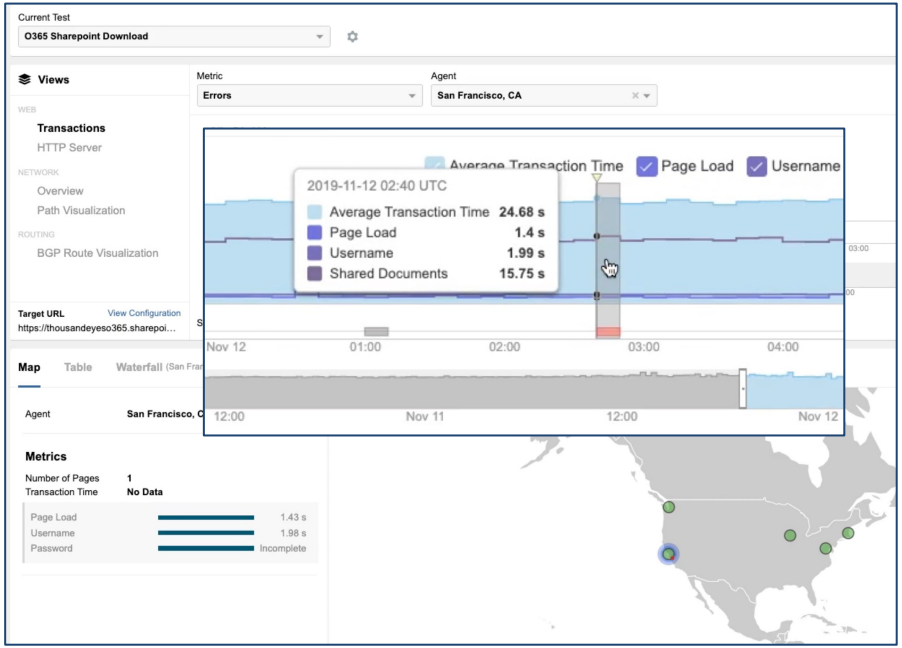
Measure page load times of individual web components using **waterfall analysis**



Page load test view

Transaction Tests

Monitor application usability by emulating user journey through an app with **multi-step transactions scripts**



Transaction test view

More access features to be aware of…

Bonjour is redefining tenant experience

Various Use Cases for IT and Users

Bonjour enabled devices on the rise!

Cisco DNA Service for Bonjour

Enterprise mDNS Services

17.6.1

Intuitive mDNS Configuration

- ✓ Simplified Configuration
- ✓ Accelerate solution adoption
- ✓ Reduced operation overhead

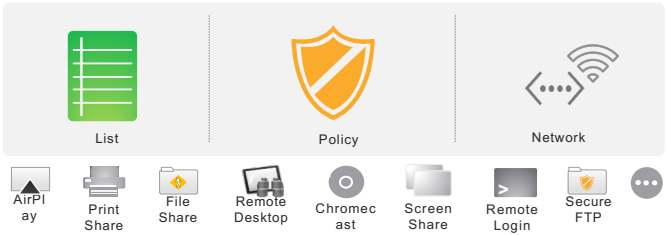
SSO Capable mDNS Cache

- ✓ Non-stop service routing
- ✓ Real-time synchronization
- ✓ Support for managing continuous query during Switchover
- ✓ Virtual and physical unified system mode support

Global Enterprise Customers*

2000+

Don't flood, Only route
Wired & Wireless



HSRP Aware Service Routing

- ✓ Service Routing on HSRP-based Network
  - → Rapid Switchover at Data VLAN Failure
  - → Backup SDG-Agent Becomes Primary
  - → Cache Sync with Service Peer

Micro-Location (17.7.1)

- ✓ Device Segmentation at a Granular Level
- ✓ Segment Devices per VLAN, per Switch Port/s, per AP-Groups

* App Download Since 9/19

Audio Video Bridging (IEEE 802.1BA)

