

INTUITIVE

Cisco *live!*
December 4-7, 2018 · Cancun

#CiscoLiveLA

Cisco Webex Teams



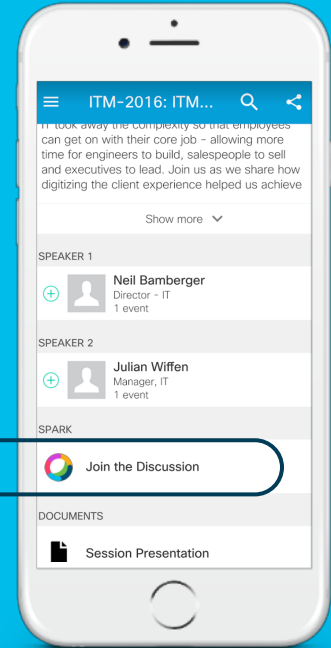
Questions?

Use Cisco Webex Teams (formerly Cisco Spark) to chat with the speaker after the session

How

- 1 Find this session in the Cisco Live Mobile App
- 2 Click “Join the Discussion”
- 3 Install Webex Teams or go directly to the team space
- 4 Enter messages/questions in the team space

Webex Teams will be moderated by the speaker until December 10, 2018.



cs.co/ciscolivebot#BRKARC-1343



Catalyst 9200 Overview & Architecture

Extending Intent Based Networking Everywhere

Jay Sharma, Technical Marketing Engineer
BRKARC-1343



#CiscoLiveLA



INTUITIVE

Jay Sharma

Technical Marketing Engineer



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Jay currently works as a Technical Marketing Engineer for Enterprise Switching Group. He is one of the TMEs to work on Catalyst 2960X/XR/L and Catalyst 9200 and has worked on many Catalyst Switching products over the years.

He also contributes to Enterprise Network designs and Next Generation Platform Architectures. In the past he has held role as a Software Engineer with Cisco SD-WAN Team. Jay holds a Masters degree in Engineering Management from Duke University.

Agenda

- Intent Based Networking
- Catalyst 9200 Hardware Architecture
- Catalyst 9200 Software Architecture
- Platform Features
- Manageability Demo

Catalyst 9K Family

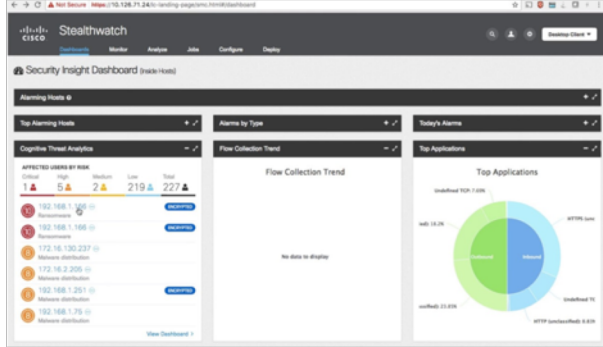


June 2017

Fastest Growing Product in Cisco's History

Catalyst 9K has fundamentally changed the Networks

Security



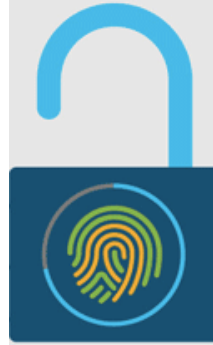
Encrypted Traffic Analytics

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

Today **Our Networks** are more **Secure** than ever



Platform Resilience
Sub Second
Convergence

1+1 Redundancy
Active and Standby
SSO/NSF

ISSU
eFSU
Hot Patching

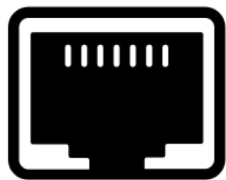


Highly Available
Networks

Software Upgrade
Instant Fix

Stackwise Virtual
GIR
HSRP/VRRP

Today **Our Networks** are most **Resilient**



Multigigabit

UPoE

40G 100G

25G

10G

5G

2.5G

10M

100M

1G



Fabric Enabled Wireless

Embedded Wireless LAN Controller

Today **Our Networks** are **Ready for 11ax**

Full PoE+/UPoE



802.3bt Type 3 (60W)

LED
Lights

Building Management
Systems

AVB & PTP

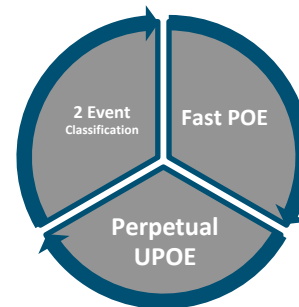


Digitized Audio & Video

Digital Court Rooms

Media
Rooms

IoT Readiness



PoE Innovations

IoT
Devices

IP Based
End Points

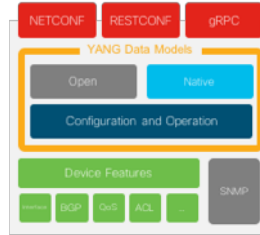
Today **Our Networks** are **Ready for IoT**

Application Hosting & Containers



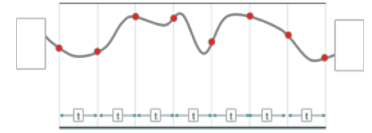
Flexibility and Control

Model Based API & Programmability



Network Automation

Streaming Telemetry



Monitoring the Network

Network Analytics Tools

Monitoring Tools

Build Your Own

Consistent Models

Candidate Datastore

Real Time Monitoring
e.g. Kibana

On-change &
Periodic Telemetry

Today **Our Networks** are **Programmable**

What can DNA Center do? Take a Tour

Need to add functionality to DNA Center? [Add applications](#)
 Want to learn more about DNA Center? [Watch video](#)

Design
 Model your entire network, from sites and buildings to devices and links, both physical and virtual, across campus, branch, WAN and cloud.

- Add site locations on the network
- Designate golden images for device families
- Create wireless profiles of SSIDs

Policy
 Use policies to automate and simplify network management, reducing cost and risk while speeding rollout of new and enhanced services.

- Segment your network as Virtual Networks
- Create scalable groups to describe your critical assets
- Define segmentation policies to meet your policy goals

Provision
 Provide new services to users with ease, speed and security across your enterprise network, regardless of network size and complexity.

- Discover and provision switches to defined sites
- Provision WLCs and APs to defined sites
- Set up Campus Fabric access switches

Assurance
 Use proactive monitoring and insights from the network, devices, and applications to predict problems faster and ensure that policy and configuration changes achieve the business intent and the user experience you want.

- Assurance Health
- Assurance Issues

Platform beta
 Use DNA-C Platform to unlock the full potential of DNA-C using APIs, integration capabilities and Data services

- View the API Catalog
- Configure DNA - to - Third Party Integrations
- Schedule and Download - Data Sets and Reports

Software Defined Access

Client Health Summary As of May 23, 2018 9:00 pm

All Clients
 Total Clients: 53
 Active: 53 | Inactive: 0
 Healthy Clients: 66%

WIRELESS
 57% Healthy Clients (24 Hours)
 Clients: 14
 Clients with FCCW Health: 6
 Device Type: Low-Medium
 Count: 6

WIRED
 69% Healthy Clients (24 Hours)
 Clients: 39
 Clients with FCCW Health: 13
 Device Type: Other
 Count: 13

Client Onboarding Times
 30 Minutes | 24 Hours
 Avg Onboarding Time (min) vs Time (hours)

Client Count per SSID
 30 Minutes | 24 Hours
 14 Devices

Client Count per Band
 30 Minutes | 24 Hours
 14 Devices

DNA Assurance

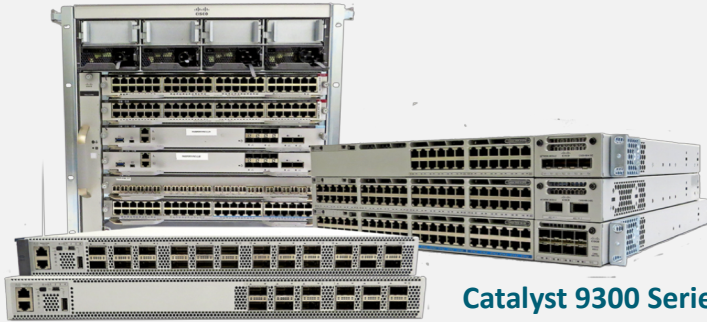
Today **Our Networks** are **Software Defined**

