
CISCO
You make possible

Introduction to Cisco Catalyst 9800 Wireless Controller

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BRKEWN-2670

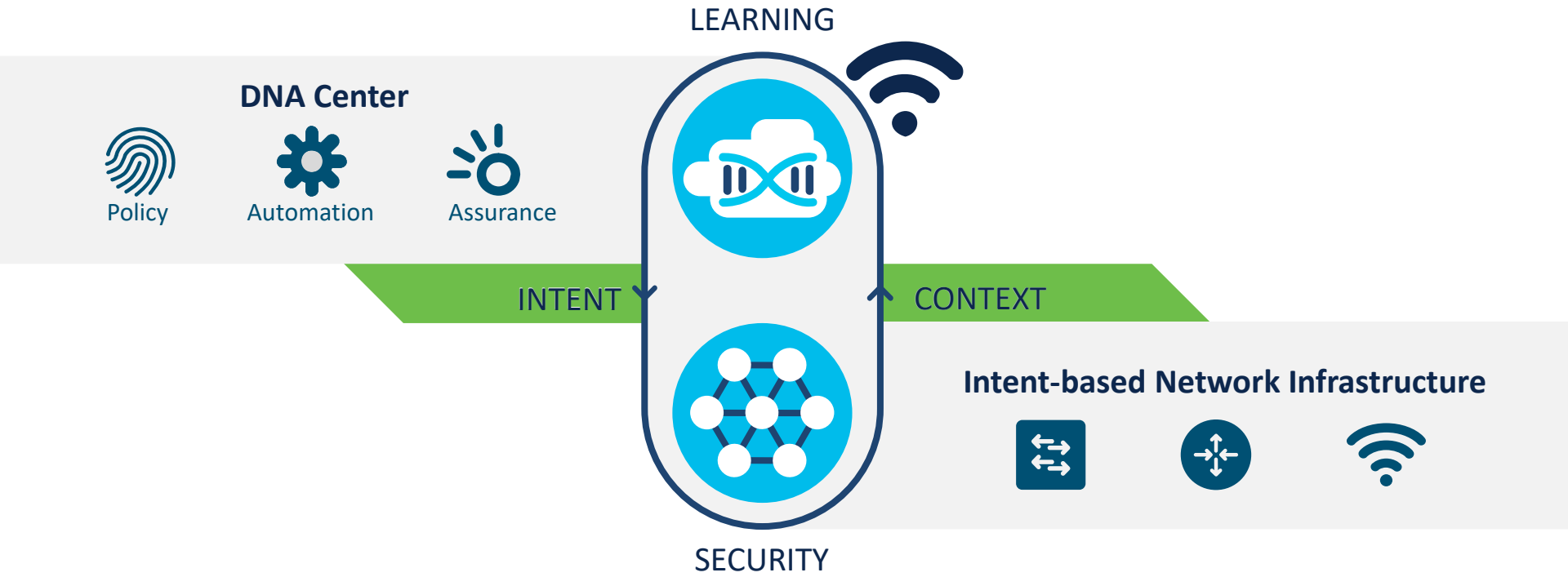
Agenda

- Why Cisco Catalyst 9800
- Platform Support | Software Interoperability
  - Cisco Catalyst 9800 Wireless Controller Appliances
  - Cisco Catalyst 9800 Wireless Controller for Cloud
  - Cisco Catalyst 9800 Series Embedded Controller on Catalyst 9K Switches
  - Embedded Wireless Controller (EWC) on Catalyst 9100 APs
- Key Differentiators
  - High Availability | SSO | Patching | Rolling Upgrades
  - Security and Threat Detection
  - Programmability and Telemetry
- Catalyst 9800 Adoption
  - Configuration Model | Migration | IRCM

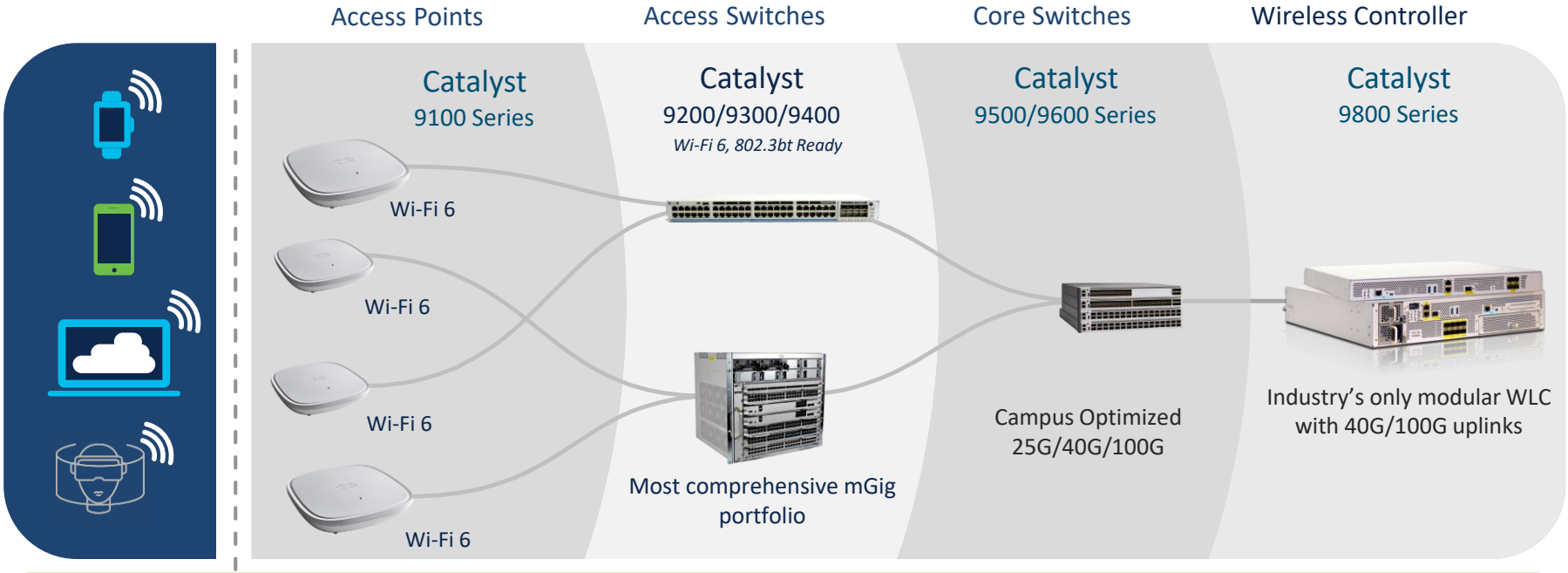
Why Catalyst 9800

You make networking **possible**

Intent-Based Networking (IBN) Strategy



End-to-end Wi-Fi 6 leadership enabling next-generation mobility



Built for intent-based networking

Automation Security Analytics

Cisco Next Gen Wireless Stack

Cisco Catalyst 9800
Wireless Controllers

Cisco Catalyst 9100
Access Points

Managed by

Cisco DNA Center

Translate business intent into network policy and capture actionable insights

Digitized by

Cisco DNA Spaces

Digitize people, spaces and things

Resilient

Secure

Intelligent

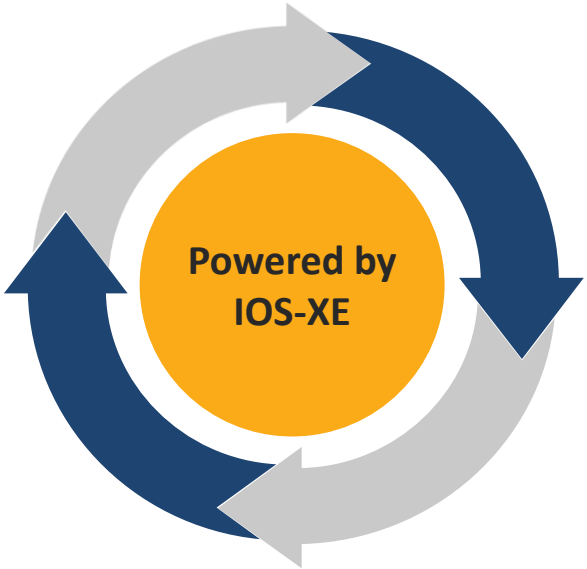
IBN Starts from a Strong Hardware Foundation

C9800 appliance

QFP

QuantumFlow Processor

- Advanced, Multi-Core, Feature-Rich
- **Fully Programmable**
- Scalable
- Advanced on-chip QoS
- Secure
- **Extensible Architecture**



C9800 embedded in Catalyst 9000

UADP

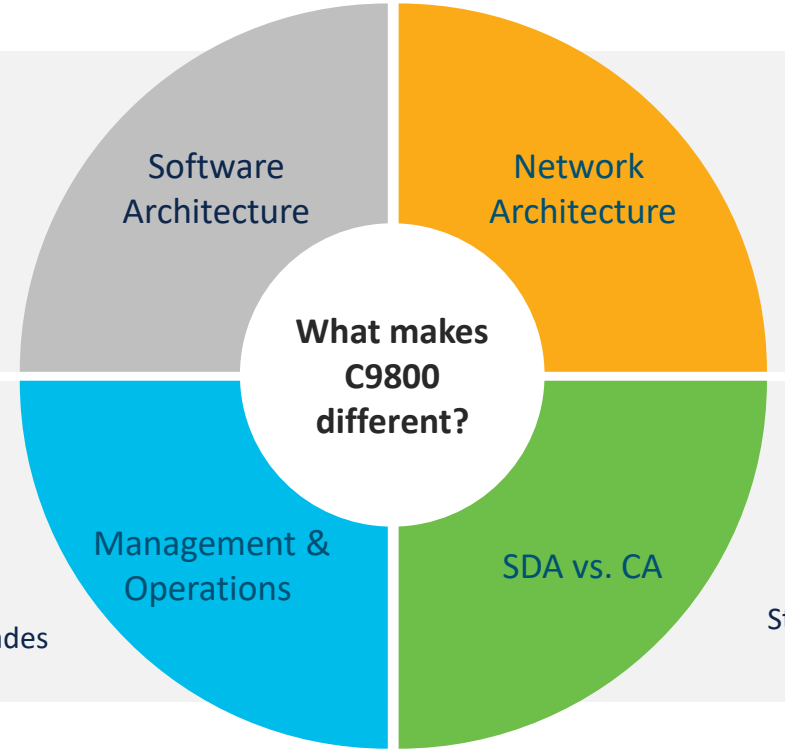
Unified Access Data Plane

- Flexible, Programmable, High-Performance
- Fully Programmable
- Scalable
- Advanced on-chip QoS
- Secure
- Extensible Architecture

100% Cisco-developed Flexible Silicon – Unlocking the Power of DNA at Hardware Speeds

Next Gen Software Architecture

Built from scratch, modular, highly available, scalable, multi-process, wireless software architecture



Control Plane is always centralized
Optimize data plane for Enterprise
(options: CAPWAP, VXLAN, 802.1q)

Managed (Cisco DNAC/Prime)
Fully Programmable
Cisco DNAC Automation
Cisco DNAC Assurance
Hot and cold patches
Zero downtime software upgrades

No MC/MA complex tunneling
Indirect AP Support
Policy abstraction: no VLAN/IP/ACLs
L2 mobility made easy
Stretch subnet without spanning VLANs

New Cisco Catalyst 9100 Series Access Points

Ideal for small to medium deployments | **Mission critical** | **Best in Class**

Powered by Cisco RF ASIC

9115AX

- 4x4 + 4x4
- MU-MIMO, OFDMA
- Spectrum Intelligence
- 1 x 2.5 mGig
- TWT

9117AX

- 8x8 + 4x4
- MU-MIMO, OFDMA (only DL)
- Spectrum intelligence
- 1 x 5 mGig
- TWT
- Integrated Antenna only