Fewer cables and a transparent collaboration experience

Traditional AV networks

Quality of experience

- Improved time – synchronized audio/video (latency <2 milliseconds)
- Standard QoS to simplify and automate switch configuration
- Ability to scale with higher bandwidth, 1/10G

Digital AV network (Dante, Cobranet, AVB)

Scalability

- Allows device interoperability
- Eliminates proprietary networks
- Increases flexibility to add new media applications

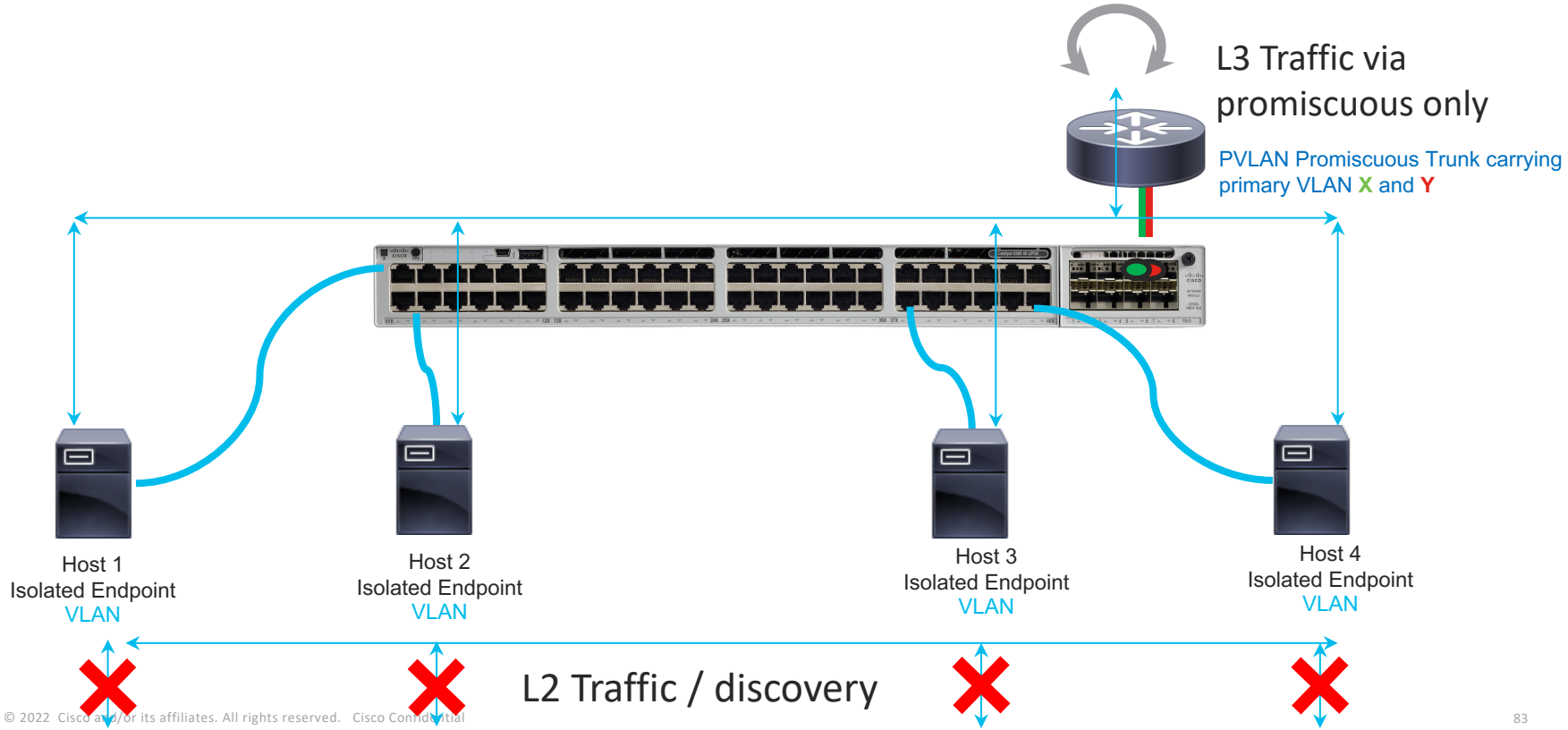
Media on AVB over Cisco® hardware

Lower TCO

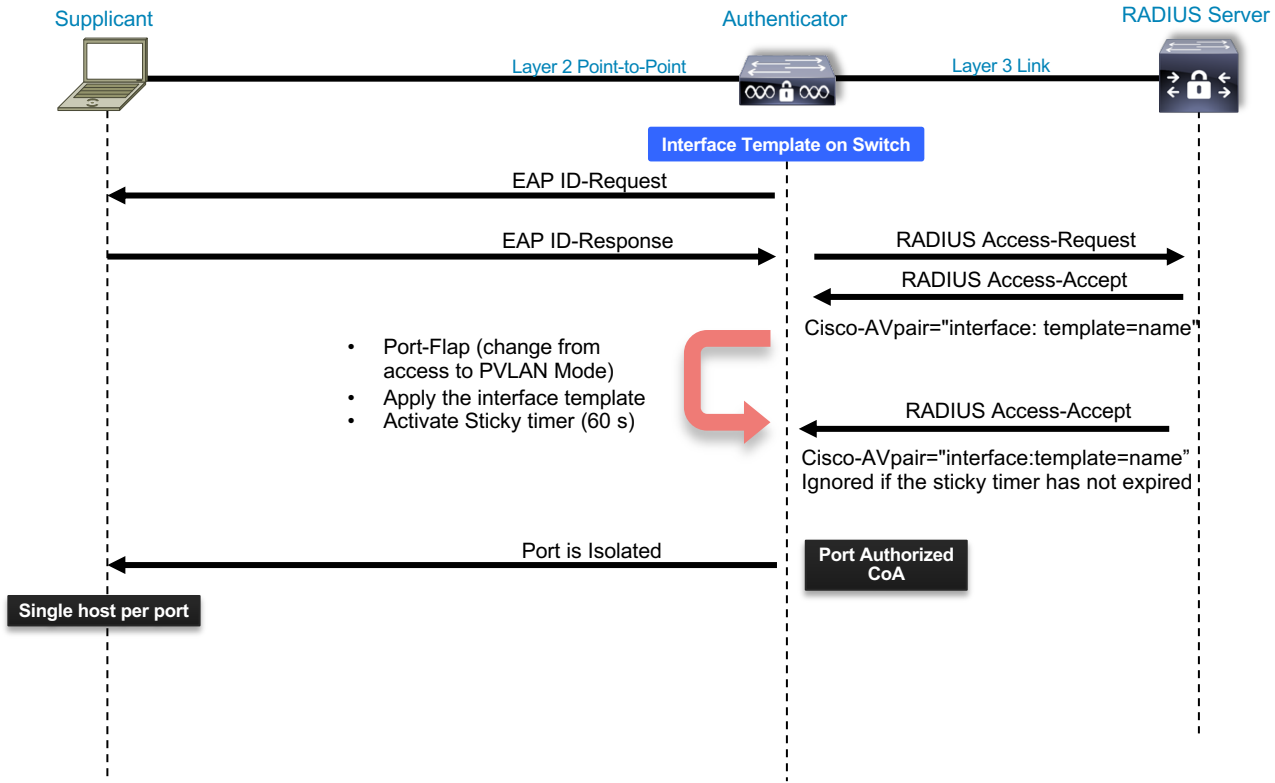
- Lower cost and complexity (60% CapEx and 35% OpEx savings) over 5 years*
- Added functionality and control
- No proprietary license fee per endpoint

* Source: Axon and Axis Report.

Wired Dynamic PVLAN



How Wired Dynamic PVLAN works?



