
cisco
You make possible

Catalyst 9000 Family

An Architectural View

Muhammad A Imam, Technical Marketing

BRKARC-2035

cisco Live!
Barcelona | January 27-31, 2020

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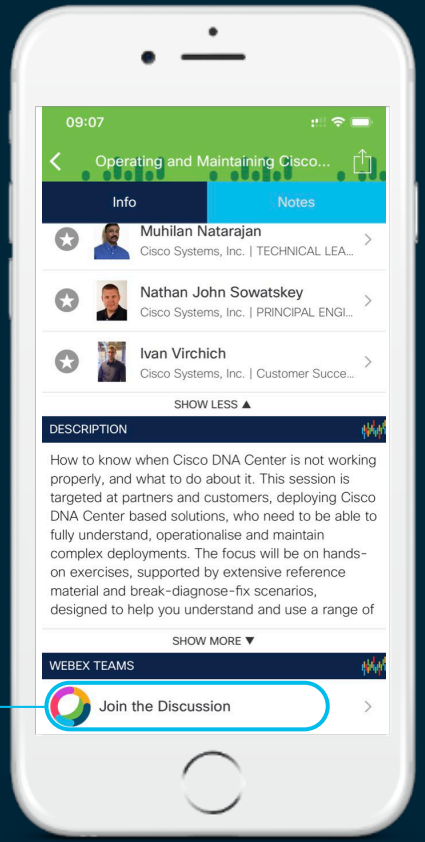
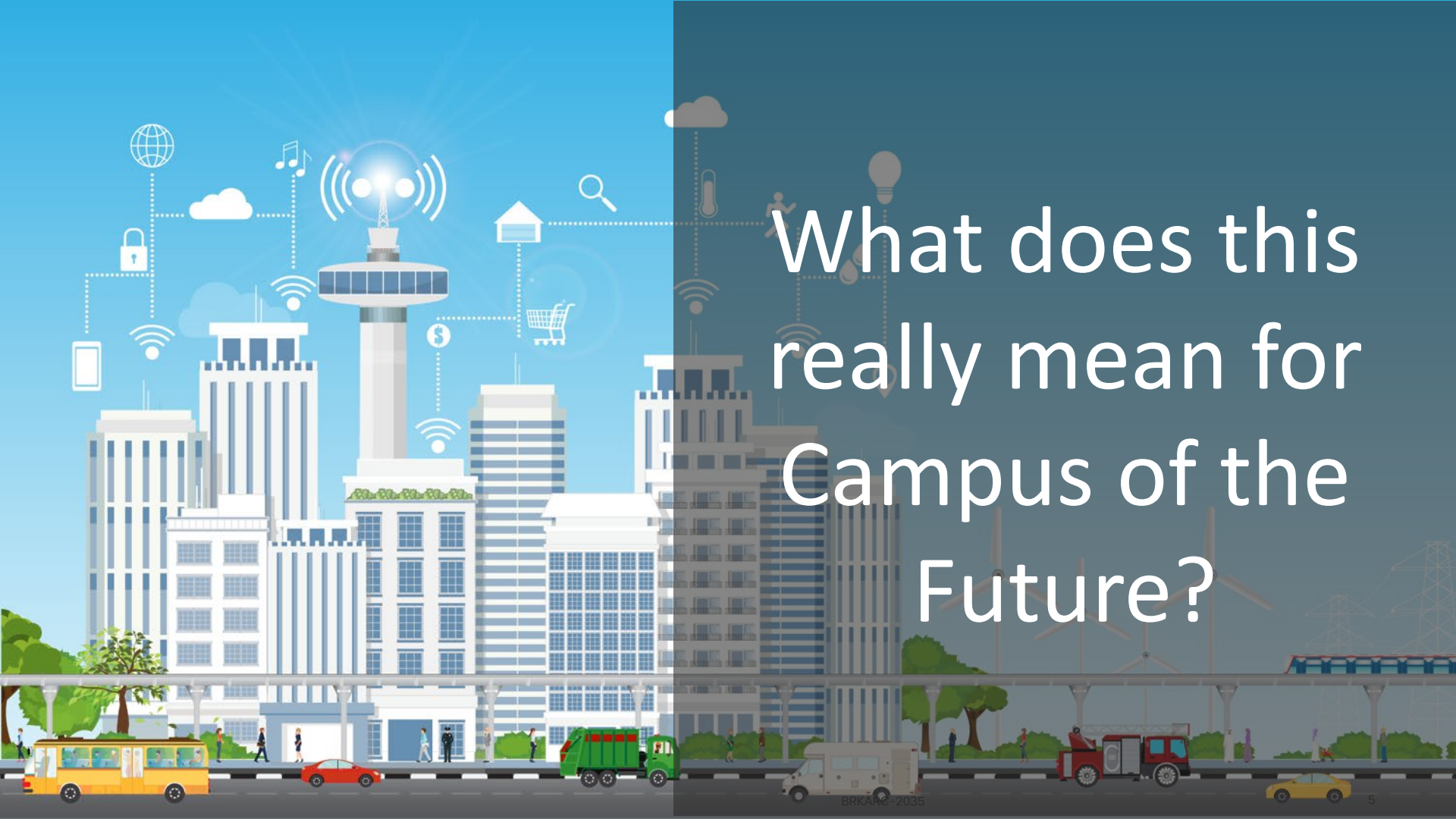


Campus of the Future

New Trends Drive New Requirements for the Network


What does this really mean for Campus of the Future?

Users

IoT Devices

BMS Devices

Secure On Boarding

Fingerprints & Identity

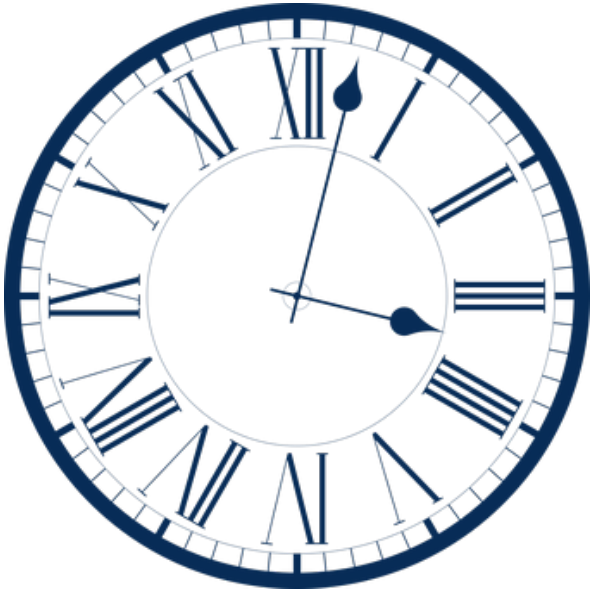
End to End Policy

Encryption

Design your Networks for End to End Security & Segmentation

- Data Analytics in Real Time
- Forensic Troubleshooting
- Telemetry Data
- Open Interfaces & Models

Data is Essential to Operate & Manage the Networks



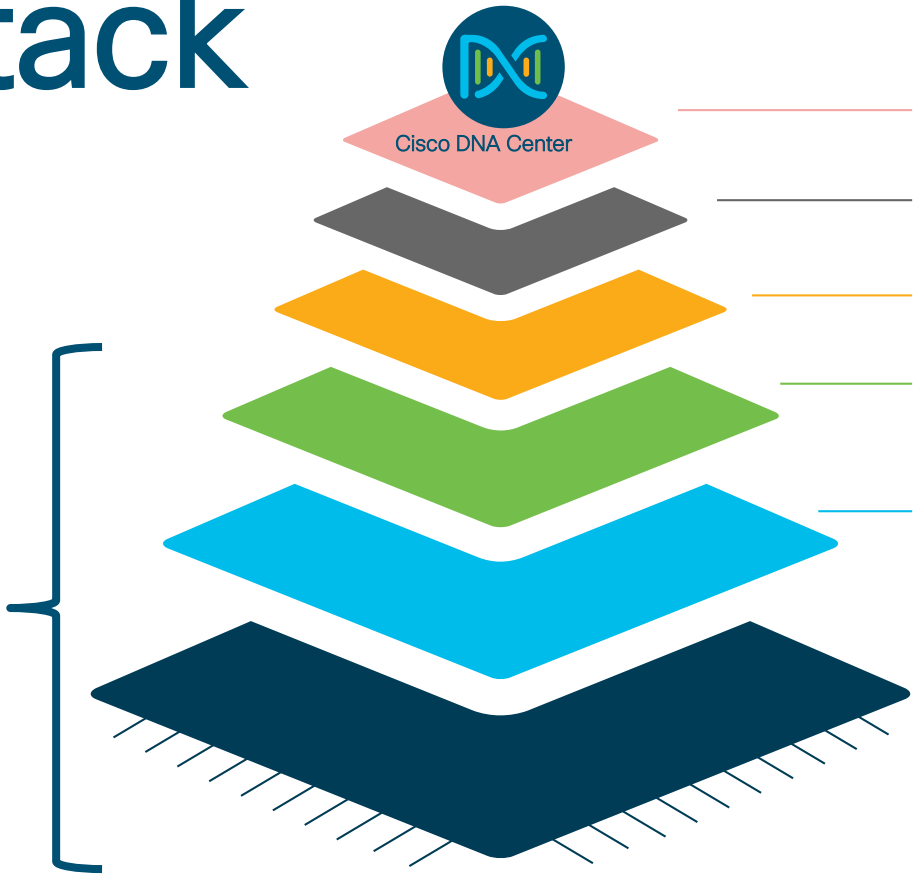
Availability Requirements
For Campus of the Future

Always ON

99.9999999 %
Availability

Always Available is the New Requirement

Full Stack



Catalyst 9K

Catalyst 9K Family

Built for Campus of the Future

The goal of this session is to give you an architectural view of Catalyst 9000 family, and how it enables Campus of the Future

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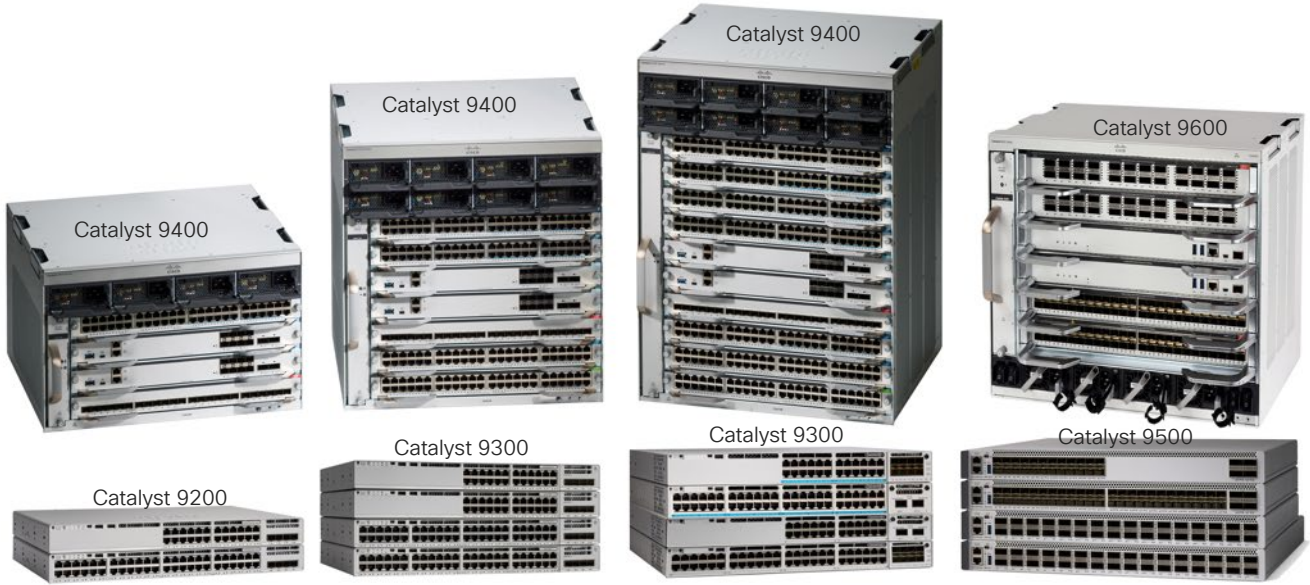
Muhammad currently works as a Director Technical Marketing for Enterprise Networks Group. Muhammad joined Cisco in 2008 and has around 15 years of experience in the networking industry. Currently he leads a team of Catalyst Products TMEs. He is one of the first TMEs to work on Catalyst 3850/3650 and Catalyst 9000 Family and has worked on all Catalyst Switching products over the years. He also contributes to Enterprise Network designs and Next Generation Platform Architectures. In the past he has held roles in Development, Test and Support of different products ranging from Routers, Switches, Firewalls, etc.

Muhammad holds a Masters degree in Electrical & Computer Engineering. He also maintains a CCIE #27739 in Routing and Switching.

Catalyst 9000 Family

Catalyst 9000 (9K) – A Growing Family



IOS-XE 16
Common Software Architecture

UADP 2.0
Common Hardware Architecture

The Latest Addition – Catalyst 9600

Modular Campus Core – Modernizing the Catalyst 6K

And there are a couple more Catalyst 9K

The First Catalyst Wireless LAN Controller

Outside the scope of this session

Catalyst 9100

[BRKEWN-2670 - Introduction to Cisco Catalyst 9800 Wireless Controller]

Catalyst 9800 Powered by IOS XE

Building Blocks

Catalyst 9K – Common Building Blocks

UADP

2.0/3.0

Programmable pipeline
Flexible tables

Open and Extensible
IOS-XE

Model-Driven APIs
Streaming telemetry

Building Blocks to Face the challenges of Campus of the Future

UADP – Next Generation of ASIC Innovation

Investment Protection
Flexible Pipeline

Universal Deployments
Adaptable Tables

Enhanced Scale/Buffering
Multicore resource share

Up to 384K Flex Counters

Shared Lookup

Up to 1.6T Bandwidth

Up to 2X to 4X Forwarding + TCAM

Up to 20B Transistors

16nm Technology with latest ASIC

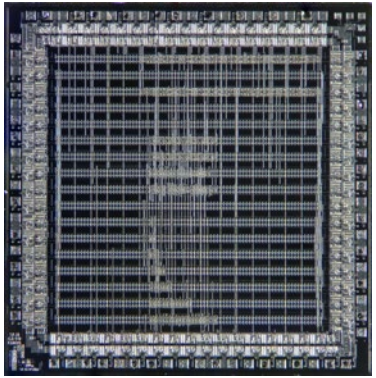
Embedded Microprocessors

Up to 36MB Packet Buffer

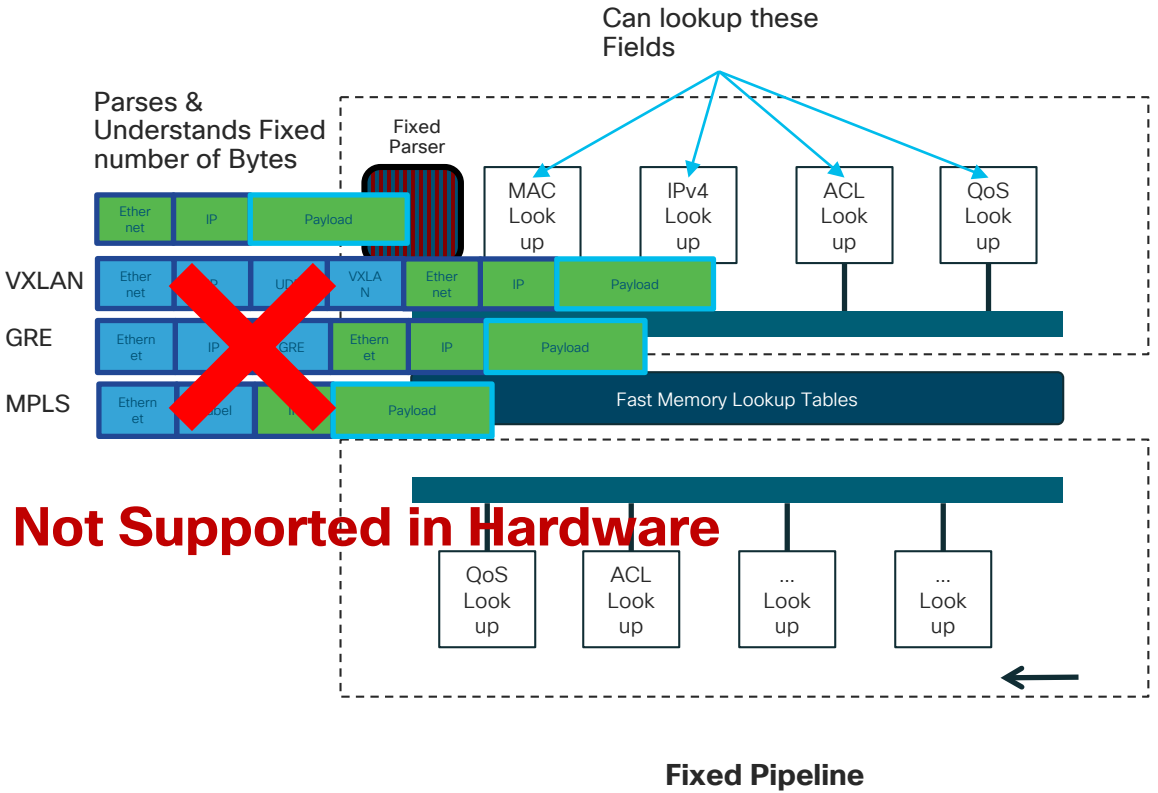
Up to 64K x2 Netflow Records

Flexible & Programmable ASIC – Adapts to the New Technologies

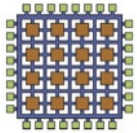
Traditional Networking ASICs – Fixed Pipelines

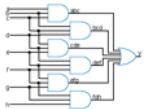


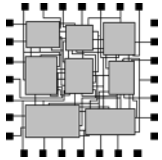
Traditional ASIC

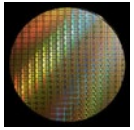


New ASICs for New Technology ?







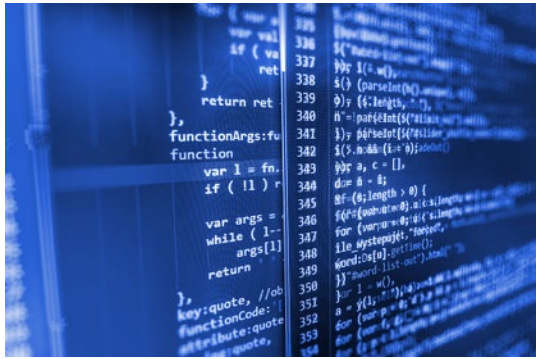


Marketing Requirements | Architecture | RTL Design | Synthesis | Floor Planning | Fabrication

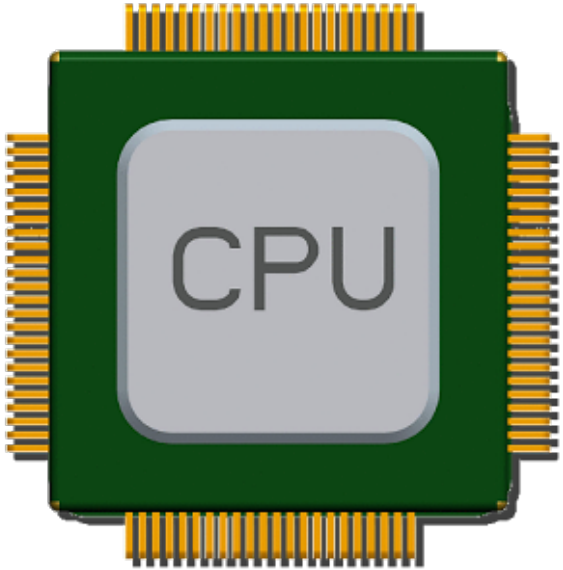
2 – 4 Years

Building a new ASIC takes a lot of time & money

How about CPUs ?