9120AX

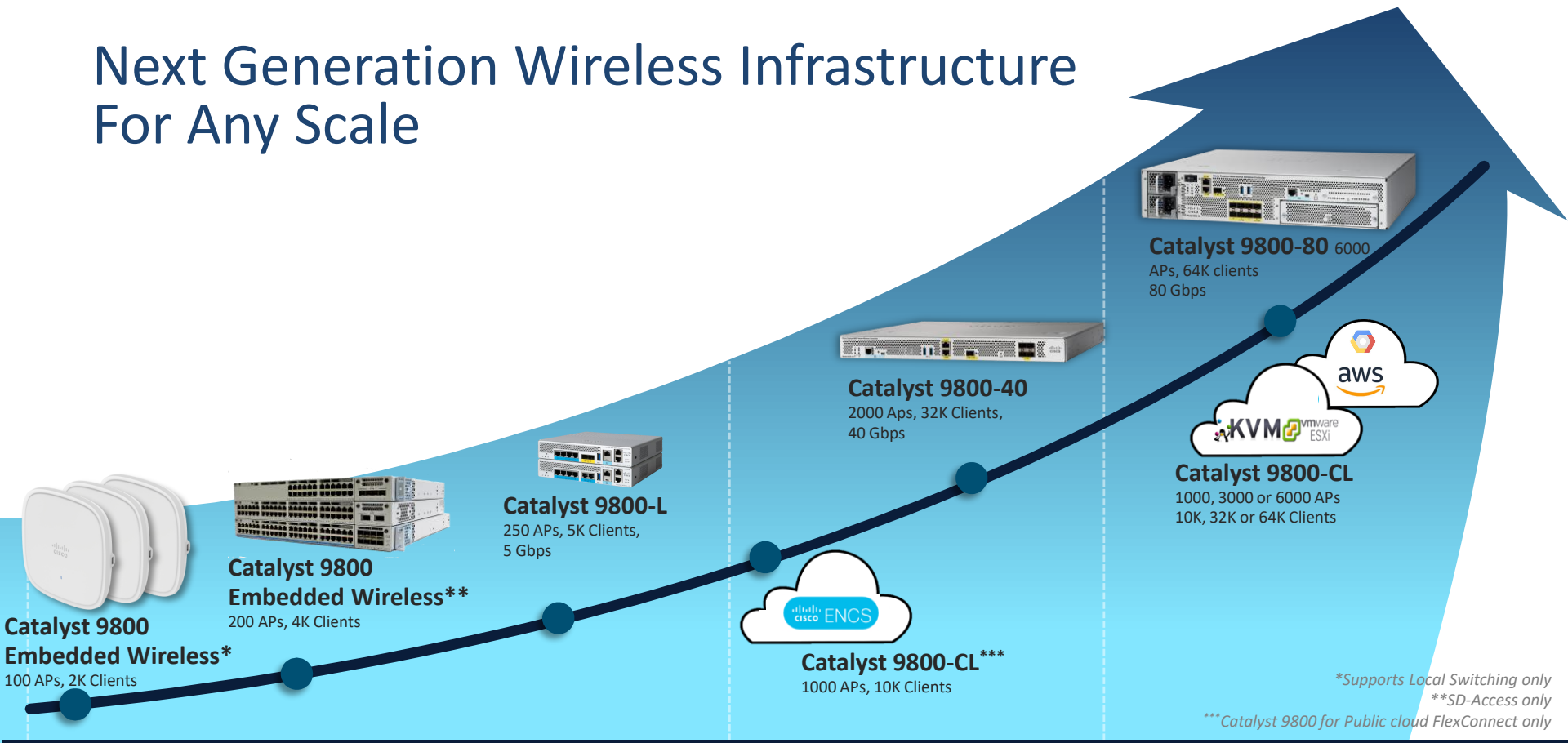
- 4x4 + 4x4
- Cisco RF ASIC
- Dual 5GHz, HDX
- RF Layer 1 detail
- IoT ready (Zigbee, Thread)
- Application Hosting
- 1 x 2.5 mGig
- TWT

9130AX

- 8x8 + 4x4 or 4x4 + 4x4 + 4x4
- Tri-radio (Dual 5GHz + 2.4GHz), HDX
- Cisco RF ASIC
- RF Layer 1 detail, Application Hosting
- Decrypted data packet iCAP
- IoT ready (Zigbee, Thread)
- Industry-first 8x8 AP with external antennas
- 8 port Smart Antennas
- 1 x 5 mGig

DNA Assurance with iCAP | Bluetooth 5 | USB | Integrated or external antenna SKUs

Next Generation Wireless Infrastructure For Any Scale



Cisco Catalyst 9800 Wireless Controller Appliances

You make networking **possible**

Unprecedented Throughput with C9800 Appliances

99%+

Accuracy with
Encrypted Traffic Analytics
and Stealthwatch integration

Catalyst 9800 Series Wireless Controller
Appliances
C9800-40 and C9800-80

Always-on:
High availability and seamless
software updates

Open standards based
programmability with
model-driven telemetry

2x

Throughput option now available
with C9800-80 going up to 80
Gbps

Industry's 1st
100GE uplink

Investment protection
with modular uplinks

Scale options for
your campus

Programmable multi-core
network processor

Cisco Catalyst 9800 Wireless Controller Series: C9800-80-K9

C9800-80-K9
Front Panel

EXTERNAL INTERFACES

- RJ-45 Console Port
- Mini USB Console Port
- 2 External USB Ports
- RJ-45 Ethernet Management Port (SP)
- RJ-45 Ethernet Redundancy port (RP)
- SFP Gigabit Ethernet Port
- BUILT-IN-6x10GE/2x1GE or 10GE
- C9800 Modules

LEDs

- Power Status LED
- Alarm LED
- High availability LED
- USB console LED
- 10/100/1000 RJ45 Link LED
- 10/100/1000 RJ45 Activity LED
- SSD Activity LED
- System Status LED

- Power Supply (PEM 0)
- Power Supply (PEM 1)
- Power Switch

Dimensions of C9800-80-K9: 17.3” (439.42 mm) wide, 3.5” (88.9 mm)tall (2RU), and 22.0” (558.8 mm) deep

(Compared to
30.8 “ for 8540)

Industry's First Controller with Modular 100G Uplink

C9800 Modules Support

- **C9800-2X40GE**
- **C9800-1X40GE**

- **C9800-18X1GE**

Eighteen 1GE-ports that support small form-factor pluggable (SFP) optical transceivers to provide network connectivity. Ports are numbered 0 – 17

- **C9800-10X10GE**

Ten 10GE-ports that support small form-factor pluggable (SFP+) optical transceivers to provide network connectivity. Ports are numbered 0 – 9.

- **C9800-1X100GE**

QSFP MODULES

- **QSFP-40G-SR4**
- **QSFP-40G-LR4**
- **QSFP-40GE-LR4**
- **QSFP-40G-ER4**
- **QSFP-40G-SR4-S**
- **QSFP-40G-LR4-S**
- **QSFP-40G-SR-BD**
- **QSFP-40G-BD-RX**

Cisco Catalyst 9800 Wireless Controller Series: C9800-40-K9

C9800-40-K9 Front Panel

EXTERNAL INTERFACES

- RJ-45 Console Port
- Mini USB Console Port
- 2 External USB Ports
- RJ-45 Ethernet Management Port (SP)
- RJ-45 Ethernet Redundancy port (RP)
- SFP Gigabit RP Port
- 4 x 10GE/1GE SFP and SFP+ ports

LEDs

- Power Status LED
- Alarm LED
- High availability LED
- USB console LED
- 10/100/1000 RJ45 Link LED
- 10/100/1000 RJ45 Activity LED
- SSD Activity LED
- System Status LED

Gigabit SFP RP Port

Dimensions : 17.3” (439 mm) wide, 1.75”(44.4 mm) tall (1RU), and 18.3”(464 mm) deep*

C9800-40-K9

AIR-CT-5508-K9

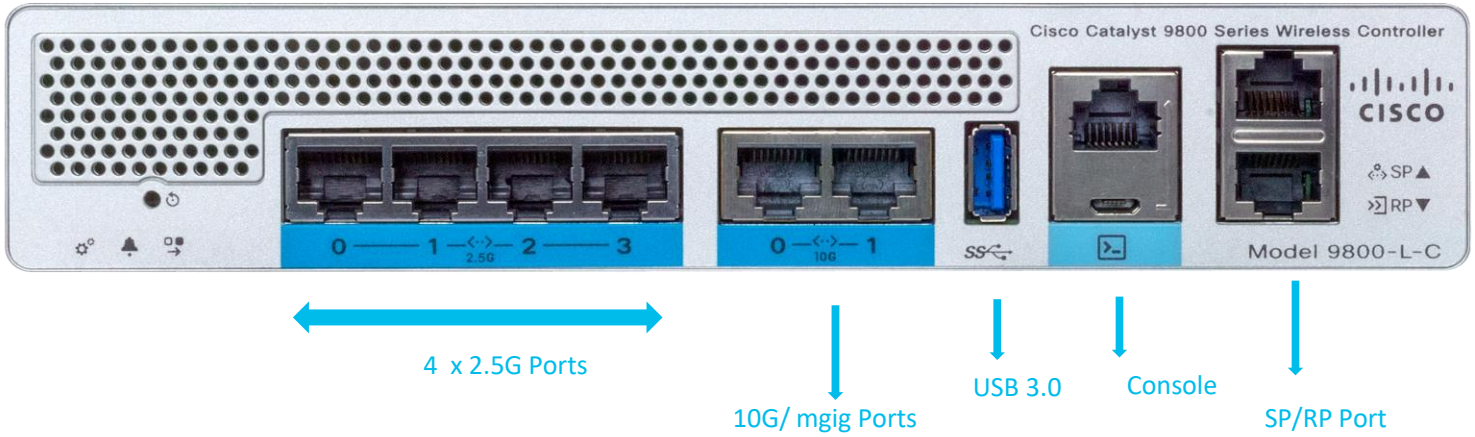
AIR-CT-5520-K9

*compared to 30.98” (786 mm) in 5520

Cisco Catalyst 9800 Wireless Controller Series: C9800-L

Industry's First Fixed Wireless Controller with Seamless Software Updates

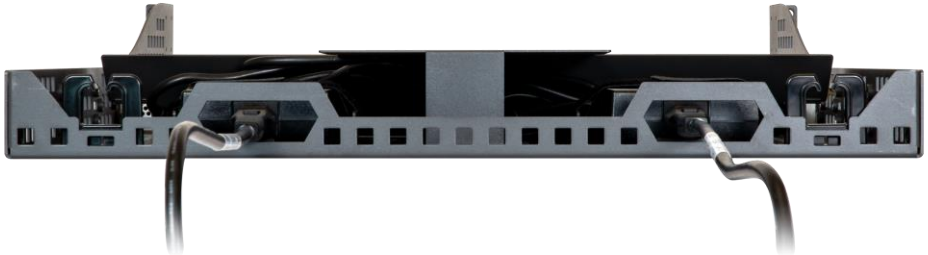
Up to 250 APs	Up to 5,000 Clients	5 Gbps

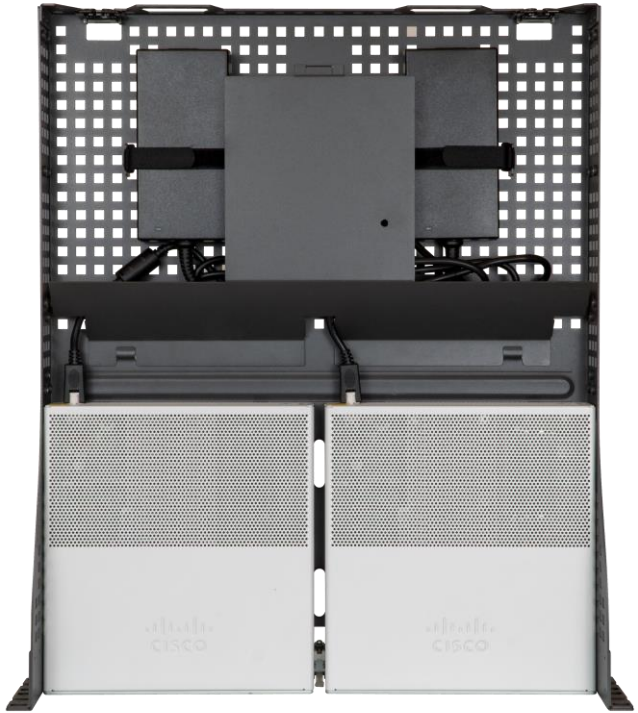


Fully programmable multi-core network processor	Support for Netflow, AVC and ETA

C9800-L Racking Tray

Fit 2 units in 1RU with a ‘toolless' snap-in rackmount installation (with exception to the rack screws)