IOS XE Programmability & Automation Overview

gNMI Bootstrapping

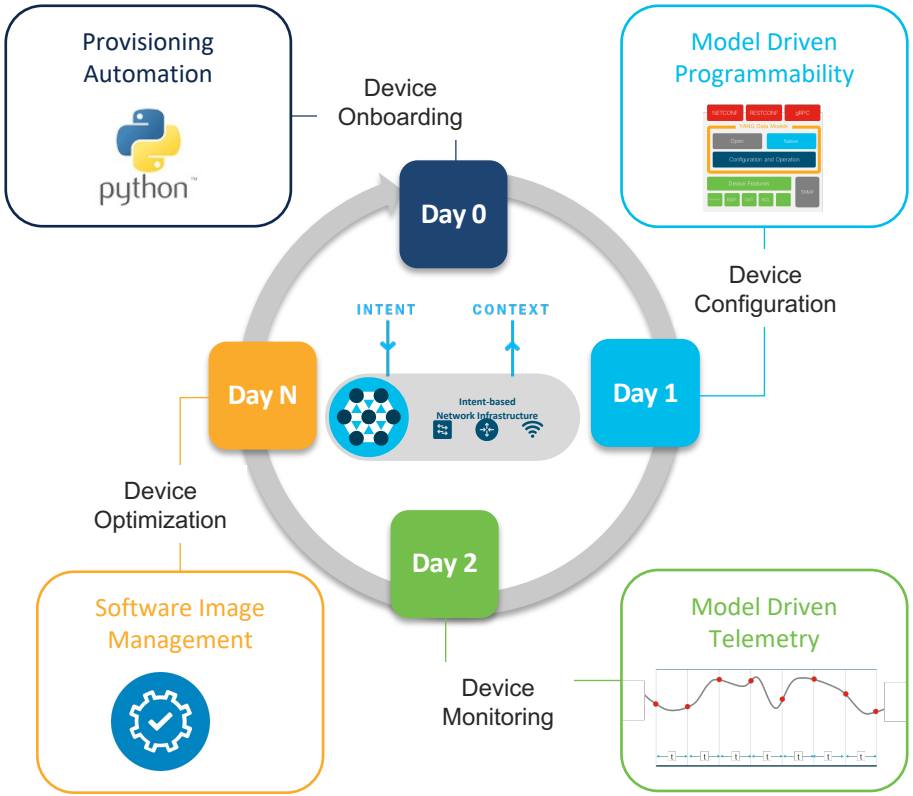
gNOI cert/os/reset.proto

gNMI

TIG_MDT container
+ GitHub examples

YANG on-change support

gNMI Dial-In

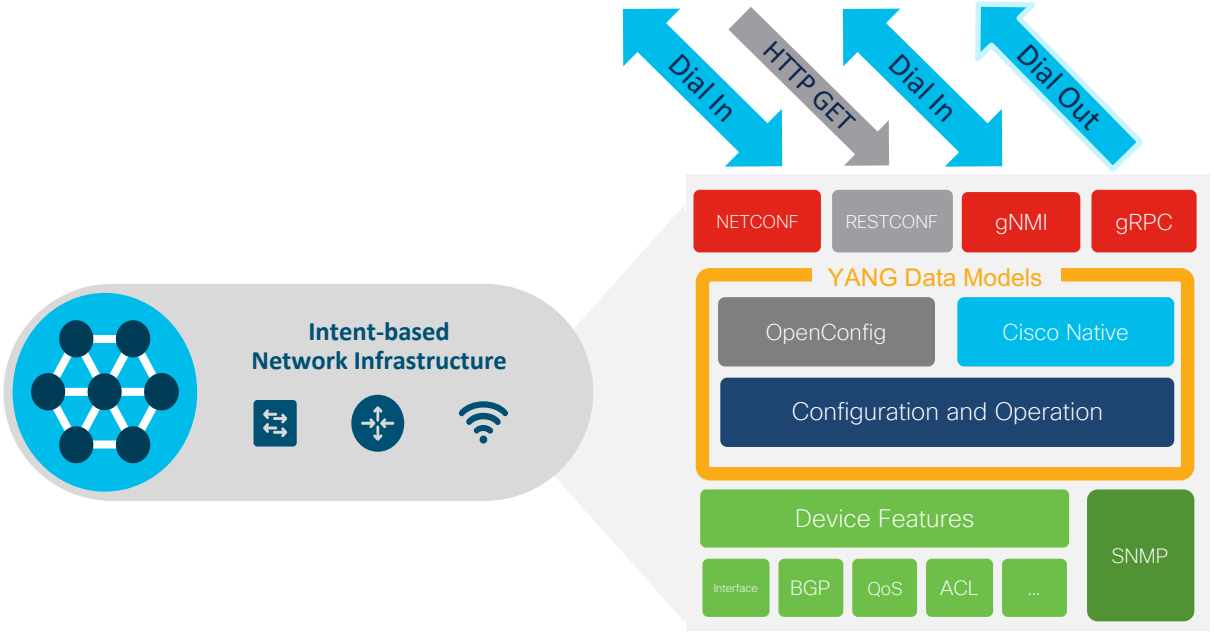


Model Driven Telemetry Interfaces

Dial In: Collector establishes a connection to the device then subscribes to telemetry (pub/sub)

Dial Out: Telemetry is pushed from the device to the collector based off configuration (push)

Publication / Subscription



XML, JSON and kvGPB encoding

Consistent YANG data models between interfaces

On-change event and time-based publication options

gNOI reset.proto - tooling

https://github.com/google/gnxi/tree/master/gnoi_reset

Similar to previous gNOI implementations the recommended tooling is gnoi_reset from Google's gNxI Github repository

```
show gnxi state detail
```

```
GNOI
====

  Cert Management service
  -----------------
    Admin state: Enabled
    Oper status: Up

  OS Image service
  ---------------
    Admin state: Enabled
    Oper status: Up
    Supported: Supported

  Factory Reset service
  --------------------
    Admin state: Enabled
    Oper status: Up
    Supported: Supported
```

Run

```
./gnoi_reset \
    -target_addr localhost:9339 \
    -target_name target.com \
    -rollback_os \
    -zero_fill \
    -key client.key \
    -cert client.crt \
    -ca ca.crt
```

gNOI Factory Reset Client

A simple shell binary that performs Factory Reset operations against a gNOI target. The target will then enter bootstrapping mode.

gNOI Factory Reset Options

- `-rollback_os` will attempt to roll back the OS to the factory version and reset all certificates on the target.
- `-zero_fill` will attempt to zero fill the Target's persistent storage.

Install

```
go get github.com/google/gnxi/gnoi_reset
go install github.com/google/gnxi/gnoi_reset