CPUs are highly Programmable

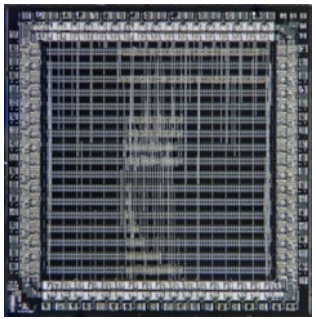


CPUs are not as fast

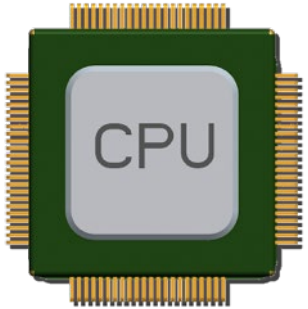
Traditional Networking ASICs vs CPUs

Performance

Flexibility



Traditional Networking ASIC



General Purpose CPU

Performance

Flexibility

Purpose Built – High Performance

General Purpose – Highly Flexible

Cisco Innovation – UADP ASIC

In 2013 Cisco Introduced UADP

(Unified Access Data Plane)

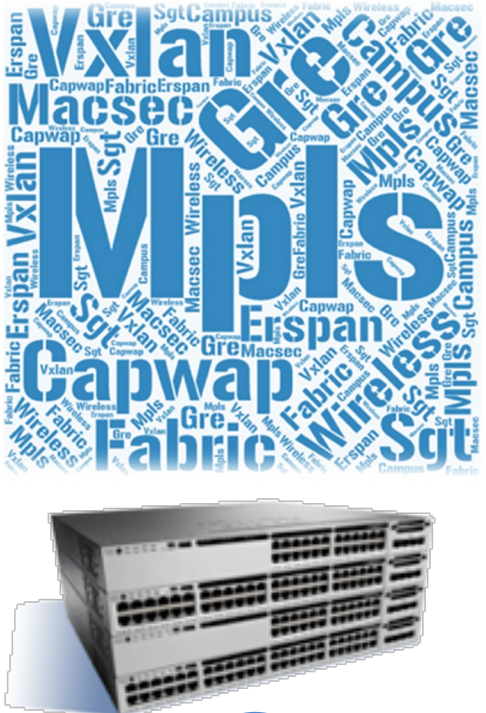
- ✓ Performance
- ✓ Flexibility
- ✓ Programmability

UADP brings Flexibility without compromise on Performance

Proven Investment Protection with UADP 1.0

2013

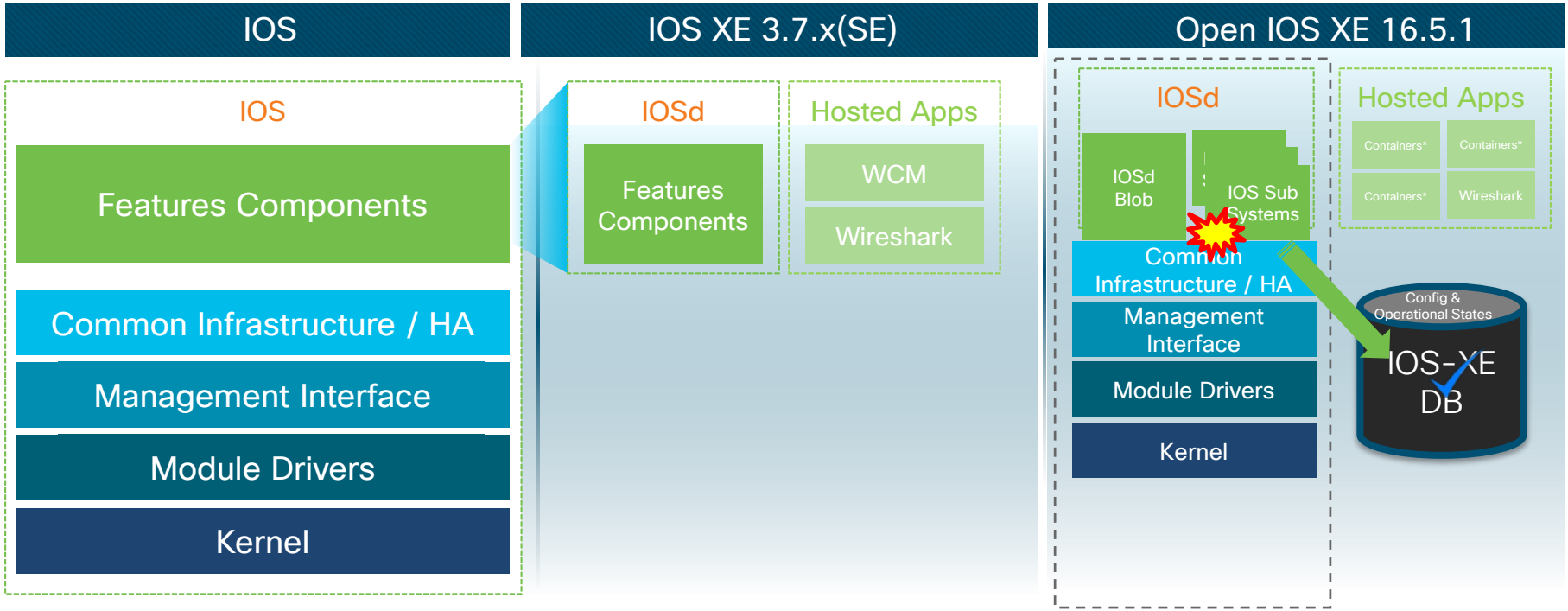
2015



2017

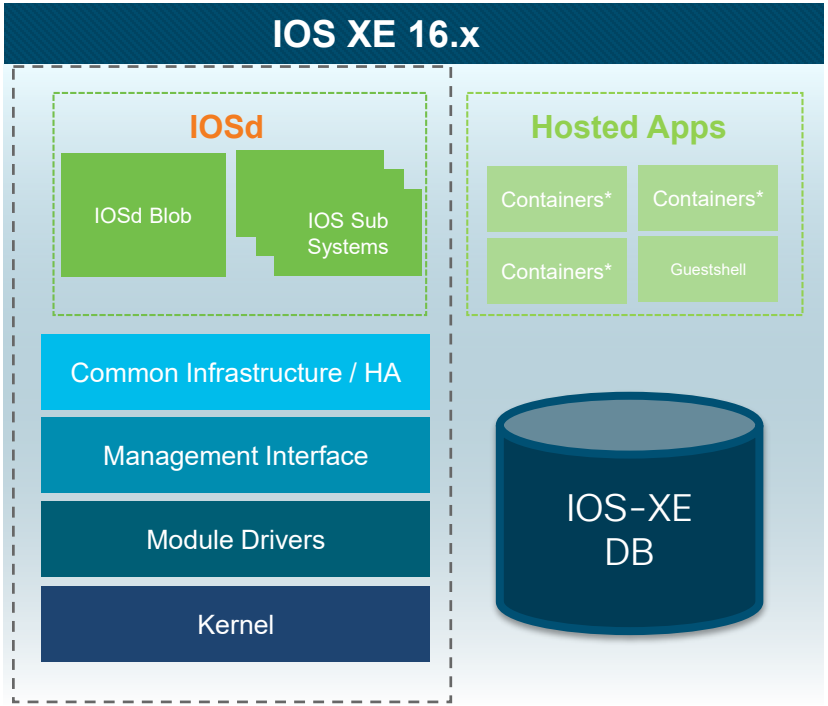
UADP 2.0 extends it to the Catalyst 9K Family

Open IOS-XE



Modern Software Architecture with the same look & Feel

Open IOS XE – A Modern Operating System



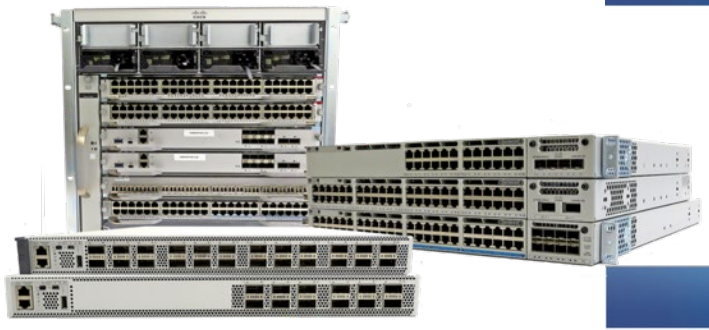
IOS Sub Systems
Resiliency & HA

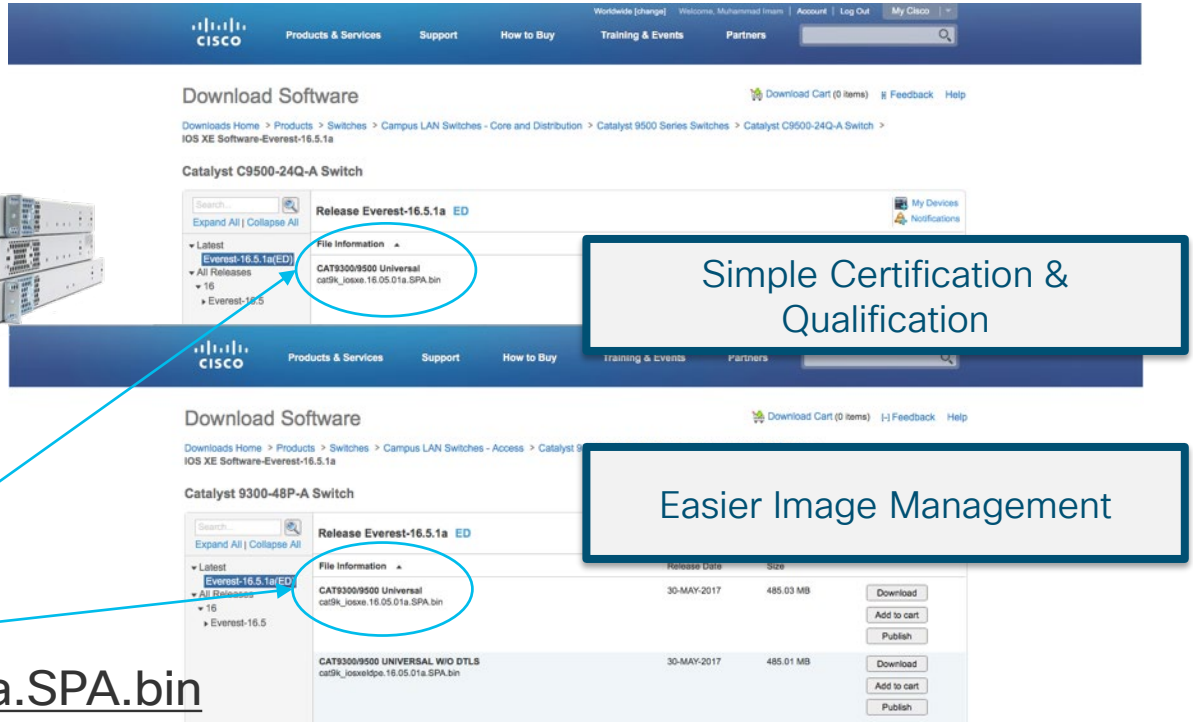
IOS XE Database
Programmability & Open Models

Container Support
3rd Party App Hosting

Open, Model Driven & Secure Operating System

IOS XE – Same Software on all 9K Platforms





Simple Certification & Qualification

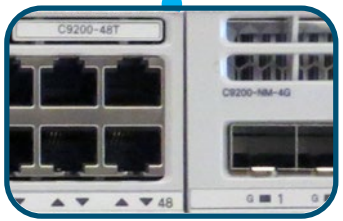
Easier Image Management

Same Binary Image
On all C9K

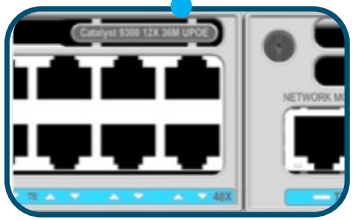
cat9k_iosxe.16.05.01a.SPA.bin

Single Binary for the entire Catalyst 9K Family

IOS XE
16.x



Catalyst 9200



Catalyst 9300

Catalyst 9400

Catalyst 9500

Catalyst 9600

IOS XE Lite
Binary Image

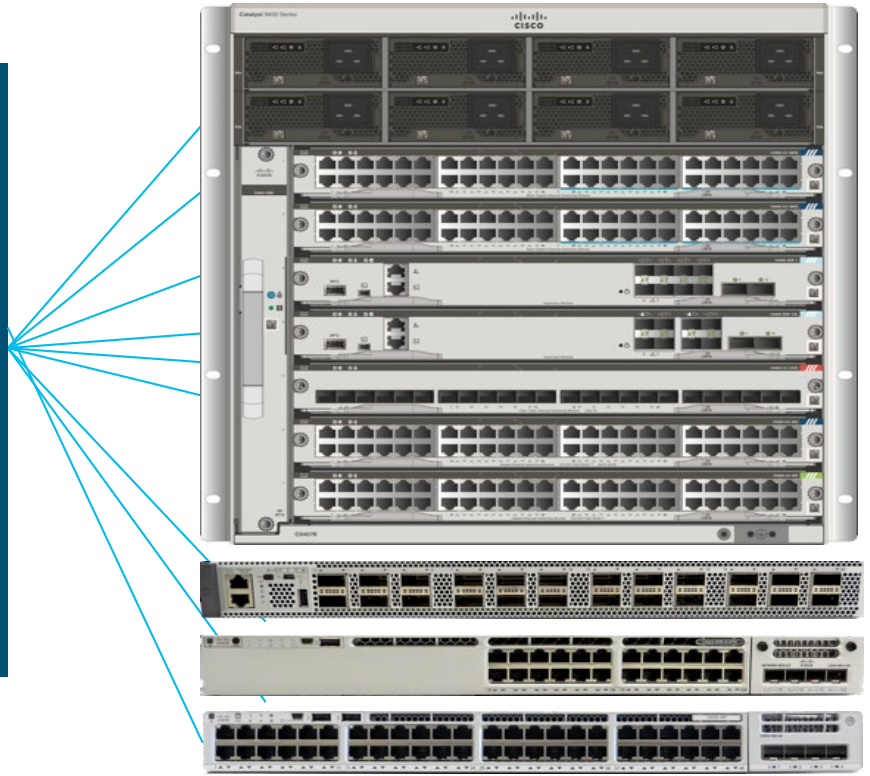
IOS XE
Same Binary Image

Catalyst 9000 runs the same Operating System

User Centric Design of Catalyst 9K

Catalyst 9K Family – Blue Beacon

Blue Beacon
on Every System &
Components



Identification of Devices has never been Easier

Catalyst 9K Family with Built-in RFID

RFID on Every Device and FRUable Components of Catalyst 9400

Inventory Management (Tracking) has never been Easier

Catalyst 9K Family – Optional Bluetooth

File Transfer

Device Management

cat9k (config)# interface bt0

Accessing the Device has never been Easier

Catalyst 9400/9600 – Cool Fan Trays

Fan Trays Serviceable from Front and Back

Barometer

Temprature Sensors

Variable Speed Fans

Flexibility in Cabling & Maintenance

Catalyst 9K Family – Industrial Design & Ergonomics

Circle Pattern
Hex Packing

Silver/Nickel Based.
Smooth finish

Cisco Medium Gray
Smooth finish

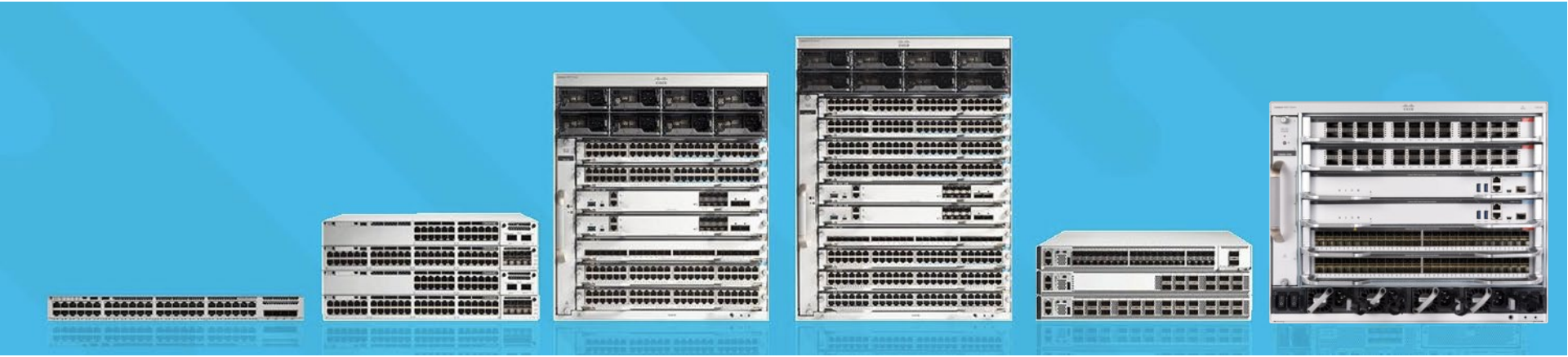
Grab area in
molded plastic

Rounded Frame

2.5 mm.

Best Safety Certifications

The Catalyst 9K Family

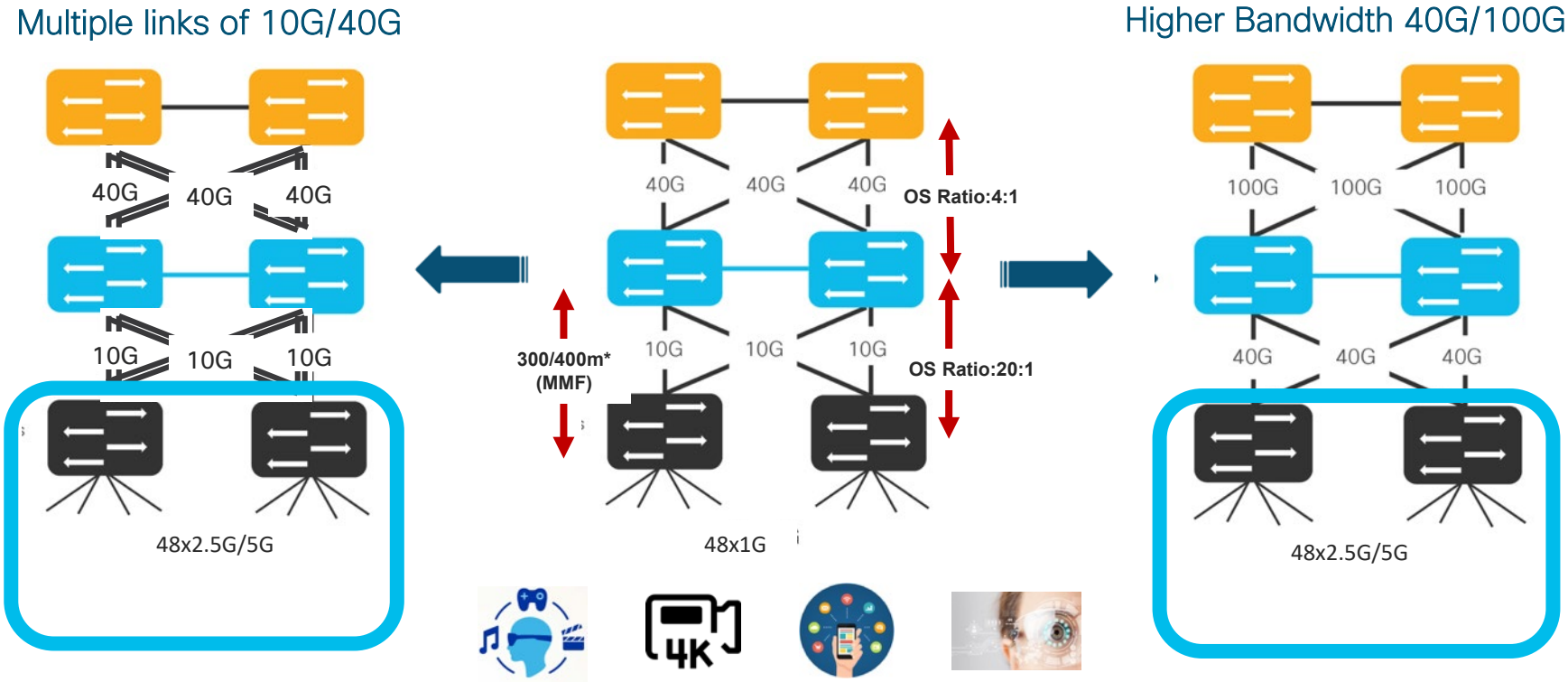


Catalyst 9200	Catalyst 9300	Catalyst 9400	Catalyst 9500	Catalyst 9600
Fixed Access Switches		Modular Access & Distribution Switches	Fixed Core & Distribution Switches	Modular Core & Distribution

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

Connectivity & Speed

New Technologies Push for New Speeds



MultiGigabit Portfolio across the Catalyst 9000

C9300 Module: 4-port Full Multigigabit Ethernet

C9300-24UX: 24-port Full Multigigabit Ethernet

C9300-48UN: 48-port 5 Gigabit Ethernet

C9300-48UXM: 48-port 2.5 Gigabit Ethernet (12 full mGig)

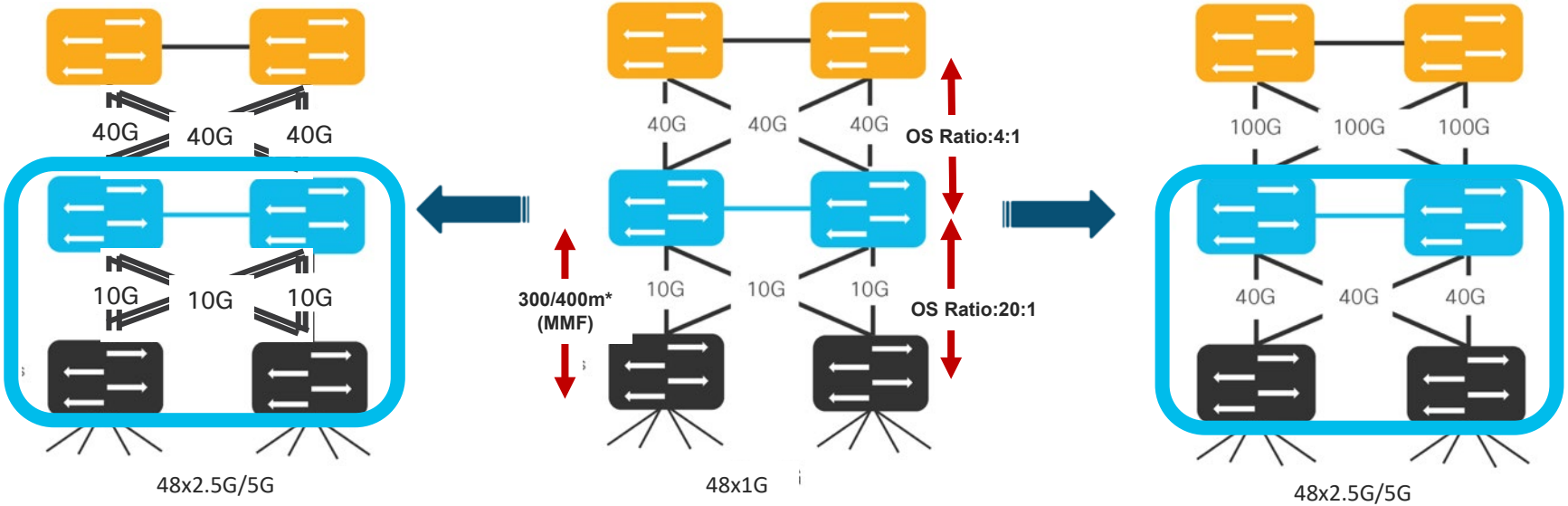
C9400-LC-48UX: 24-port Full Multigigabit Ethernet

Get ready for 11ax and beyond

New Technologies Push for New Speeds

Multiple links of 10G/40G

Higher Bandwidth 40G/100G

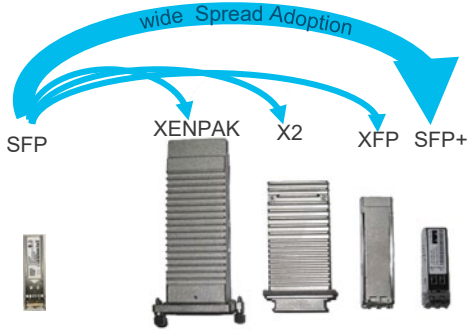


Challenges with 10G to 40G Migration

MPO Assemblies for Short Reach 40G

- Significant costs (transceivers and cables)

10G Backward Compability with 1G



- 10G X2/XFP presented a form factor conundrum
- SFP+ backward compatibility with 1G SFP and 100-Mbps SFP has enabled that speed transition

Lower Port Densities

QSFP+

(H x W x D) 13.5 x 18.4 x 72.4 mm

SFP+

(H x W x D): 8.5 x 13.4 x 56.5mm

- Single-lane serial optics, providing a port density similar to that of 10G switches

The Challenges Slow down 40G Adoption

25GE – A better alternative

25G derived from 100G

IEEE 25G standards

Provides seamless migration path from 10GE

Project	Interfaces	Description
IEEE P802.3by	25GBASE-CR	Passive copper cables up to 5 m
	25GBASE-SR	Short reach over MMF (OM3/OM4)
IEEE P802.3cc	25GBASE-LR	Long reach 10 km over SMF
	25GBASE-ER	Long reach 40 km over SMF

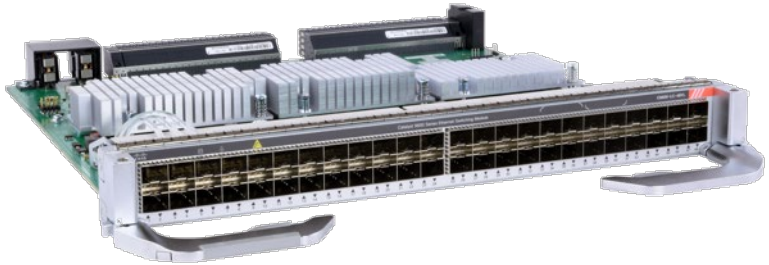
Reduced CAPEX through reuse of existing cabling