We have **changed** the networks
together

And we will change it for **everyone**

Extending intent-based networking everywhere

Catalyst 9400 Series switches
Lead Modular Access



Catalyst 9300 Series switches
Lead Fixed Access

Catalyst 9500 Series switches
Lead Fixed Core



Catalyst 9200 Series switches



Fast, Flexible and light ASIC
Cisco UADP 2.0 mini



Resiliency
Redundant PS, Fans



Security
Macsec-128



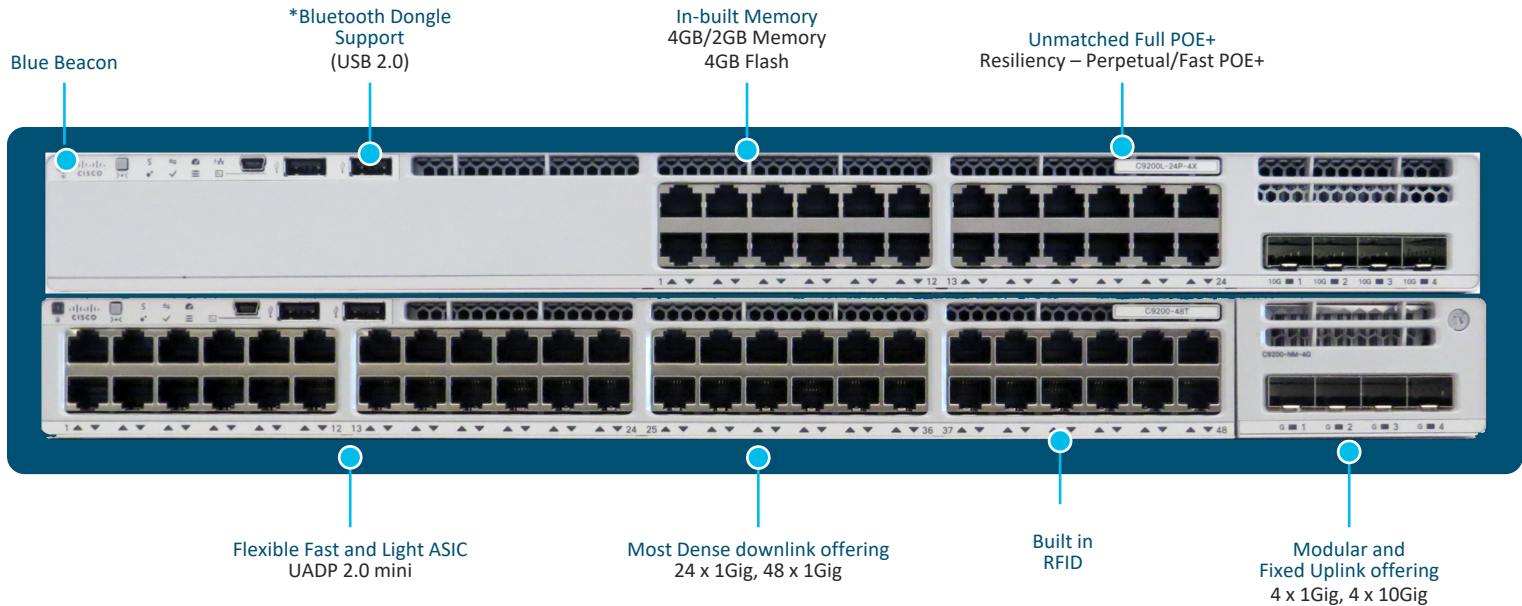
Programmability
YANG Models



SD-Access
Edge Node

Catalyst 9200 Series switches built on industry leading Catalyst 9000 switching attributes

Catalyst 9200 Hardware



Catalyst 9200 Extends **Intent Based Networking** Everywhere

* Hardware Capable

Ciscolive!

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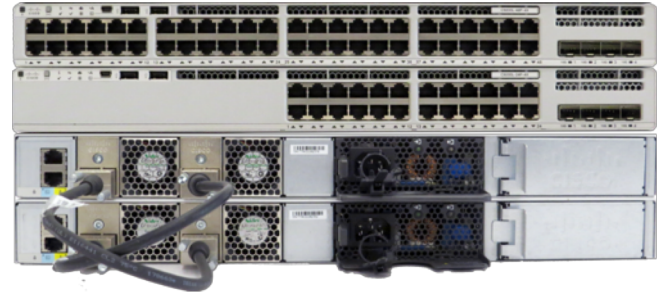
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Better Scale & Performance



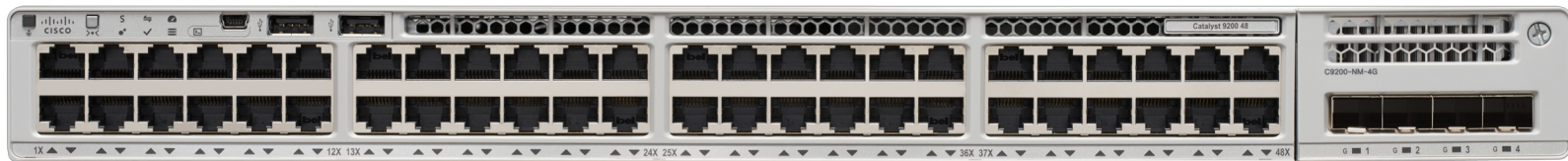
9200
Modular Uplinks & Fans



9200L
Fixed Uplinks & Fans



Catalyst 9200 Series



Full PoE+ (30W on All Ports)

Separate Data SKUs Available



Catalyst 9200 Offers **Best in Class PoE+**



Redundant Modular Power Supplies



1+1 Redundancy OR Combined Mode



Field Replaceable Unit – FRUable Power Supplies



Universal Power Supplies 110-240 Volts

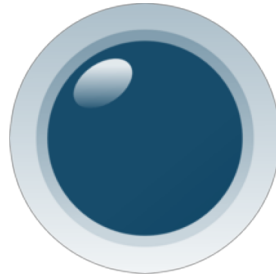


PoE+ with Platinum Rated Power Supplies

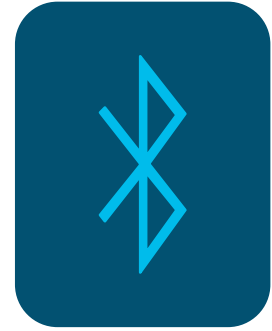
Catalyst 9200 Offers Full Power Resiliency



RFID



Blue Beacon



Bluetooth

Catalyst 9200 Extends **User Centric Design** on Catalyst 9K Family

Catalyst 9200



4 x 10 Gig

SFP/SFP+ + Transceivers



4 x 1 Gig

SFP Transceivers

Catalyst 9200L



4 x 10 Gig

SFP/SFP+ + Transceivers



4 x 1 Gig

SFP Transceivers



Modular Uplinks Supported on All 9200s



Modular Uplinks FRUable



10G /1G Speed



SFP/SFP+ Auto Sensing

Catalyst 9200



Modular Redundant Fans

Catalyst 9200L



Fixed Redundant Fans



Modular Fans FRUable



Variable Speed based on Temperature



1+1 Redundancy

Catalyst 9200

Stackwise-160



Catalyst 9200L

Stackwise-80



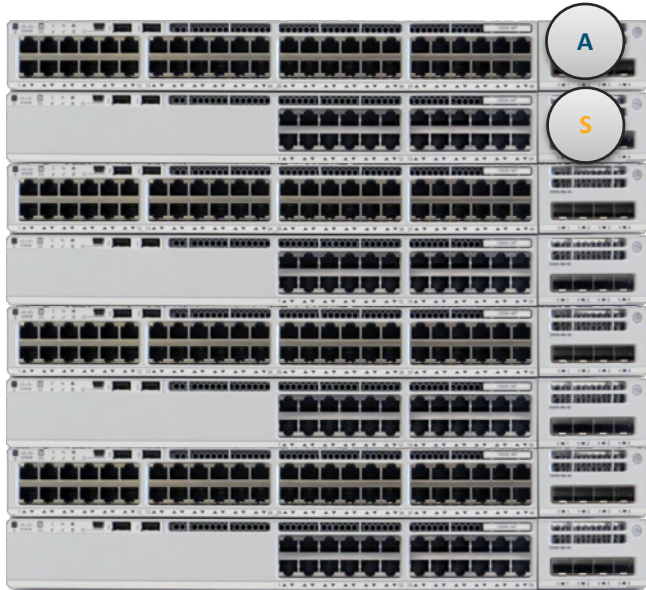
Stackwise-160/80 Technology



Stack Ring Architecture



Optional Stacking Kit



Dedicated Back stack Ring – Stackwise-160/80



Sub Second Stateful Switchover (SSO)