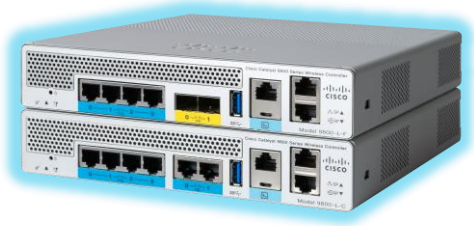




9800-L Performance License Strategy

250 APs
5k Clients
Max Throughput (*): 5Gbps

Performance License*



500 APs
10K Clients
Max Throughput (*): 10 Gbps

- ✓ Same device can scale up to higher no. of APs and higher throughput
- ✓ Ability to upgrade at any point without having to buy new hardware
- ✓ Complete investment protection
- ✓ It supports smart licensing and for HA SSO it should be present on both boxes

(*) Max throughput is calculated with large packets, with IMIX traffic and small packets the numbers will be lower

Cloud-based Controllers

Some definitions first…

- Customer has unique access to dedicated DC virtualized or physical resources
- The resources are onPrem DC or hosted by a Colo provider
- WLC as a Virtual Machine

- Customer doesn't own the infrastructure (computing, storage, networking).
- WLC is consumed as Infrastructure as a Service (IaaS)

- Simply the reality…
- Customer will have both Private and Public cloud deployments for some time

Cisco Catalyst 9800 Series for Private and Public Cloud

Cisco Catalyst 9800-CL for private cloud

- Scale to 6000 APs and 64,000 clients*
- Centralized, Cisco FlexConnect®, fabric
- Open and programmable

Cisco Catalyst 9800-CL for private cloud

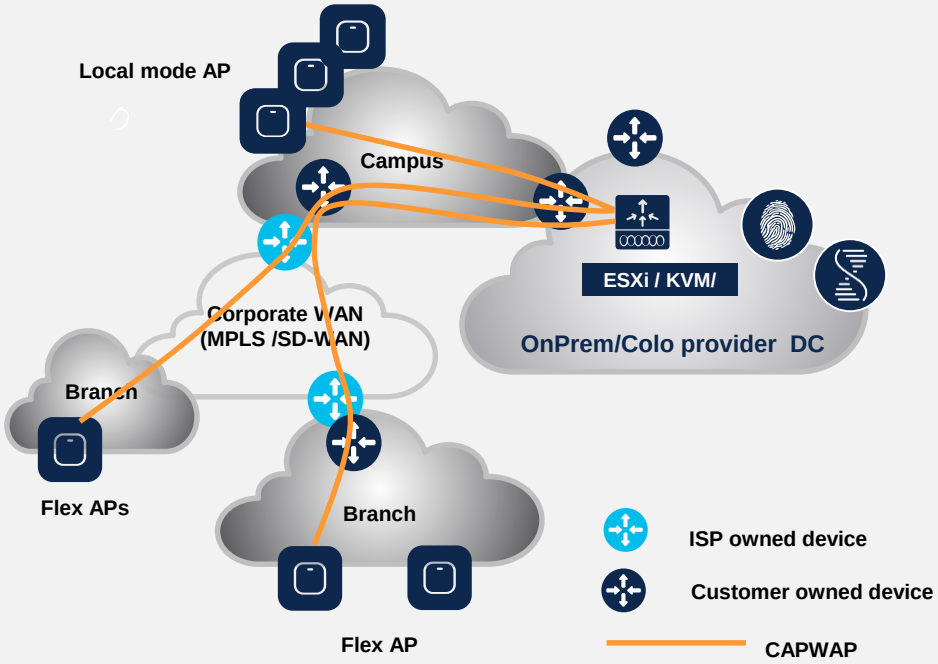
- Scale to 1000 APs and 10,000 clients
- Cisco FlexConnect local switching
- Open and programmable
- Requires Managed VPN to the Cloud

*Only with Cisco FlexConnect and fabric mode for 6000 AP support

Private Cloud

You make multi-cloud **possible**

Catalyst 9800 Private Cloud Deployment



- **Customer value prop:**
  - Deploy wireless controller where you want it, how you want it
  - All AP modes supported
  - Feature parity with appliance (only exception is GuestShell)

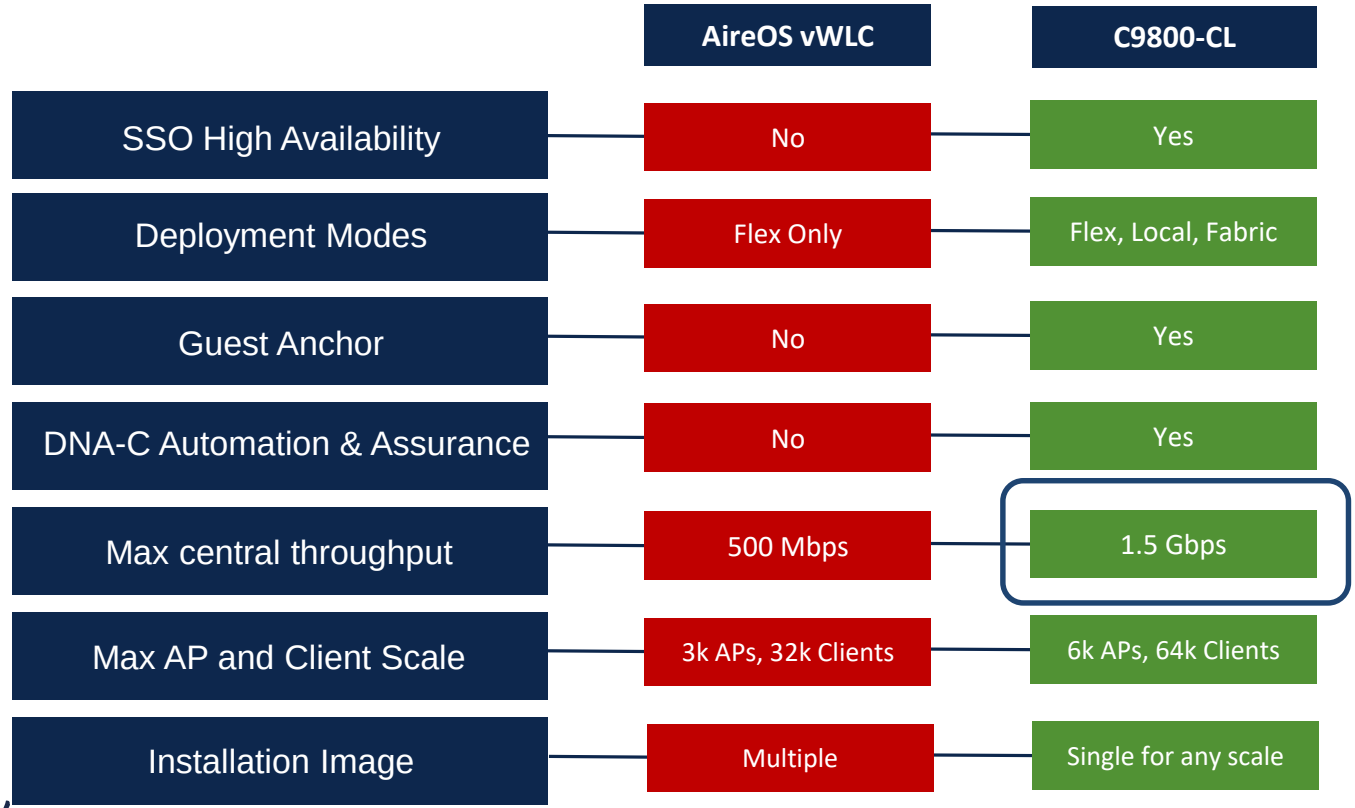
- **Support**
  - VMware ESXi , KVM, Hyper-V and ENCS
  - Wi-Fi 6, Wave2 and Wave1 APs
  - Centrally switched traffic <= 1.5 Gbps
  - ESXi vCenter or KVM Virt-Mgr for VM provisioning
  - Automated VM bootstrap flow (ESXi vCenter only)

Hyper-V Specification

- Supported on C9800-CL IOS-XE 17.1
- Hyper-V Supported platforms
  - Windows 2016 Server
  - Windows 2019 Server
  - Windows server core 2016
  - Windows server core 2019

Model Configuration	Small (17.1)	Medium(17.1)	Large(17.1)
Maximum Access Points	1,000	3,000	6,000
Maximum Clients Support	6,000	32,000	64,000
Minimum Number of vCPUs	4	6	10
Minimum Memory (GB)	8	16	32
Required Storage (GB)	8	8	8

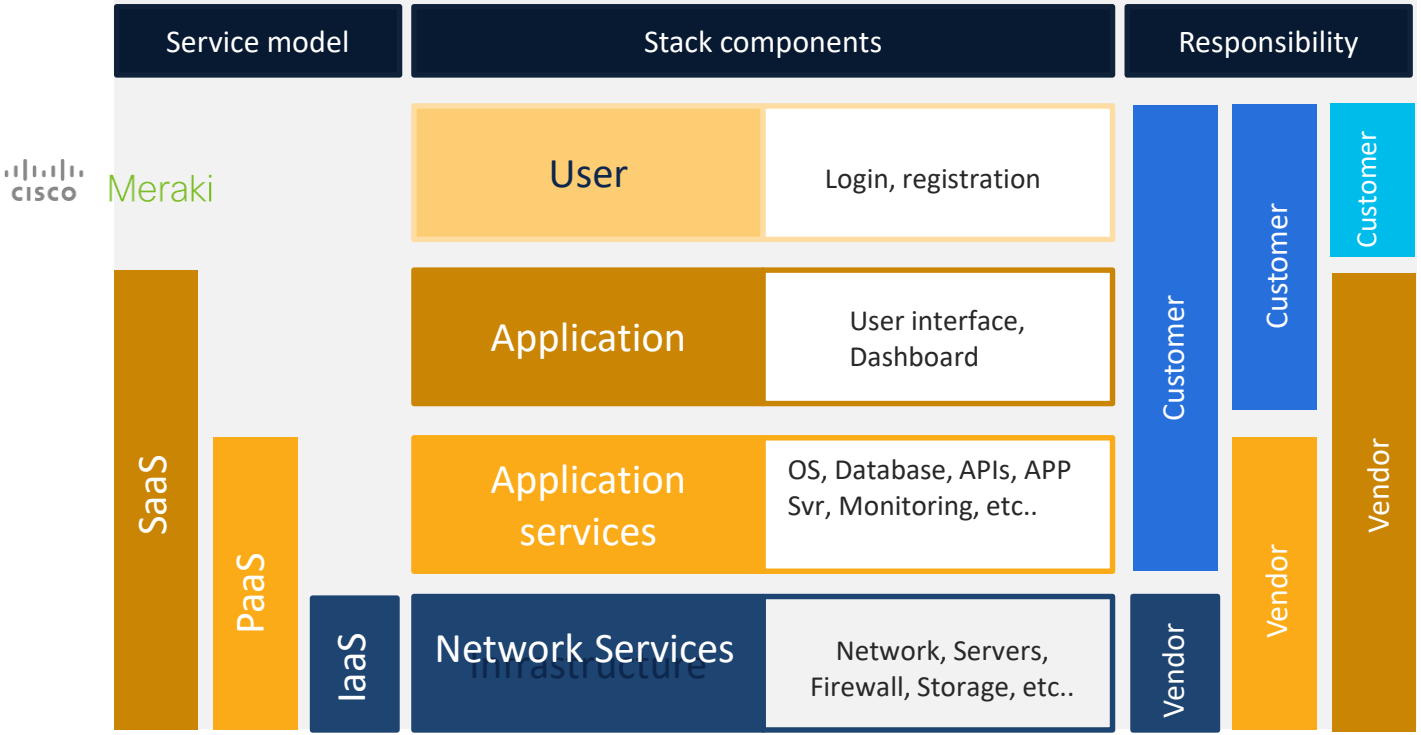
C9800-CL for Private Cloud vs. AireOS vWLC



