



TURN  
IT  
UP

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#CiscoLive



The bridge to possible

# Catalyst 9300 Series Hardware Architecture

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BRKARC-2019

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# Agenda

- Introduction
- Platform Overview
- Hardware Innovations
- Software Innovations
- Conclusion

# Is Your Network Ready for the Cloud Era?



Cloud

Does the platform support new UPOE+ devices efficiently?

Does the platform make it easy to provision and scale?

Does the platform support enough Programmability?

Does the platform ensure secure network access?

Does the platform let you adapt to new connectivity requirements?



IP Display/DMS

PC/Laptop

Printer

IP Camera

LED Lights

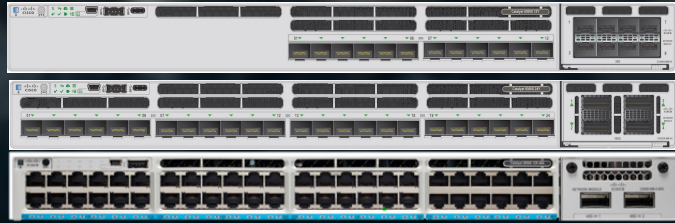
AP

IP Phone





# New Era of Networking – Catalyst 9300



## Integrated security

Encrypted Traffic Analytics  
MACsec Encryption  
Trustworthy Systems



## Mobility ready

Highest mGig Density for WiFi 6  
Fabric Enabled Wireless



## IoT ready

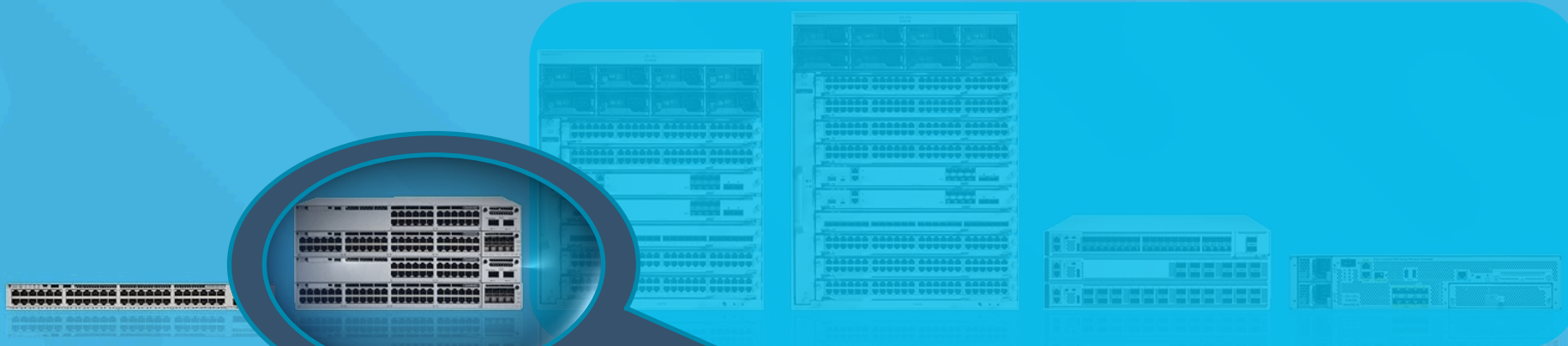
CoAP  
UPOE+  
IEEE 1588  
Bonjour  
IoT Sensor Application



## Cloud ready

Umbrella Connector  
Stealthwatch Connector  
Radsec

# The Catalyst 9K Family



Catalyst 9200

Fixed Access Switches

Catalyst 9400

Modular Core & Distribution Switches

Catalyst 9500

Core & Distribution Switches

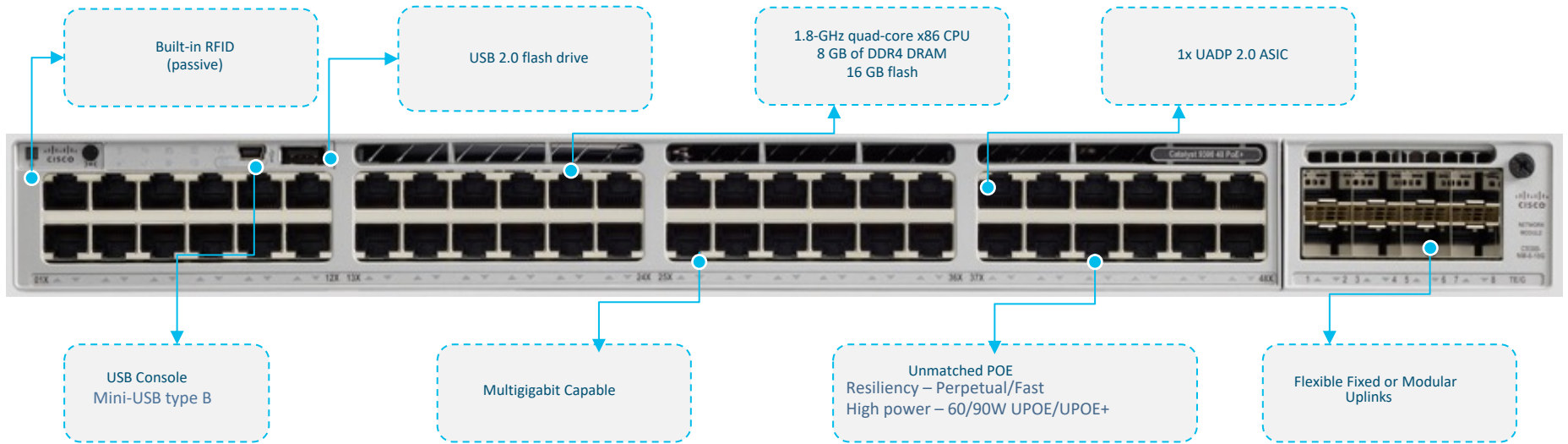
Catalyst 9800

Wireless LAN Controller

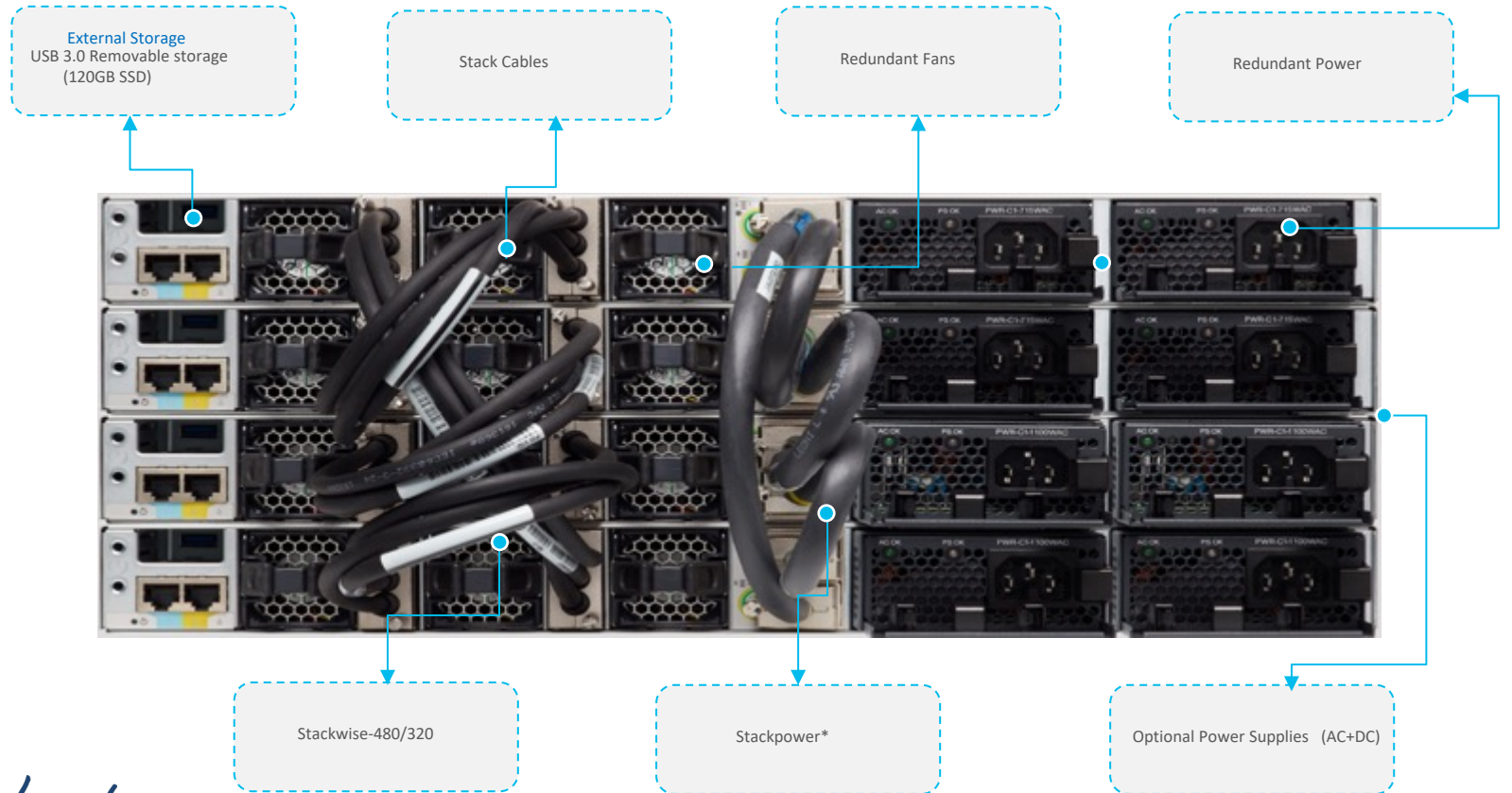
Please refer to other sessions

**Built on Cisco's Innovative Hardware & Open IOS-XE**

# Catalyst 9300 – Leading Fixed Access Switch



# Catalyst 9300– Back View



# Cisco Catalyst 9300 Series Switches

New generation of fixed access

## Flexible uplinks

(C9300 SKUs)