1+1 Stateful Redundancy with Active & Standby



Centralized Control Plane
Distributed Data Plane

Catalyst 9200 Stacks up to 8 members

Catalyst 9200



Catalyst 9200L



Catalyst 9200 Addresses the **Compact and Tight Rack Space** Deployments

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



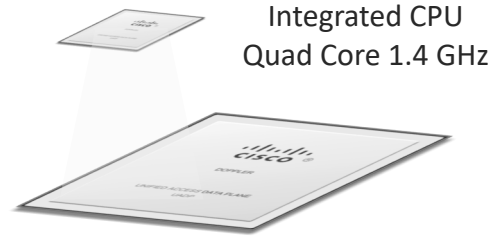
48 ports + 4x1G Full POE+ SKUs & Data SKUs



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

Optional Second Power Supply available for All SKUs

Simple but Powerful Architecture



UADP 2.0 Mini



Programmable
Flexible Pipelines



100G
Bandwidth



6MB
Packet Buffer



16K
Netflow Records



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

Catalyst 9200 is powered by **UADP ASIC** Family

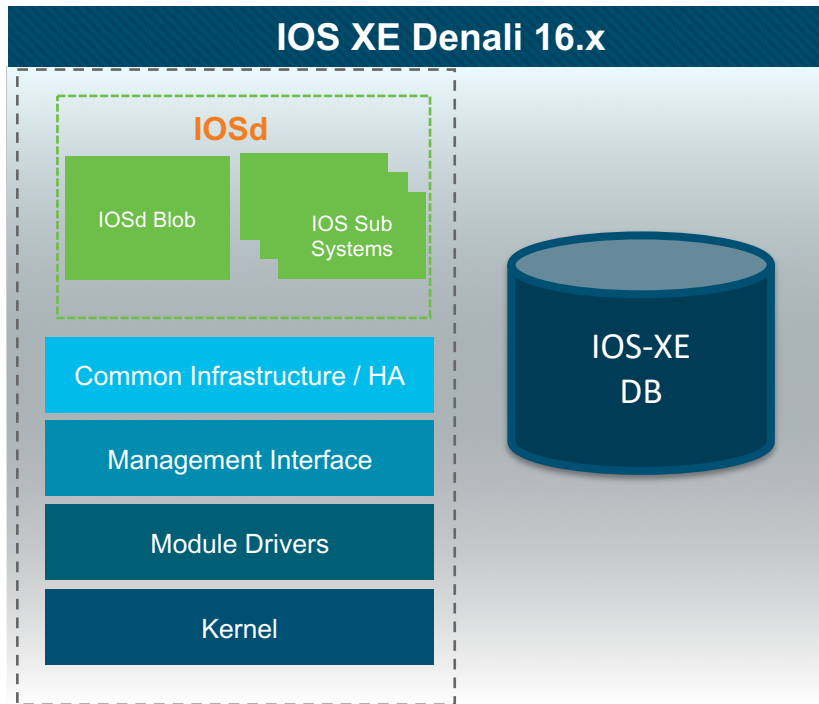
Catalyst 9200 Software



Open IOS XE – A Modern Operating System



Open and Extensible IOS-XE



IOS Sub Systems

Resiliency & HA

IOS XE Database

Programmability & Open Models

Open, Model Driven & Secure Operating System

IOS XE

Consistent Operating System



Model Based API

YANG Models
Standard Based Interfaces



Highly Available

Modular Peocesses
IOS XE Database



Optimized

Optimized for
Lower Memory Footprint

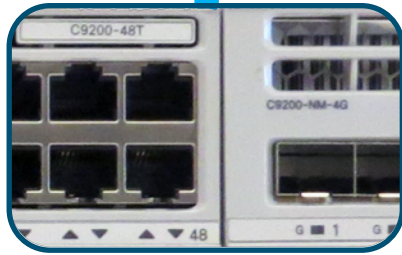


Light

50%
Smaller Image Size

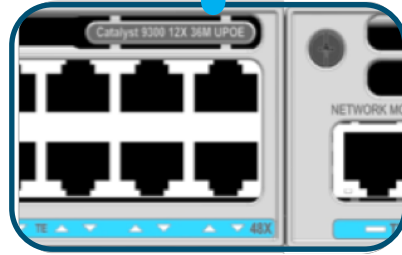
Catalyst 9200 runs the **Modern** Operating System **IOS-XE**

IOS XE
16.x



Catalyst 9200

IOS XE Lite
Binary Image



Catalyst 9300



Catalyst 9400

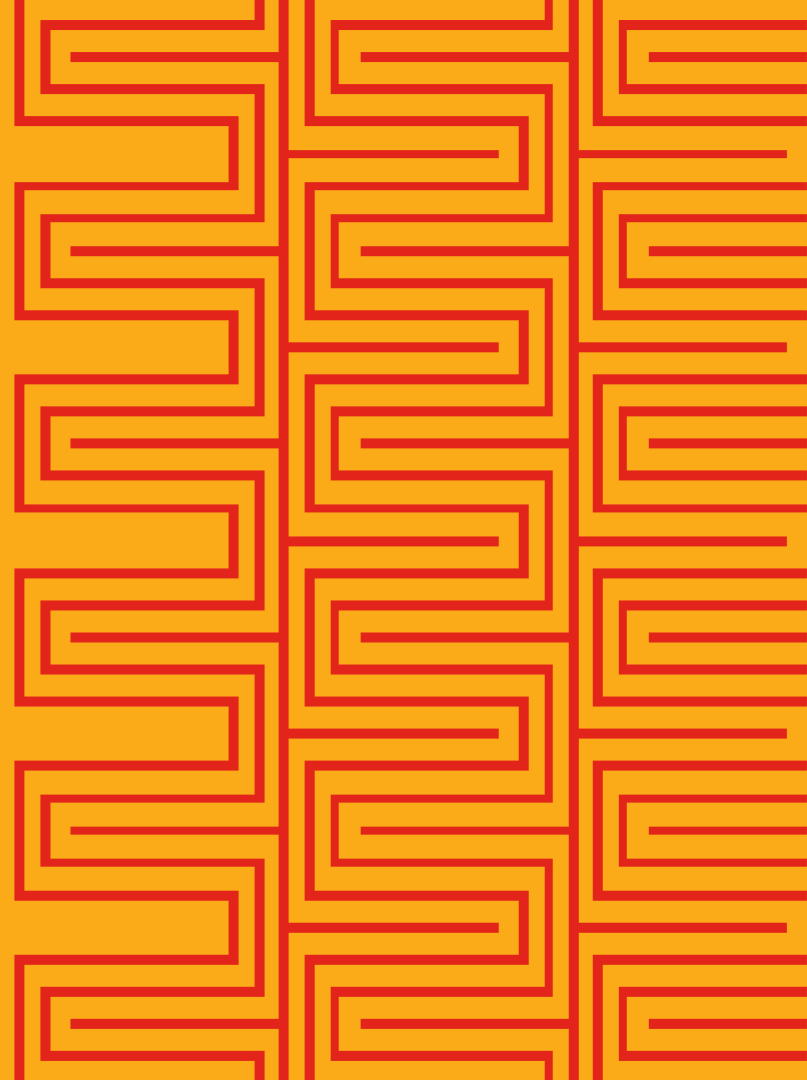
IOS XE
Binary Image



Catalyst 9500

Catalyst 9200 runs the same Operating System with **Lighter Image**

Enabling Intent Based Networking

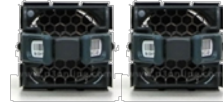


Resiliency

Stateful Switchover SSO



Platform Resiliency

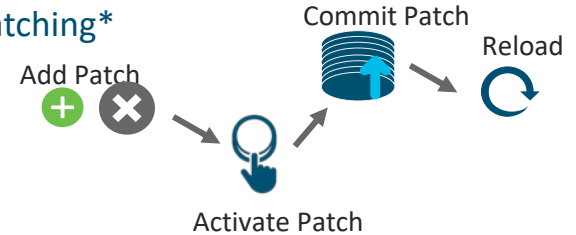


Redundant Fans



Redundant PS

Cold Patching*



Catalyst 9200 is the **Most Resilient** and **Highly Available** Product in its Class

Stateful switchover in StackWise



Hardware Redundancy

Ability to stack multiple switches through stack cables

Stackwise-160 and Stackwise-80

Use stateful switchover to provide resiliency within the stack

How?