```

```
auto@pod24-xelab:~$ go get github.com/google/gnxi/gnoi_reset
auto@pod24-xelab:~$ go install github.com/google/gnxi/gnoi_reset
auto@pod24-xelab:~$ gnoi_reset
F1012 14:44:19.032795 2715507 credentials.go:136] Please provide a -target_name
```

```
go get github.com/google/gnxi/gnoi_reset
go install github.com/google/gnxi/gnoi_reset
auto@pod24-xelab:~$ gnoi_reset
F1012 14:44:19.032795 2715507] Please provide a -target_name
```

CLI to YANG

This new CLI addition to “show run | format” brings additional visibility into the YANG configurations, either for NETCONF with XML or JSON with RESTCONF

show run | format netconf-xml
show run | format restconf-json

```
C9300#
C9300#show run | i netconf-yang
netconf-yang
C9300#
```

```
C9300#show run | format netconf-xml
<config xmlns="http://tail-f.com/ns/config/1.0">
  <native xmlns="http://cisco.com/ns/yang/Cisco-IOS-XE-native">
    <version>17.7</version>
    <memory>
      <free>
        <low-watermark>
          <processor>131752</processor>
        </low-watermark>
```

```
C9300#show run | format restconf-json
{
  "data": {
    "Cisco-IOS-XE-native:native": {
      "version": "17.7",
      "memory": {
        "free": {
          "low-watermark": {
            "processor": 131923
```

- Requires netconf-yang Data Model Interfaces to be enabled
- CLIs with corresponding native YANG and modeled in show run are returned

Enhanced Leaf Level Filtering for Telemetry

Enhanced Leaf level filtering for telemetry allows filtering to leaf or container level when gather points used as container level subscription is not acceptable in long term due to the amount of extra data being returned

Only the subscribed data from that path should be returned in telemetry update notifications and not all data from the gather point - the data from other paths mapped to the same gather point is no longer returned.