Copper 1G – 24/48 Ports



Data-Only

POE+ - 30W



UPOE – 60W

Fiber 1G SFP – 24/48 Ports



Data-Only

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## Fixed uplinks

(C9300L SKUs)

Copper 1G – 24/48 Ports



Data or POE+

C9300L Stack kit



# Cisco Catalyst 9300 Increased Scale Platform

## C9300 AVID Models



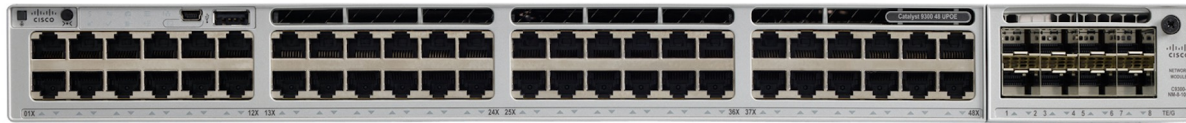
CERTIFIED



EXPANDED  
PACKET BUFFERS



INCREASED  
NETWORK SCALE



C9300-48UB



C9300-24UB

## Powered by UADP 2.0 XL

Stackable Access optimized for Media Distribution and IP Storage Networks

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# Cisco Catalyst 9300 Series Switches

## Multigigabit Models

### Flexible uplinks (C9300 SKUs)

Copper – 24/48 Ports



24UX



48UXM



48UN

Increased Scale/Buffer Multigigabit UPOE Model

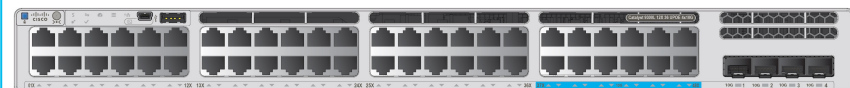


24UXB

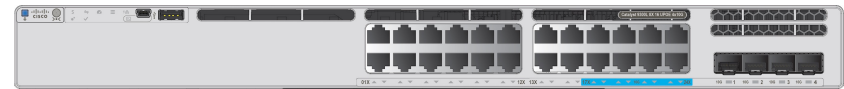


### Fixed uplinks (C9300L SKUs)

Multigigabit – 48 Ports ( 12 x Multigig )



Multigigabit – 24 Ports ( 8 x Multigig )



# Highest UPOE+/802.3bt Port Density in the Industry



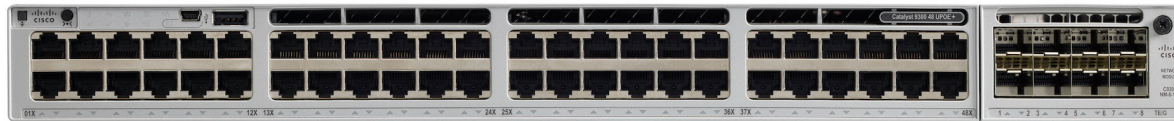
# Cisco Catalyst 9300 – IEEE 802.3bt Compliance