The active switch creates and updates all the switching, routing information and constantly synchronizes that information with the standby switch

Stateful Switchover

If the active switch fails, the standby switch assumes the role of the active switch and continues to keep the stack operational

Redundant power supply

Silver Rated (80% efficiency)



125WAC

Supported only on 1G Data SKUs

Platinum Rated (90% efficiency)



600WAC

Supported only on 24
Port POE+ SKUs



1000WAC

Supported only on 48
Port POE+ SKUs

Load sharing (1+1) mode supported for PoE+ SKUs

**Non-stop power
in 1 RU**

Optional power
redundancy with dual
supplies

Hot Swappable

Insert and Remove PS
on go

**Easy field
replacement**

of failed PSU

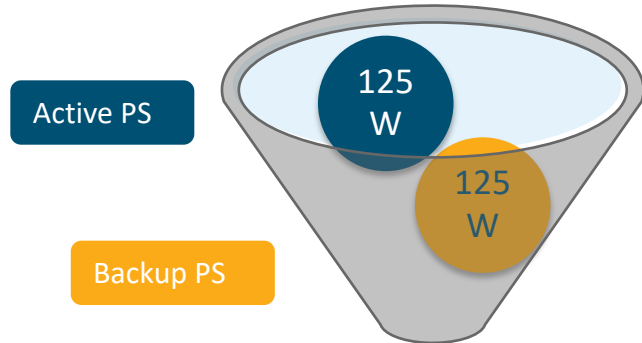
**Redundancy in
combined mode**

PoE budget gets
doubled with second PS

Power supply modes

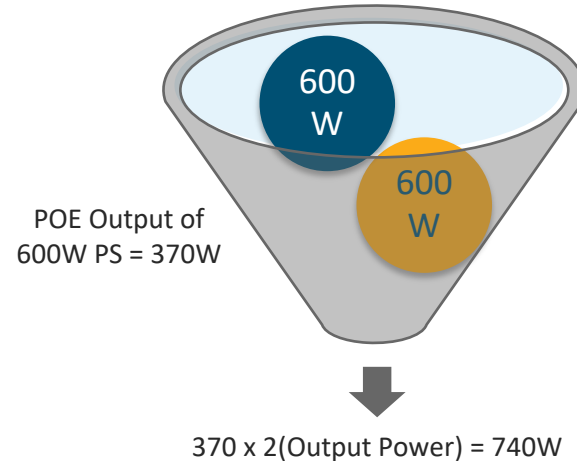
Non-POE SKUs

- First power supply is used for system power
- Second power supply is in redundant mode
- No Load sharing between the power supplies



POE+ SKUs

- Combined mode by default
- Both the power supplies will add to POE Budget
- System Power is redundant



POE Budget of all Catalyst 9200 Series switching SKUs

| PID | Power Supply | Available PoE Budget with One PS | Available PoE Budget with Two PS |
|---------------|--------------|----------------------------------|----------------------------------|
| C9200-24P | 600W | 370W | 740W |
| C9200-48P | 1000W | 740W | 1440W |
| C9200L-24P-4G | 600W | 370W | 740W |
| C9200L-24P-4X | 600W | 370W | 740W |
| C9200L-48P-4G | 1000W | 740W | 1440W |
| C9200L-48P-4X | 1000W | 740W | 1440W |

Redundant Power Supply should be identical

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.



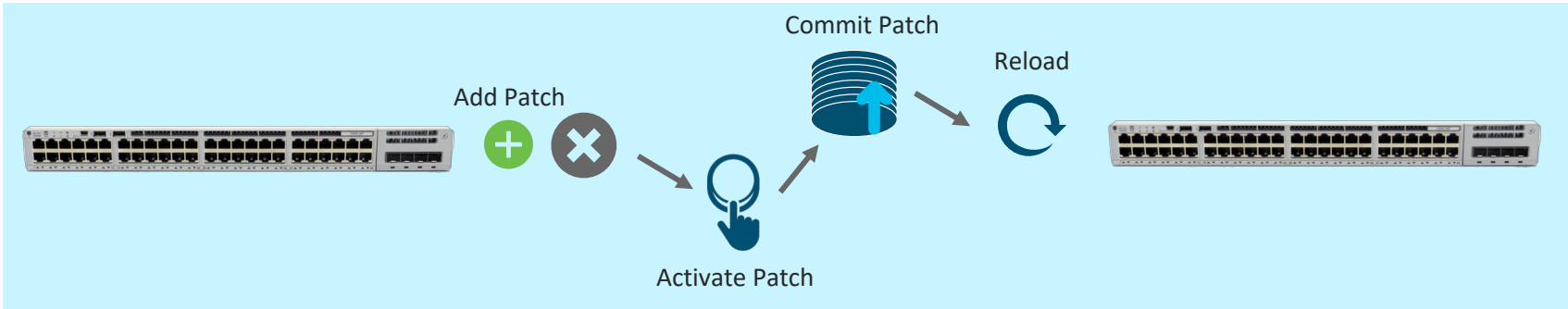
Install Add



Install Activate



Install Commit



Security



MACSEC-128



Dot1X, IBNS 2.0



Trustworthy System

Catalyst 9200 provides **Essential Network Security**

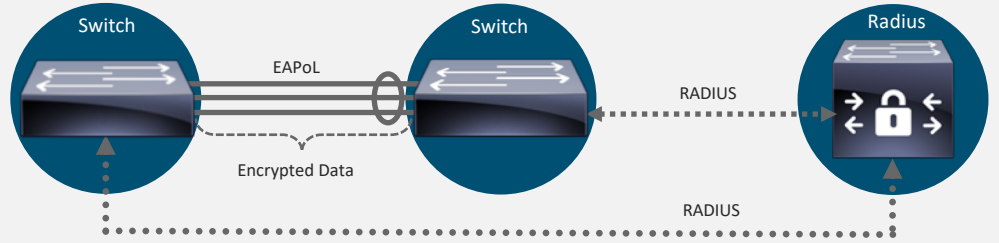
MACsec-128

Securing the network via link encryption

MACsec encryption performed at hardware

Switch to Switch (can be any front panel port or Network Module ports) but usually uses the network module uplink ports

MACsec is not supported on the Port-channel Logical Link but it can be enabled on the port-members individually (MKA Mode only)



| | MACSEC | Catalyst 9200 SKUs | | Catalyst 9200L SKUs | |
|------------------|--------------|--------------------|---------|---------------------|---------|
| | | SW | License | SW | License |
| Switch to Switch | 128 Bits SAP | 16.10.1 | NE | 16.9.1a | NE |
| | 128 Bits MKA | 16.10.1 | NE | 16.9.1a | NE |
| Host to Switch | 128 Bits MKA | Roadmap | | Roadmap | |

NE: Network Essentials

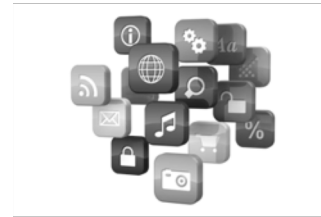
Visibility & Control



Full Flexible Netflow
16K Flows



QoS, CoPP
MQC, Larger Buffer



NBAR lite*
Top 500 Applications

Catalyst 9200 provides **Visibility without Compromise**

Key differences – Catalyst 9200 Series switches vs Catalyst 2960X/XR Series switches