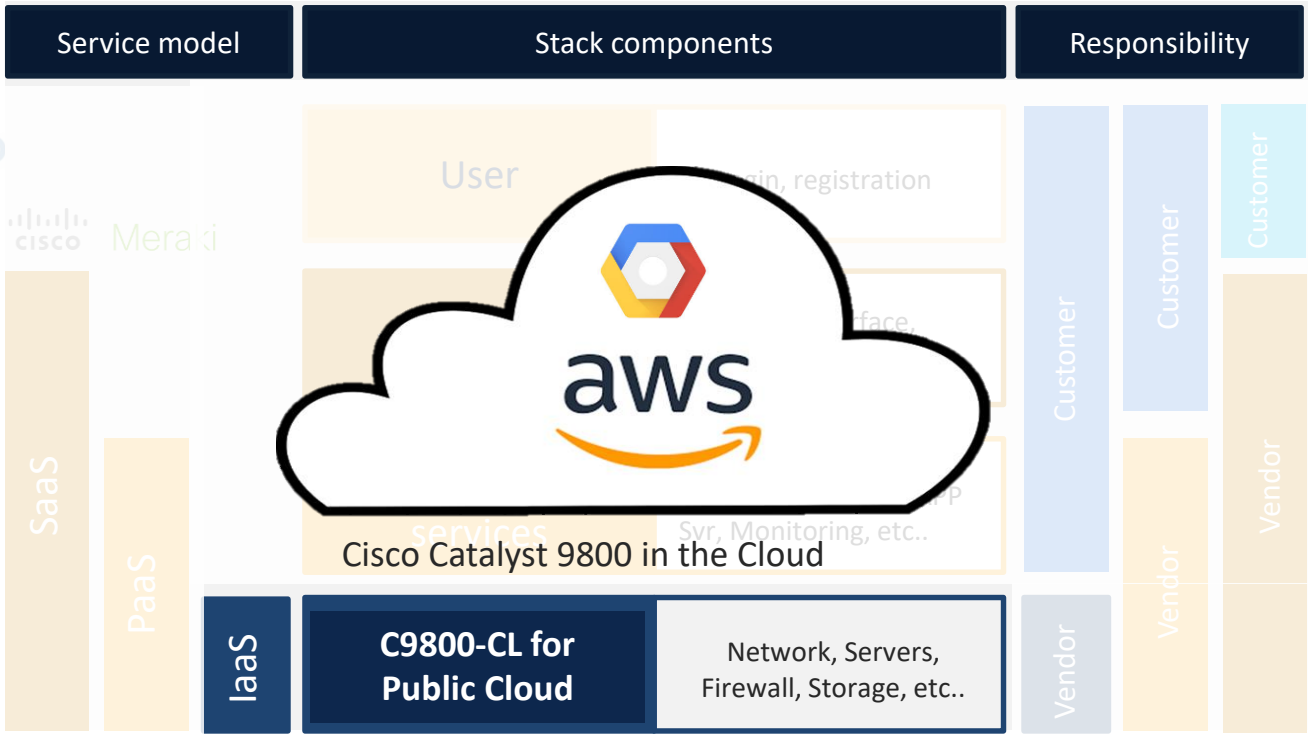
Public Cloud

You make multi-cloud **possible**

Public Cloud Deployment Models



Public Cloud Deployment Models



Advantages of C9800-CL in Public Cloud

$0

The C9800-CL Wireless Controller price

7 minutes

Time taken to deploy C9800-CL for AWS

Up to 50%

Cost Savings seen by a large enterprise by deploying C9800-CL for Private Cloud

VMware® VMotion

No more planned / unplanned outages

AWS GovCloud

Host the Catalyst 9800 Series controller in AWS' FedRAMP certified GovCloud

Agility - simple to deploy

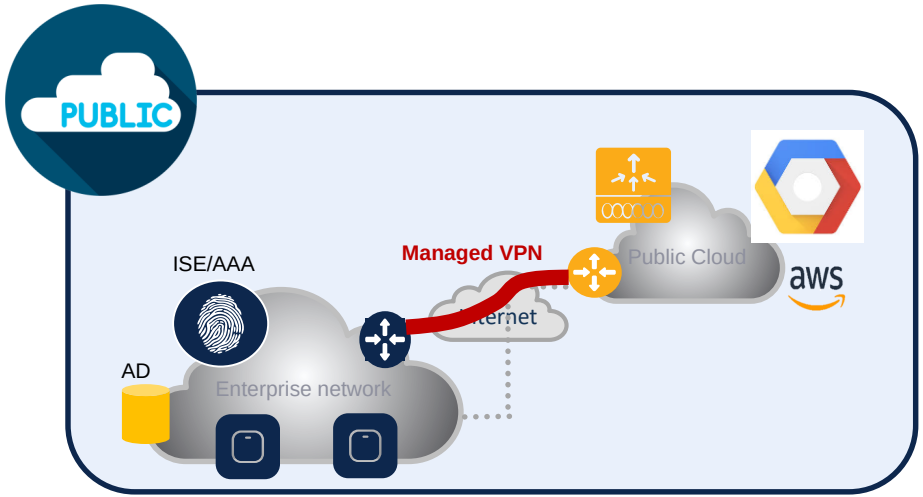
Scale based on network size

Global Footprint

Cost Effective

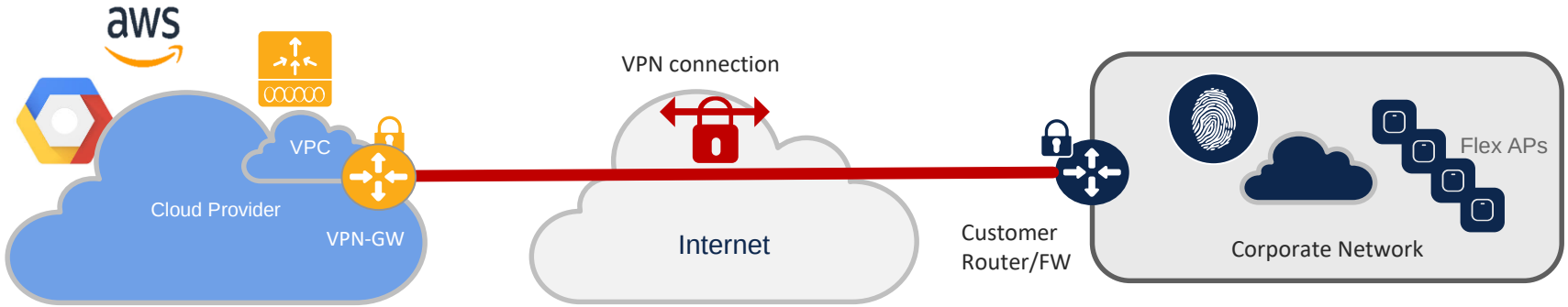
cisco Live!

Catalyst 9800 Wireless Controller for Cloud
AWS and GCP



- Google Cloud Platform with Managed VPN
  (*AWS support introduced in FCS)
- 6,000 APs / 64,000 Clients
- FlexConnect local switching only
- ISE and AD typically on Prem
- N+1 high availability
- Smart License Management &
  DNA subscription based AP licenses

Public Cloud – Managed VPN



Cisco Catalyst 9800 Series Wireless Controller on Catalyst 9K Switches

For SDA Deployment Only

SD-Access Everywhere

Optimized for Distributed Braches → Small and Medium Campus → Medium and Large Campus

On Switch

- Cisco IOS® XE Software
- Cat 9300, 9400, 9500
  - 200 AP, 4k Clients
- SD-Access wireless with Cat9800 Software Package
- Indirect AP Support
- Optimized for Mobility
- Centralize Control Plane
- Always on Fabric with robust HA

On Private Cloud

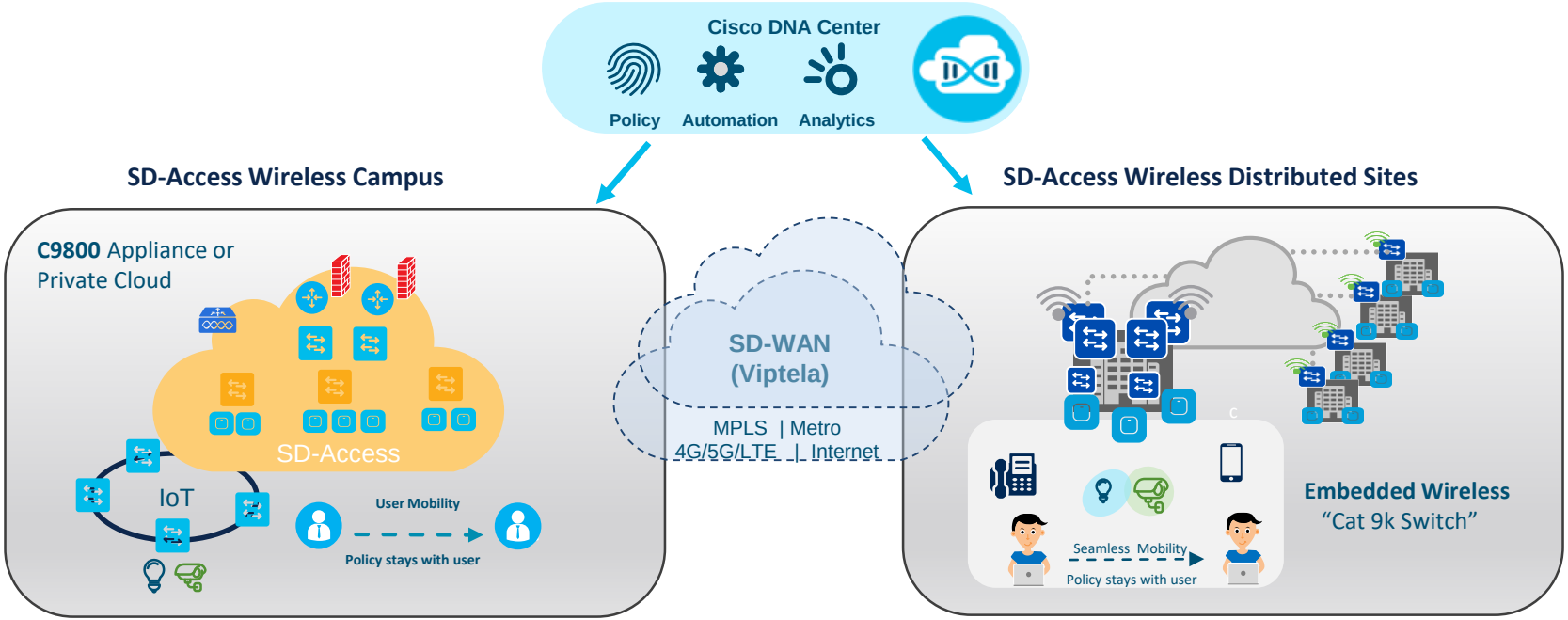
- Cisco IOS® XE Software
- C9800-CL
  - 1k AP, 10k Clients
  - 3k AP, 32k Clients
  - 6k AP, 64k Clients^
- Scale on demand
- Optimized for mobility
- Designed for IoT
- Always on Fabric with robust HA

On Appliance

- Cisco IOS® XE Software
- C9800-40-K9
  - 2k APs, 32k Clients
- C9800-80-K9
  - 6k APs, 64k Clients
- Optimized for mobility
- Designed for IoT
- Always on Fabric with robust HA