Single Lane serial optics providing port densities similar to 10G Switches

Reduced OpEx through savings in power and cooling

Cisco's 25G solution provides Speed w/o Compromise on Distance

25G Portfolio



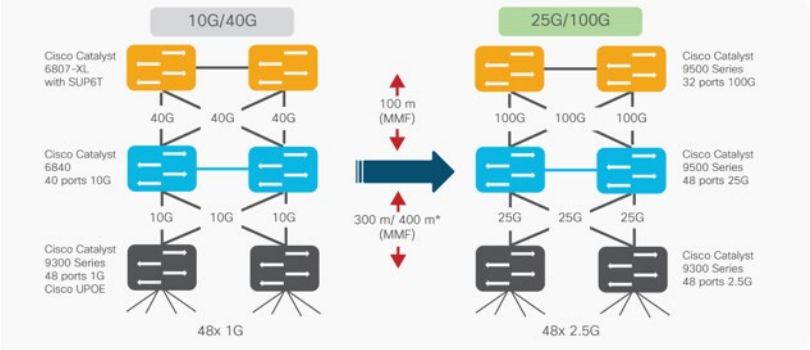
Catalyst 9600
Line Card
48x25G

Catalyst 9400
Supervisor Module
2x25G

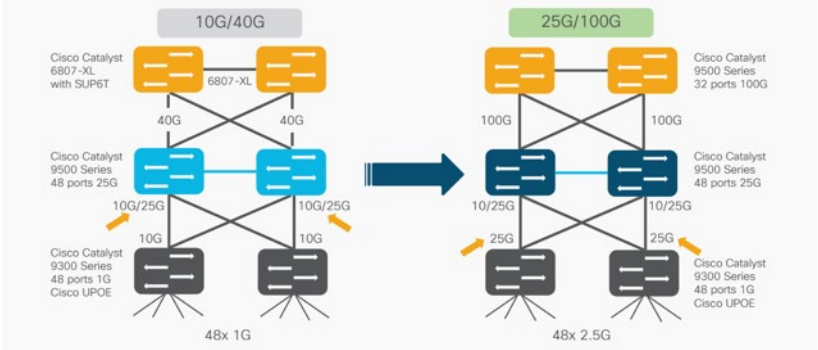
Catalyst 9500
48x25G or 24x25G

Catalyst 9300
Uplink Module
2x25G

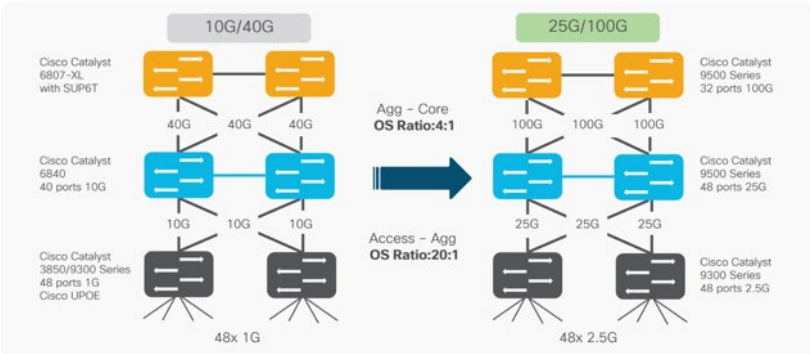
Enabling Architectural Transformation



Campus-optimized distance with Speed transition



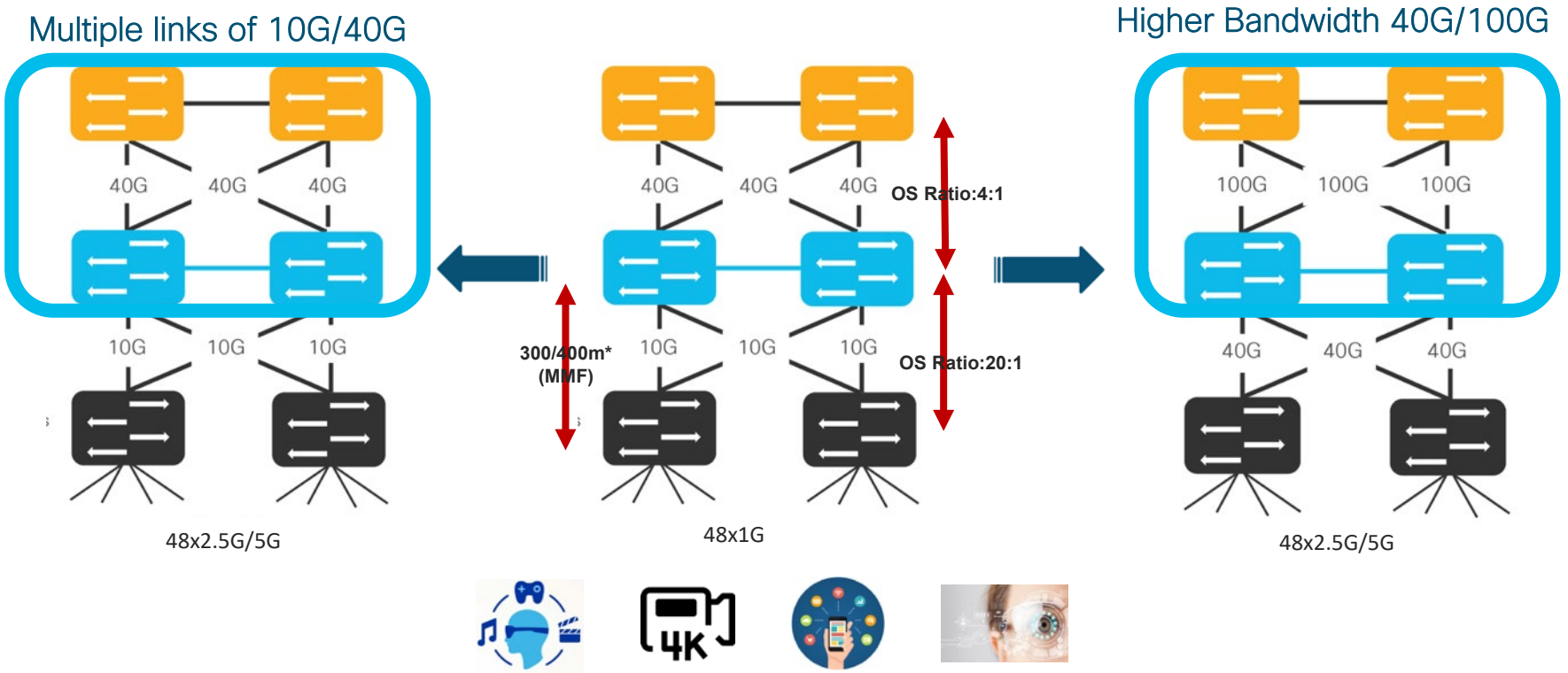
Speed migration with dual-rate optics



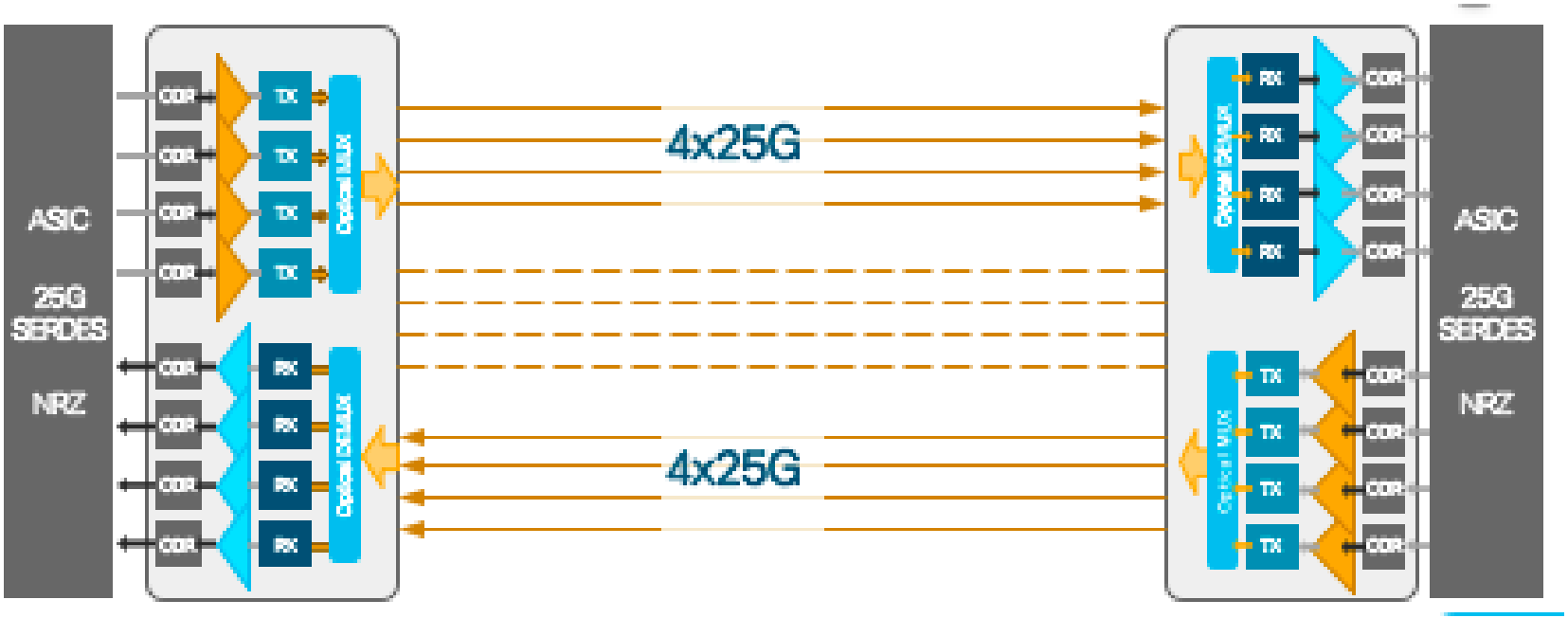
Speed transition with similar oversubscription ratio

And more...

New Technologies Push for New Speeds in Core

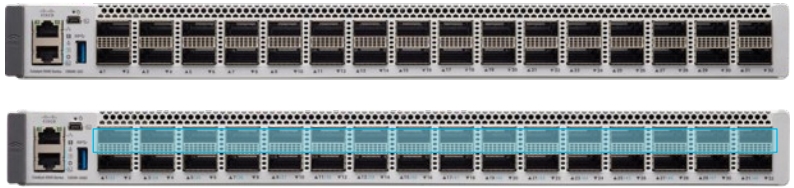


100GE – 100G supports multiple speeds



100G Portfolio

Catalyst 9600
48x100G

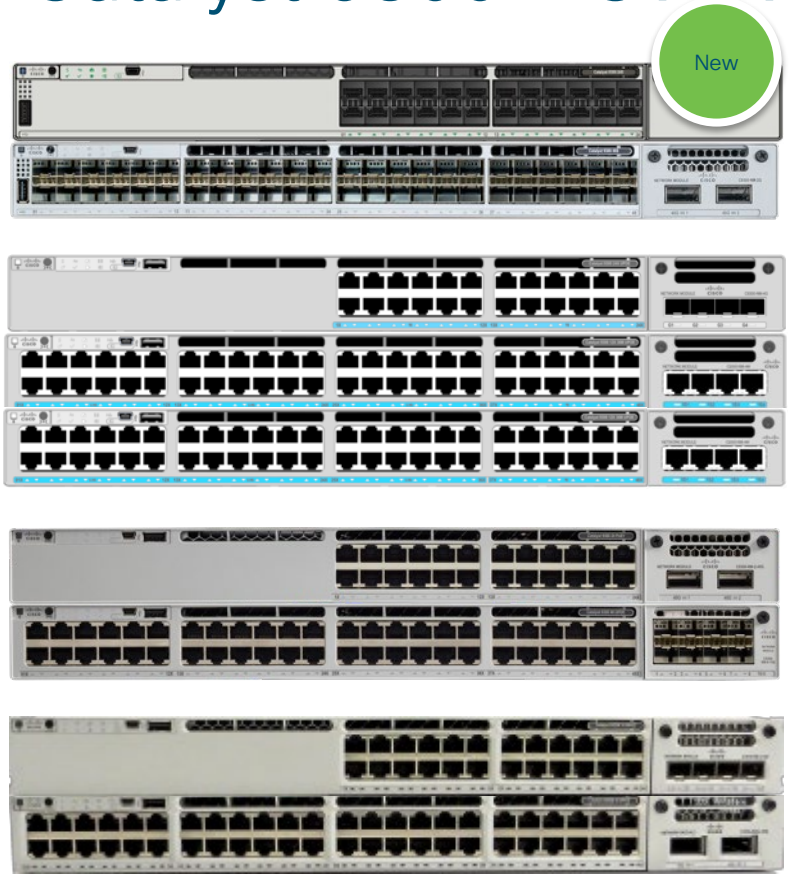


Catalyst 9500
32x100G, 16x100G

Catalyst 9K Family Members

Stackable Access

Catalyst 9300 – Overview



Fiber

4 x Multigigabit

2 x 25G

Multigigabit

4 x 1G

8 x 10G

2 x 40G

PoE+/UPoE

Data

Stackwise-480
480Gbps

Stackpower
Zero Footprint
Power Red.

Larger Buffers
& Scale

Catalyst 9300L

New Shipping

- Stackwise-320
  320 Gbps
- Fixed Uplinks
  4x1G, 4x10G
- VRFs
- Dual PS
  No Stackpower
- PoE+
  Up to 30W

Catalyst 9300-B Increased Scale Platform
C9300B Models

New Shipping

C9300-48UB

C9300-24UB

CERTIFIED
Architecturally Capable

Higher Scale

Deeper Buffer

Powered by UADP 2.0 XL

Stackable Access Optimized for Media Distribution & IP Storage

Catalyst 9300-B Lookup Tables

Forwarding resources

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

Feature resources

	Cisco® Catalyst® 9300-B Series Advantage	Cisco® Catalyst® 9300-B Series Essentials
Security ACL entries • PACL • VACL • RACL	18,000	5000
QoS ACL entries	18,000	5000

NetFlow

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

Higher Scale with Advantage License

Cisco Catalyst 9300 – IEEE 802.3bt Compliance

Introducing 90W UPOE+ Models to power latest intelligent devices

Feb `20

~ 21 Ports of 90W in Standalone Mode

C9300-48H

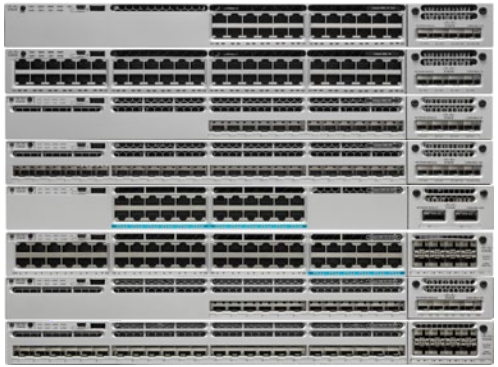
168 Ports of 90W in StackWise-480

C9300-24H

Highest 90W Port Density in the industry

Catalyst 9300 Stacking Support

Modular Uplink
C9300 (non -B) SKUs

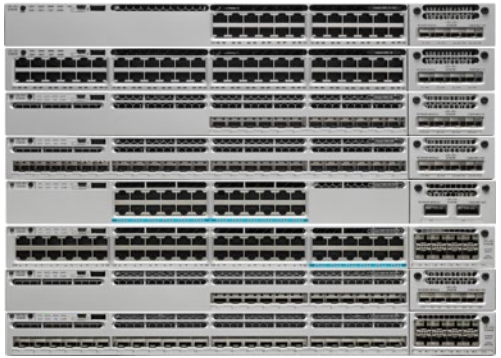


8 switches

Stacking supported among C9300 SKUs

Combination Support on Roadmap

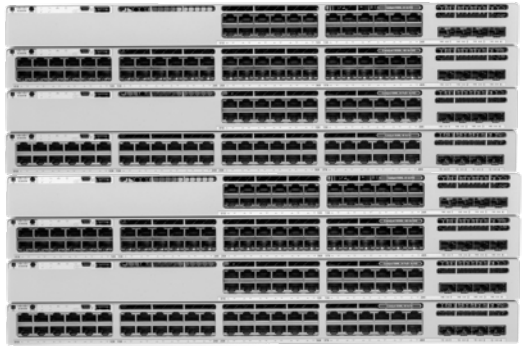
Increased Scale
C9300-B SKUs
(today)



8 switches

Stacking supported among C9300-B SKUs

Fixed Uplink
C9300L SKUs



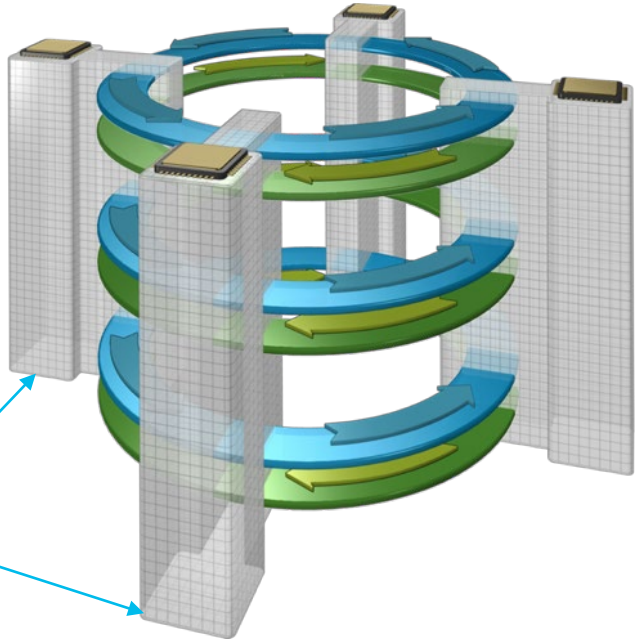
8 switches

Stacking supported among C9300L SKUs only

Mixed stacking is not supported between C9300 and C9300L SKUs

Cisco Catalyst 9300 Series Switches

The stack ring – StackWise-480 on C9300 SKUs



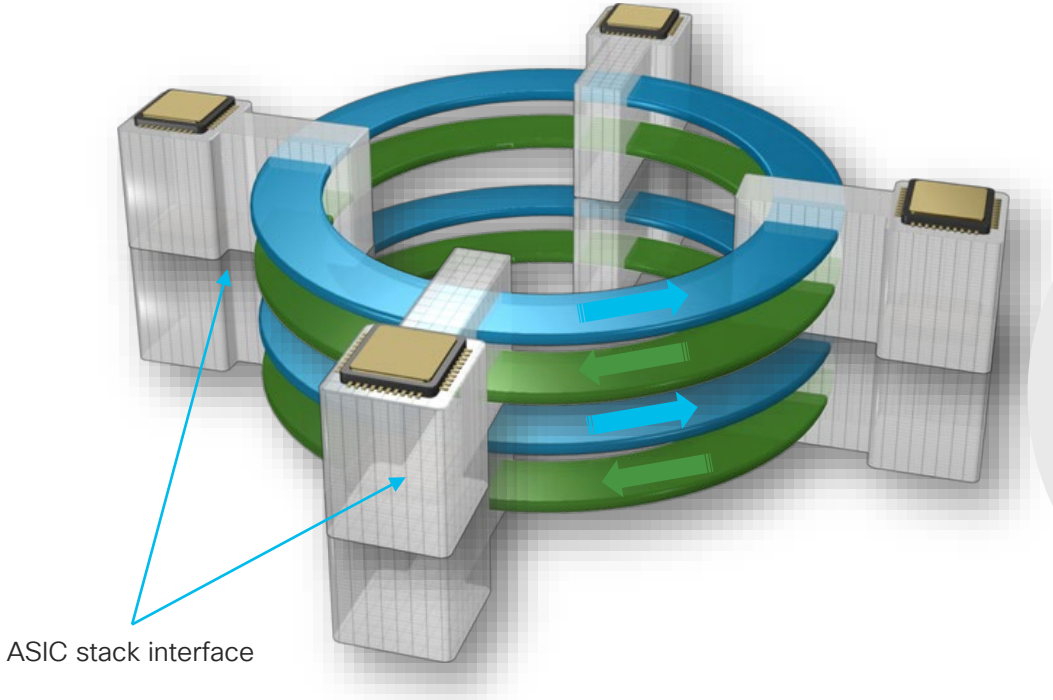
Stack interface of doppler

- 6 rings in total
- 3 rings go east
- 3 rings go west
- Each ring is 40 Gbps
- 240 Gbps unidirectional
- Spatial reuse = 480 Gbps

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

Cisco Catalyst 9300 Series Switches

The stack ring – StackWise-320 on C9300L SKUs

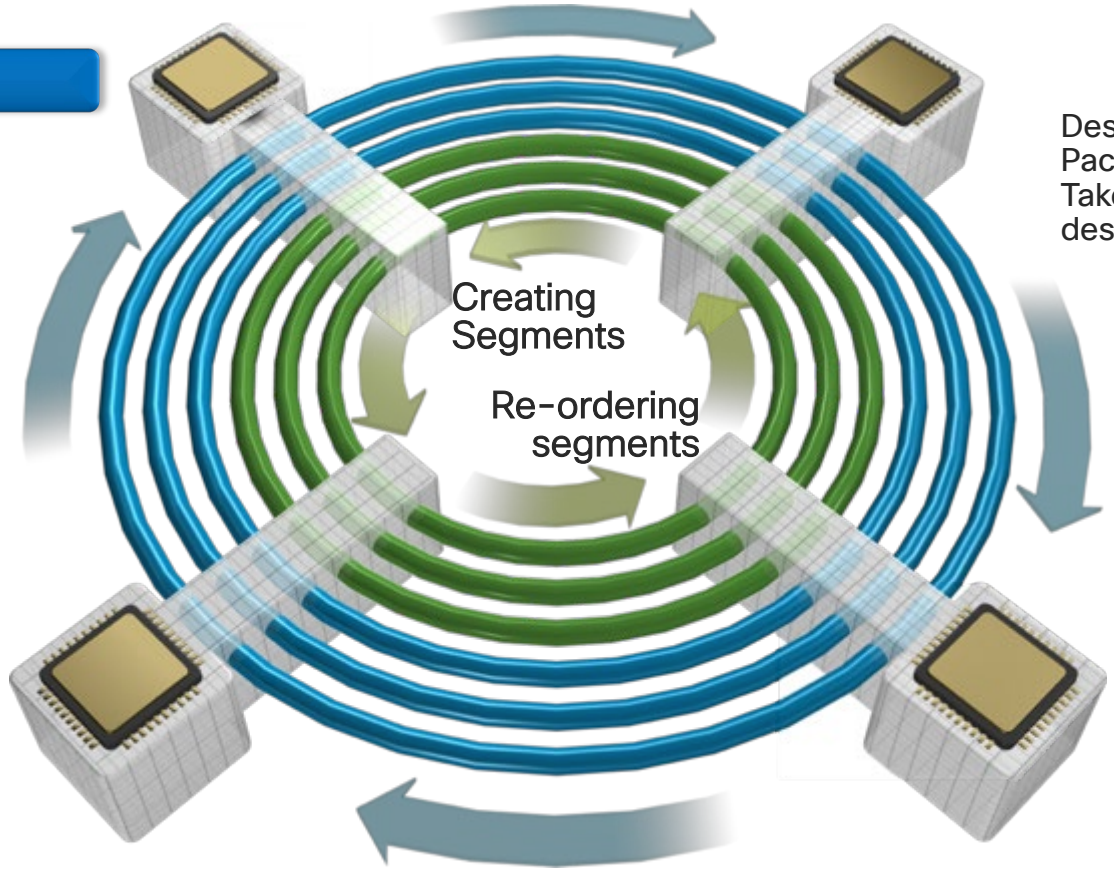


- 4 rings in total
- 2 rings go east
- 2 rings go west
- Each ring is 40 Gbps
- 160 Gbps bidirectional
- Spatial reuse = 320 Gbps