Catalyst 9200 Series switches



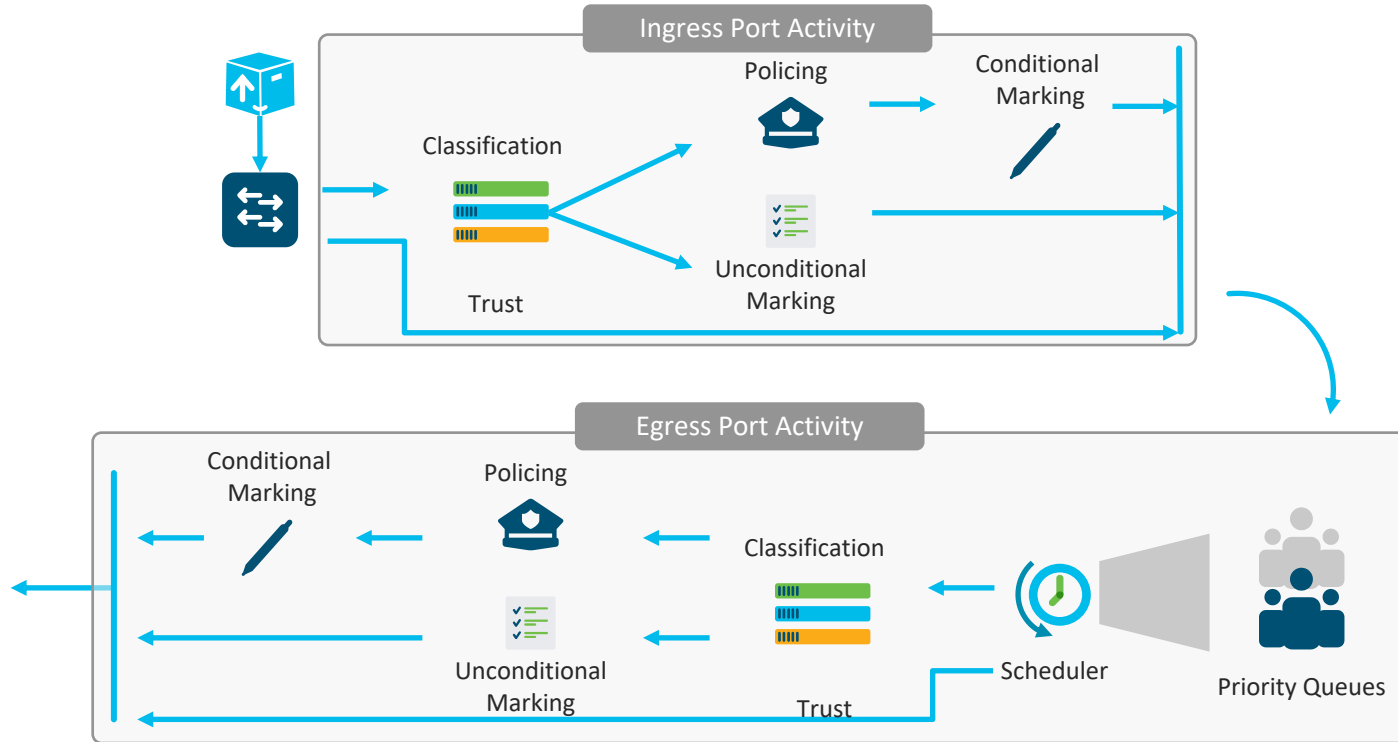
- MQC
- Trust by Default
- 8 Queues per Port
- 6 MB Buffer per ASIC
- HQoS – 2 Level Hierarchical Policy

Catalyst 2960X/XR Series switches

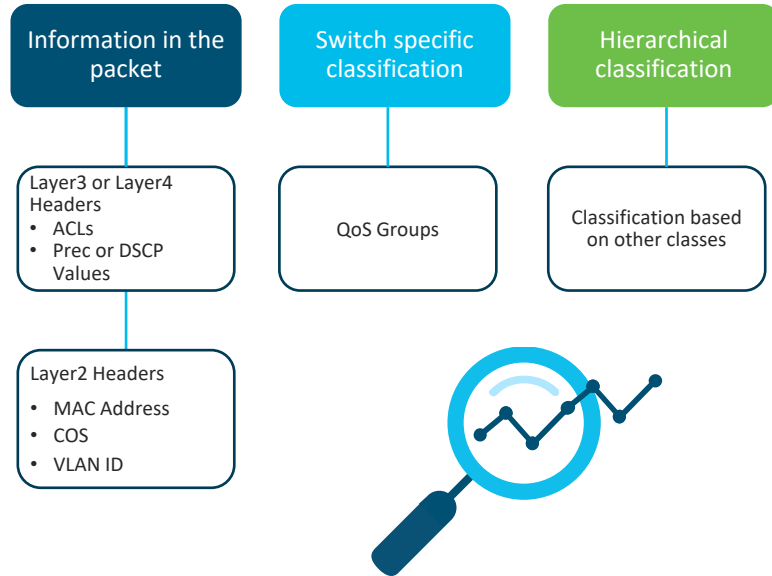


- MLS QoS
- Untrust by Default
- 4 Queues per Port
- 4 MB Buffer per ASIC
- No HQoS

QoS Activities on Ingress and Egress



Packet classification



A class-map can be defined as a logical OR only, i.e. “match-any” “match-all” is also supported on Catalyst 9000 switches (default)

```
switch(config-cmap)# class-map match-any VOICE
switch(config-cmap)#match ?
access-group  Access group
any           Any packets
class-map    Class map
cos          IEEE 802.1Q/ISL class of service/user priority values
dscp         Match DSCP in IPv4 and IPv6 packets
group-object Match object-group
ip           IP specific values
non-client-rt Match non-client NRT
precedence   Match Precedence in IPv4 and IPv6 packets
protocol     Protocol
qos-group    Qos-group
vlan         VLANs to match
wlan        802.11-specific values
```

Marking



Conditional
Policer
based marking



Unconditional
Explicit marking



Table Map
based marking

Marking with 'set'
Marking with Table Maps

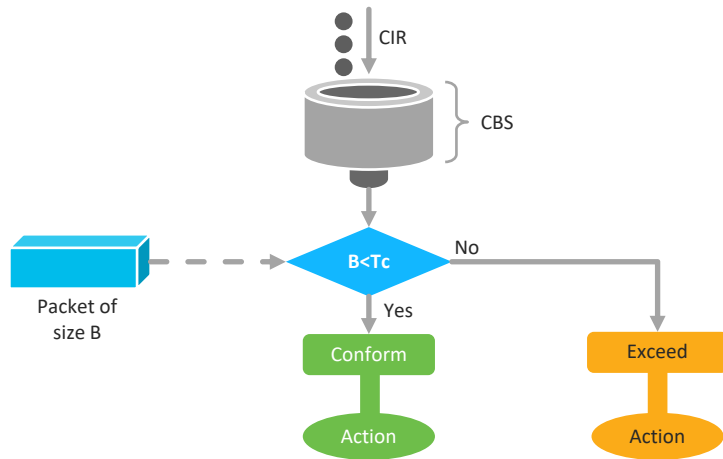
```
Catalyst9200-L(config-pmap-c)#set ?
cos      Set IEEE 802.1Q/ISL class of service/user priority
dscp     Set DSCP in IP(v4) and IPv6 packets
ip       Set IP specific values
precedence Set precedence in IP(v4) and IPv6 packets
qos-group Set QoS Group
wlan     Set WLAN
```

```
[class-maps omitted for brevity]
policy-map MARKING-POLICY
class VOIP
  set dscp ef
class MULTIMEDIA-CONFERENCING
  set dscp af41
class SIGNALING
  set dscp cs3
class TRANSACTIONAL-DATA
  set dscp af21
class BULK-DATA
  set dscp af11
class SCAVENGER
  set dscp cs1
class default
  set dscp dscp table COS2DSCP
```

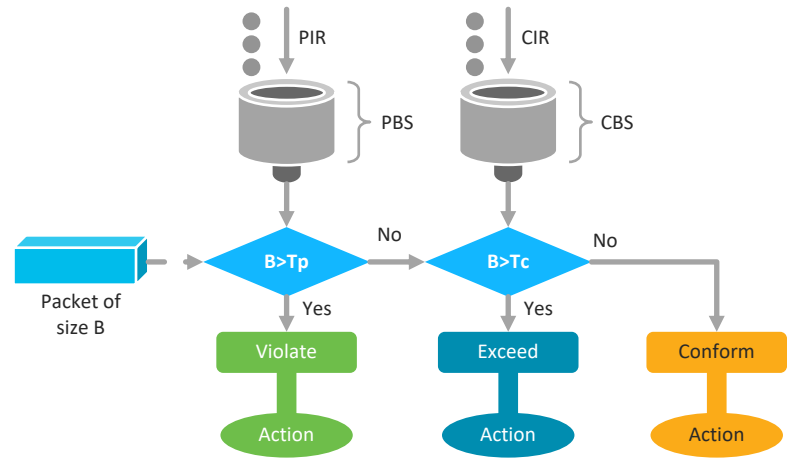
```
table-map COS2DSCP
map from 5 to 46
default copy
```