90W UPOE+ Models to power latest intelligent devices



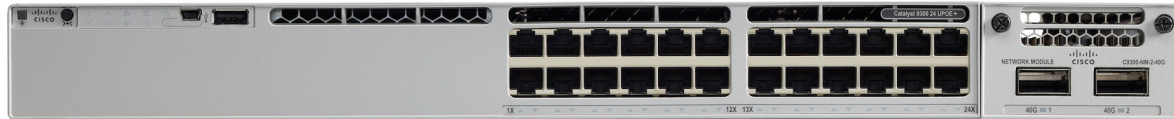
1900W AC-P

32 Ports of 90W in Standalone Mode



C9300-48H

256 Ports of 90W in StackWise-480

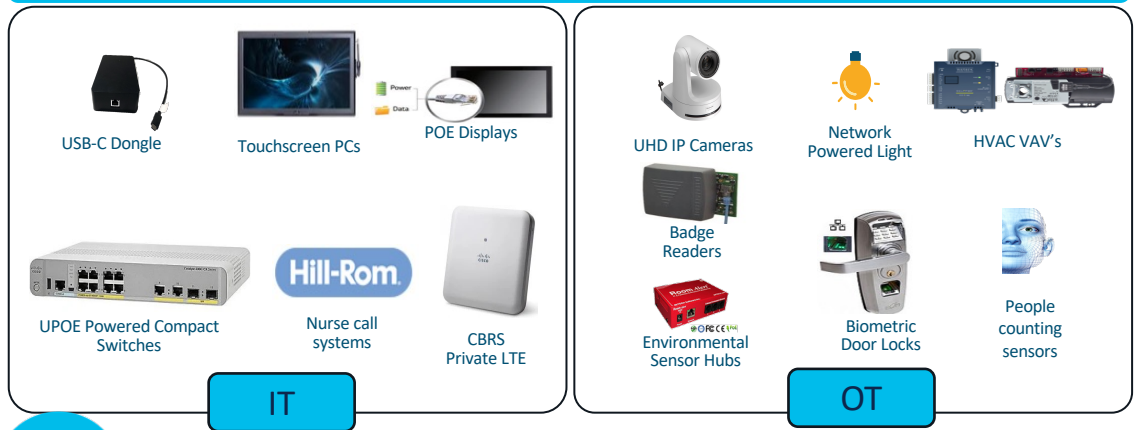


C9300-24H

Highest 90W Port Density in the industry

# Driving connectivity for Smart Buildings

## Growing Ecosystem

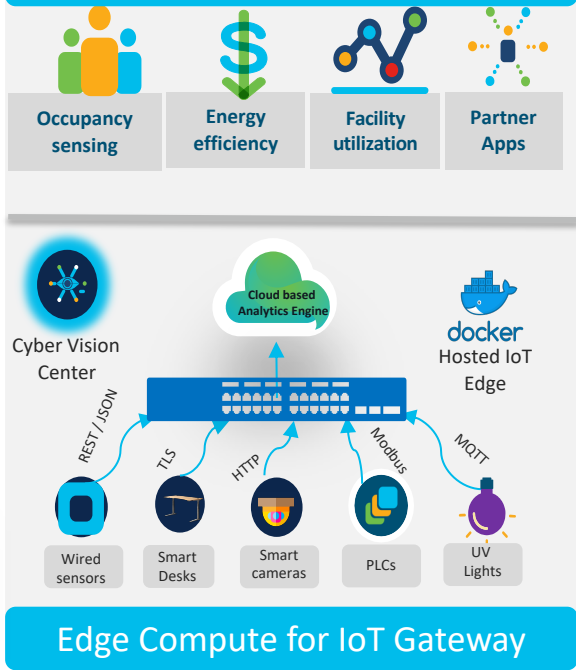


**PoE Assurance and Troubleshooting**



Industry Leading portfolio for 90W PoE

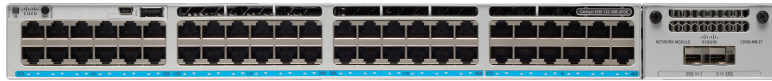
## Smart Building Insights



# Cisco Catalyst 9300 Series Switches

## Uplink options

Cisco® Catalyst® 9300 Series modular uplink models



4x Multigigabit copper

C9300-NM-4M



4x 1 Gbps SFP

C9300-NM-4G



8x 10 Gbps SFP/SFP+

C9300-NM-8X



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

C9300-NM-2Y



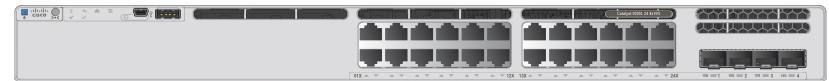
2x 40 Gbps QSFP

C9300-NM-2Q

Cisco Catalyst 9300 Series fixed uplink models



4x 1G fixed uplinks



4x 10G fixed uplinks



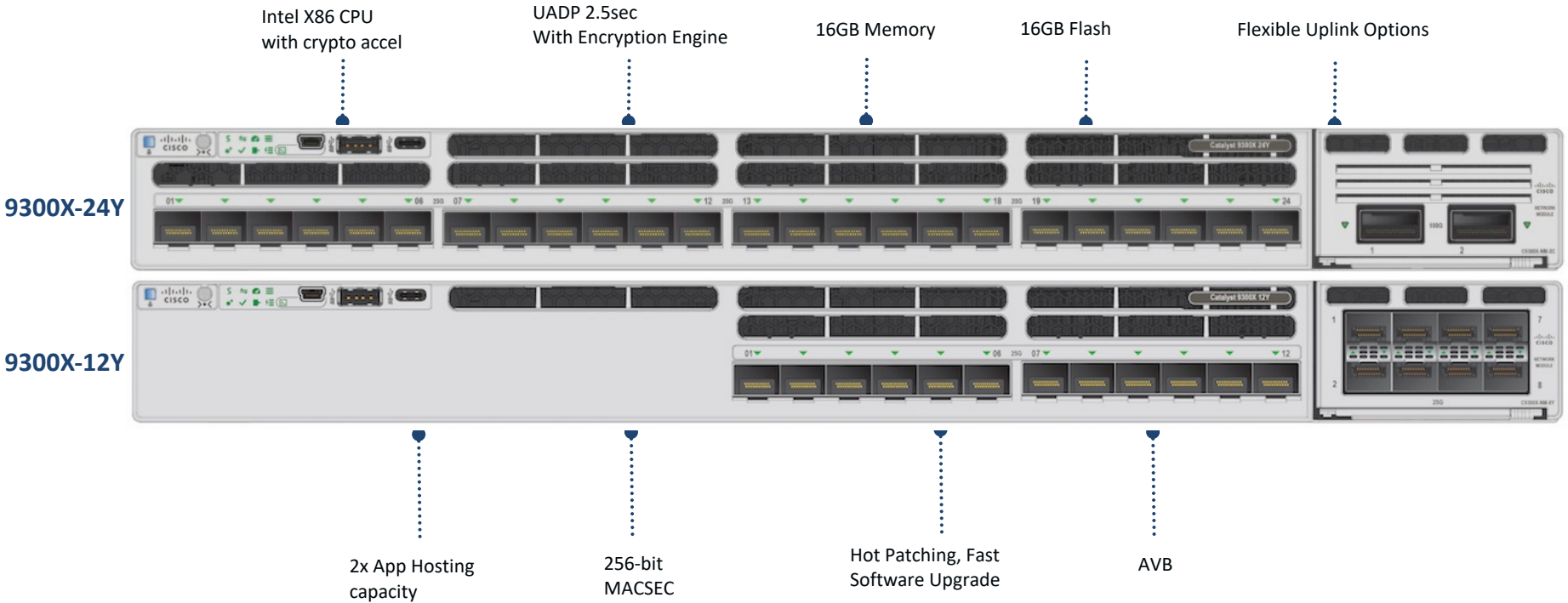
2x 40G fixed uplinks

Modular Uplink options on all C9300 SKUs

Fixed uplink option on C9300L SKUs

# Catalyst 9300X ( 10/25G Models)

# Introducing Catalyst 9300X 10/25G Fiber



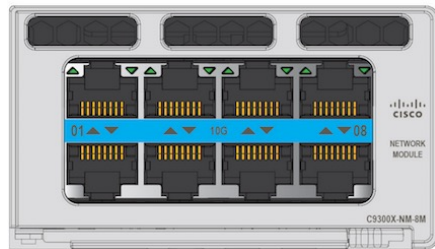
# Highest Speed Uplink Options in the Industry

## 100/40G Modular Uplinks



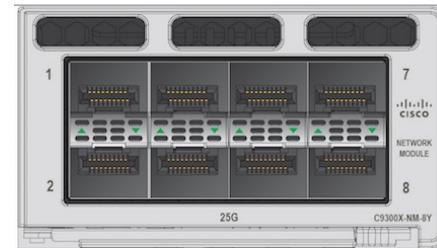
2 x 100/40G QSFP

## Multigigabit Uplinks



8 x 10G-mGig

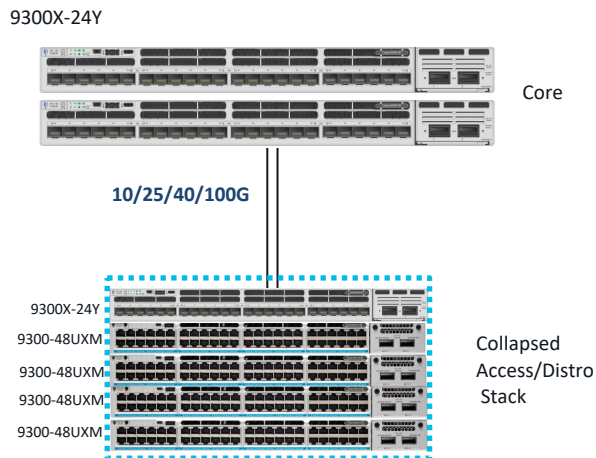
## 10/25 G Modular Uplinks



8 x 10/25G

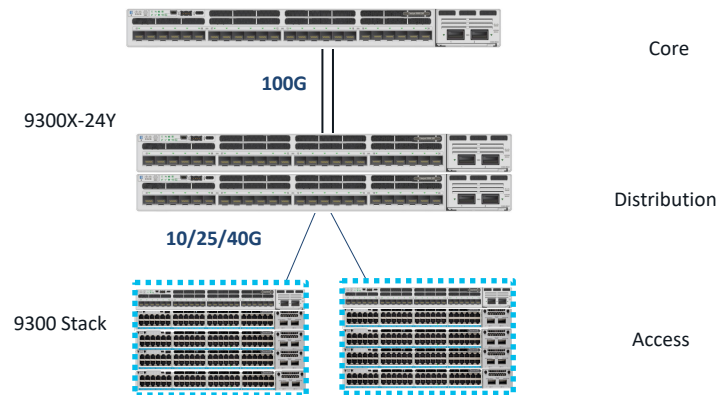
# Flexible Architectures with C9300 and C9300X

## 2 Tier Architecture



C9300X Stack in Core  
C9300X Stacked with C9300 in Access

## 3 Tier Architecture



C9300X Standalone in Core  
C9300X Stack in Distribution  
C9300X Stacked with C9300 in Access

# Catalyst 9300 and 9300X Uplinks, PS and Cables

## C9300 only Uplink Modules



4x Multigigabit copper



4x 1 Gbps SFP



8x 10 Gbps SFP/SFP+



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



2x 40 Gbps QSFP

1/10/25/40G Options

## C9300X only Uplink Modules



2x 100/40 Gbps QSFP



8x Multigigabit copper



8x 10/25 Gbps SFP/SFP+

10/25/40/100G Options

- Wire-speed, non-blocking performance
- Seamlessly integrates with Cisco Catalyst 9300 Series copper
  - Supports same optics
  - Common stacking – StackWise®-1T
  - Common power stacking – StackPower
- Common uplink modules across C9300X models
- Common uplink modules across C9300 models
- Common power supplies, fans, cables across C9300 Family

Platinum rated (90% efficiency)



350W AC-P



715W AC-P



1100W AC-P



1900W AC-P

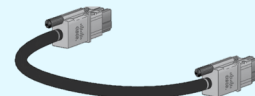


715W WDC

StackWise and StackPower Cables

- STACK-T1-50CM
- STACK-T1-1M
- STACK-T1-3M

- CAB-SPWR-30CM
- CAB-SPWR-150CM



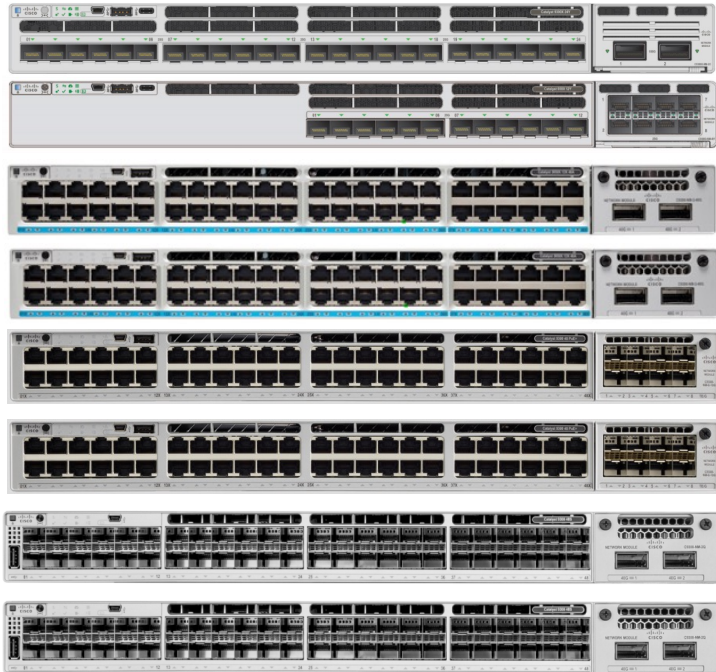
PS and Stack Cables Supported on all Cisco® Catalyst® 9300 Series Switches



# Highly Resilient Platform in the Industry

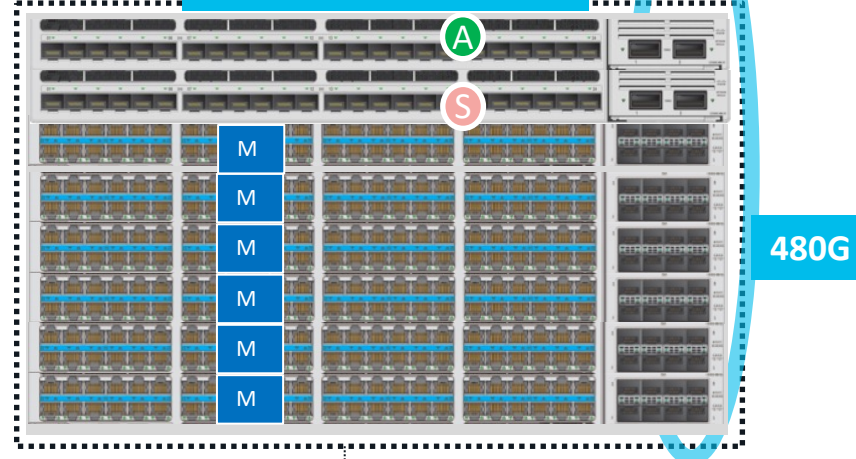
# StackWise-480: Mixed Stacking

8 Individual Switches



Combined  
→

One Logical Switch



```
Switch#sh switch stack-bandwidth
Switch Stack Current
Switch# Role Bandwidth State
-----
*1 Active 480G Ready
2 Standby 480G Ready
3 Member 480G Ready
```