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

Unicast Packet Path

Assuming
4 x 24-port
9300 Switches



Destination Stripping
Packet travels ½ the rings
Taken out of stack by
destination

StackPower – overview

"Zero-footprint" redundant power system (RPS) deployment

- Provides RPS functionality with zero RPS footprint
- Pay-as-you-grow architecture – similar to the data stack
- 1+N redundancy with inline power
- Up to 4 switches in a StackPower ring
- Multiple StackPower possible within one data stack
- Up to 8 switches in a star topology with an expandable power system (XPS)

StackPower is not supported on C9300L SKUs

Catalyst 9200 – Fixed and Modular

Catalyst 9200 Series

9200
Modular Uplinks & Fans

9200L
Fixed Uplinks & Fans

Better Scale &
Performance

Catalyst 9200 – SKUs Summary

Catalyst 9200

48 ports Full POE+ SKUs & Data SKUs
Modular Uplinks

24 ports Full POE+ SKUs & Data SKUs
Modular Uplinks

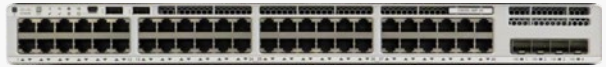
4x1G

4x10G

Catalyst 9200L

48 ports + 4x10G Full POE+ SKUs & Data SKUs

24 ports + 4x10G Full POE+ SKUs + & Data SKUs



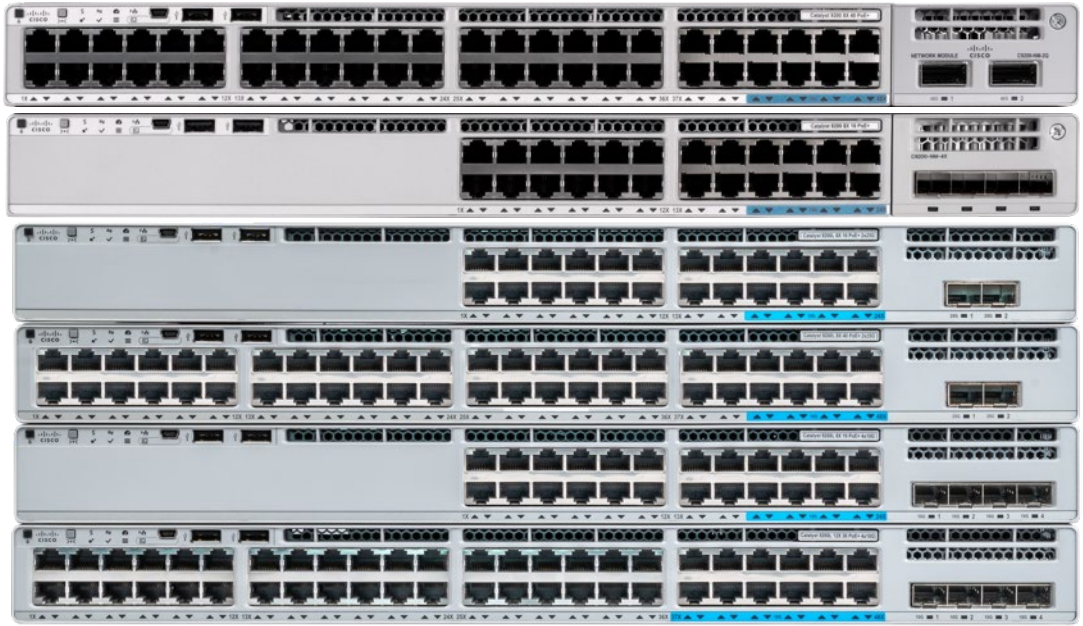
48 ports + 4x1G Full POE+ SKUs & Data SKUs

24 ports + 4x1G Full POE+ SKUs & Data SKUs

Optional Second Power Supply available for All SKUs

The Latest Addition to Catalyst 9200 Family

New



40x1G, 8xmGig, **2x25G OR 2x40G**

16x1G, 8xmGig, **2x25G OR 2x40G**

16x1G, 8xmGig, **2x25G**

40x1G, 8xmGig, **2x25G**

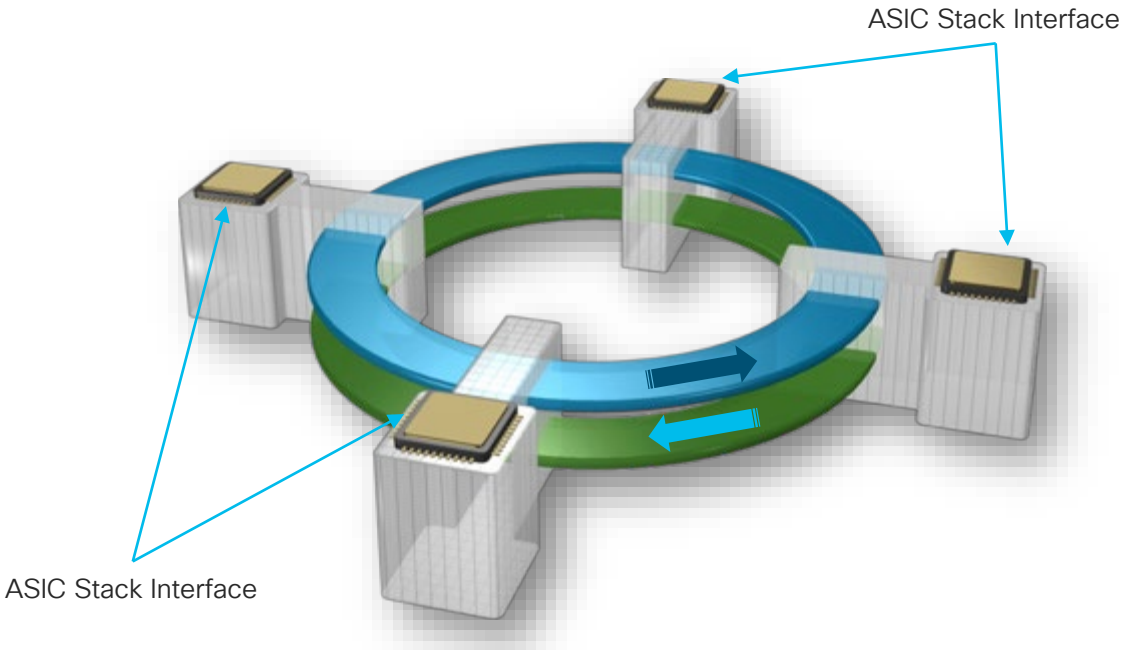
16x1G, 8xmGig, **4x10G**

36x1G, 12xmGig, **4x10G**

Catalyst 9200 MultiGigabit Portfolio

Get ready for 11ax and beyond

The stack ring – StackWise 160/80



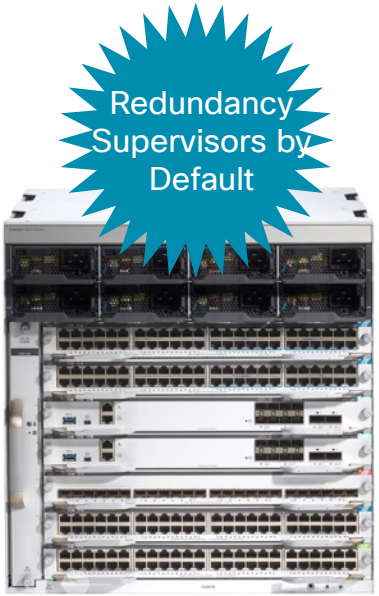
- 2 rings in total
- 1 ring goes East
- 1 ring goes West
- Each ring is 40/20 Gbps
- 80/40 Gbps bi-direction
- Spatial Reuse= 160/80 Gbps

Assuming 4 x 24-port Catalyst 9200 Series modular switches

Catalyst 9400

Catalyst 9400

4-Slot



7-Slot

10-Slot

Supervisor	Access Linecards	Core Linecards	Power Supply
Sup-1: 80G/Slot Access Optimized	24xmGig + 24xUPOE	24x 10G SFP+	3200W AC
Sup-1XL: 120G/Slot Core Optimized	48xUPoE	48x1G SFP	2100W AC
Sup-1XL-Y: 120G/Slot Core Optimized	48xPoE+	24x1G SFP	3200W DC*
	48xData		

NEW Catalyst 9400 90W UPOE+ Line Card

New

Highest UPOE+ scale in industry to power latest intelligent devices

C9400-LC-48H

Cisco UPOE+©
(low voltage)

Cat5e/6

Cisco and partner cloud services for control

New Devices

30 - 60 Watt devices

90 Watt devices

Wall switch

Network Powered Light arrays

PTZ UHD Cameras

Large Video Displays

HVAC VAV's

Catalyst 9400

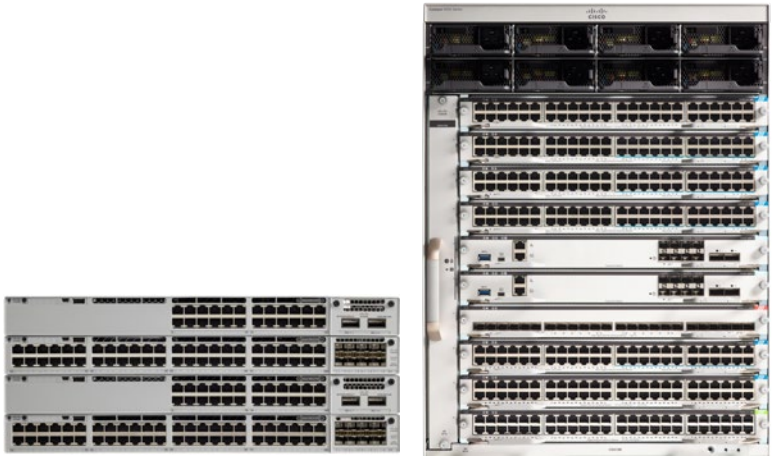
- Up to 260* x 90W concurrent power
- IEEE 802.3bt standards compliant
- 48 x 1G Ports per line card
- Up to 8 x 3200W AC/DC PSU

Investment Protection with 90W UPoE+

*10-slot chassis w/o power redundancy. Subject to available PoE power budget in chassis

Catalyst 9300/9400 vs 9200

Higher Scale & Rich Capabilities



Catalyst 9300/9400

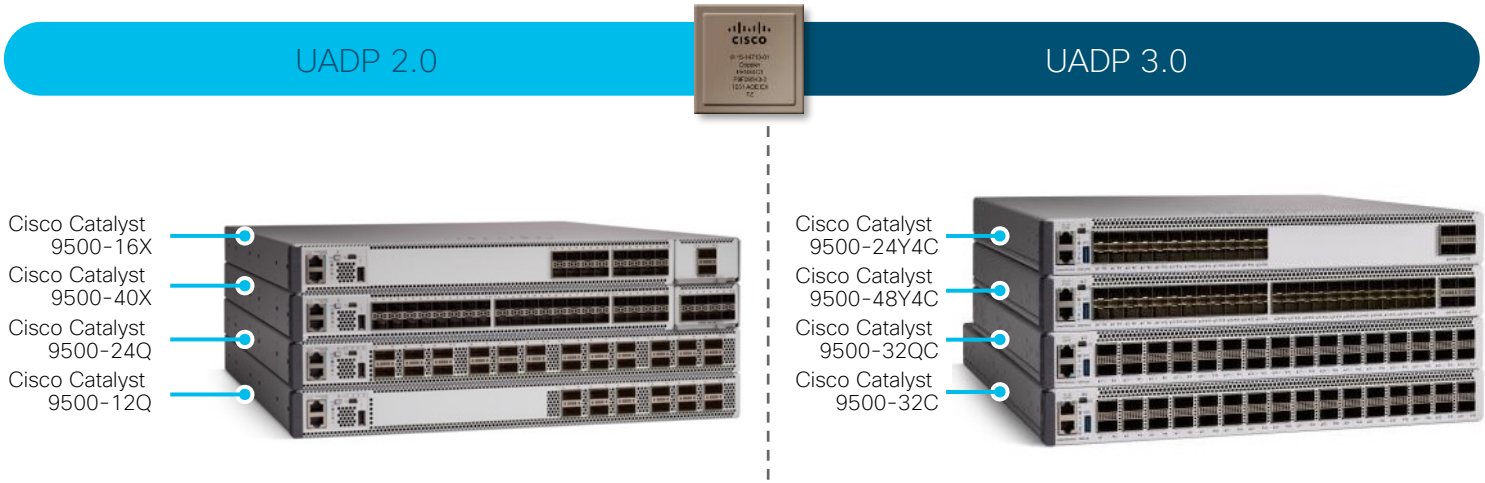
Simplicity without Compromise

Catalyst 9200

Options for Different Deployments and Use Cases

Catalyst 9500

Catalyst 9500 Series



Catalyst 9600

Cisco Catalyst 9600 Series
Chassis

- Dual-serviceable fan tray
- Built-in RFID
- Blue Beacons (system/fan tray, sup, line cards)
- Modular power supplies

- 4 line card slots
- 2 supervisor slots (dedicated)
- 6.4 Tbps per slot from each supervisor slot
- Dimensions (HxWxD inches) 13.95 x 17.4 x 16.1 (8RU)

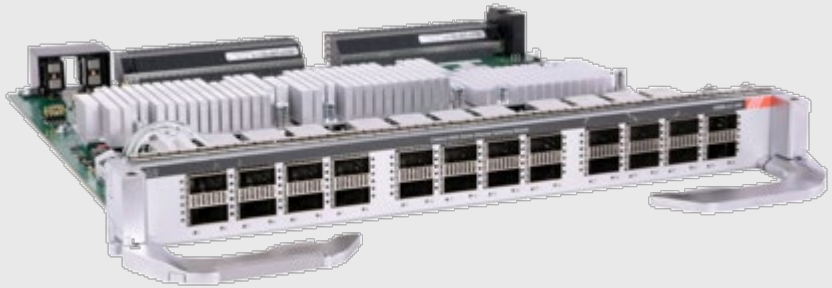
Cisco Catalyst 9600 Series
C9606R chassis port density

Port speed	Density with supervisor 1	Maximum chassis density
100G	48	128
40G	96	128
25G	192	192
10G	192	192
1G*	192	192

Line Rate non-blocking

*Roadmap

Cisco Catalyst 9600 Series
Line cards

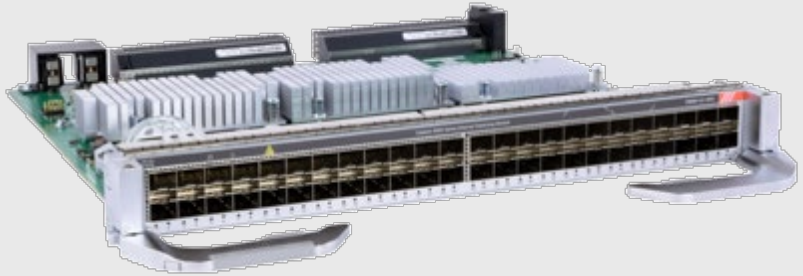


C9600-LC-24C – 100G/40G (fiber)

- 24 ports
- QSFP28/QSFP+
- Supports 100G and 40G

C9600-LC-48YL – 25G/10G/1G* (fiber)

- 48 ports
- SFP28/SFP+/SFP
- Supports 25G, 10G, and 1G



*Roadmap
The Y in the product ID (PID) indicates the hardware capability

Cisco Catalyst 9600 Series
mGig Line Card – C9600-LC-48TX

New

For collapsed core deployment and connectivity to application servers

- All 48 ports can support 10G/5G/2.5G/1G/100M/10M
- Line rate on all ports. Any port, any supported speed.
- No PoE
- Port reference is “Ten<slot#>/0/<port#>” and port speed is auto (default).

Cisco Catalyst 9600 Series
Fan tray

- N+1 (8+1) fan redundancy
- Flexible service - fan tray can be replaced from the portside or the back
- Efficient - variable speed per fan depends on the load, temperature, and altitudes (=>lower noise)
- Airflow – side-to-side airflow

Fan tray hot-swappable needs to be done within 120 seconds

Cisco Catalyst 9600 Series
Power supplies

- Chassis has 4 slots for power supply
- Individual on/off switch for each power supply
- Supports a mix of AC (@220V) and DC power supplies

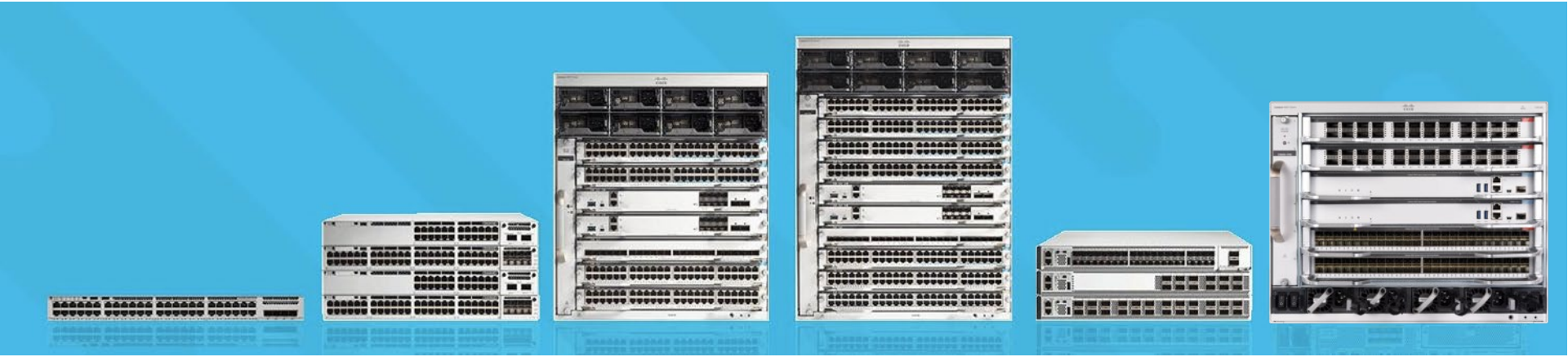
AC

- Supports both 110V and 220V input
- 2 KW output with 220V (1050W with 110V)
- Platinum rate power supply
- Redundant mode: Combined and N+1

DC

- Supports input range of -40V to -72V
- 2 KW output
- Platinum rate power supply
- Redundant mode: Combined and N+1

The Catalyst 9K Family



Catalyst 9200 Catalyst 9300 Catalyst 9400 Catalyst 9500 Catalyst 9600

Fixed Access Switches

Modular Access & Distribution Switches

Fixed Core & Distribution Switches

Modular Core & Distribution

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

An Architectural View

Platform Architecture & Layouts

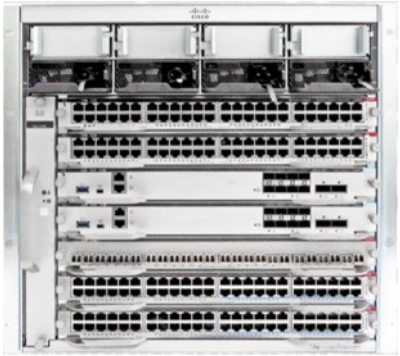
The Catalyst 9K – Fixed & Modular Platforms