Telemetry subscriptions to any xpath within the gathering point would previously return all data from that gatherpoint – now with leaf level filtering only the specific xpath is included and no other xpaths or data from the same gatherpoint

For example, with the “five-seconds oper data” from the “process-cpu-oper” gatherpoint, it is now possible to subscribe to a single KPI current-frequency and no other telemetry will be returned with this subscription:

filter xpath /process-cpu-ios-xe-oper:cpu-usage/cpu-utilization/five-seconds

Catalyst 9000 Switching – New Features(17.7.1)

Platform/Infra

- ✓ PTP on 9300 Stack
- ✓ PTP on 9600
- ✓ AES67 compliance
- ✓ AVNU Certification [9300/9500]
- ✓ Bonjour – Micro location services
- ✓ Low priority Control Packet mapping to Non-LLQ

High Availability

- ✓ xFSU on 9300X
- ✓ Graceful Insertion & Removal (GIR) [9500H/9600]

Security

- ✓ API Registration for Umbrella Switch connector [9200/9300]
- ✓ IPSEC on 9300X
- ✓ AAA cache

Routing/Overlay's

- ✓ MPLS Traffic Engineering
- ✓ EVPN L3 TRM with MDT Data

Programmability

- ✓ gNOI reset.proto – tooling
- ✓ CLI to YANG
- ✓ Enhanced Leaf Level Filtering for Telemetry

Cisco Catalyst TV

HOME VIDEOS PLAYLISTS COMMUNITY CHANNELS ABOUT

Cloud Security on Catalyst 9000

Cisco Catalyst TV • 122 views • 11 months ago

Learn about Umbrella Integration with Catalyst 9000 platforms with a demo

https://www.youtube.com/c/CiscoCatalystTV

Uploads ▶ PLAY ALL

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Enterprise Networks Books

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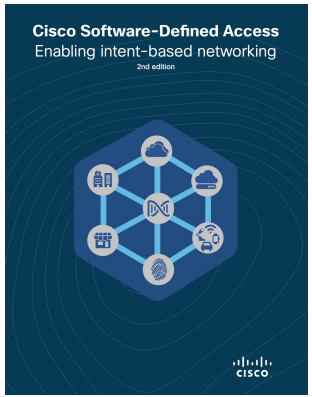
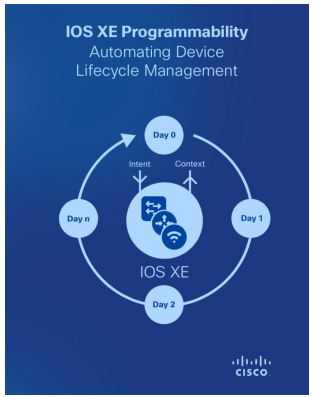
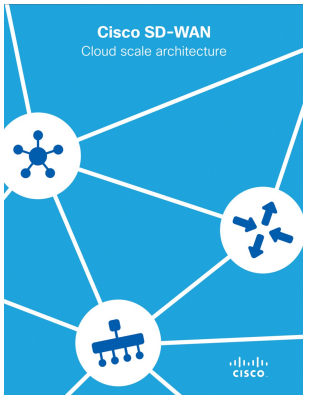
http://cs.co/sdabook
http://cs.co/wirelessbook
http://cs.co/programmabilitybook
http://cs.co/assurancebook
http://cs.co/sdwanbook







The bridge to possible