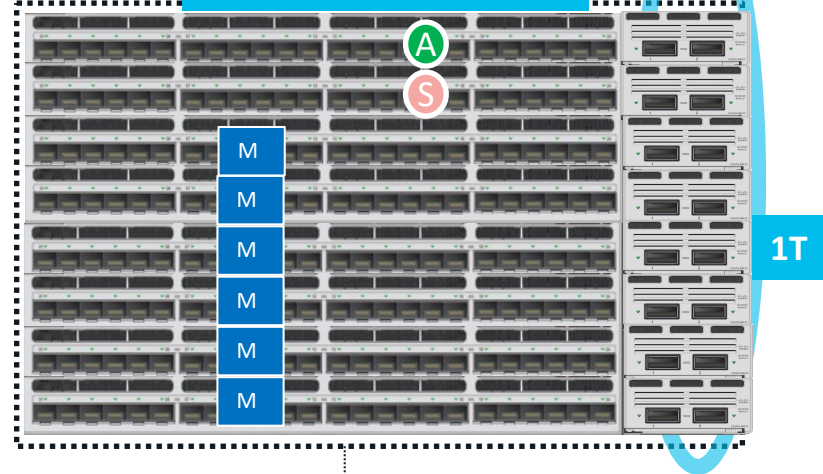
# StackWise-1T: 9300X models only

8 Individual Switches



Combined  
→

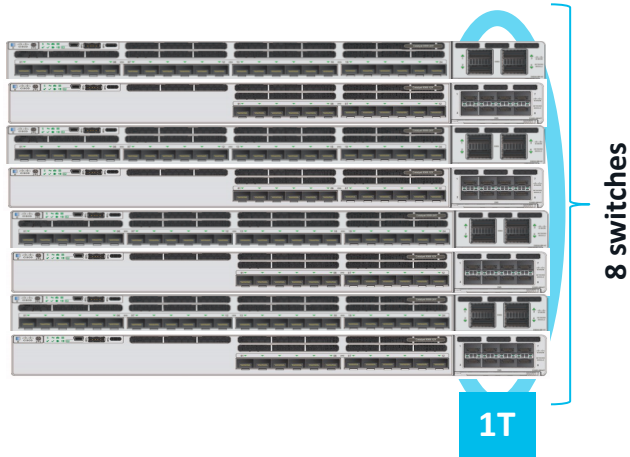
One Logical Switch



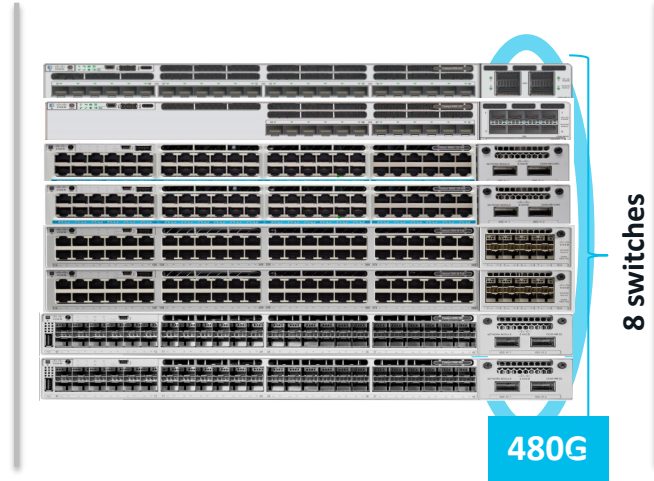
```
Switch#sh switch stack-bandwidth
Stack Current
Switch# Role Bandwidth State
*1 Active 1000G Ready
2 Standby 1000G Ready
3 Member 1000G Ready
```

# Catalyst 9300 Stacking Support

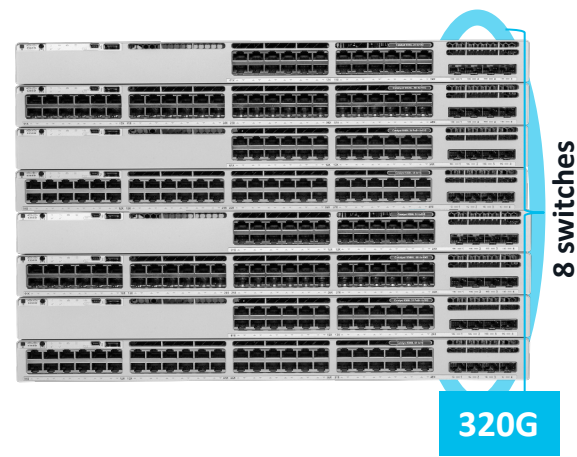
Modular Uplink  
C9300X SKUs ( 10/25G Fiber )



Modular Uplink  
C9300 (non -B) SKUs and C9300X



Fixed Uplink  
C9300L SKUs

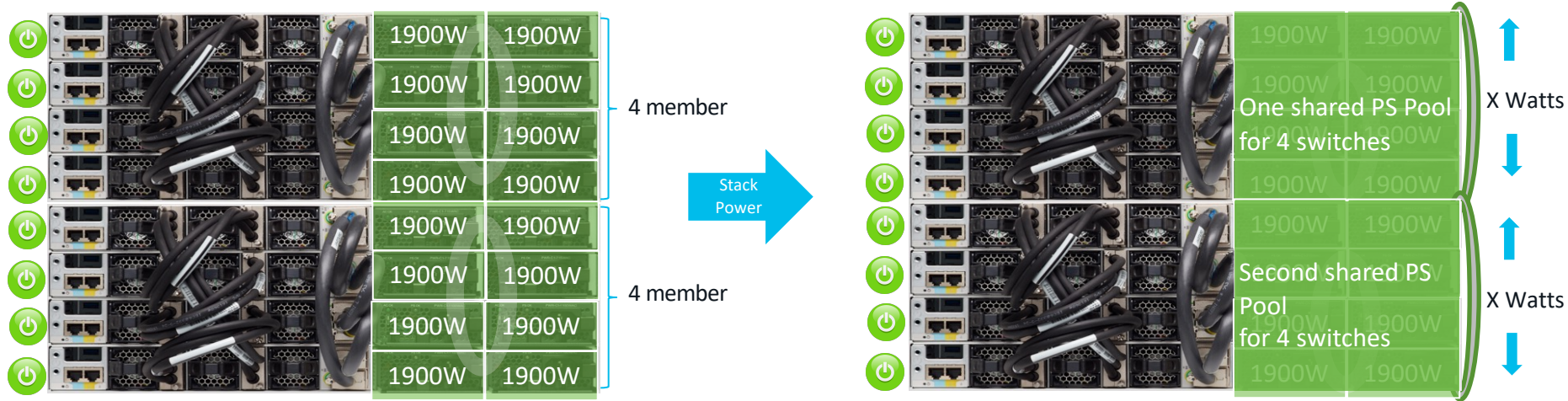


Stacking supported among C9300X SKUs and Mixed Stacking between C9300 and C9300X SKUs

Stacking supported among C9300L SKUs only

Mixed stacking is not supported between C9300 and C9300L SKUs

# Highly Available StackPower

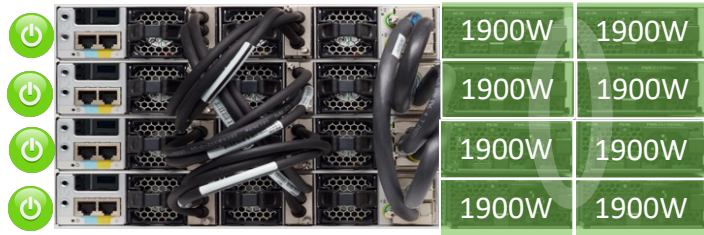


- Up to 4 switches in a StackPower ring
- Multiple StackPower possible within one data stack

- Provides RPS functionality with zero RPS footprint
- Pay-as-you-grow architecture – similar to the data stack
- 1+N redundancy with inline power



# Power Stack Modes

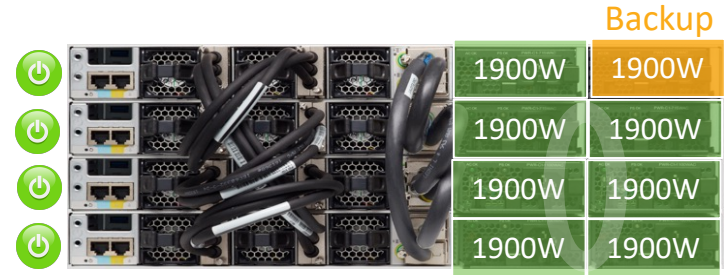


Combined Mode  
( Default Mode )

Power Stack

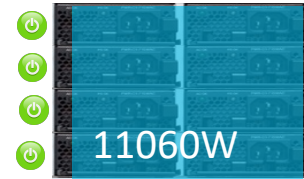


- All power supplies contribute to common output power budget



Redundant Mode  
( User Configurable )