Catalyst 9500

Catalyst 9300 & 9200

Fixed

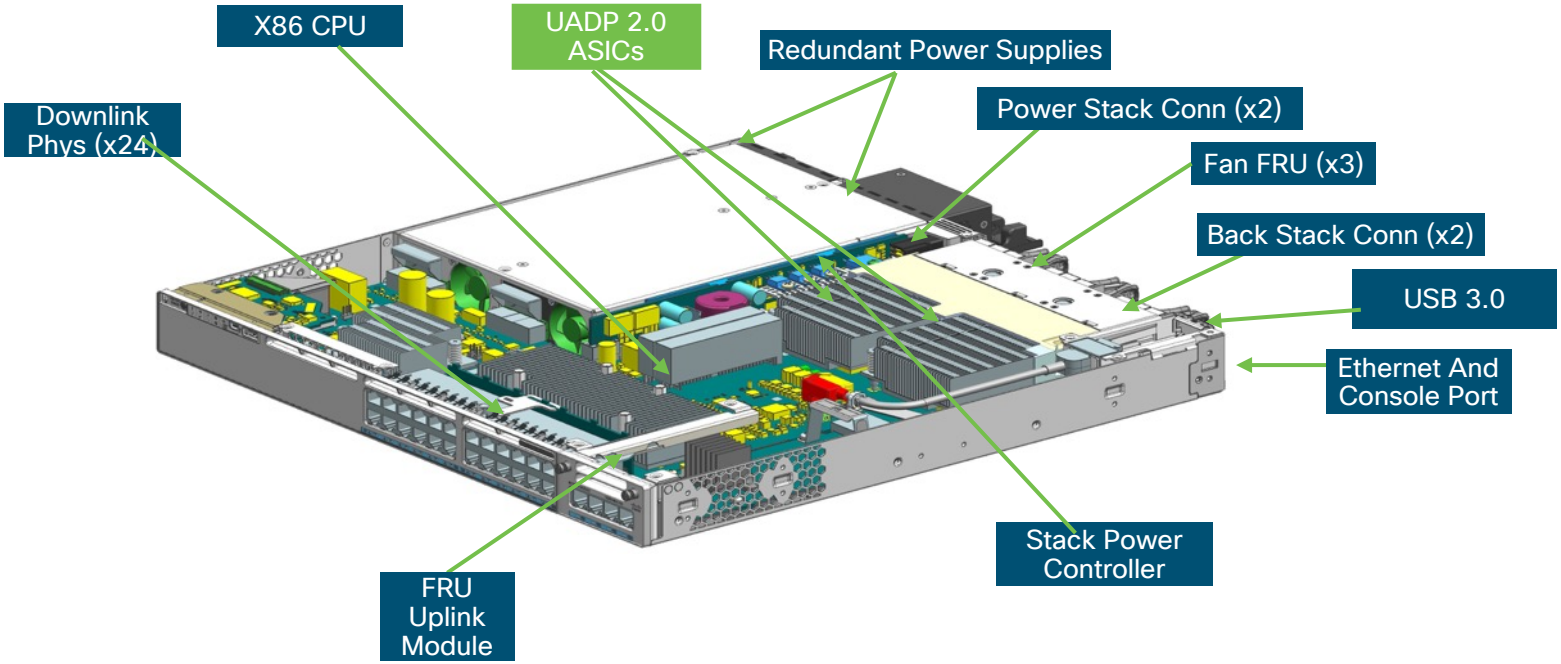
Catalyst 9400



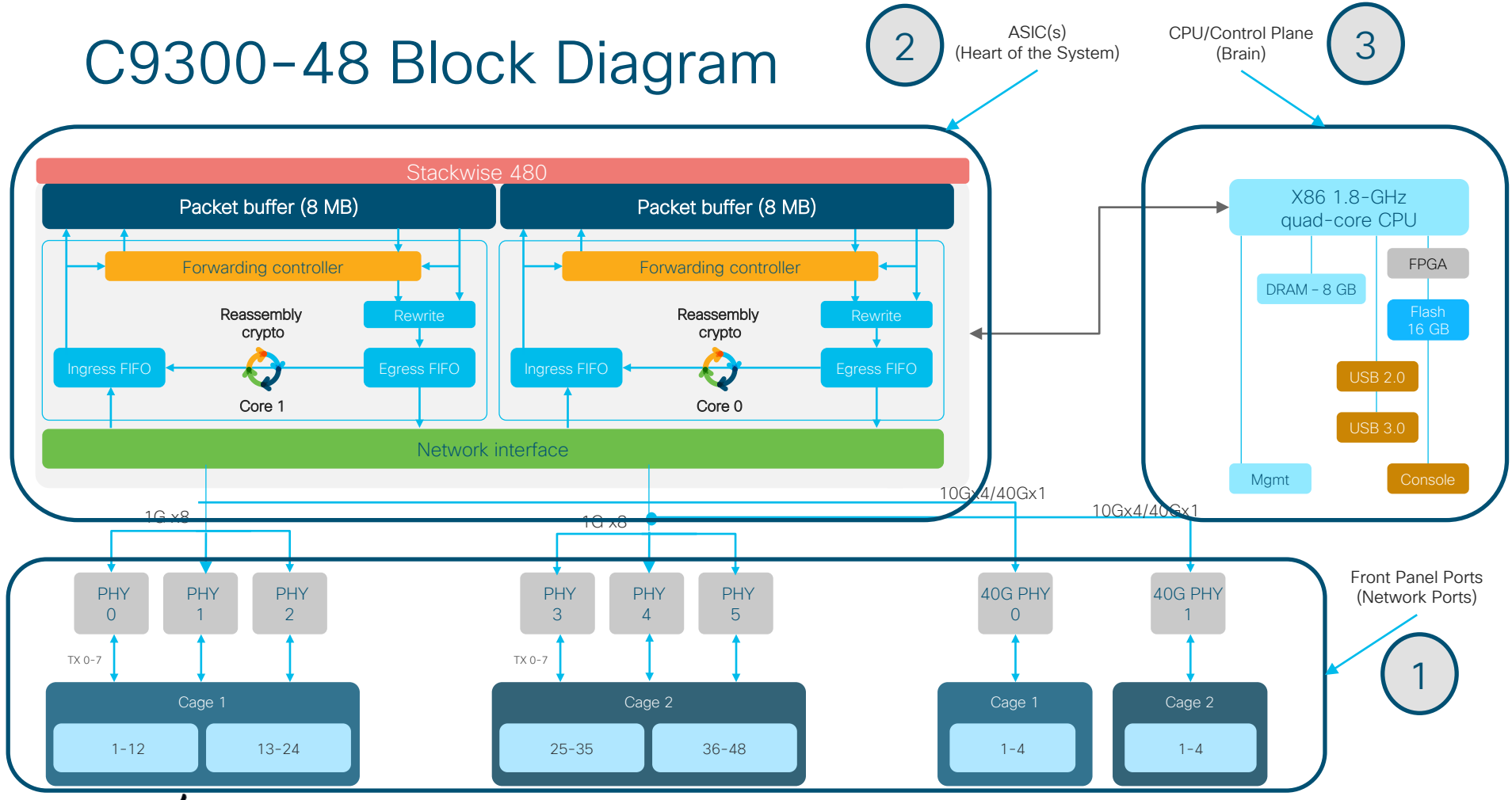
Catalyst 9600

Modular

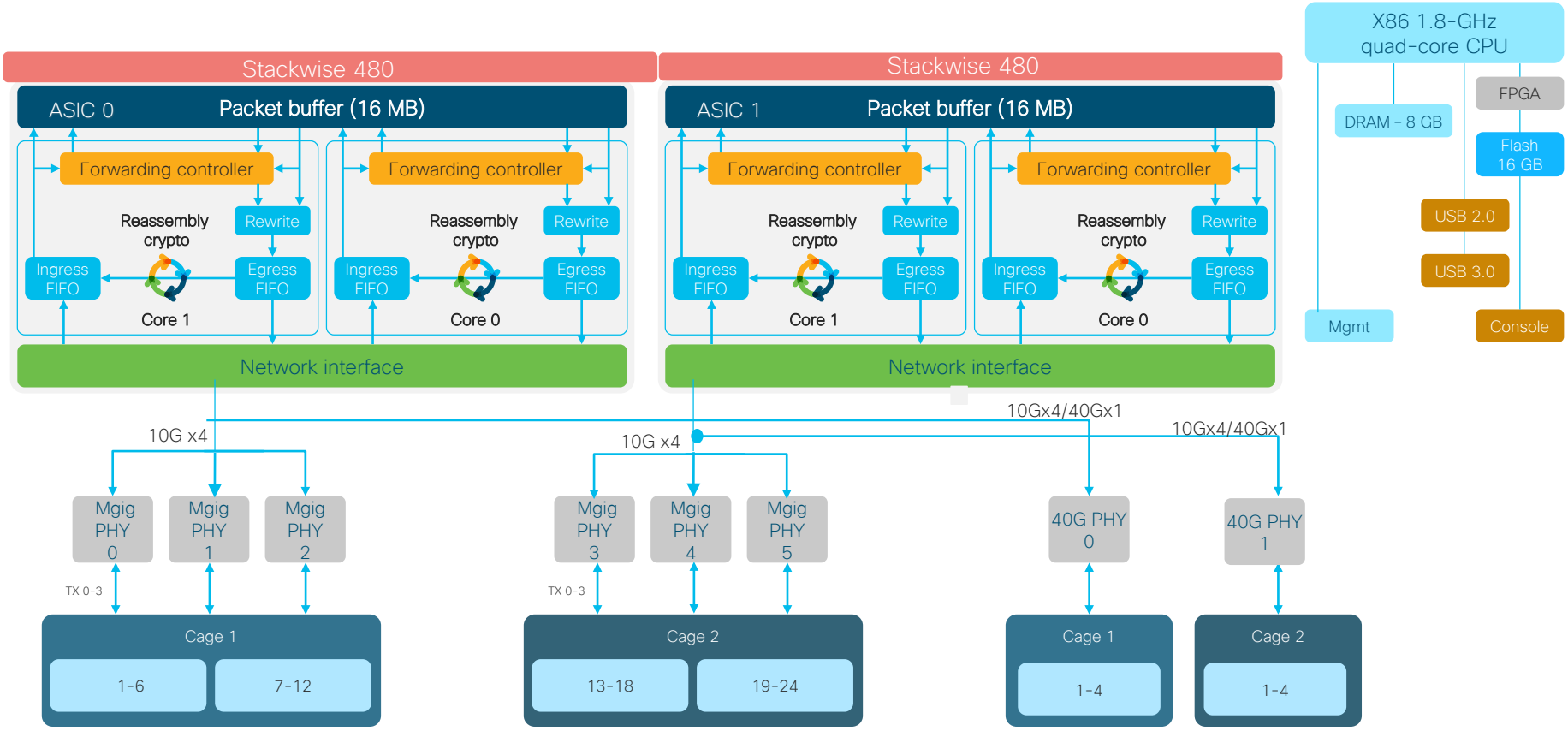
Fixed Architecture



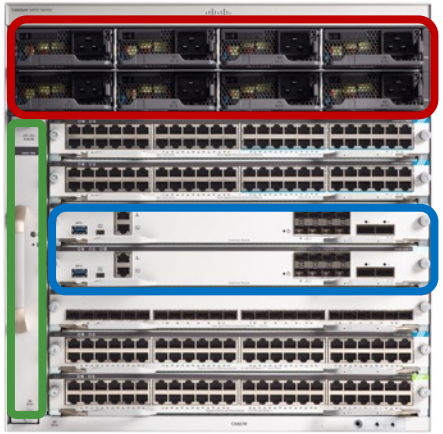
C9300-48 Block Diagram



C9300 Multigigabit-24 Block Diagram



Catalyst 9400 – Modular



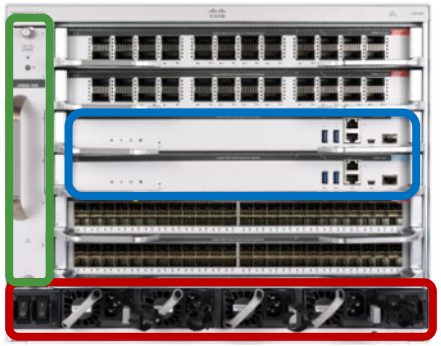
Catalyst 9400

Power Supplies

Fan Tray

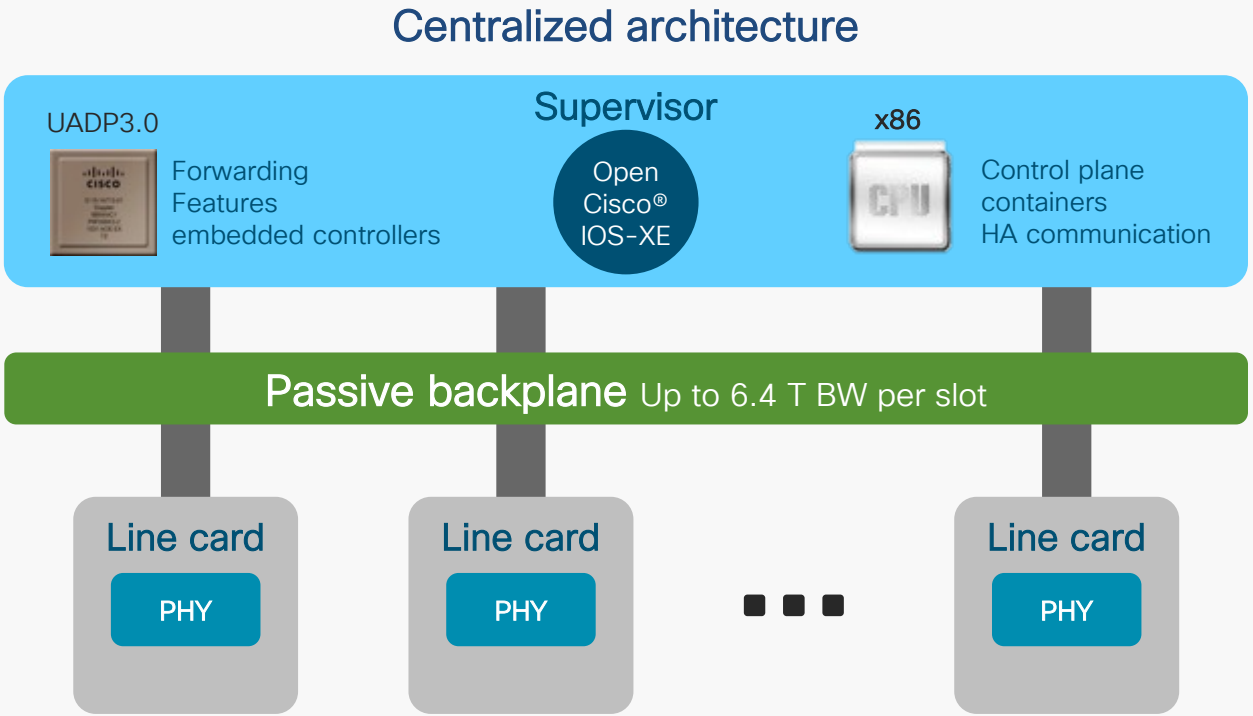
Supervisors

Line cards



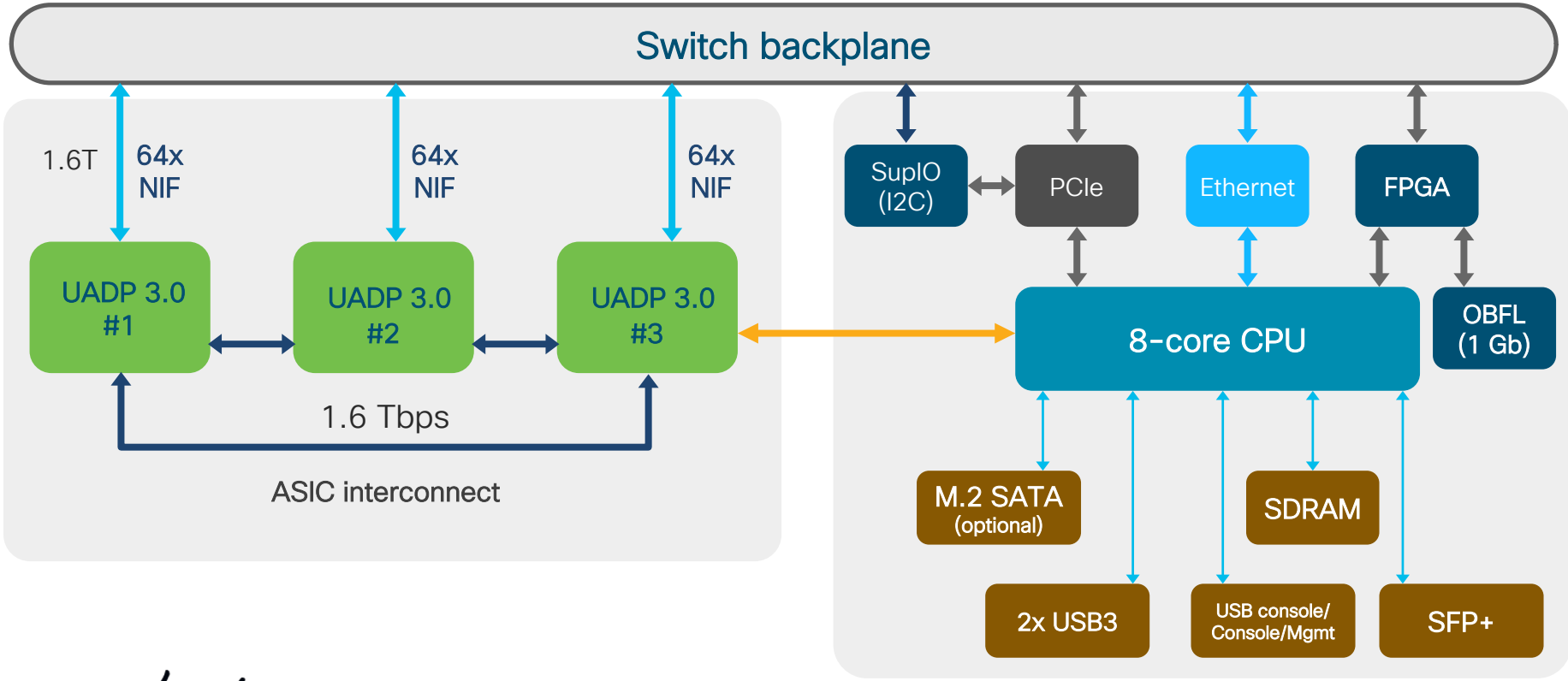
Catalyst 9600

Catalyst 9600 – Centralized Architecture

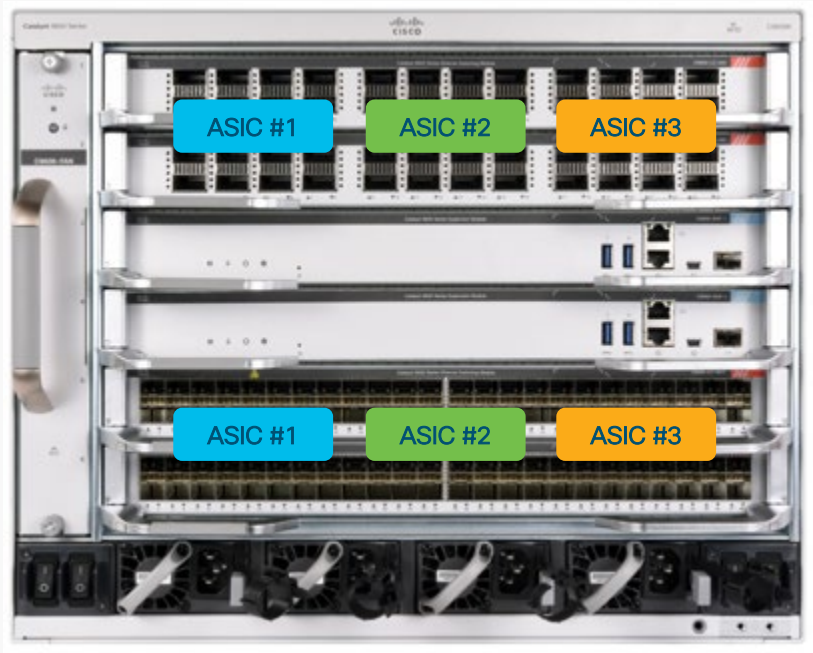


- Centralized architecture => **Uninterrupted supervisor switchover**
- Centralized architecture (Forwarding, queuing, and security are done on the supervisor) => **Unlock new capability** with a supervisor upgrade
- Transparent line cards => **Compatible** with new sup
- Passive backplane => **High MTBF**
- X86 CPU + storage => **App hosting**

Catalyst 9600 – Supervisor 1 – Block diagram

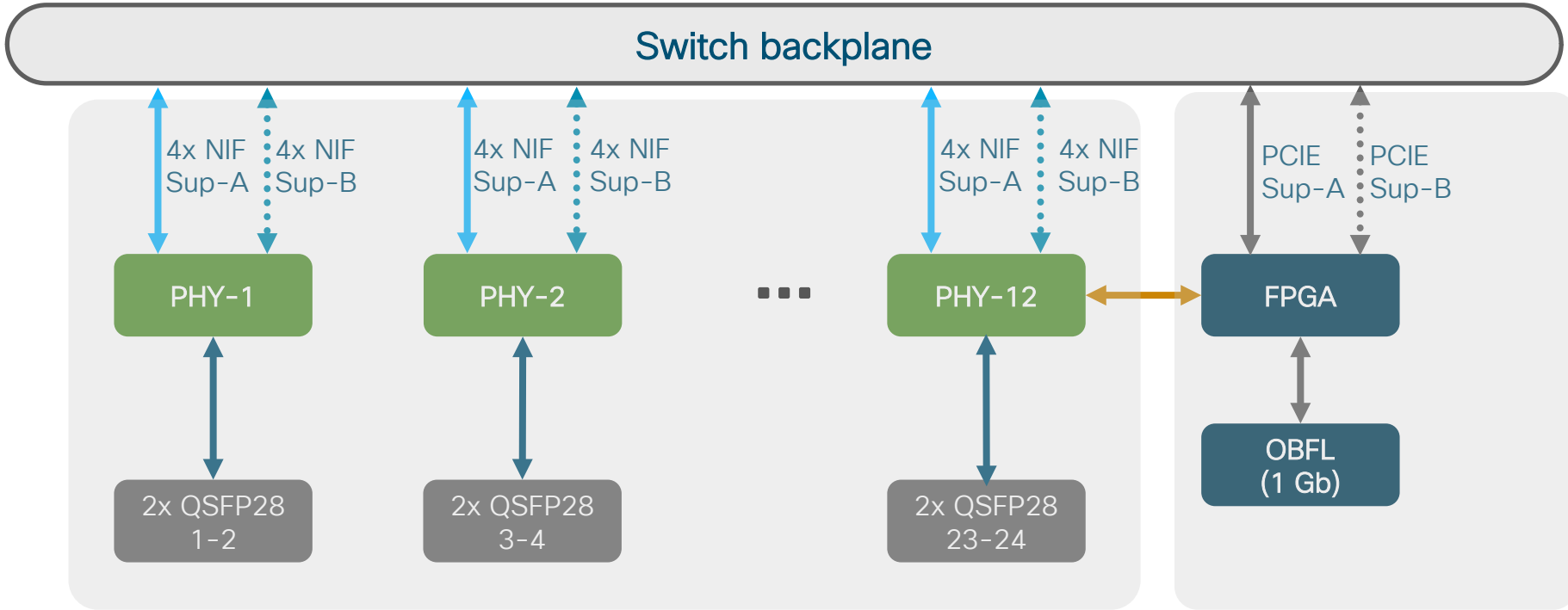


Supervisor engine 1 – ASICs to LC mapping

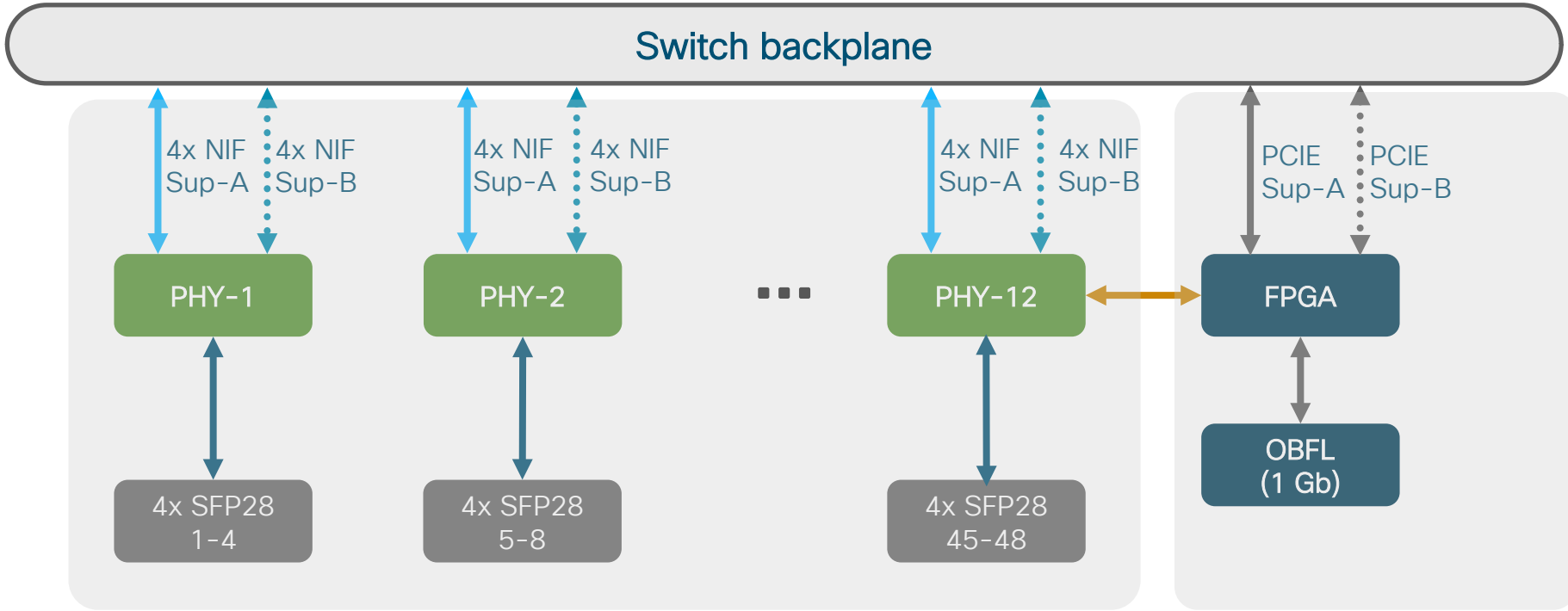


- ASIC #1: First third of the ports
  - 48-port module: 1-16
  - 24-port module: 1-8
- ASIC #2: Middle third of the ports
  - 48-port module: 17-32
  - 24-port module: 9-16
- ASIC #3: Last third of the ports
  - 48-port module: 33-48
  - 24-port module: 17-24