Catalyst 9800 SD-Access Wireless

Introducing SD-Access Multi-Site Wireless Solution



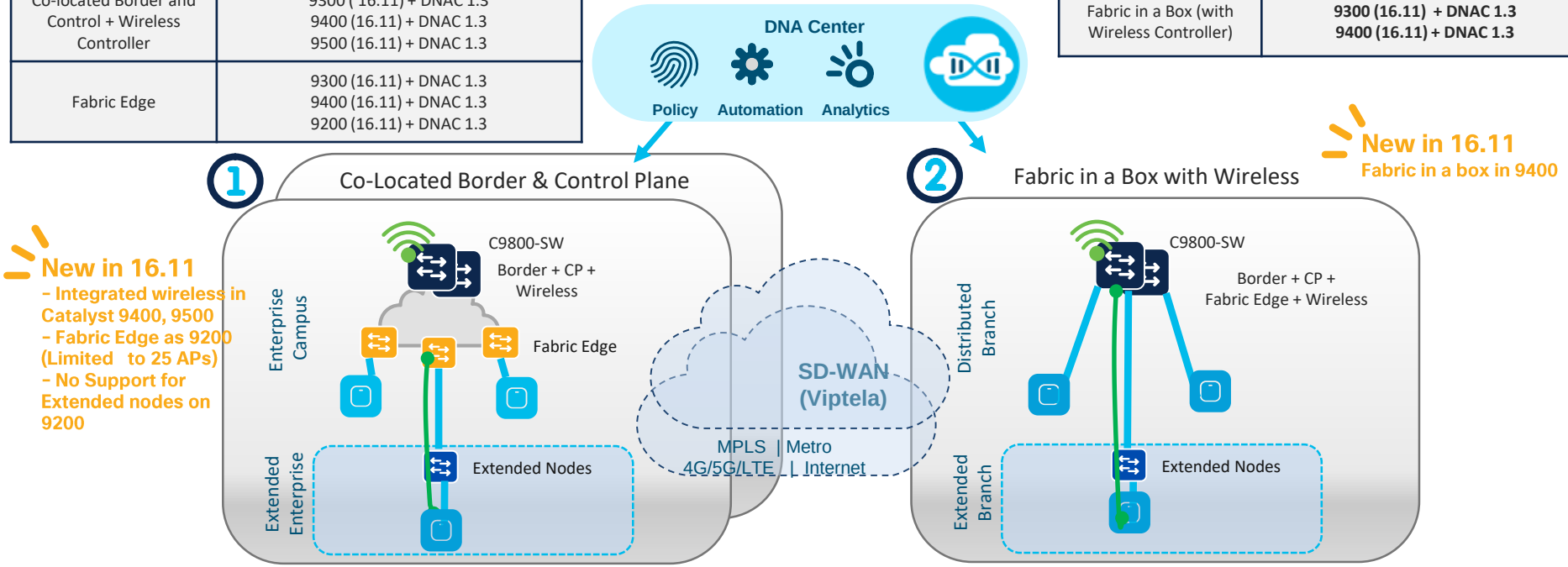
Highly Secure and Optimized Solution for Campus and Distributed Sites

Catalyst 9800 SD-Access Embedded Wireless

DNAC 1.3

Function	Catalyst
Co-located Border and Control + Wireless Controller	9300 (16.11) + DNAC 1.3 9400 (16.11) + DNAC 1.3 9500 (16.11) + DNAC 1.3
Fabric Edge	9300 (16.11) + DNAC 1.3 9400 (16.11) + DNAC 1.3 9200 (16.11) + DNAC 1.3

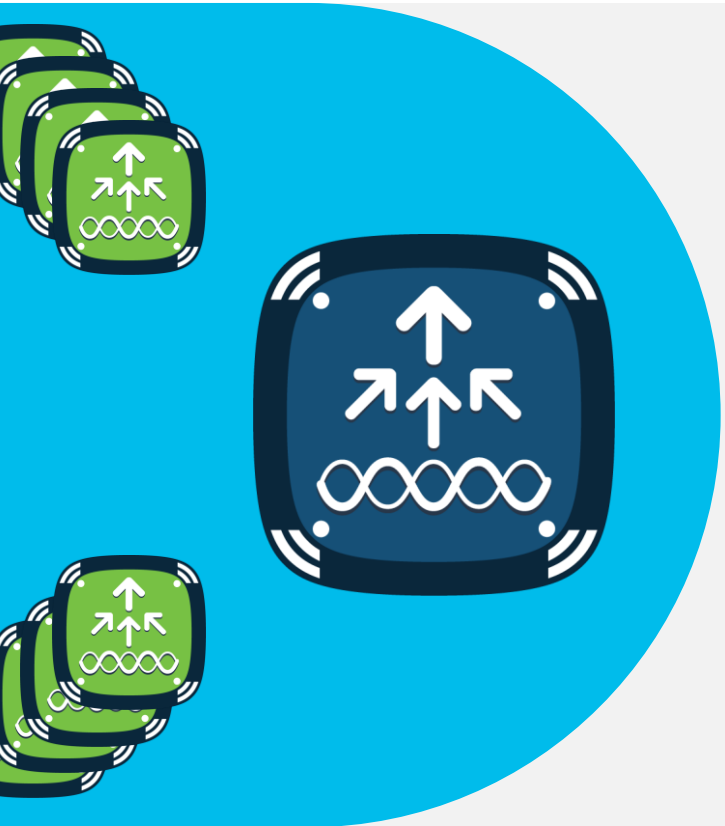
Function	Catalyst
Fabric in a Box (with Wireless Controller)	**9300 (16.11) + DNAC 1.3** **9400 (16.11) + DNAC 1.3**



Highly Secure and Optimized Solution for Branch and Small Campus

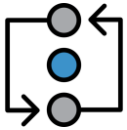
Embedded Wireless Controller (EWC) on Catalyst 9100 APs

Embedded Wireless Controller on Catalyst 9100 Ready for Enterprise deployments



Runs C9800 **IOS-XE** Wireless Controller on Catalyst Access Points	Modern OS, scalable, open and programmable, supports telemetry
Supports Advanced Enterprise Feature Set	HA, SMU, aWIPS, Umbrella, NetFlow, ICAP
Flexible Management Options	Use Mobile App, WebUI and DNA-C to Deploy, Manage and Monitor
Investment Protection	Migrate Access Points to controller for more than 100 Access Points

Ready for Enterprise Branch Deployme



Redundancy with Active & Standby Controllers running simultaneously on two Access Points

<10 seconds

Active to Standby switchover in a few seconds

SMU(patching) support for both Controller and Access Point

aWIPS*, Rogue detection, identification and **mitigation**

Walled Garden & DNS Blocking[1]

cisco
Cisco Umbrella

Cloud Delivered Enterprise Security with Cisco Umbrella*

Simplified WebUI for Monitoring, Provisioning and Day-N Operations

DNA Center

PnP, Automation and Assurance

Open standards based programmability with NETCONF, YANG

#CiscoLiveAPJC

Resilient

Secure

Intelligent & IT Simplicity

Embedded Wireless Controller Catalyst 9100 Access Points

Ideal for single or multi-site small to medium Enterprise deployments

Mission Critical
Best suited for High Density Enterprise Branch Deployments

Best in Class

C9115AX-EWC

- **50 Access Point, 1000 Clients**
- 4x4 + 4x4
- MU-MIMO, OFDMA
- Spectrum intelligence
- Bluetooth 5
- 1 x 2.5 mGig
- USB
- Integrated or External antenna

C9117AX-EWC

- **50 Access Point, 1000 Clients**
- 8x8 + 4x4
- MU-MIMO, OFDMA (only DL)
- Spectrum intelligence
- Bluetooth 5
- 1 x 5 mGig
- USB
- Integrated Antenna only

C9120AX-EWC

- **100 Access Point, 2000 Clients**
- 4x4 + 4x4
- MU-MIMO, OFDMA
- Cisco RF ASIC
- Dual 5GHz, HDX
- RF signature capture
- 1 x 2.5 mGig
- Integrated or External antenna

C9130AX-EWC

- **100 Access Point, 2000 Clients**
- 8x8 + 4x4 or 4x4 + 4x4 + 4x4
- Tri-radio (Dual 5GHz + 2.4GHz), HDX
- Cisco RF ASIC
- RF signature capture
- Decrypted data packet iCAP
- 1 x 5 mGig
- 8 port Smart Antennas

Software Feature Parity across APs

Supports up to 100 APs, 2000 Clients

Supports Wave 2 APs as client serving

Cisco DNA Assurance with ICAP

What About 802.11ac Wave 2 Access Points?

Supports client serving mode

Ideal for small to medium-sized deployments

Mission critical

Indoor

1815W

1815I, 1815M

1832

1842

1852

2802

3802

4800

Outdoor

1540

1560

ALL 11ac Wave 2 Access Points can connect to Embedded Wireless Controller

Cisco Recommended Releases
Catalyst 9800 and 3504/5520/8540 AireOS Wireless Controllers

Access Points	IOS-XE	AireOS	DNA-C	Prime	CMX	ISE
C9115AX, C9117AX, C9120AX, 9130AX	16.12.2s	8.10.105.0	1.3.2	3.7MR1	10.6.2	2.2 2.4 2.6
Wave 2	16.12.2s	8.5.161.0	1.3.2	3.7MR1	10.6.2	2.2 2.4 2.6
Wave 2 4800 APs	16.12.2s	8.8.125.0	1.3.2	3.7MR1	10.6.2	2.2 2.4 2.6

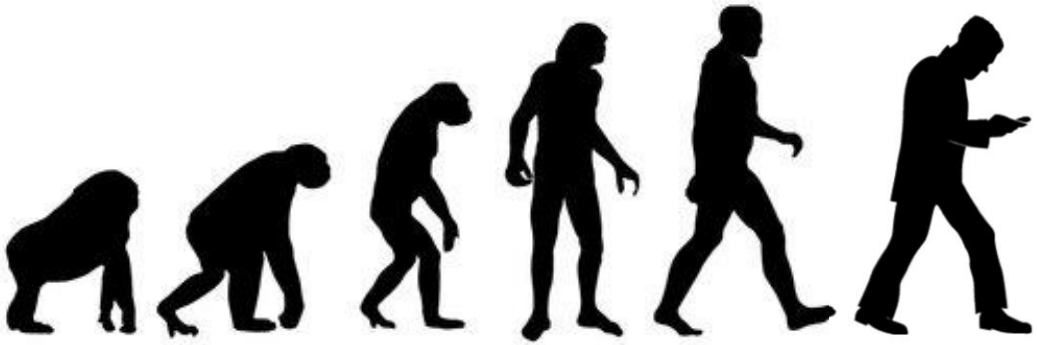
Key Differentiators

You make networking **possible**

Resiliency

How long can people survive without Internet ?

Beginning of Time ← **1990** → **Now**



2,000,000 years

5.26 min

per Year !

High Availability

Reducing downtime for Upgrades and Unplanned Events

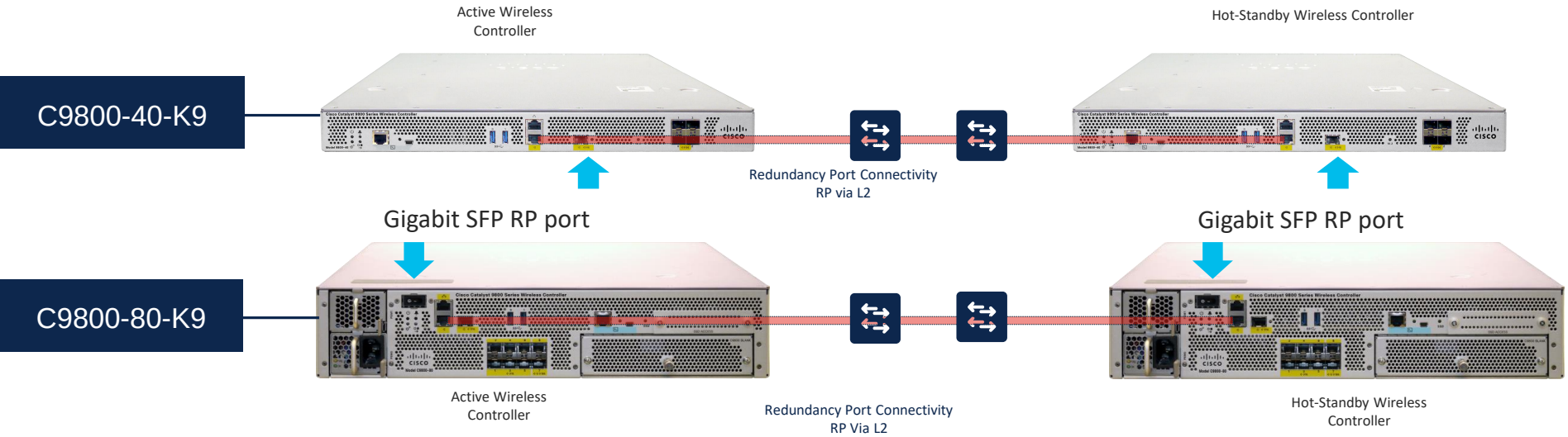
Cisco Catalyst 9800 Wireless Controller Differentiators

^ MD Release Only

High Availability – Stateful Switch Over (SSO)