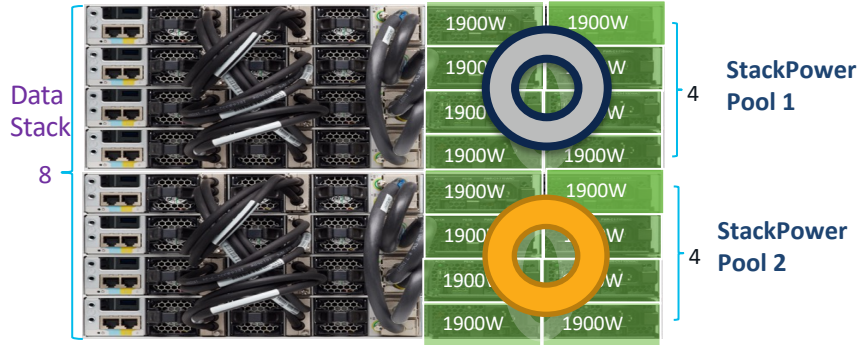
Power Stack



- One of the highest valued PS is not used in the power budget Calculation

# Power Stack Deployment Models

## Ring Model ( Default )



Power sharing and redundancy is only available within individual pools

## Star Model ( Requires XPS 2200 Device )



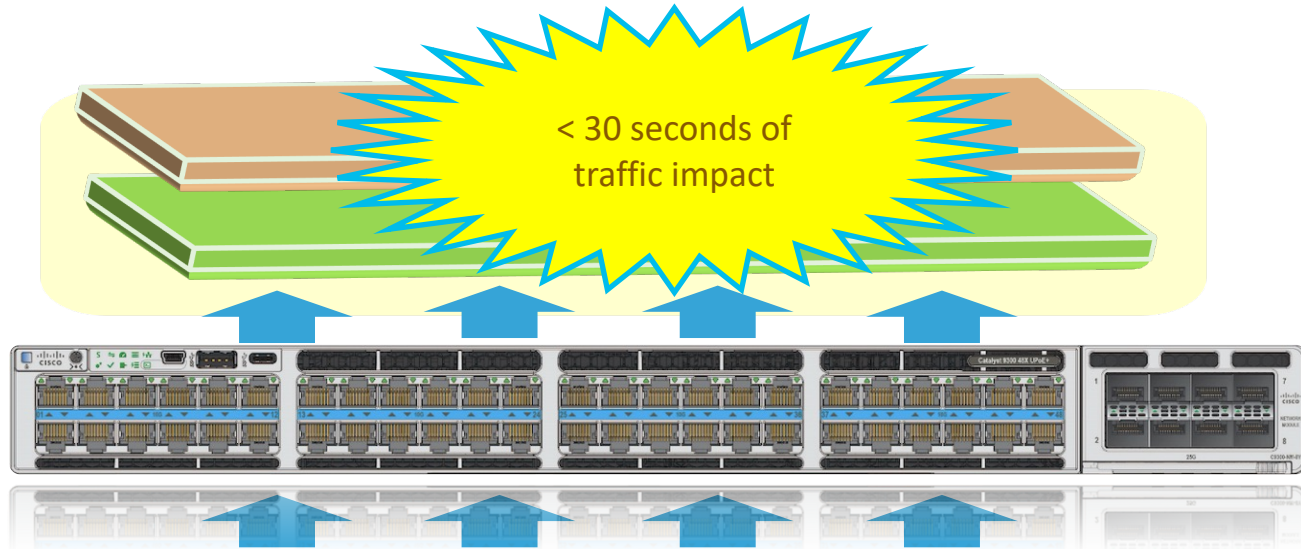
XPS 2200 ( External Power Supply System requires 2 separate PS

Power sharing and redundancy is across all 8 members in stack

# Extended Fast Software Upgrade on Standalone



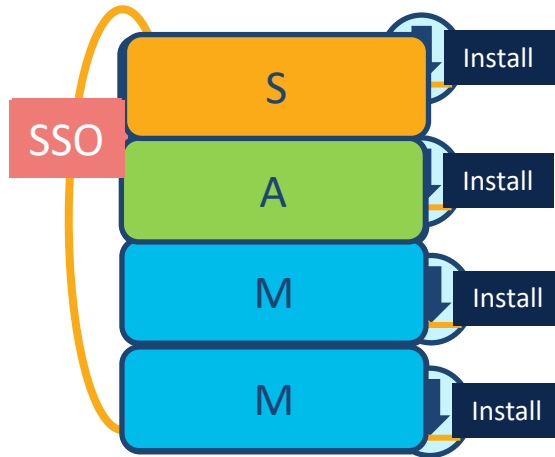
#Install add file image activate reloadfast commit





# Extended Fast Software Upgrade on Stack

```
#Install add file image activate reloadfast commit
```



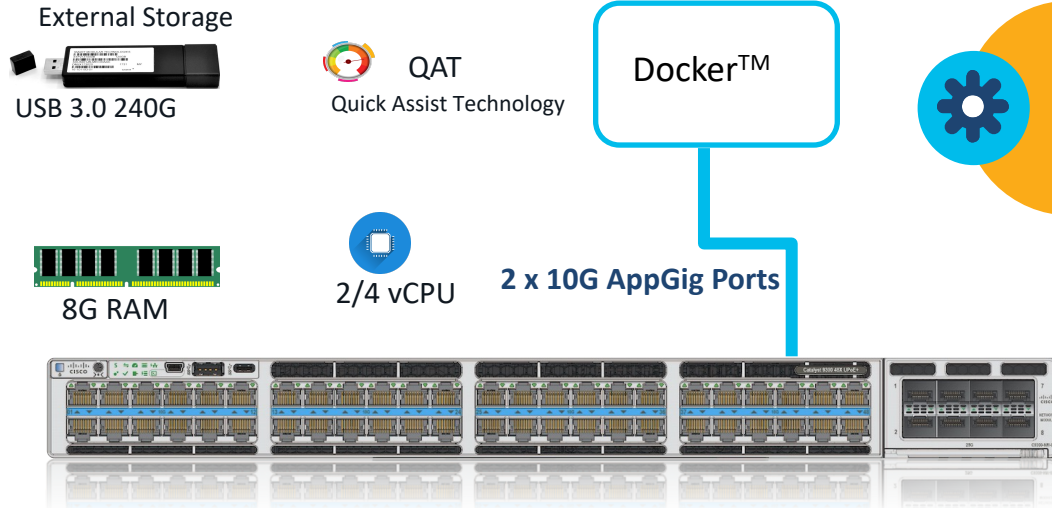
1. Install the images on all switches
2. Fast reload the standby and member switches
3. Fast reload the active switch only
4. Standby becomes the new active
5. Old Active switch becomes the new standby

Traffic Impact during the complete upgrade is less than 30 seconds

# Catalyst 9300 as a Compute Platform

# Transforming Catalyst 9300 in to a compute Platform

## Enhanced Application-Hosting Infrastructure on C9300X



### Support for Multiple Docker applications

With Additional RAM Memory and 2 x AppGigabit Ports, multiple 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