Policing

1 rate 2 color



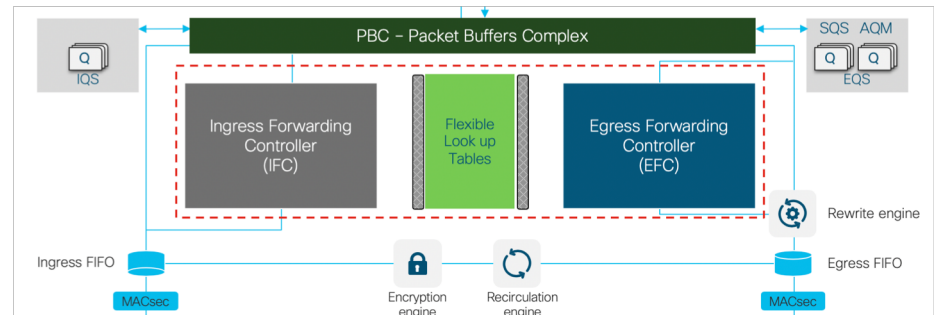
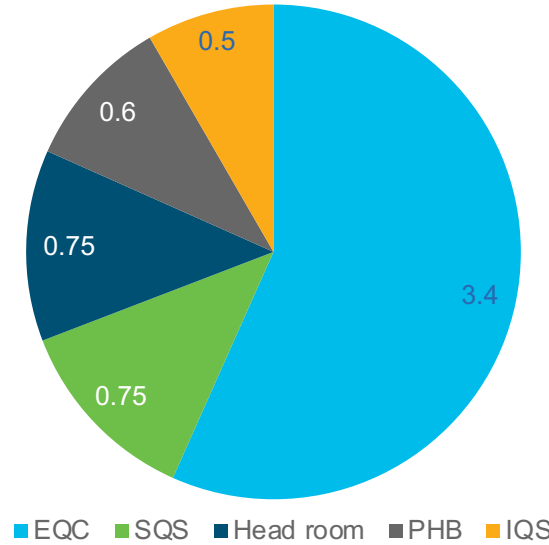
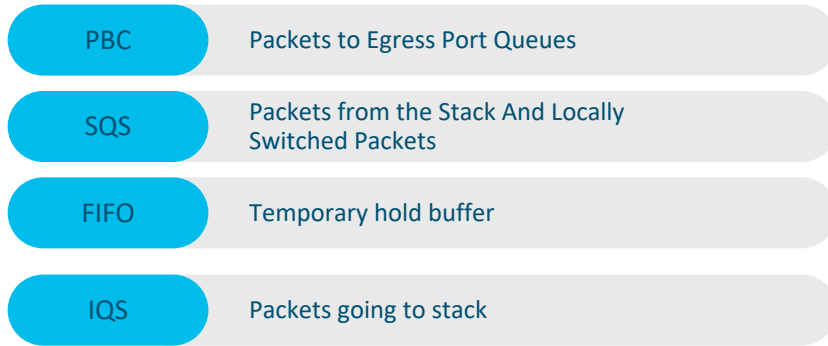
2 rate 3 color



```
police cir 100000000 bc 3125000 conform-action set-dscp-transmit af41  
exceed-action drop
```

```
police cir percent 10 pir percent 50 conform-action transmit exceed-  
action set-dscp-transmit af11 violate-action drop
```

6MB packet buffer per ASIC



Full flexible Netflow

Key Differences – Catalyst 9200 Series switches vs Catalyst 2960X/XR Series switches

Catalyst 9200 Series switches



- Both ingress and egress
- 16K Flows/ASIC
- Match on Layer2 VLAN header as well

Layer 2, IPv4 and IPv6 capable

4 banks in ASIC, 2 ingress, 2 egress
Ipv4 flows: 8k per direction
Layer 2 and Ipv6 flows: 4k per direction

Ingress and Egress FnF supported on all ports, VLANs

Catalyst 2960X/XR Series switches



- Only ingress
- 8K Flow/ASIC
- No match on Layer2 VLAN Header

IOT Ready

Fast PoE

- Bypasses IOS control plane boot
- Restores power to PD within 30 sec of power resumption

2-event classification

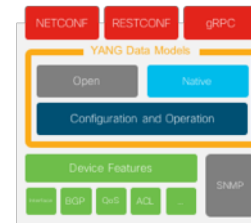
- Fast power negotiation without LLDP
- Physical layer negotiation < 1s

Perpetual PoE

- Uninterrupted PoE power during control plane reboot

Catalyst 9200 enables IoT Readiness

Network Automation



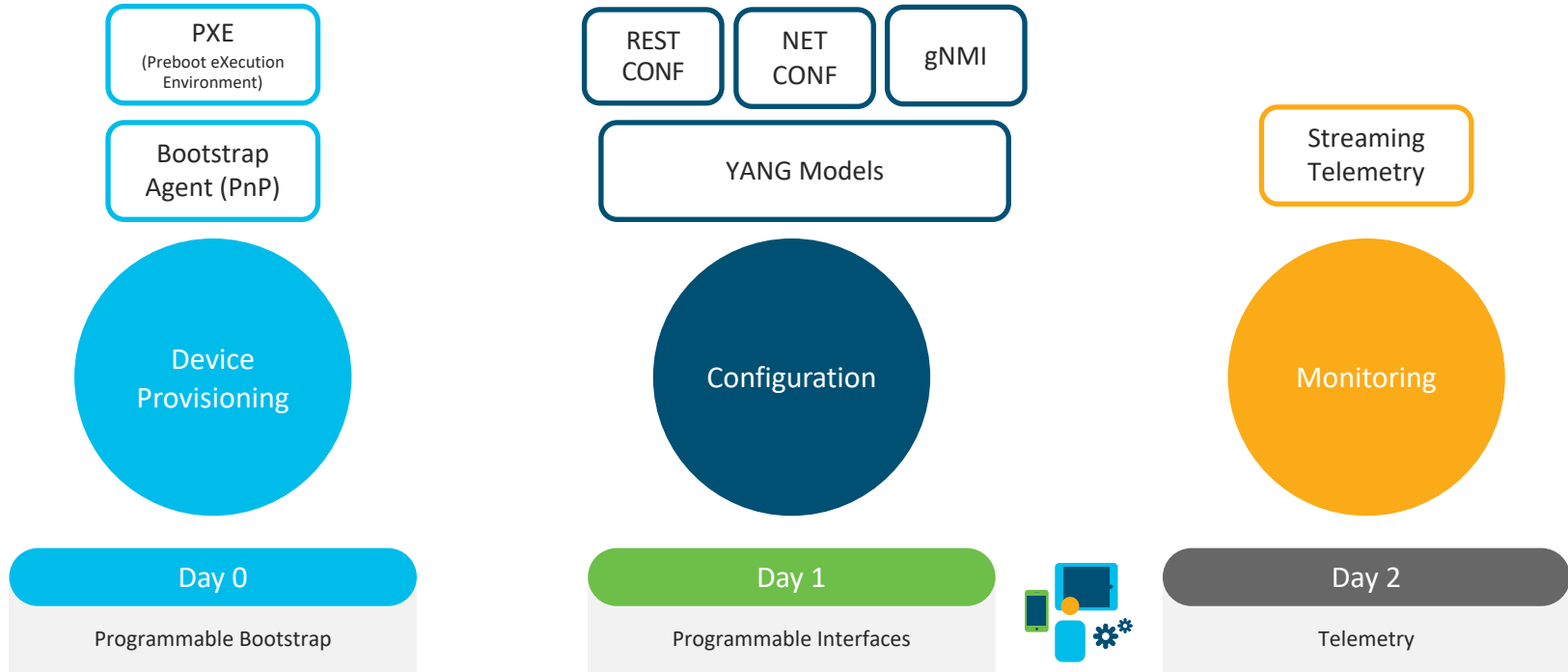
Model Driven APIs
NETCONF, RESTCONF



Python*

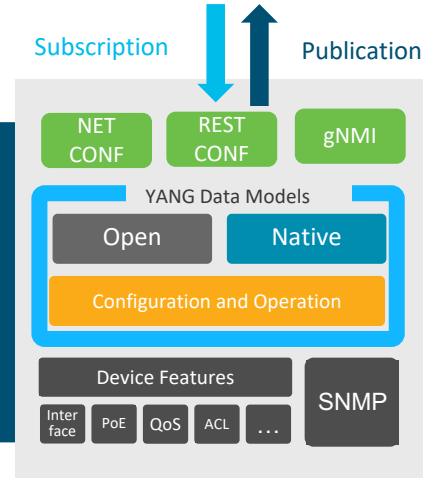
Catalyst 9200 extends **Programmability Everywhere**