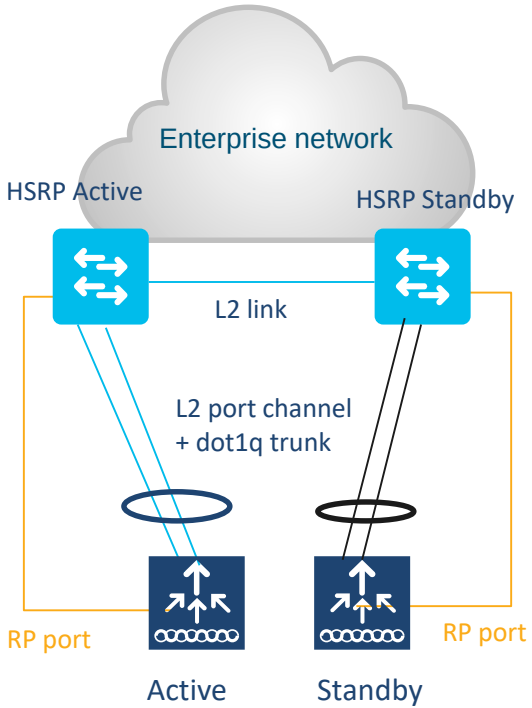
A direct physical connection between Active and Standby Redundant Ports or Layer 2 connectivity is required to provide stateful redundancy within or across datacenters

Sub-second failover and zero SSID outage



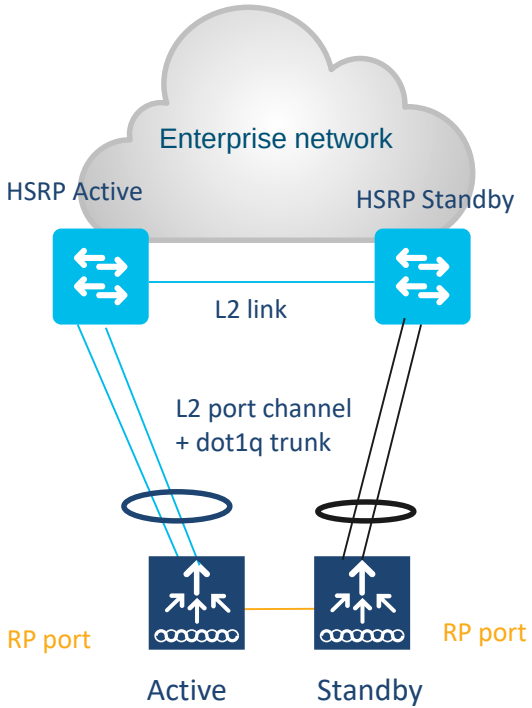
The only supported SFPs on Gigabit RP port are : GLC-SX-MMD and GLC-LH-SMD

Dual Distribution Switches with HSRP (before 17.1)
SSO HA pair



- For SSO HA, connect the Standby in the same way
- Single L2 port-channel on each box. Ports connected to Active and ports connected to Standby must be put in different port-channel
- Enable dot1q to carry multiple VLANs
- IMPORTANT: **only LAG with mode ON is supported**
- IMPORTANT: **connect RP port to the same distribution switch as the uplinks and not back to back**
- Make sure that switch can scale in terms of ARP and MAC table entries
- **This is a supported topology**

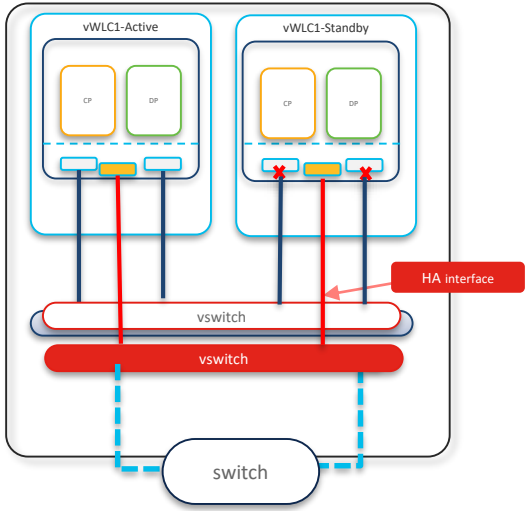
Dual Distribution Switches with HSRP (17.1 and higher)
SSO HA pair



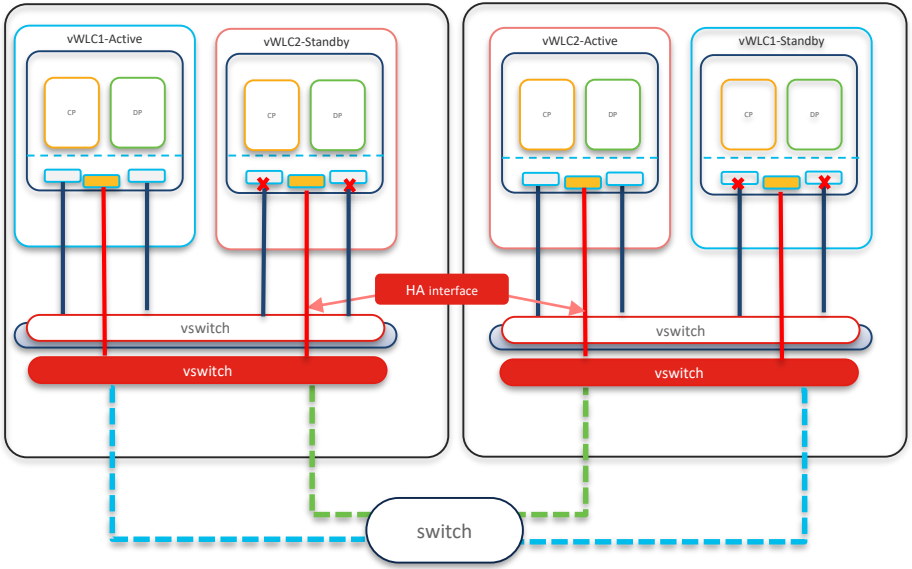
- For SSO HA, connect the Standby in the same way
- Single L2 port-channel on each box. Ports connected to Active and ports connected to Standby must be put in different port-channel
- Port-channel PagP and LACP supported
- Enable dot1q to carry multiple VLANs
- Make sure that switch can scale in terms of ARP and MAC table entries
- **This is a Recommended topology**

High Availability (AP & Client SSO)

C9800-CL-K9



Redundancy Port Connectivity



Redundancy Port Connectivity
RP via L2

Planned Updates

Wireless Controller and AP SW Updates

You make customer experience **possible**

SMU on MD Release only

Controller and AP Software Upgrades

Controller Updates

Controller update or bug fixes

SMU

PSIRTs, fixes on APs

AP update or bug fixes

AP Service Pack

New AP Model Support

Hot-patchable support for Device Pack

AP Device Pack

Contain impact within release

Fixes for defects and security issues without need to requalify a new release

Faster resolution to critical issues

Provide fixes to critical issues found in network devices that are time-sensitive

Wireless Controller SMU

Software Maintenance Update

You make customer experience **possible**

Wireless Controller SMU

Wireless Controller SMU installation Options

- Software Maintenance Update (SMU) is the ability to apply patch fixes on a software release in the customer network
- Current mechanism relies on Engineering Specials
  - Entire image is rebuilt and delivered to customer

Hot Patch
(No Wireless Controller reboot)
Auto Install on Standby

Hot-Patching

Inline replace of functions without restarting the process

On SSO Systems, patch will be applied on both active and standby without any reload

Cold Patch
Wireless Controller Reboot

Cold Patching

Install of a SMU will require a system reload

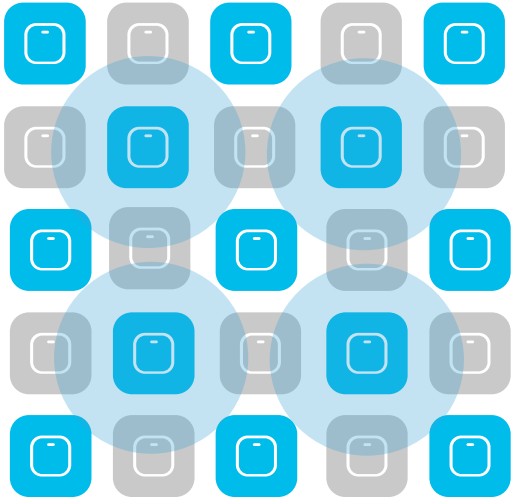
On SSO systems, SMU updates can be installed on the HA Pair with zero downtime

- ✓ **SMU Infrastructure will be available in 16.10 FCS release**
- ✓ **SMUs for C9800 will be available starting the first MD Release**

Rolling AP Update/Upgrade Infrastructure

You make customer experience **possible**

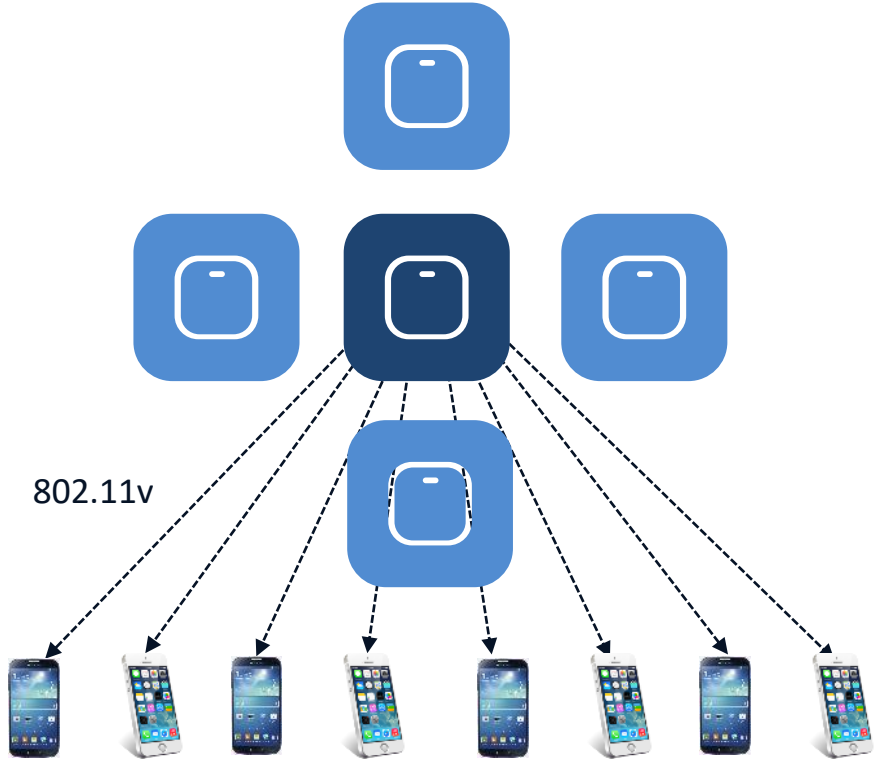
Neighbor Marking



User selects % of APs to upgrade in one go [5, 15, 25]
For 25%, Neighbors marked = 6 [Expected number of iterations ~ 5]
For 15%, Neighbors marked = 12 [Expected number of iterations ~ 12]
For 5%, Neighbors marked = 24 [Expected number of iterations ~ 22]

Client Steering

- Clients steered from candidate APs to non-candidate APs
- 802.11v BSS Transition Request
- Dissociation imminent
- If clients do not honor this, they will be de-authenticated before AP reload



New in 16.11

Per-site & per-AP Model
AP Service Pack

You make the power of data **possible**

Per-site / Per-model AP Service Pack

Supported on all platforms and all deployment scenarios (Flex, Local and Fabric)

Per-model APSP works in conjunction with site-specific rollout

Pre-downloaded to and activated on the affected AP models only

AP Service Packs

Per-AP model Service Pack

APSP can have a subset of APs that are affected by the update

Update on Subset APs

Fix applied on a subset of APs in the deployme using a site-filter

Controlled Propagation

Enables user to control the propagation of APSP in the network

APSP Workflow

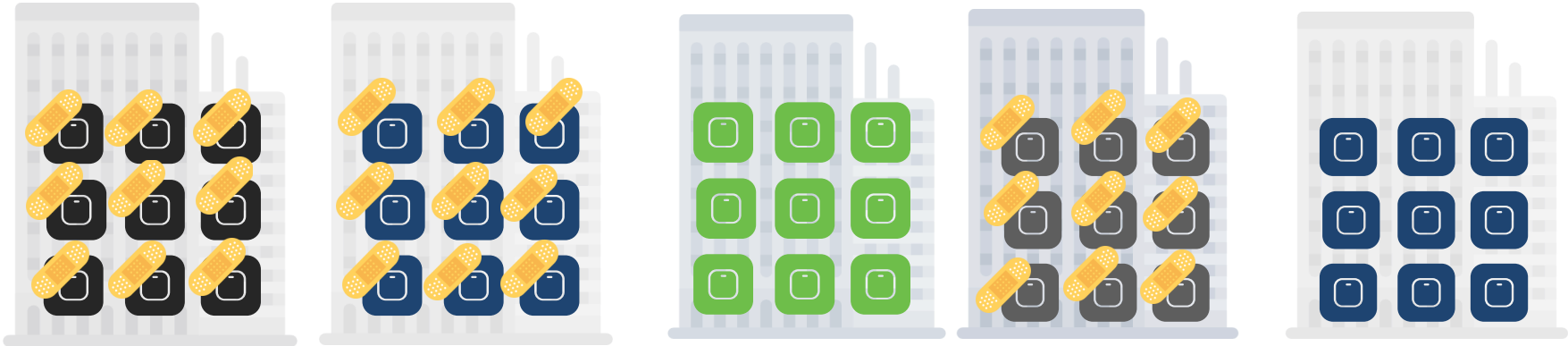
Applying APSP for 3800/2800 APs on per-site and per model basis

ap image site-filter file APSP1 add SiteA
Install prepare activate
Install activate
Install commit

Apply on Site A in rolling AP fashion

ap image site-filter file APSP1 add Site B
ap image file APSP1 site-filter apply

Not applicable for building with 9115AX



New in 16.11

AP Device Pack

You make the power of data **possible**

AP Device Pack

Traditionally ..