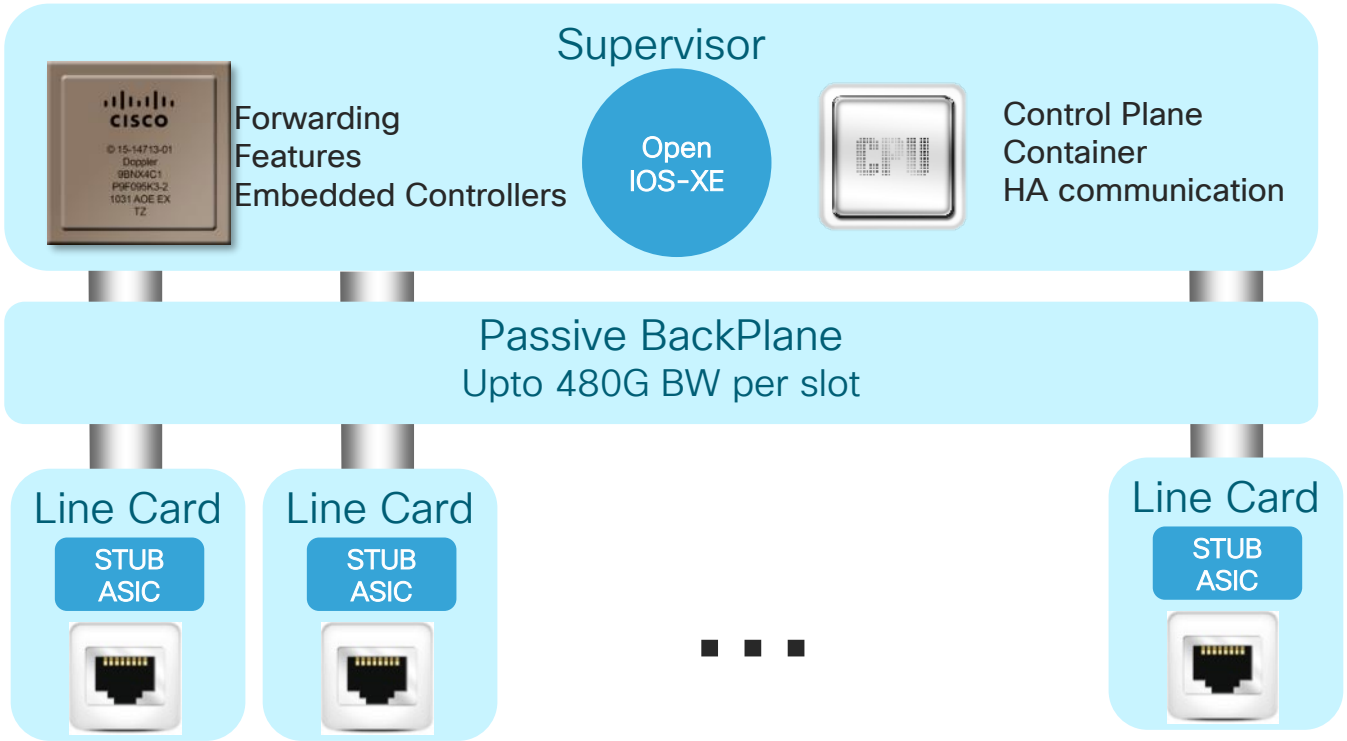
100G/40G line card block diagram



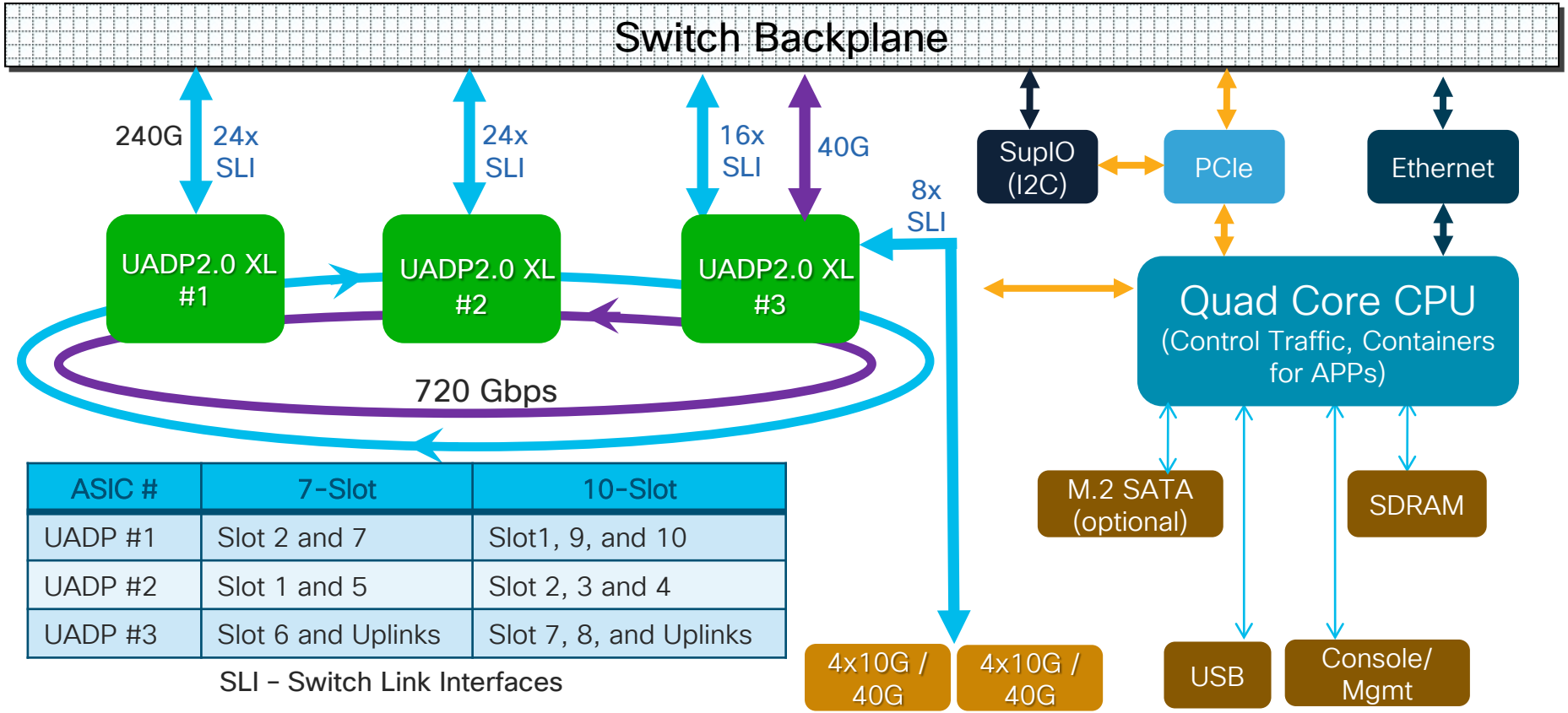
25G/10G/1G line card block diagram



Catalyst 9400 – Centralized Architecture



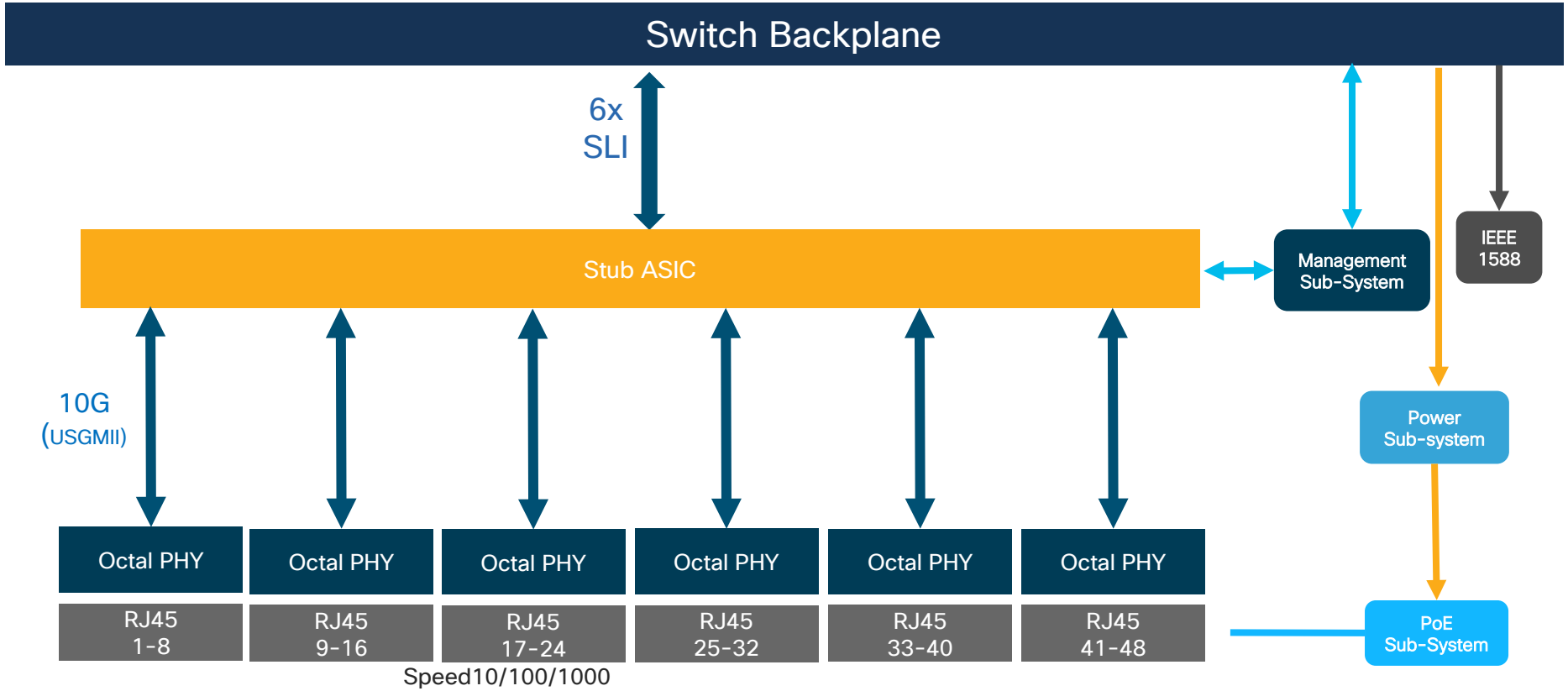
Catalyst 9400 – Sup-1/Sup-1XL Block Diagram



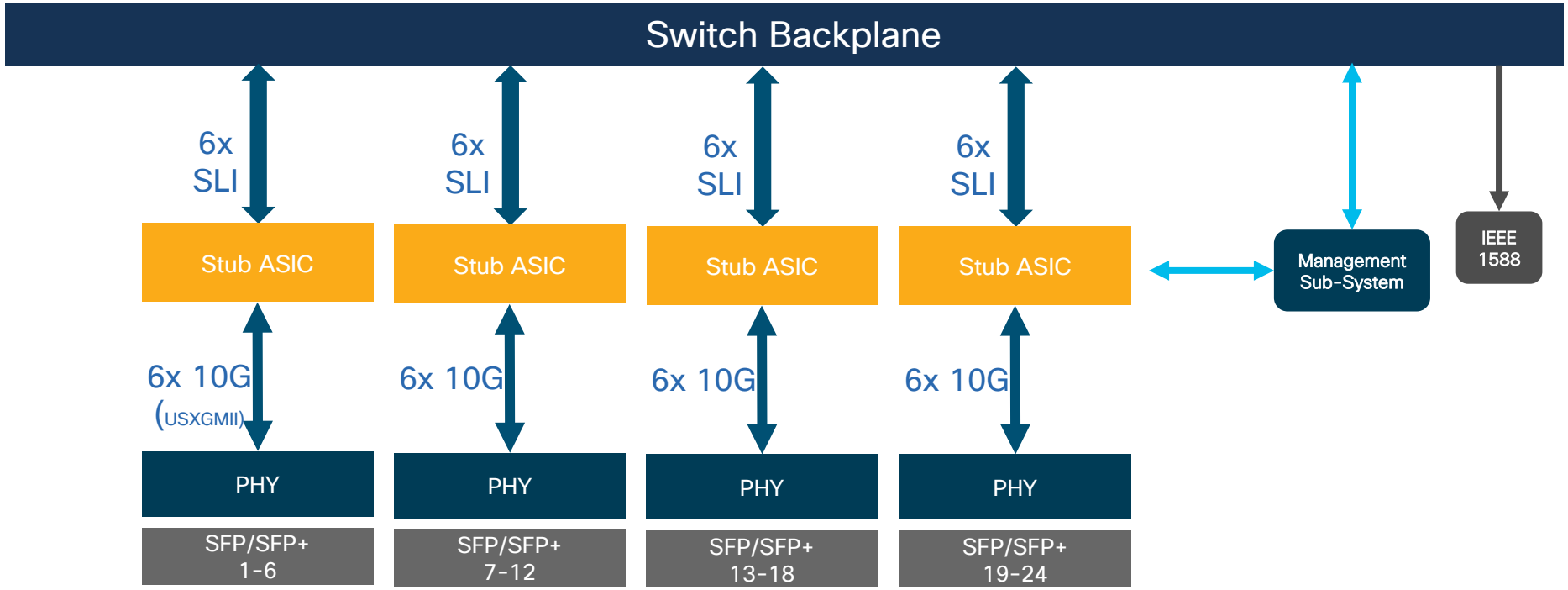
ASIC #	7-Slot	10-Slot
UADP #1	Slot 2 and 7	Slot1, 9, and 10
UADP #2	Slot 1 and 5	Slot 2, 3 and 4
UADP #3	Slot 6 and Uplinks	Slot 7, 8, and Uplinks

SLI – Switch Link Interfaces

Catalyst 9400 – 48x1G RJ45 Line Card (UPoE)

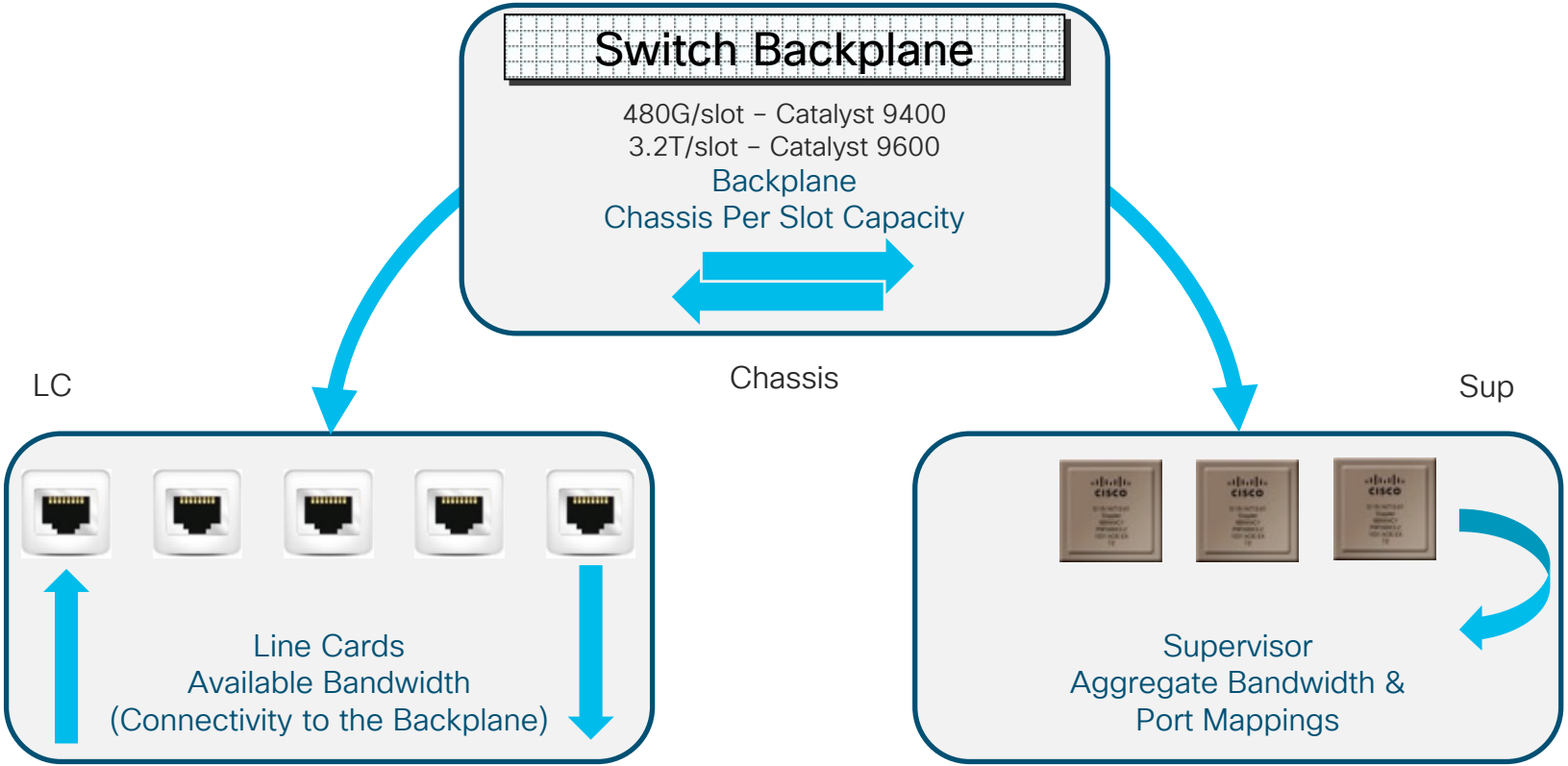


Catalyst 9400 – 24x 1/10G SFP/SFP+ Line Card



Sup-1: 80G with C9410R and C9407R
Sup-1XL: 80G with C9410R; 120G with C9407R

Modular Architecture – Key Components



UADP Family – A Programmable ASIC

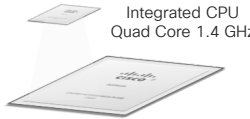
UADP Evolution

UADP 1.0/1.1
1.6/3.2 Billion Transistors
36 nm

UADP 2.0
~7 Billion Transistors
28 nm

UADP 2.0XL
~7 Billion Transistors
28 nm

UADP 3.0XL
~20 Billion Transistors
16 nm



UADP 2.0 Mini
3.2 Billion Transistors

Catalyst 3850/3650

Catalyst 9300

Catalyst 9400 &
Catalyst 9500

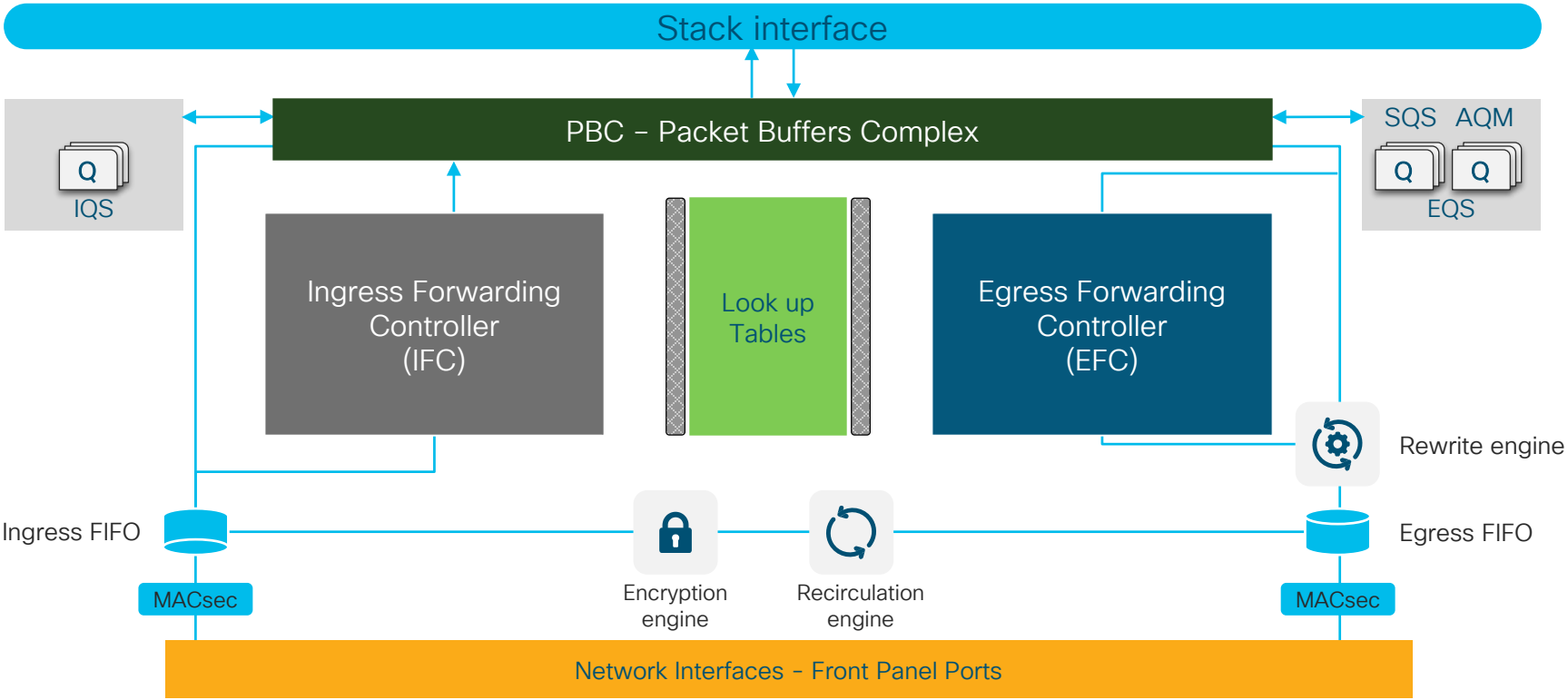
Catalyst 9600
&
Catalyst 9500 High
Performance

Catalyst 9200

UADP Family for Catalyst 9K

	UADP 2.0 mini	UADP 2.0	UADP 2.0 XL	UADP 3.0
Total Bandwidth	100G	160G	240G	1.6T
TCAM Entries	8K	20K	54K	54K
Buffers	6MB	16MB	32 MB	36 MB
Stack Bandwidth	160G	240G	720G	800G/1.6T
Stack Ring	1	1	2	2