Programmability and automation

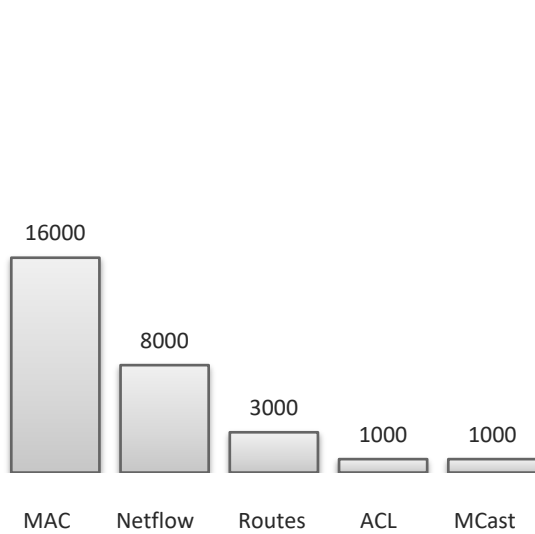


Model driven telemetry

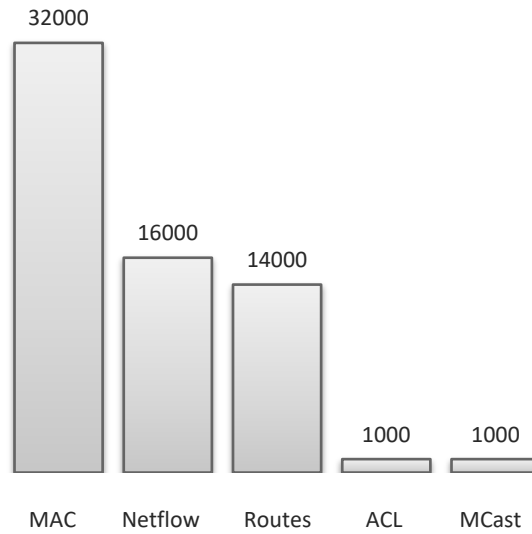
- Support for any YANG subtree
- Structured data
- XML encoding
- Periodic or On-change
- Reduced CPU Load



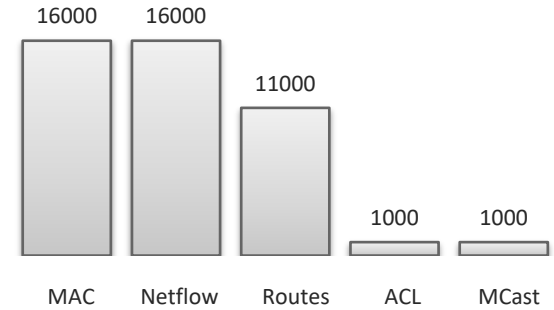
Export enriched, consistent and concise data with context from devices
for a better user and operator experience



Catalyst 2960-X

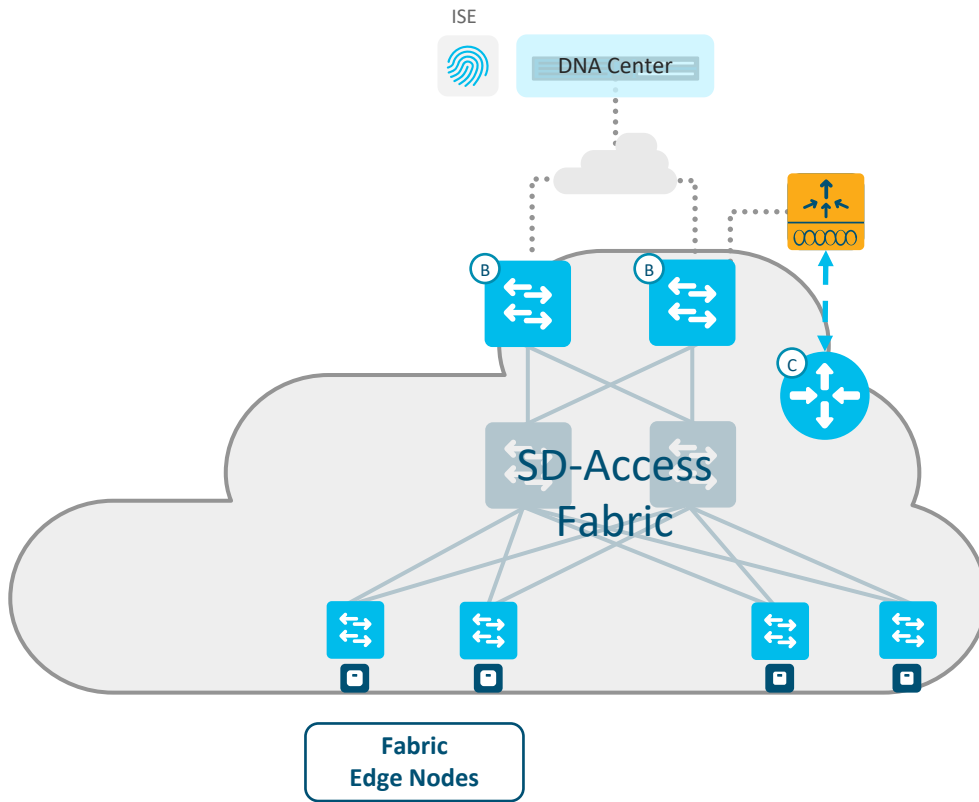


Catalyst 9200



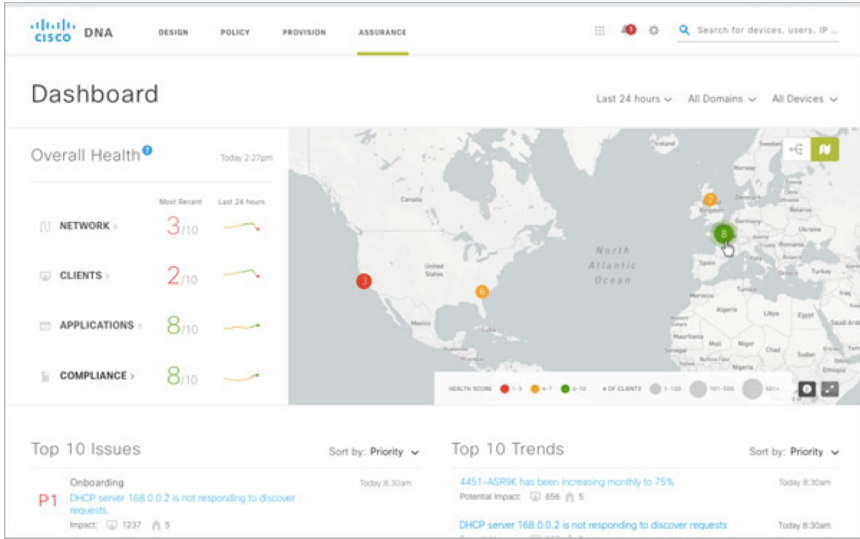
Catalyst 9200L

Catalyst 9200 provides **Right-sized** Scale for **Simple Deployments**

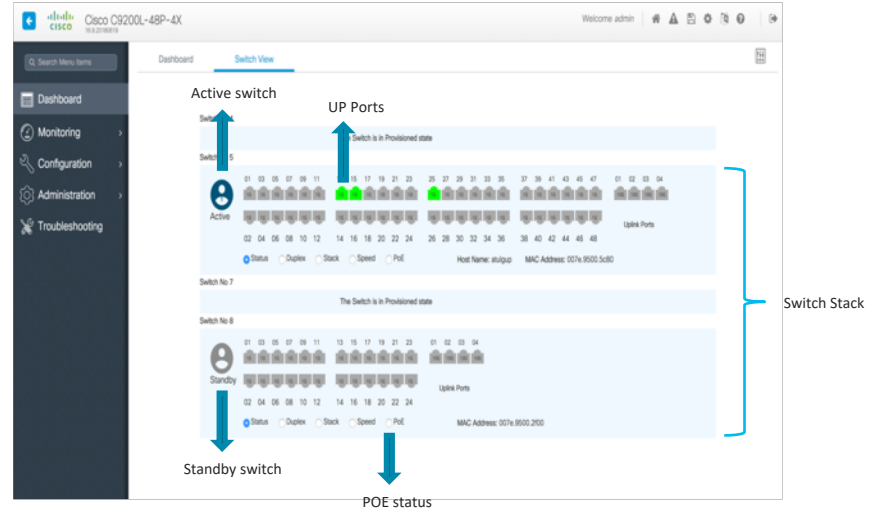


| | 9200 SKUs | 9200L SKUs |
|-------------------------|---------------|---------------|
| Number of User VRFs | 4 | 1 |
| Fabric Enabled Wireless | Roadmap | Not Supported |
| eWLC | Not Supported | Not Supported |
| Fabric in a Box | Not Supported | Not Supported |