New AP hardware models need new WLC software

Wait for CCO version and re-qualify new release

Plan for Upgrading entire network

Contain Impact within release

Deploy new hardware without need to requali
a new controller release

Reduce Lifecycle delays

Faster deployment of latest AP hardware and technology

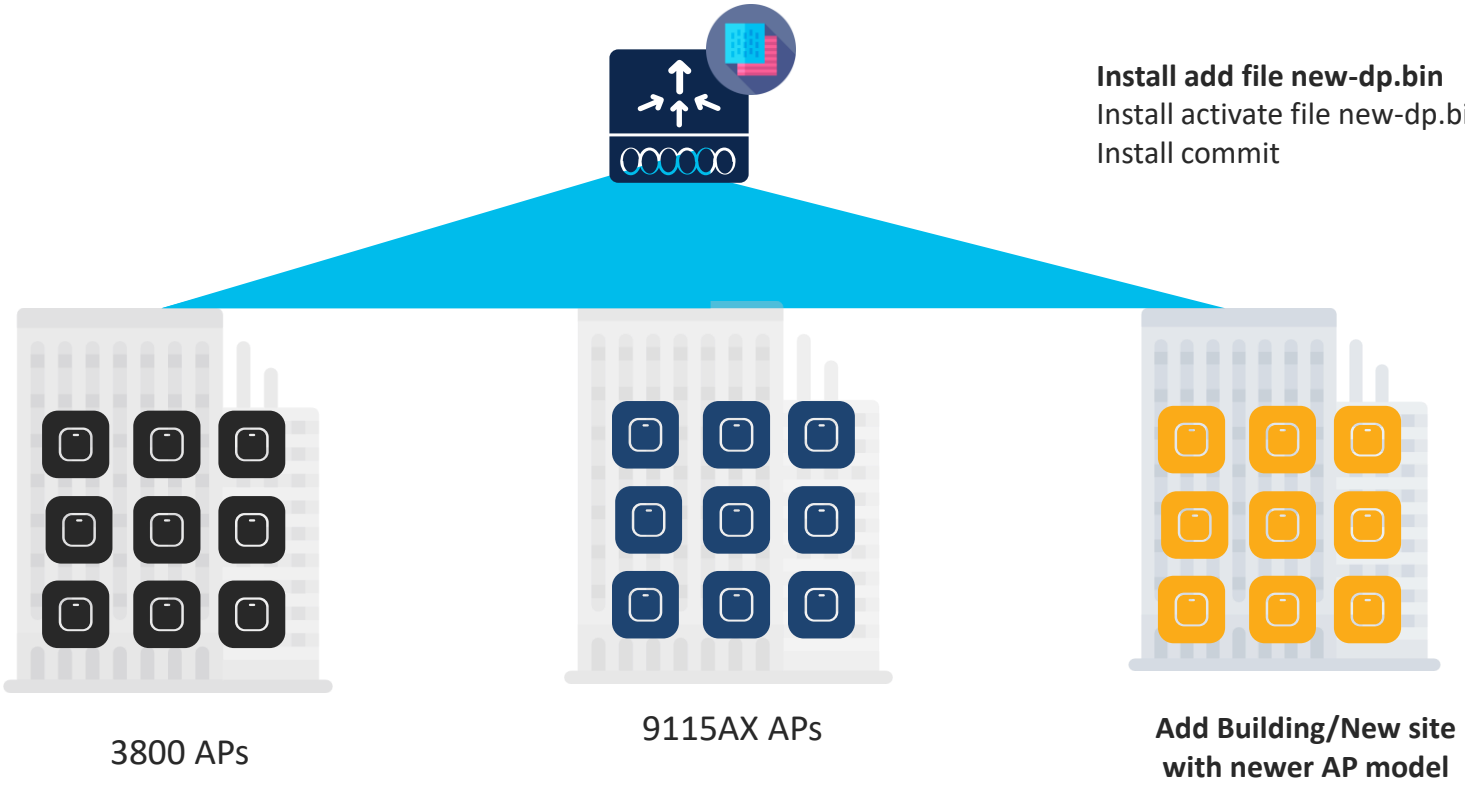
Zero Network Downtime

Applied as HOT patch on the controller with no service impact for APs and Clients

With AP Device Packs

Note : Even if new AP software supports extra wireless functionality, only the functionality supported by WLC will be enabled.

APDP Installation Workflow



Install add file new-dp.bin
Install activate file new-dp.bin
Install commit

Note: Fixes for the AP installed via APDP will be via AP Service packs like a baseline supported AP

Hitless N+1 Image Upgrade

Using Rolling AP Infrastructure

You make customer experience **possible**

N+1 Rolling AP Upgrade

Wireless Controller Image upgrade using N+1 staging Controller

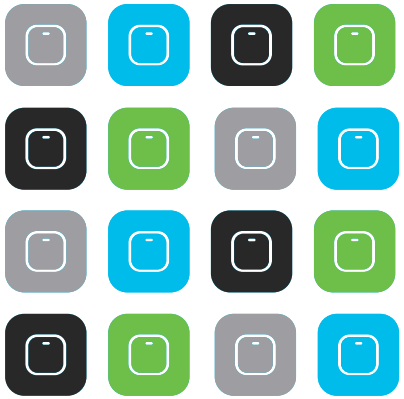
Trigger Rolling Upgrade

Version : X+1

Mobility Group

Version: X+1

Primary

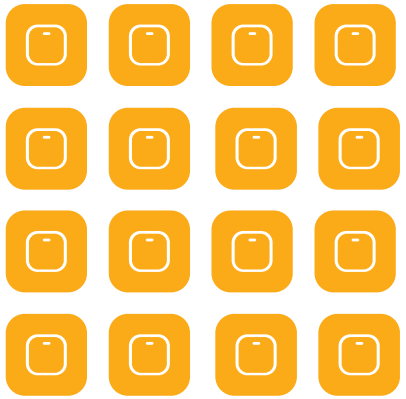


1. Device auto selects candidate APs based on selected % and RRM AP Neighbor Map

2. Upgrade process kicks-in
   - Image download to Primary Wireless Controller
   - Image pre-download to APs
   - Selective redirect of clients using 11v
   - APs moved to N+1 Wireless Controller in rolling manner
   - Primary Wireless Controller Reboot
   - APs moved back to Primary Wireless Controller (optional)

3. Monitor progress on the Device

Upgraded N+1



Security

You make security **possible**

Air

Rogue detection & Mitigation

WPA3 Standards compliance with WPA3*

- Enhanced security on open Wi-Fi
- Robust password protection
- Superior data protection
- Seamless customer migration