UADP Core Architecture



Some of the Key Capabilities of UADP ASIC

Flex Parser & Programmable Pipelines

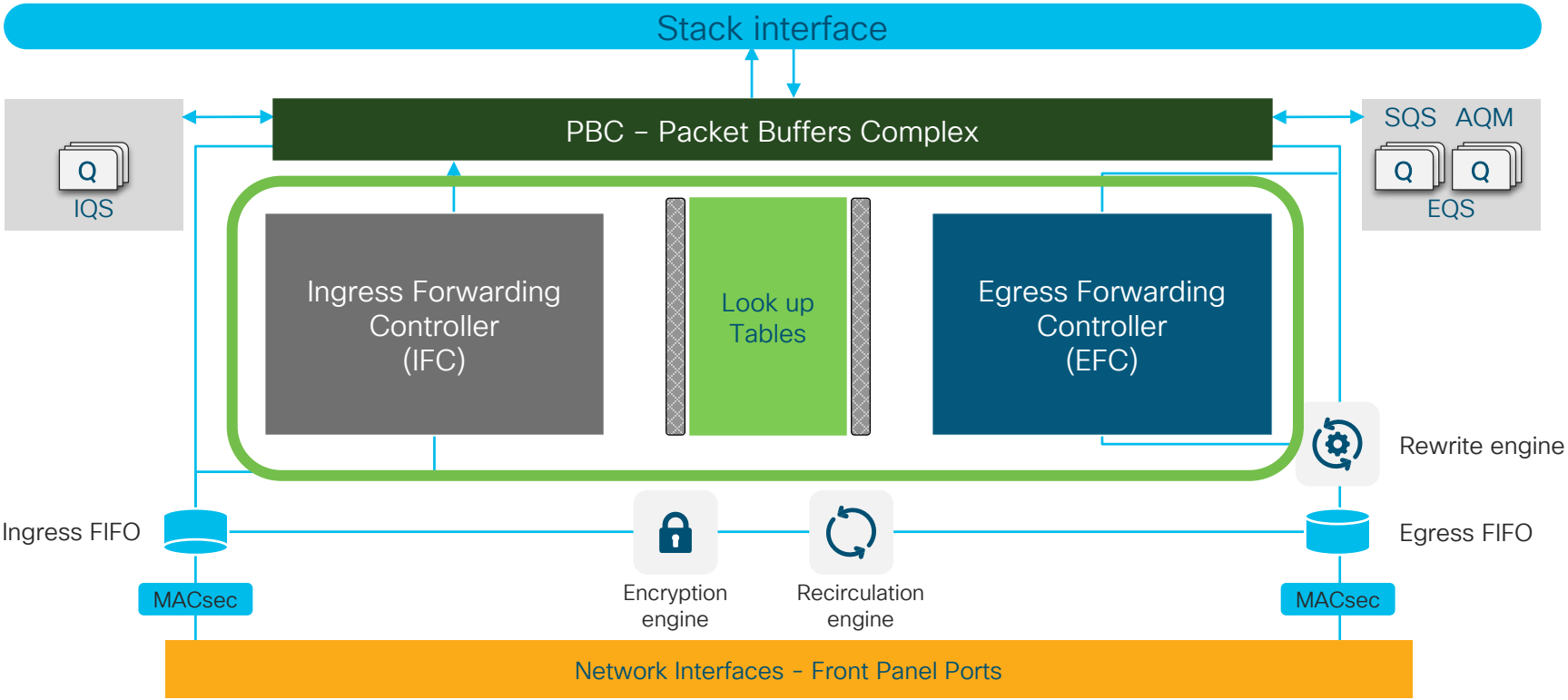
Recirculation Capability

Micro Engines

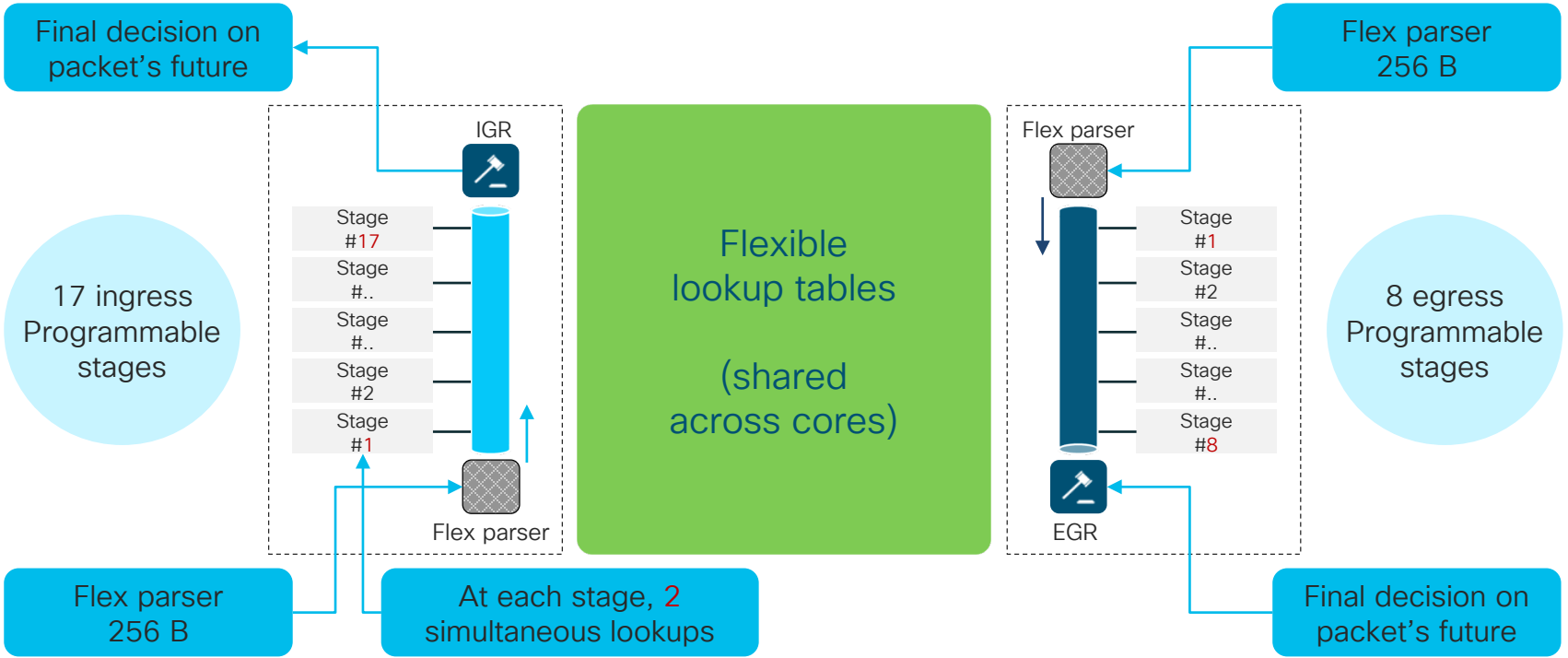
Adaptable Tables

No Compromise on Performance

UADP – Programmable Pipeline



Programmable Pipelines – Closer Look



Some of the Key Capabilities of UADP ASIC

Flex Parser
&
Programmable
Pipelines

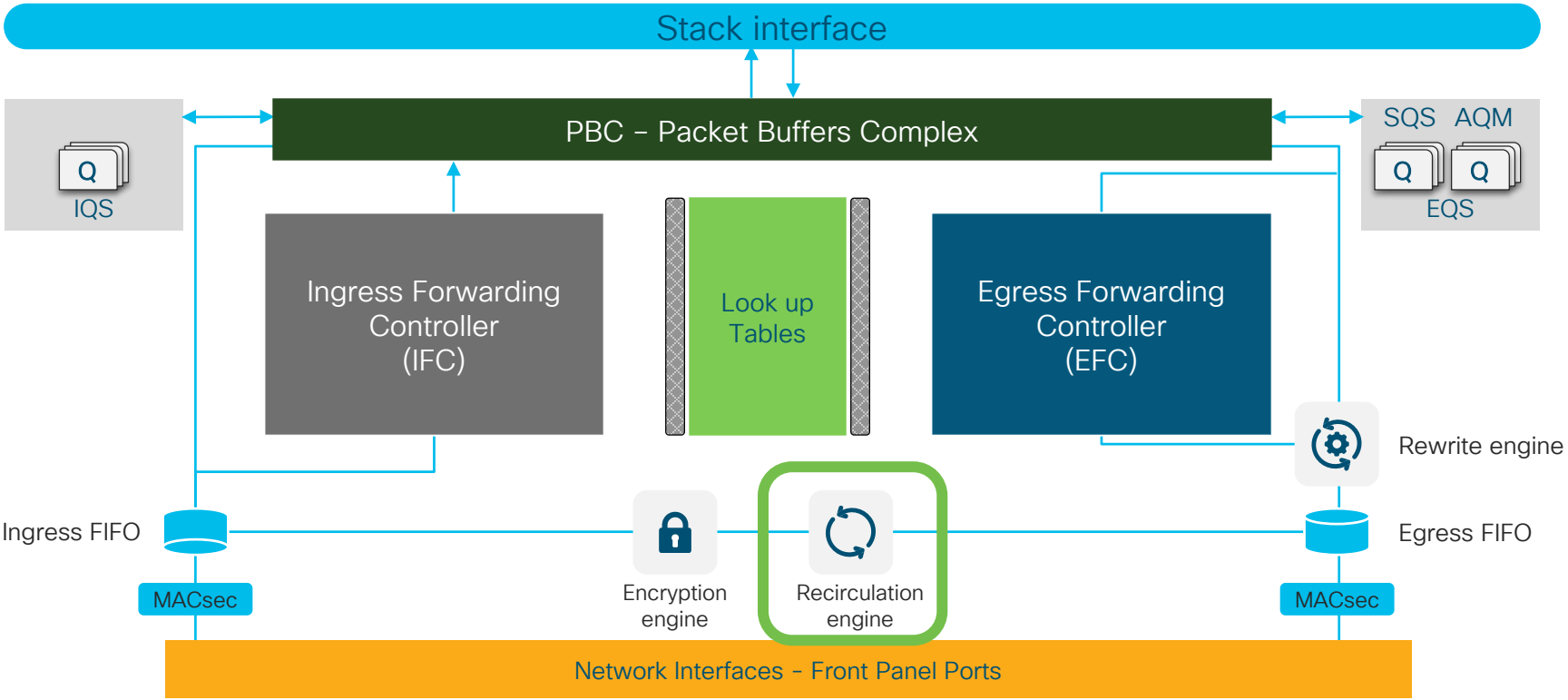
Recirculation
Capability

Micro Engines

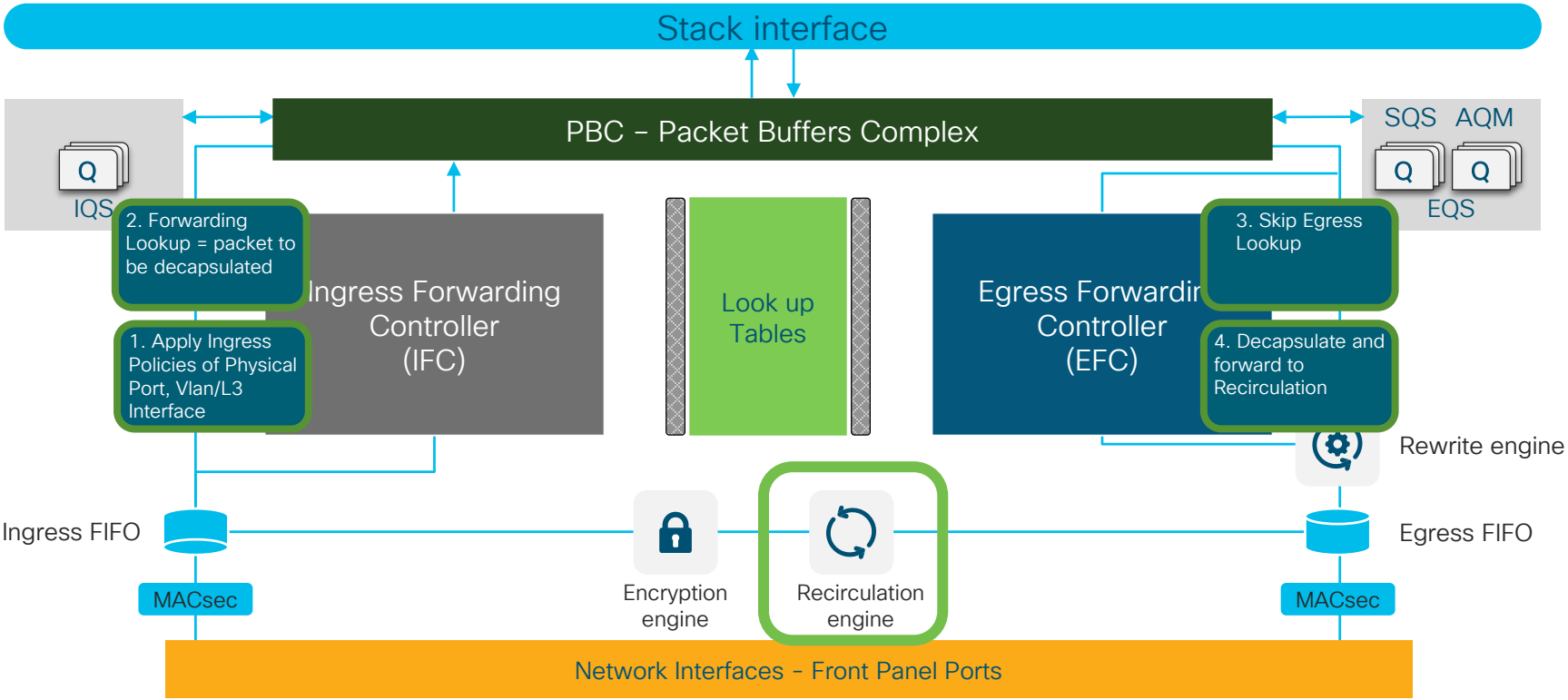
Adaptable Tables

No Compromise on Performance

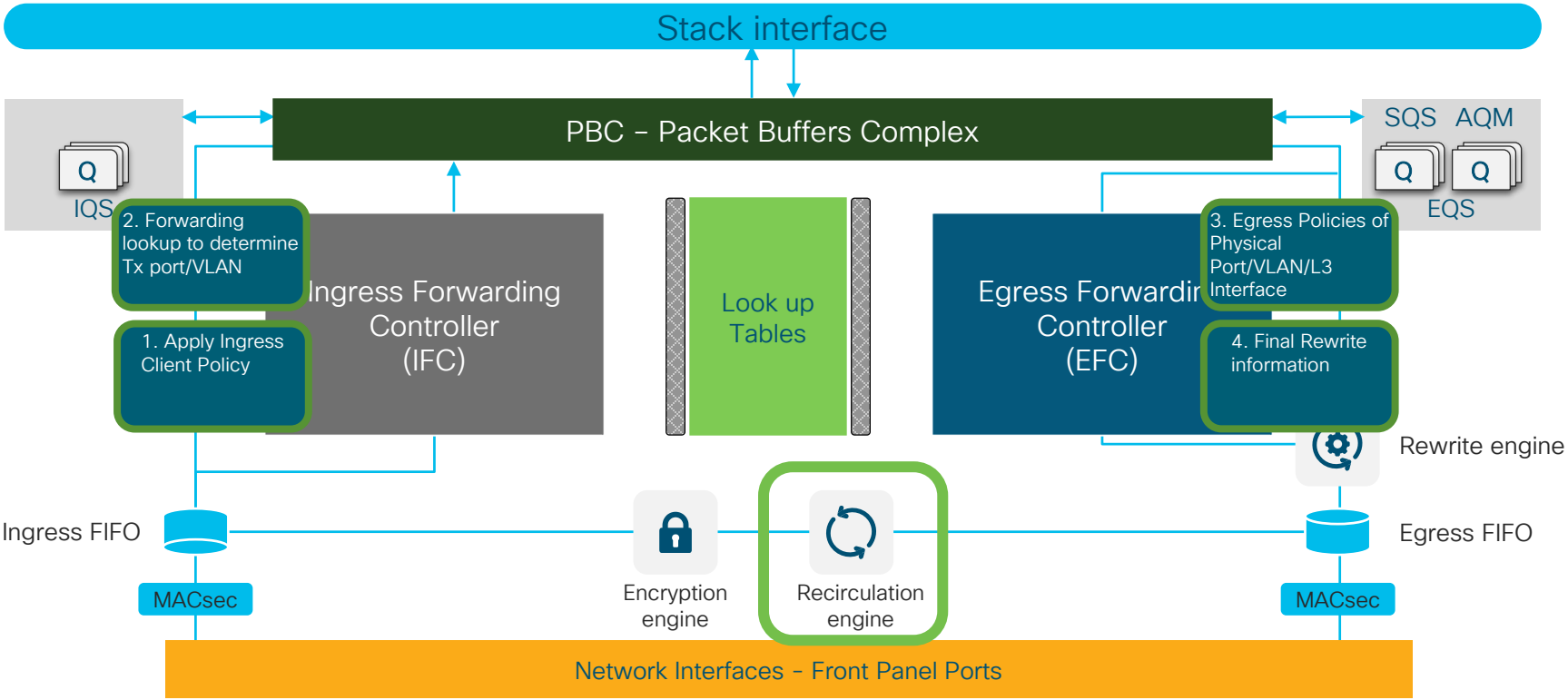
UADP – Recirculation Engine



UADP – Recirculation First Pass

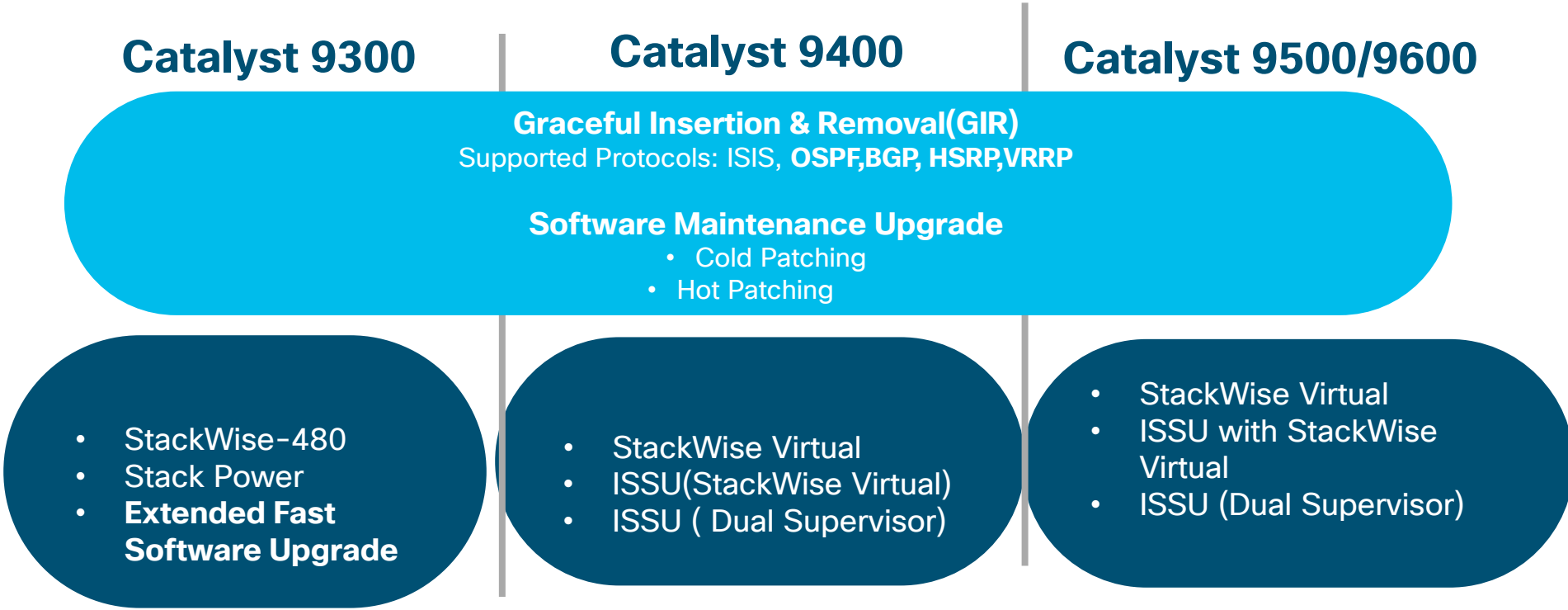


UADP – Recirculation Second Pass

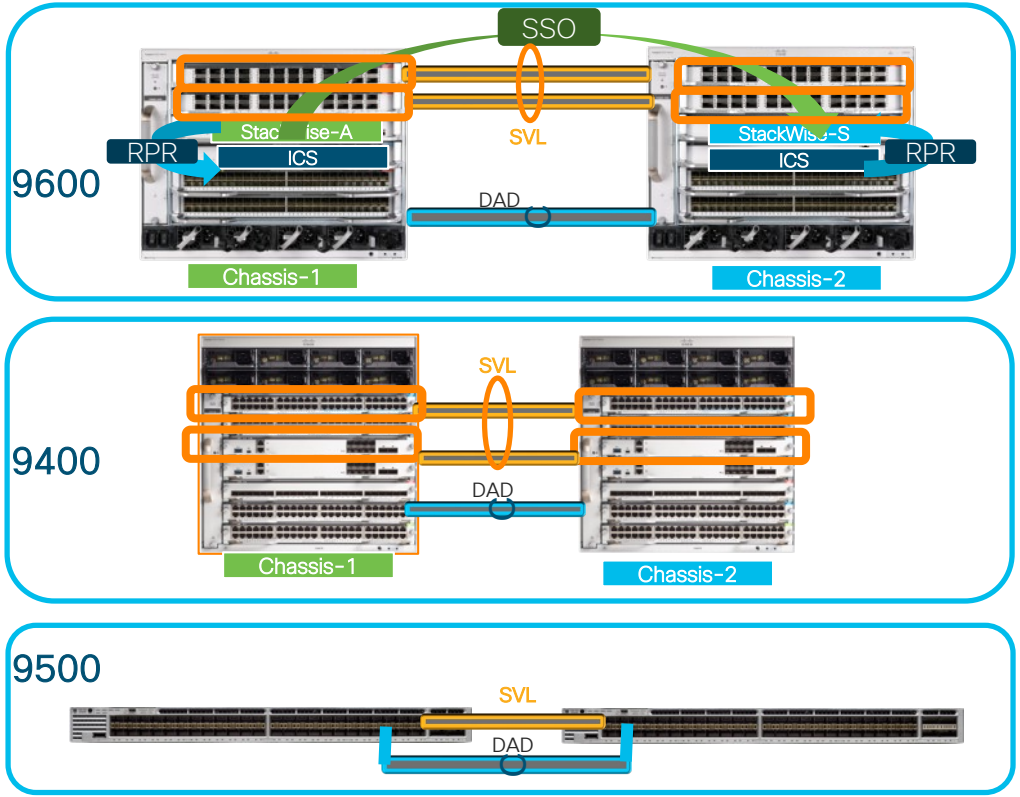


High Availability with Catalyst 9000

High Availability with Catalyst 9000



StackWise Virtual Platforms – Deployment

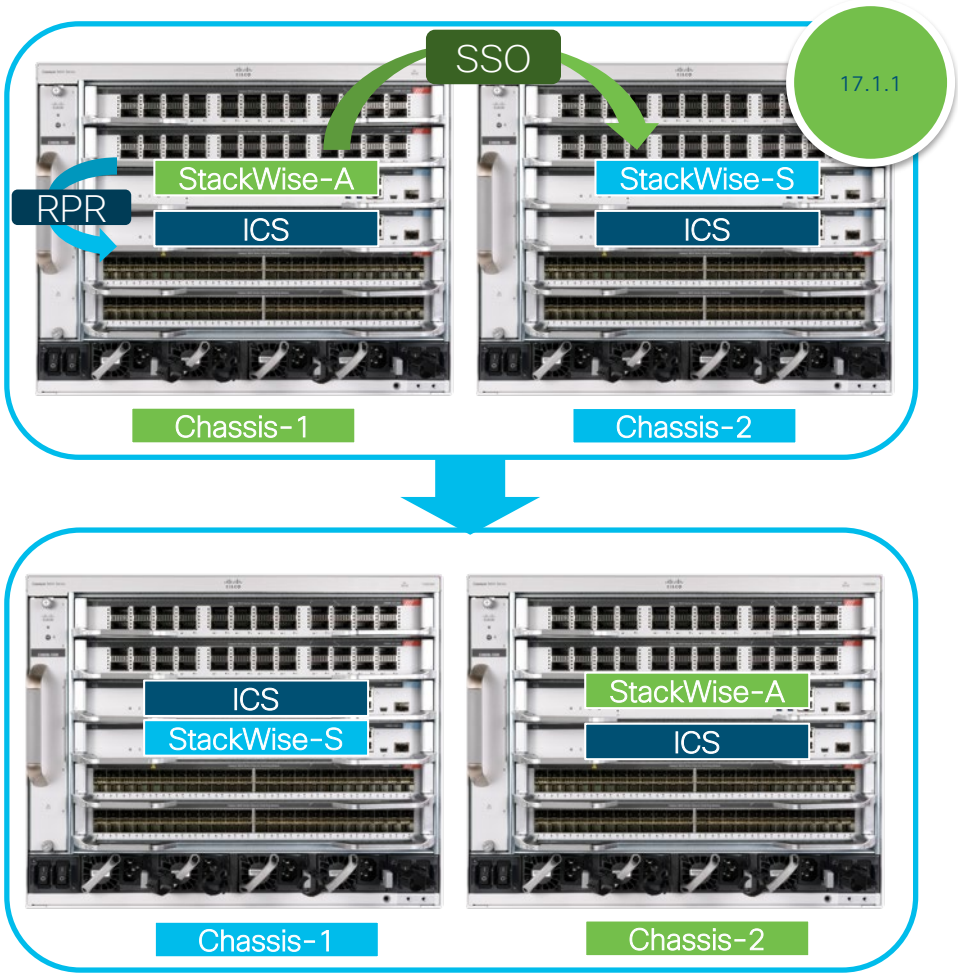


SVL: Linecards – 10/25/40/100G
DAD: Linecards – 1/10/25/40/100G

SVL: Supervisor/Linecards – 10/25/40G
DAD: Linecards – 1/10/25/40G

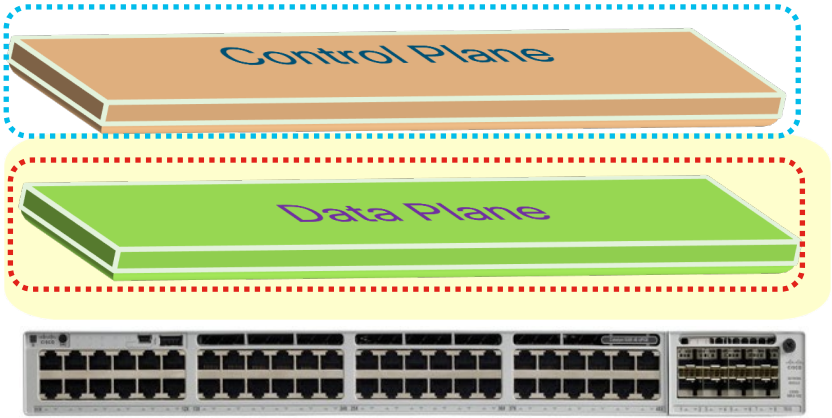
SVL: Supervisor/Linecards – 10/25/40G
DAD: Linecards – 1/10/25/40G