### Validated Apps




# Hardware Innovations



# UADP 2.0/2.0 XL – Next Generation of ASIC Innovation



**Investment Protection**  
Flexible Pipeline



**Enhanced Scale/Buffering**



**160GE**  
Bandwidth



**16/32MB**  
Packet Buffer



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



**64/128K**  
Netflow Records



**480G**  
Stacking Capacity



**Up to 2X**  
forwarding + TCAM




**App Hosting**  
1G App Gig ports



## Catalyst 9300/9300B

# UADP 2.5sec – Next Generation of ASIC Innovation

 Investment Protection  
Flexible Pipeline

 Enhanced Scale/Buffering



**500GE**  
Bandwidth



**16MB**  
Packet Buffer



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



**64K**  
Netflow Records



**QAT Engine**  
(HW Acceleration)



**100G Encryption**



**1T**  
Stacking Capacity



**Up to 2X**  
forwarding + TCAM

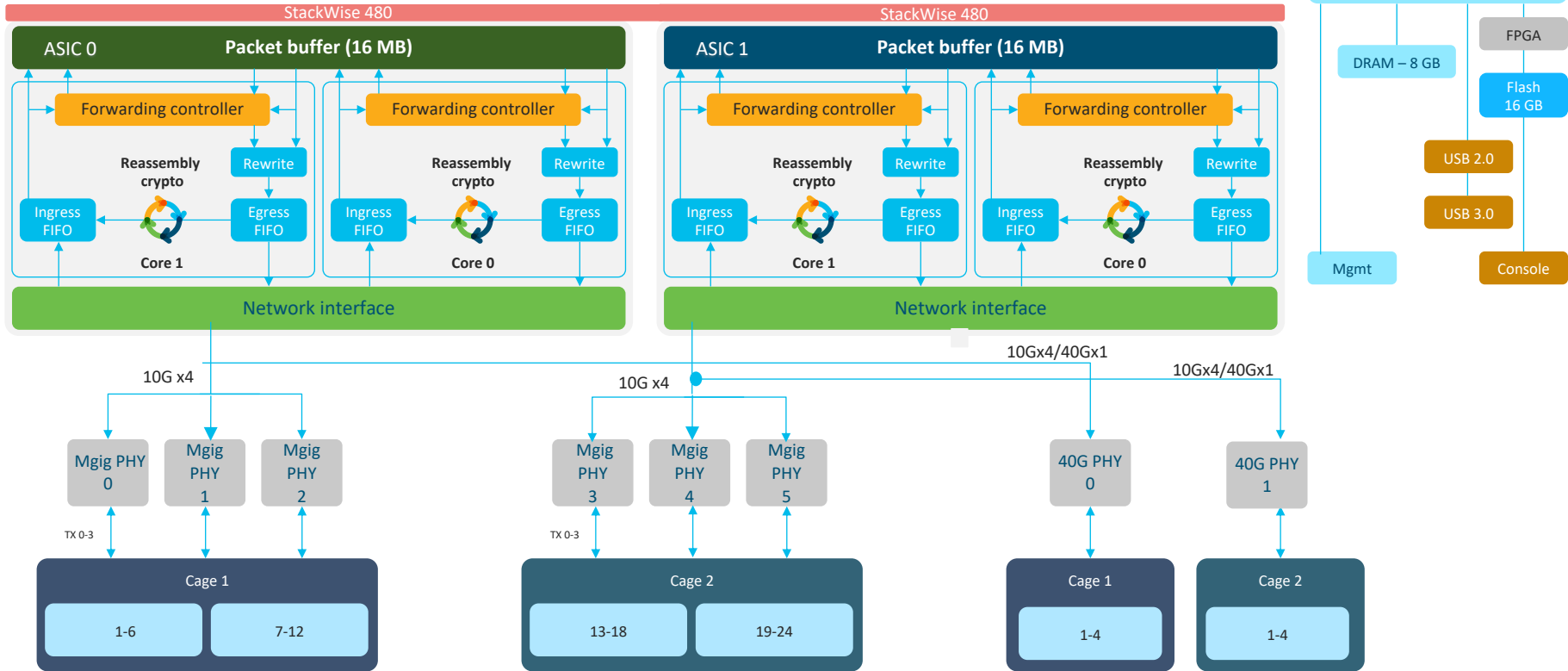


**Enhanced App Hosting**  
2 x 10G App Gig ports



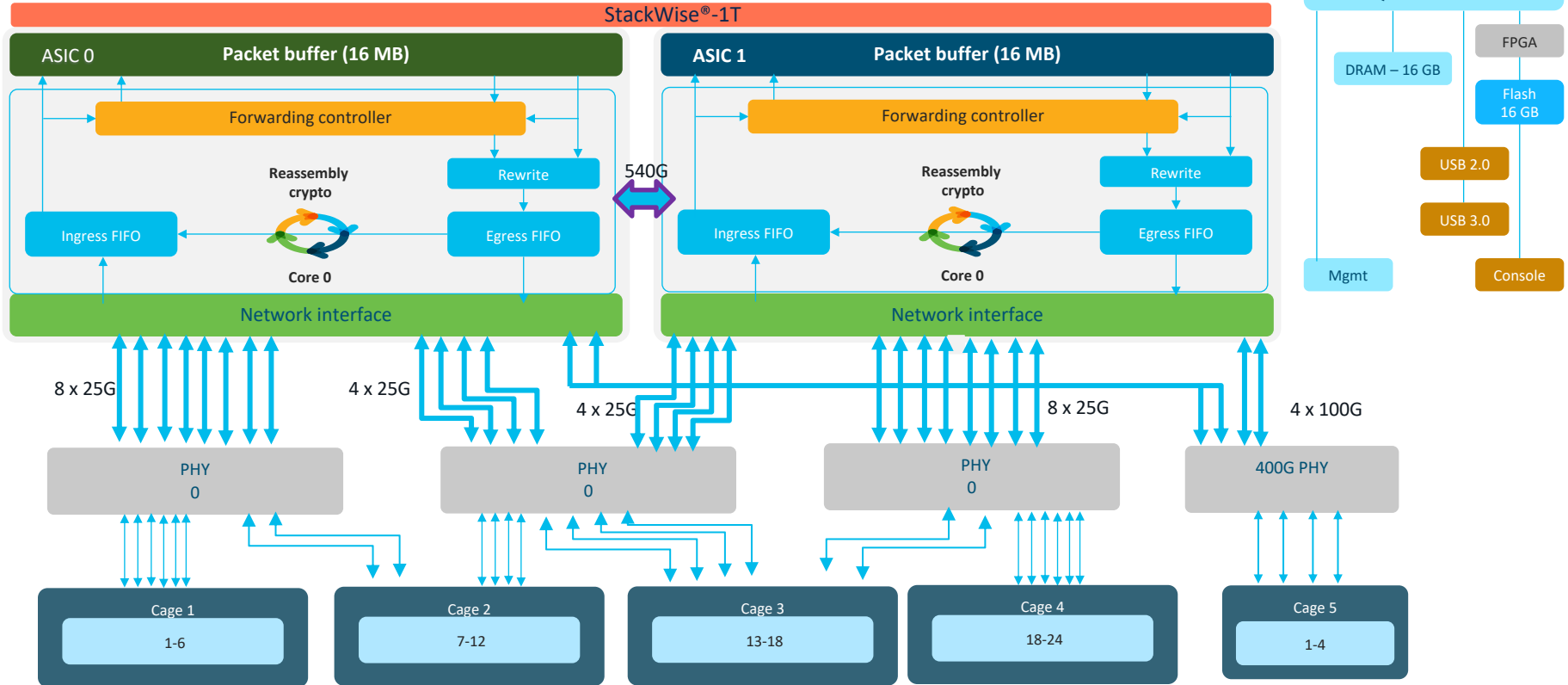
## Catalyst 9300X

# Cisco Catalyst 9300 Multigigabit-24



# Cisco Catalyst 9300X Series Switches

24 port 10G/25G SFP+



*CISCO Live!*



# Lookup tables

## Forwarding resources

	Cisco® Catalyst® 9300X Series	Cisco® Catalyst® 9300 Series	Cisco® Catalyst® 9300B Series
MAC addresses	32,000	32,000	64,000
Host/Direct routes	24,000	24,000	48,000
IGMP groups	8000	8000	16,000
LPM/Indirect routes	15,000	8000	64,000
Multicast routes	8000	8000	16,000
SGTs	8000	8000	8000

## Feature resources

	Cisco® Catalyst® 9300X Series	Cisco® Catalyst® 9300 Series	Cisco® Catalyst® 9300B Series
Security ACL entries	8000	5000	1800 0
<ul style="list-style-type: none"> <li>• PACL</li> <li>• VACL</li> <li>• RAACL</li> </ul>			
QoS ACL entries	4000	5000	1800 0

NetFlow

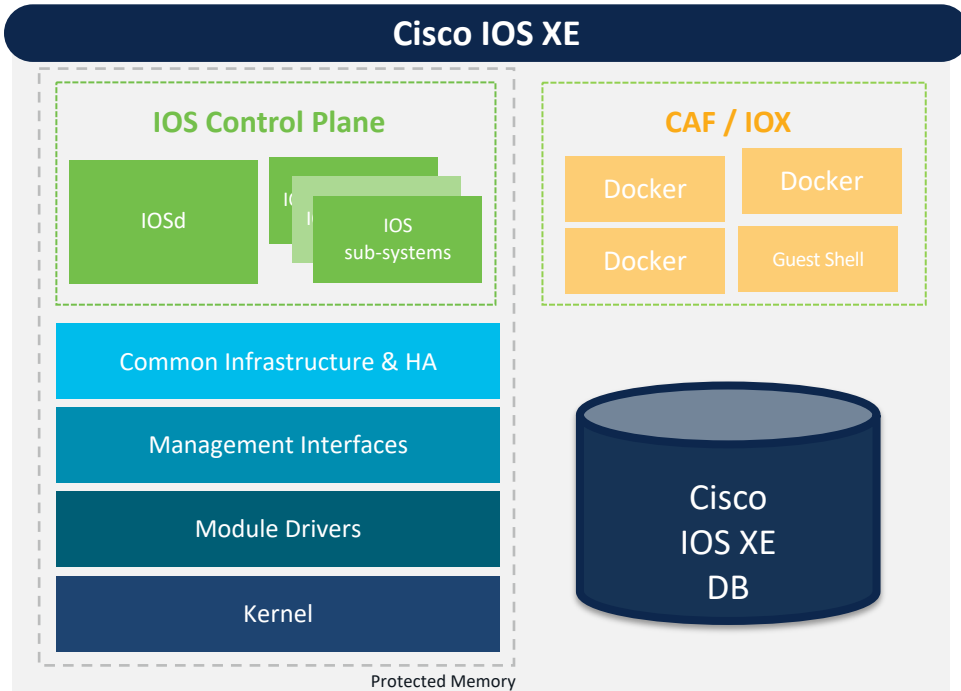
NetFlow entries: 128,000/64,000/64000 per UADP 2.0XL/2.0/2.5 ASIC

# Software Innovations

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# Cisco IOS XE – A Modern Operating System



## Cisco IOS subsystems

Resiliency and High Availability

## Cisco IOS XE database

Programmability and Open models

## IOX / Docker containers

Cisco and 3rd-party App hosting

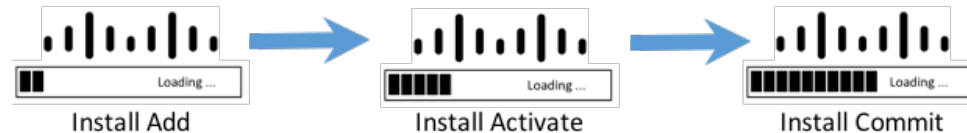
Open, Model Driven & Secure Operating System

# Ready for Software Patching

SMU is an emergency point fix positioned for expedited delivery to a customer in case of a network down or revenue affecting scenario.

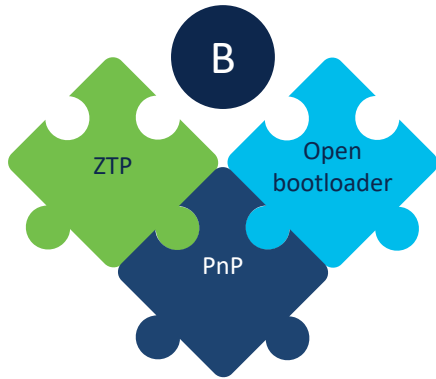
Cold Patching: Install of a SMU will require a system reload in the first release. It is traffic impacting.

Hot Patching: Install of a SMU does not require a reload.