Catalyst 9200 extends Fabric Edge Functionality Everywhere



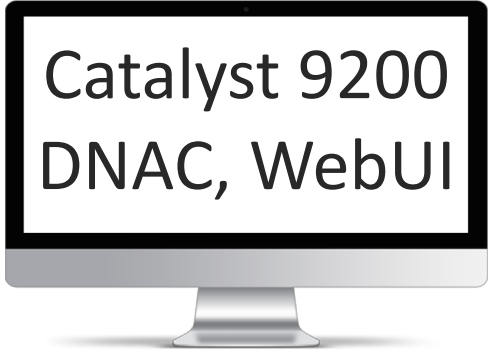
DNAC
Part of the Larger Network



WebUI
Small Branch - CPC Migration

Catalyst 9200 can be **Managed** multiple ways

Demo

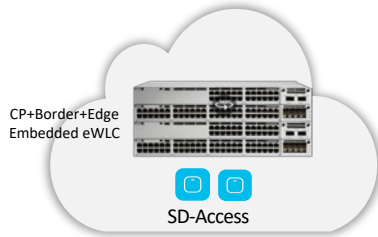


Catalyst 9200
DNAC, WebUI

How do I decide which C9K switch to position for Access?

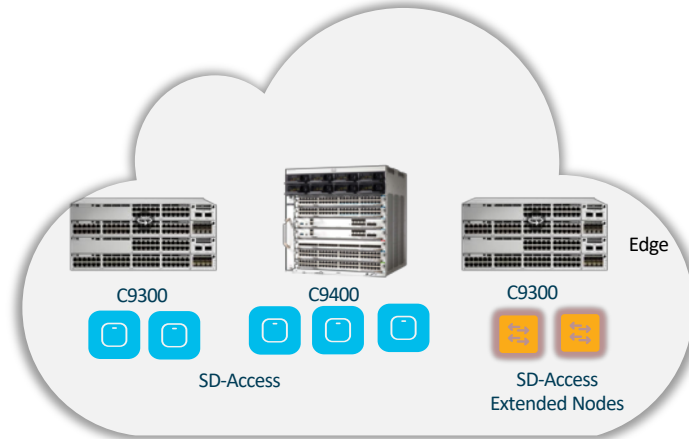
Secure Resilient Campus

Business Critical Branch



Always Lead with 9300

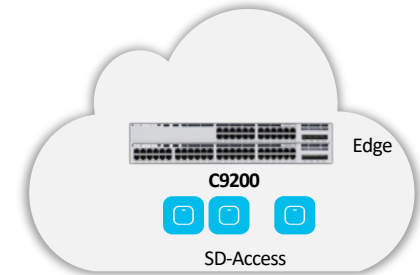
- ✓ Embedded Mobility
- ✓ Full security with visibility
- ✓ No outage
- ✓ Single touchpoint



Always Lead with 9400/9300

- ✓ Designed for Security, Mobility, IOT and Cloud
- ✓ No outage
- ✓ Anomaly/Malware detection for Encrypted Traffic (ETA)
- ✓ Automation and policy
- ✓ Simple to manage

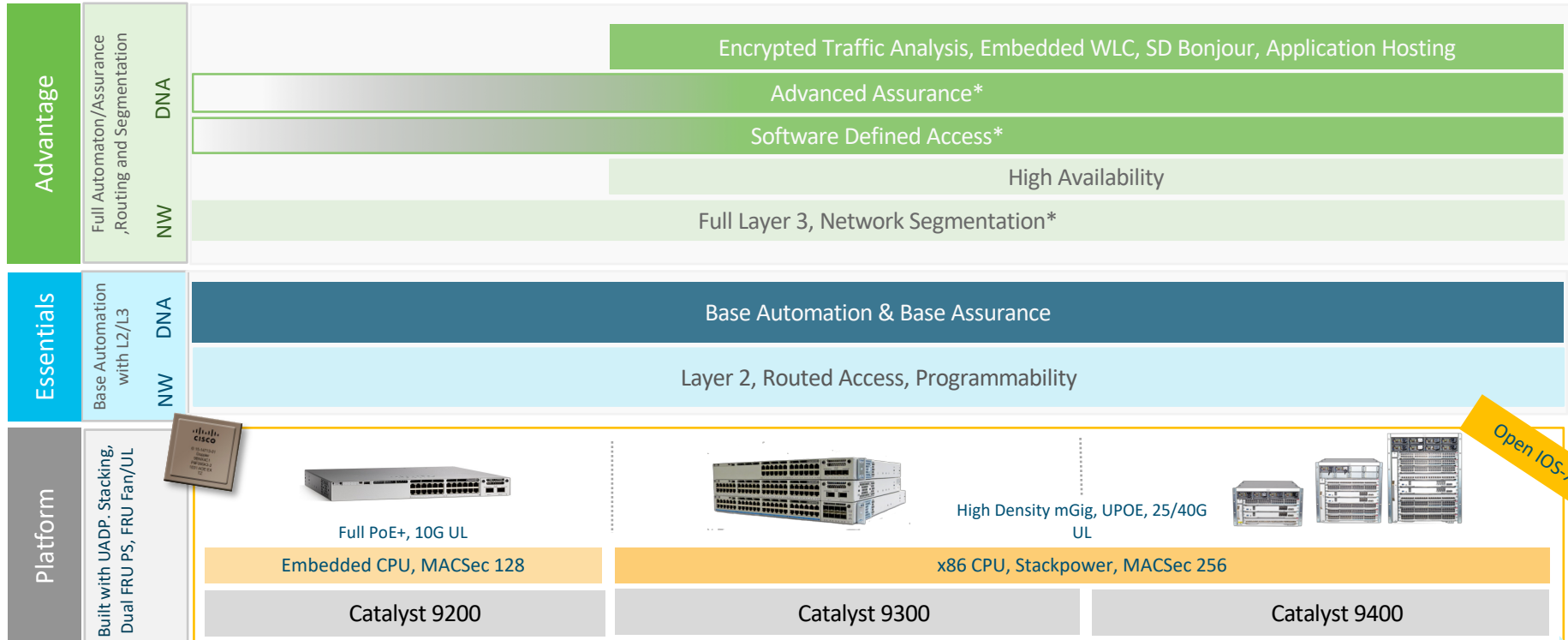
Simple Branch



Consider 9200

- ✓ Extend Automation and policy
- ✓ Multi-box deployment
- ✓ Simple to manage

Catalyst 9k Access Portfolio – Software & Licenses



Increased Scale, Increased Performance, Lower TCO

(*) Increased functionality and scale on 9400/9300

Catalyst 9200 extends your reach everywhere

Complete your online session evaluation

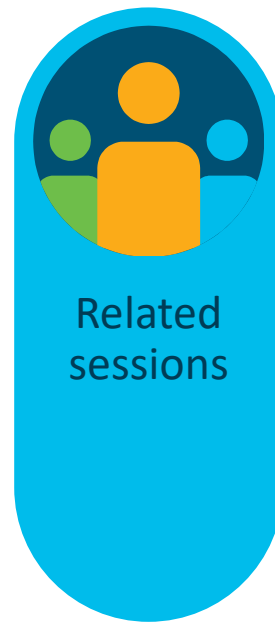
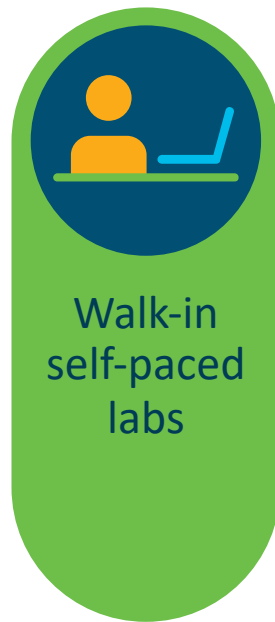
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