Quad Sup StackWise Virtual



Extended Fast Software Upgrade on Catalyst 9300

- **xFSU** provides a mechanism to independently update the control plane and data plane during the upgrade process
- Control plane is upgraded by leveraging Graceful Reload Infrastructure without impacting data plane traffic
- Data plane(ASIC) is re-programmed in less than 30 seconds by leveraging special cache memory which stores active forwarding entries

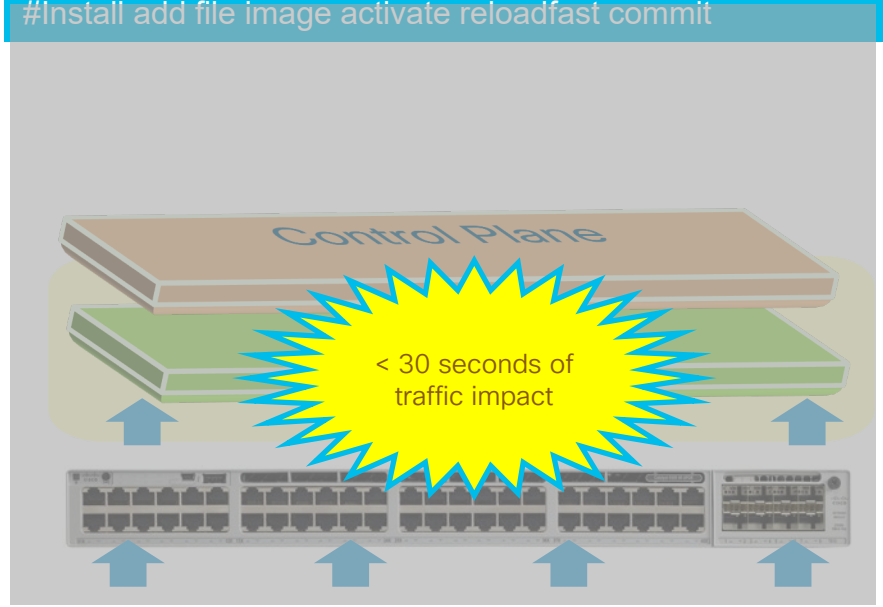


Extended Fast Software Upgrade

17.1.1

9300 Standalone

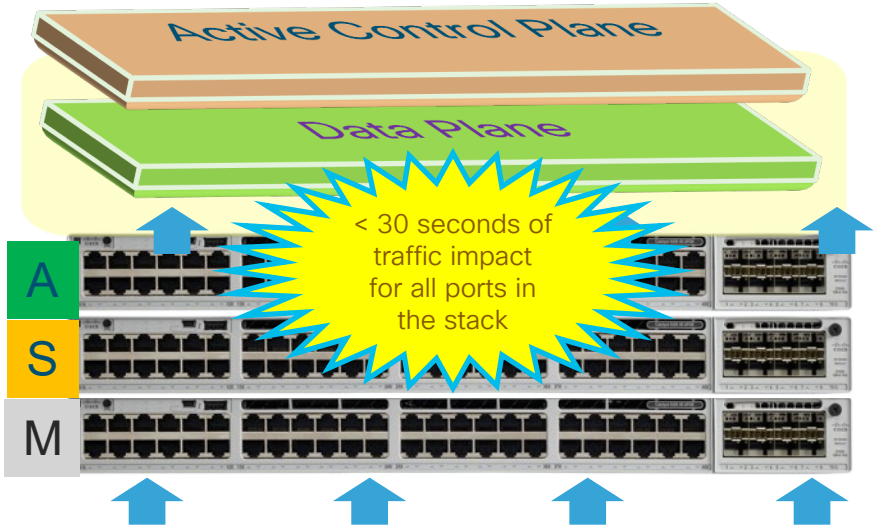
#Install add file image activate reloadfast commit



17.1.1

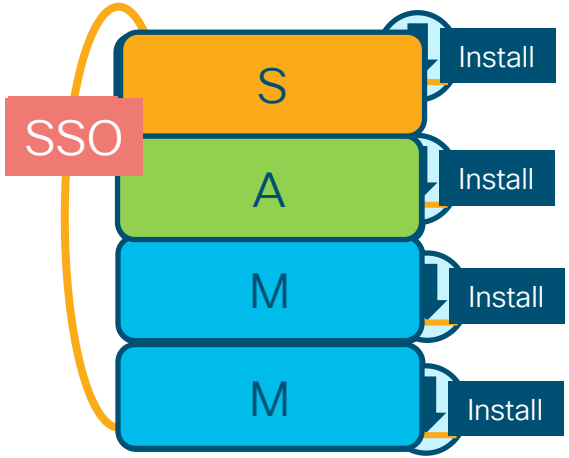
9300 Stack

#Install add file image activate reloadfast commit



Fast Software Upgrade on Stack

#Install add file image activate reloadfast commit



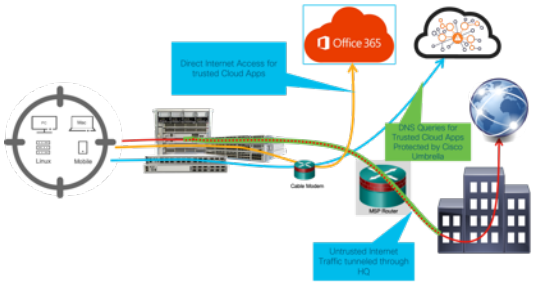
1. Install the images on all switches
2. Fast reload the standby and member switches
3. Fast reload the active switch only
4. Standby becomes the new active
5. Old Active switch becomes the new standby

Traffic Impact during the complete upgrade is less than 30 seconds

Closing & Wrap up...

Catalyst 9K has fundamentally changed the Networks

Security



Umbrella Integration

Traffic Analytics

Malware Detection

Compliance

Secure Infrastructure

Trustworthy Systems

Hardware Authenticity

Two Way Trust

Run-time Defense

Secure Transport

MACSEC

Man-in-the-Middle

Wire-tapping

Impersonation

Catalyst 9K makes **Our Networks** more **Secure** than ever

Platform Resilience
Sub Second
Convergence

1+1 Redundancy
Active and Standby
SSO/NSF

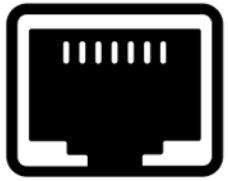
ISSU
eFSU
Hot Patching

Highly Available
Networks

Software Upgrade
Instant Fix

Stackwise Virtual
GIR
HSRP/VRRP

Catalyst 9K makes Our Networks most Resilient



Multigigabit

UPoE

100G

40G

25G

10G

5G

2.5G

10M 100M 1G

Fabric Enabled Wireless

Embedded Wireless LAN Controller

Catalyst 9K makes Our Networks Ready for 11ax

Full PoE+/UPoE

802.3bt Type 3 (60W)

LED Lights

Building Management Systems

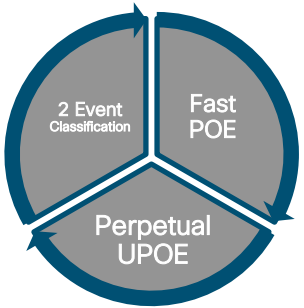
AVB & PTP

Digitized Audio & Video

Digital Court Rooms

Media Rooms

IoT Readiness



PoE Innovations

IoT Devices

IP Based End Points

Catalyst 9K makes Our Networks Ready for IoT

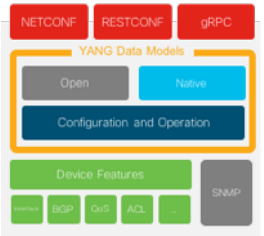
Application Hosting & Dockers

Flexibility and Control

Network Analytics Tools

Monitoring Tools

Model Based API & Programmability



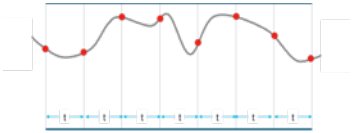
Network Automation

Build Your Own

Consistent Models

Candidate Datastore

Streaming Telemetry

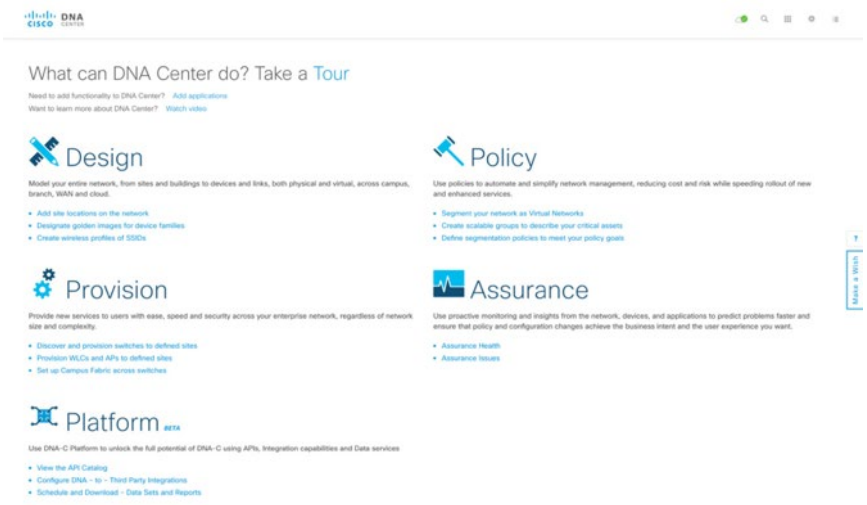


Monitoring the Network

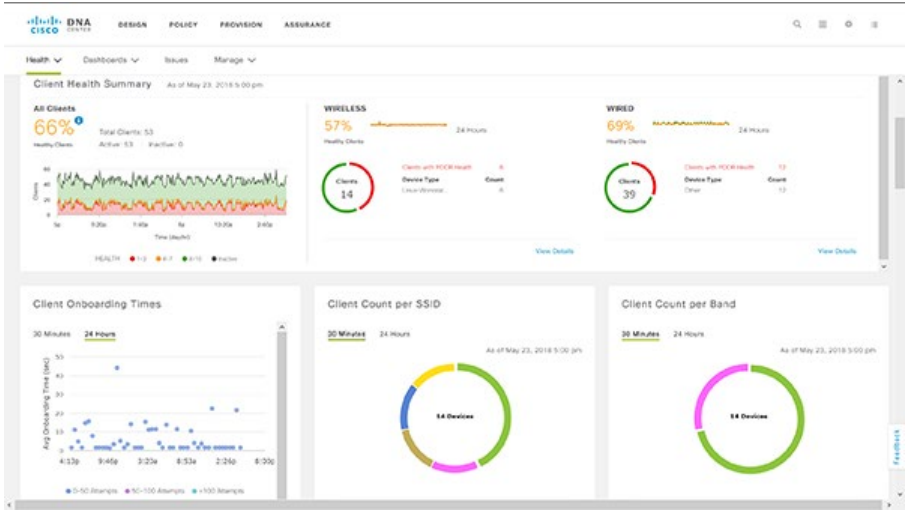
Real Time Monitoring e.g. Kibana

On-change & Periodic Telemetry

Catalyst 9K makes Our Networks Programmable



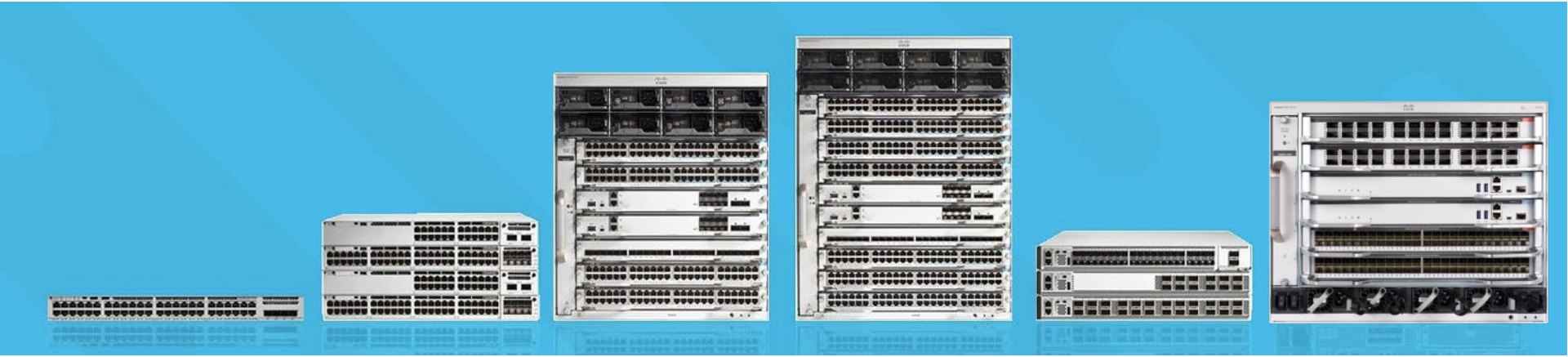
Software Defined Access



Cisco DNA Assurance

Catalyst 9K makes Our Networks Software Defined

The Catalyst 9K Family



Catalyst 9200 Catalyst 9300 Catalyst 9400 Catalyst 9500 Catalyst 9600

Fixed Access Switches

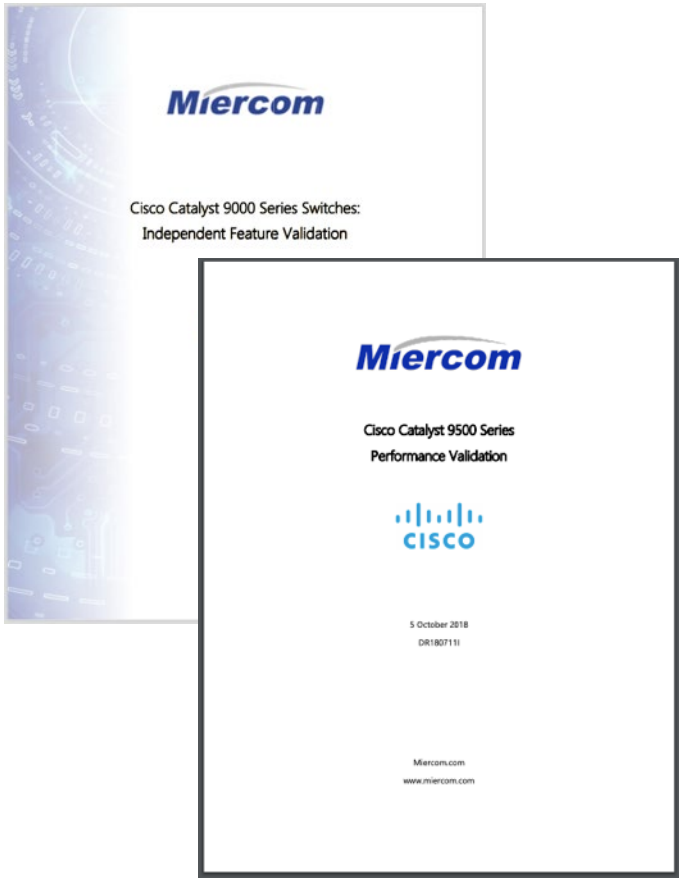
Modular Access & Distribution Switches

Fixed Core & Distribution Switches

Modular Core & Distribution

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

Industry Recognitions...

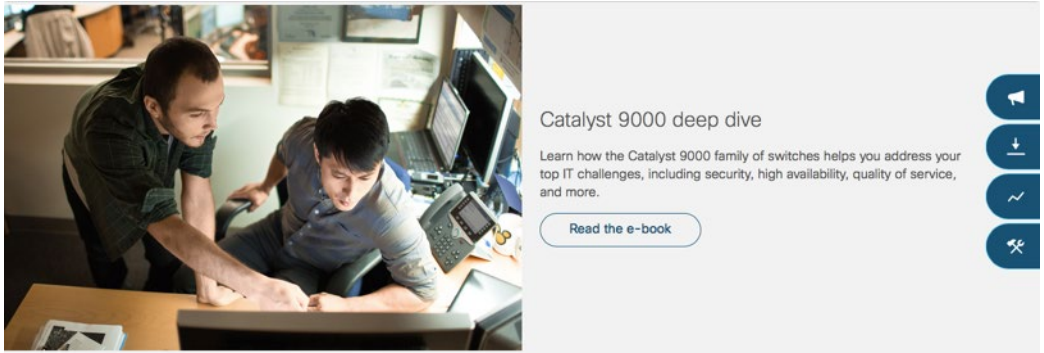


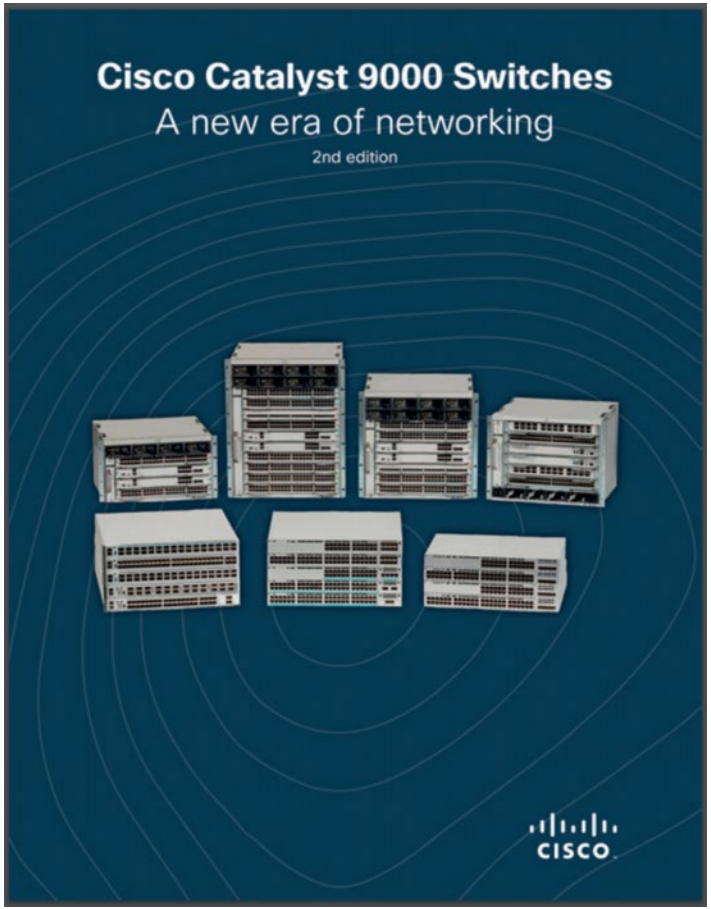
Catalyst 9K Book

2nd Edition

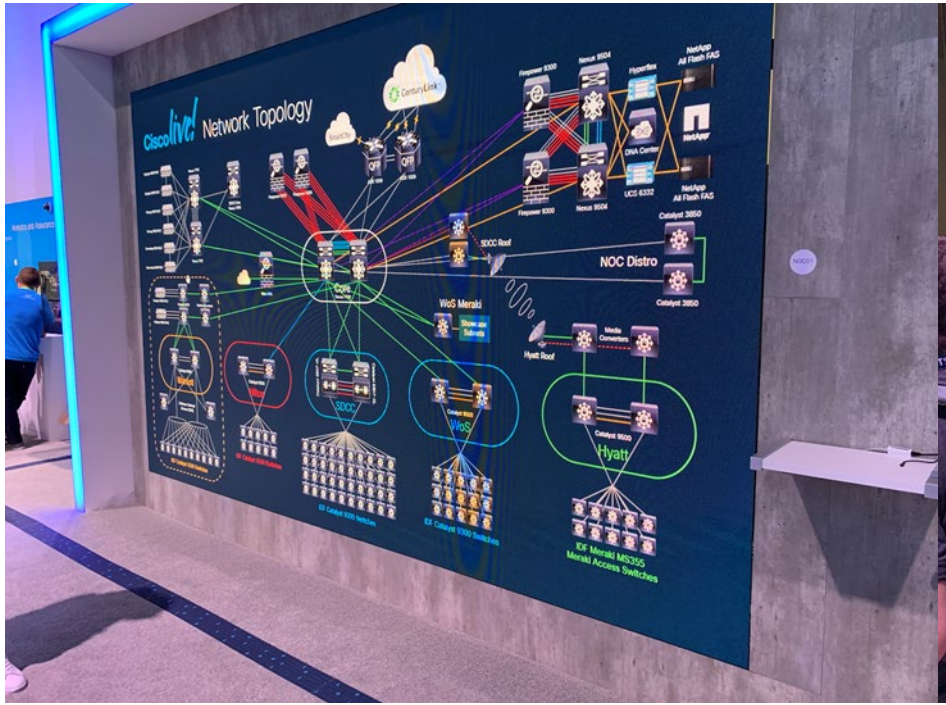
Cisco Catalyst 9000
A New Era of Networking

eBook Available on Cisco.com





Visit World of Solutions...



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Thank you

You make **possible**