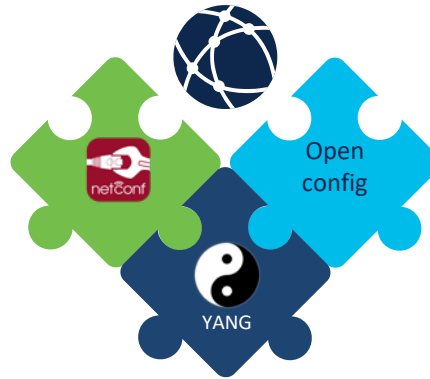


# Cisco Catalyst 9000 family

## Programmability and automation



Device bootstrap and onboarding



Configuration automation through open interfaces



Server management tools on x86 infrastructure

Cisco Catalyst 9000 family offers a complete DevOps toolkit

# Model-Driven Telemetry



Export enriched, consistent, and concise data with context from network devices for a better user and operator experience

**Periodic or on-change**



**Structured data**



**Scalable**



**Reduced CPU load**



# Day 0 Security– Trustworthy Systems



Trustworthy Systems

Image  
Signing  
Authentic OS

PnP  
SUDI Support  
Two Way Trust

Hardware  
Authenticity  
Genuine  
Hardware

Runtime  
Defenses  
64 Bit ASLR

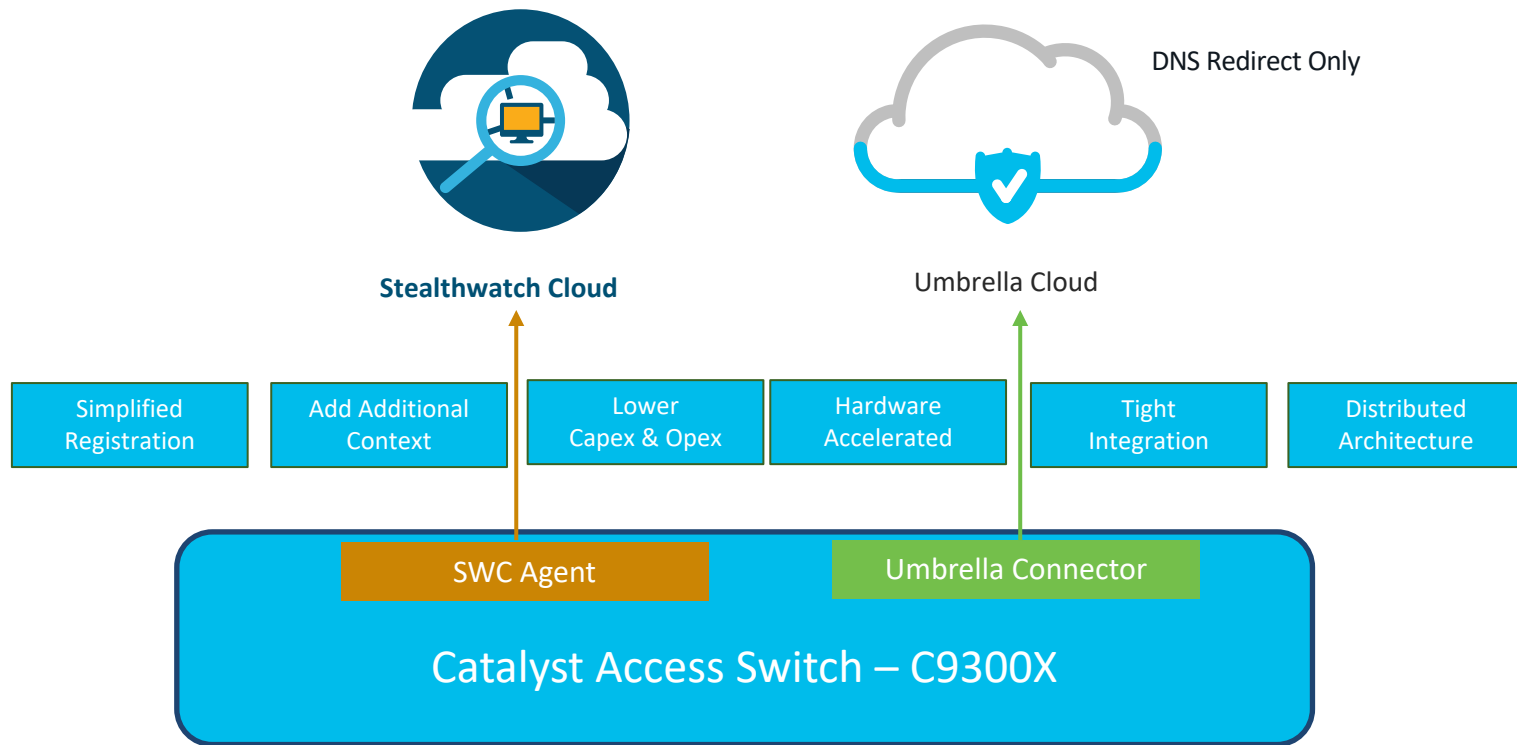
Secure  
Boot  
Boot Sequence  
Check

Integrity  
Verifications  
Malware  
Protection

## Catalyst 9K Family is Built with Security

# Cloud Security at Access

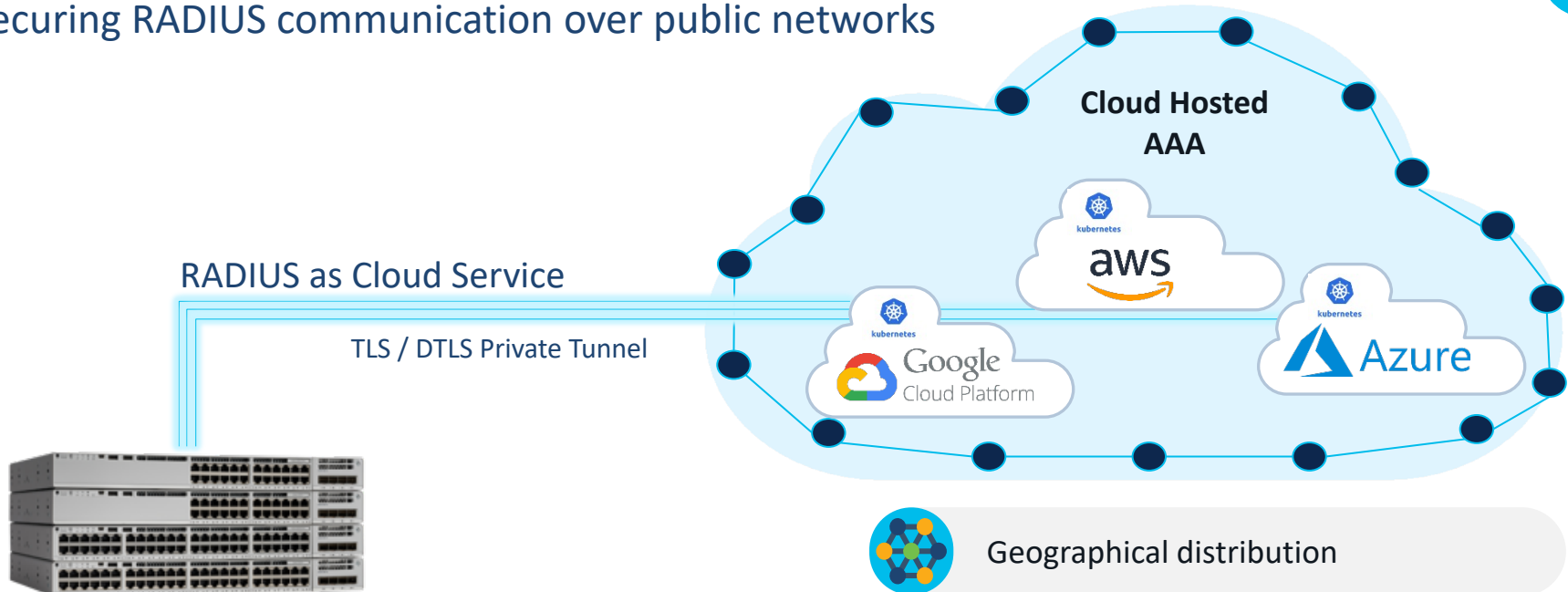
## Native Integration of Cisco Cloud Security








# RadSec

Securing RADIUS communication over public networks



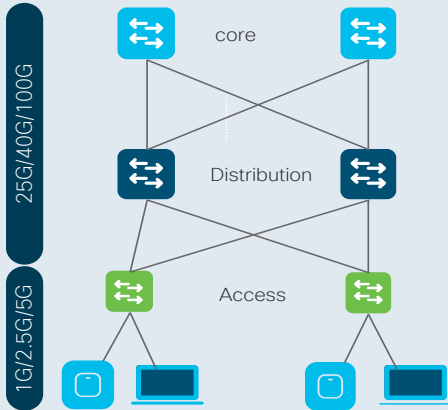
Cisco® Catalyst® 9000 Series Switches  
Open IOS-XE 17.4.1

-  Geographical distribution
-  Cloud redundancy and availability
-  Data at transit Encrypted

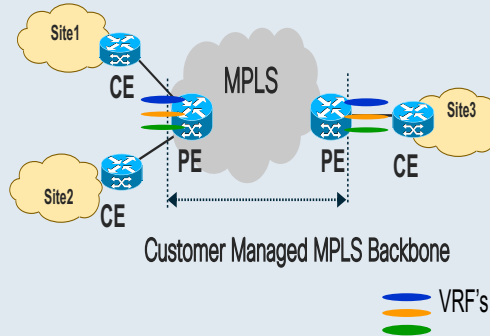


# Catalyst 9000: An Enterprise Swiss Army Knife

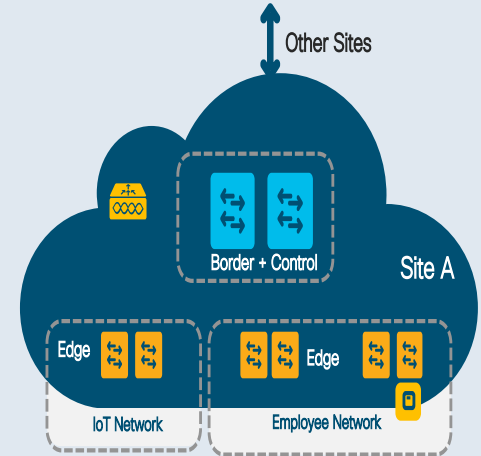
## Traditional Campus networks



## MPLS

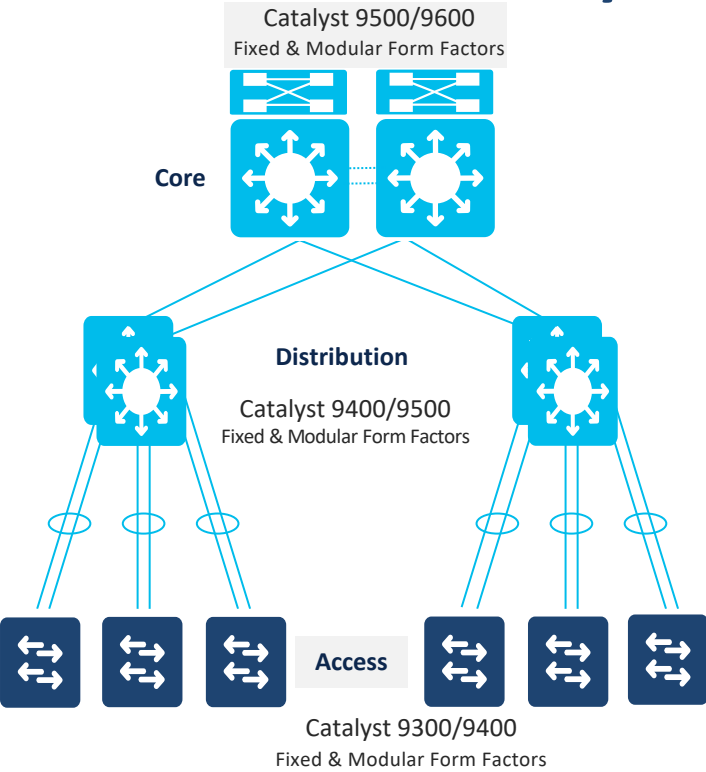


## Fabric Core

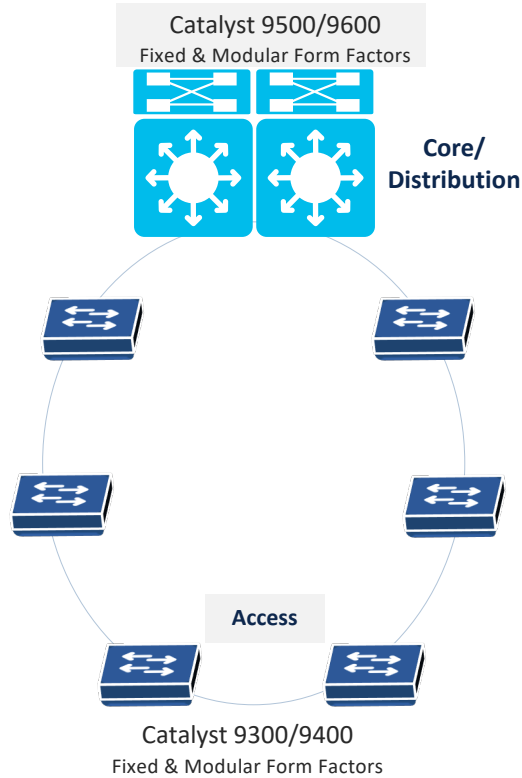


Any architecture, Any speed

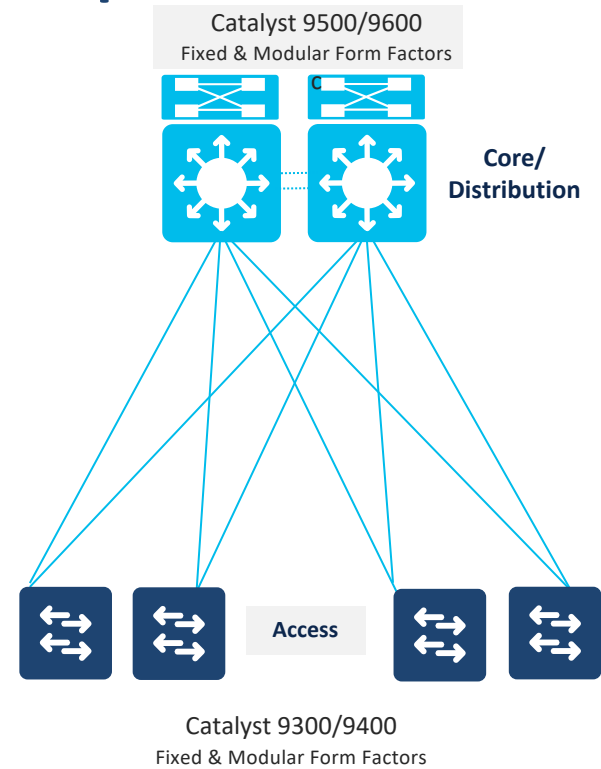
# End to End Catalyst 9000 for Traditional Campus Networks



3 Tier

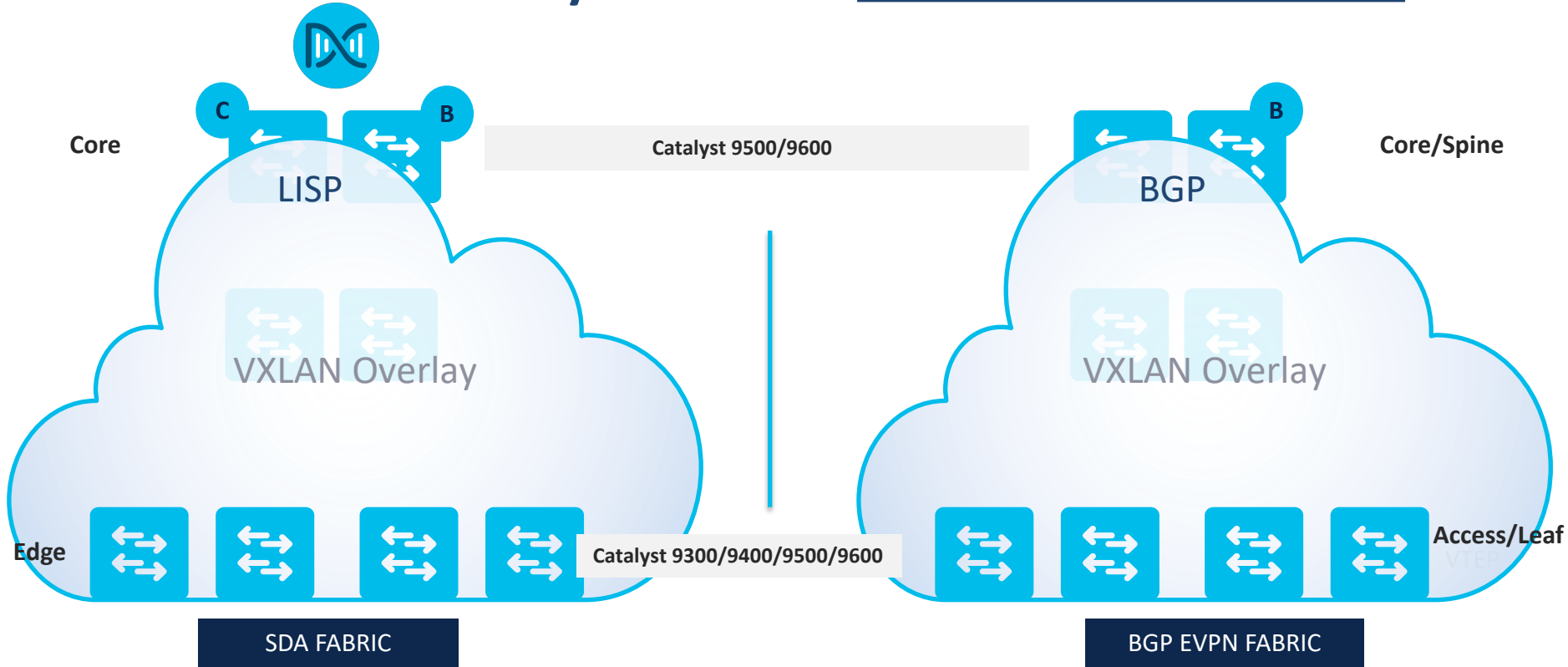


Ring



2-Tier / Collapsed Core

# End to End Catalyst 9000 for Fabric Based Networks



# Key Takeaway

- **Industry 1<sup>st</sup>**
  - ✓ **100G** Uplink Options
  - ✓ Fully **Resilient** Platform
  - ✓ **1 Terabit** Stacking Bandwidth
  - ✓ **< 30 seconds** of traffic impact during reload and Software Upgrade
  - ✓ Most Advanced Compute Platform hosting **any 3<sup>rd</sup> party** docker Application
  - ✓ **Swiss Army Knife** – Any Architecture, Any speed, Any technology
  - .....etc

# Continue your education



Demos in the Cisco campus



Meet the engineer 1:1 meetings



Walk-in labs



Related sessions





The bridge to possible

# Thank you

*CISCO Live!*

#CiscoLive





TURN  
IT  
UP

CISCO *Live!*

#CiscoLive