Devices

Enhanced threat detection with ETA

Secure device management with iPSK

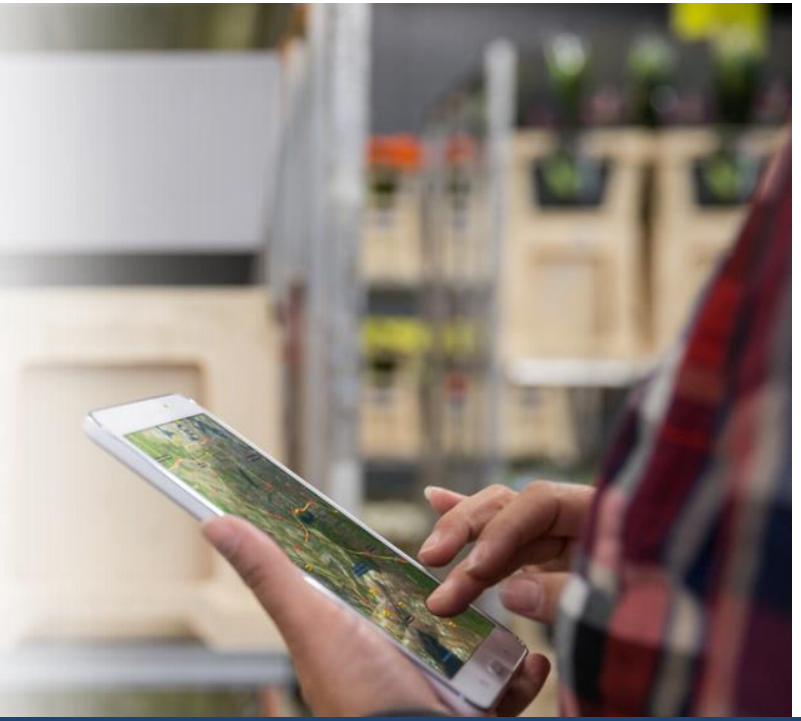
Users

Seamless BYOD onboarding with ISE

Identity based segmentation with SDA

*Future

Security and Threat Mitigation



802.1x
WPA2/AES

WPA3*

P2P
Blocking

MAC Auth

802.11w

Rogue Detection

ETA

TrustSec
SGT, SXP

AAA Override
VLAN, ACL, QoS

Local Policy w/
QoS and AVC

BYOD
NAC RADIUS

Client Exclusion

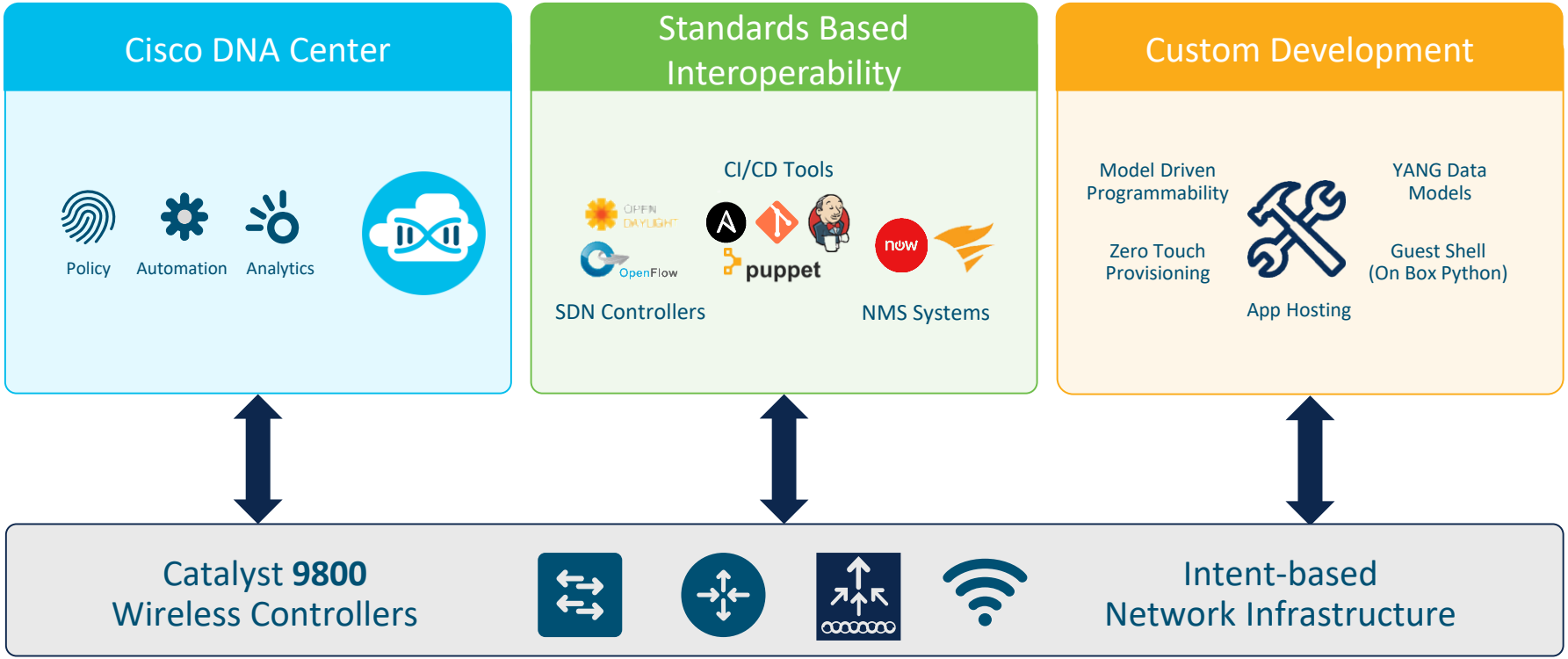
*16.12

Lower Risk

Programmability & Telemetry

You make the power of data **possible**

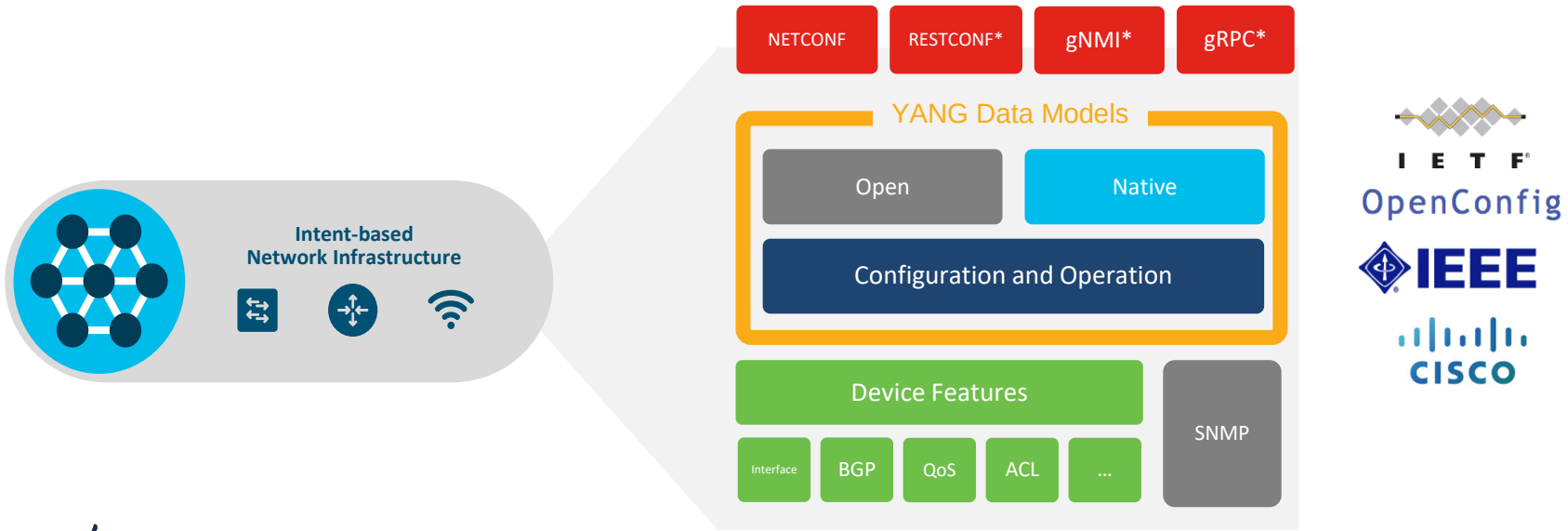
Flexible Management Options with Cisco Catalyst 9800 Wireless Controllers



Wireless Programmability “Stack”

The NETCONF, RETCONF, gNMI and gRPC are programmatic interfaces that provide additional methods for interfacing with the device

YANG data models define the data that is available for configuration and streaming telemetry



https://github.com/YangModels/yang
https://github.com/openconfig

Config vs Operational YANG Data Models

Config-data

- What the device is told to do
- It's the way you express intent

Examples:
switch> show run interface Loopback0
switch(config)# interface Loopback0

Cisco-IOS-XE-Wireless: Config models		
ap	general	rogue
apf	location	rrm
cts-sxp	mesh	security
dot11	mobility	site
fabric	mstream	wlan
flex	rf	
fqdn	rfid	

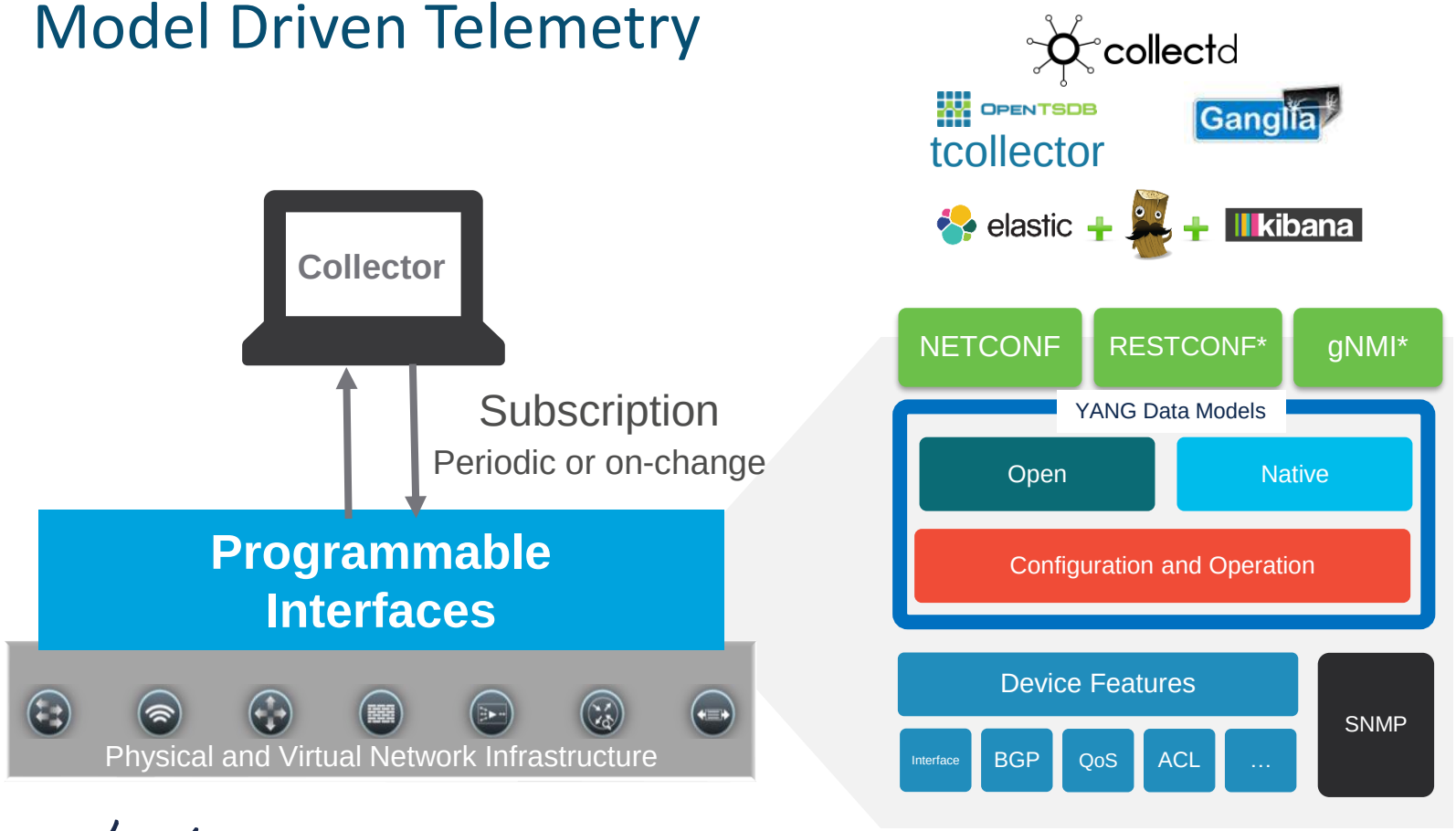
Operational-data

- What the device is actually doing
- It's what you see from most show commands

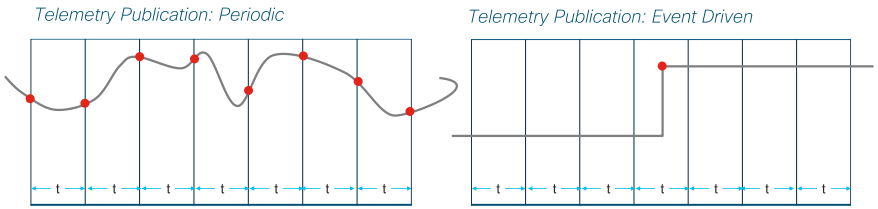
Examples:
switch> show interface Loopback0
'*snmpget*' results

Cisco-IOS-XE-Wireless: Oper models	
access-point	mobility
client	nmsp
fqdn	rf-profile
lisp-agent	rfid
mcast	rogue
mesh	rrm

Model Driven Telemetry



Network Subscription



A subscription is a contract between the network device and a subscriber that specifies the type of data, the frequency, and

Instruction on:
- What data to collect
- Where and how to send
- How often and how much

Subscribe to ietf-yangpush.yang
Specify xpath/KPI (defined within data model)


```
sh telemetry ietf subscription 100 receiver

Subscription ID: 100
  Address: 10.10.105.10
  Port: 47870
  Protocol: netconf
  Profile:
  State: Connected
  Explanation:
```

```
<?xml version="1.0" encoding="UTF-8"?>
<rpc message-id="id" xmlns="urn:ietf:params:xml:ns:netconf:base:1.0">
<establish-subscription xmlns="urn:ietf:params:xml:ns:yang:ietf-event-notifications"
   xmlns:yp="urn:ietf:params:xml:ns:yang:ietf-yang-push">
  <stream>yp:yang-push</stream>
  <yp:xpath-filter>/wireless-location-oper:location-oper-data/location-rssi-measurements</yp:xpath-filter>
  <yp:period>1000</yp:period>
</establish-subscription>
</rpc>
```

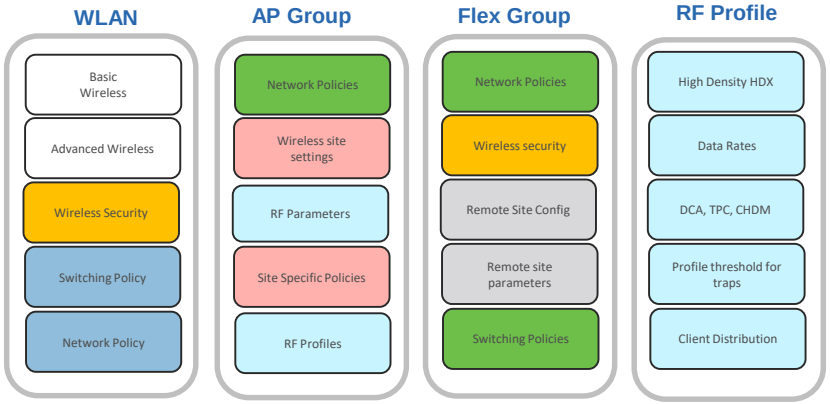
Catalyst 9800 Wireless Controller Configuration Model

You make networking **possible**

Benefits of New Configuration Model

AireOS vs Catalyst 9800 (IOS-XE) Config Model

Going towards a more **Modularized and Reusable** model with **Logical decoupling** of configuration entities

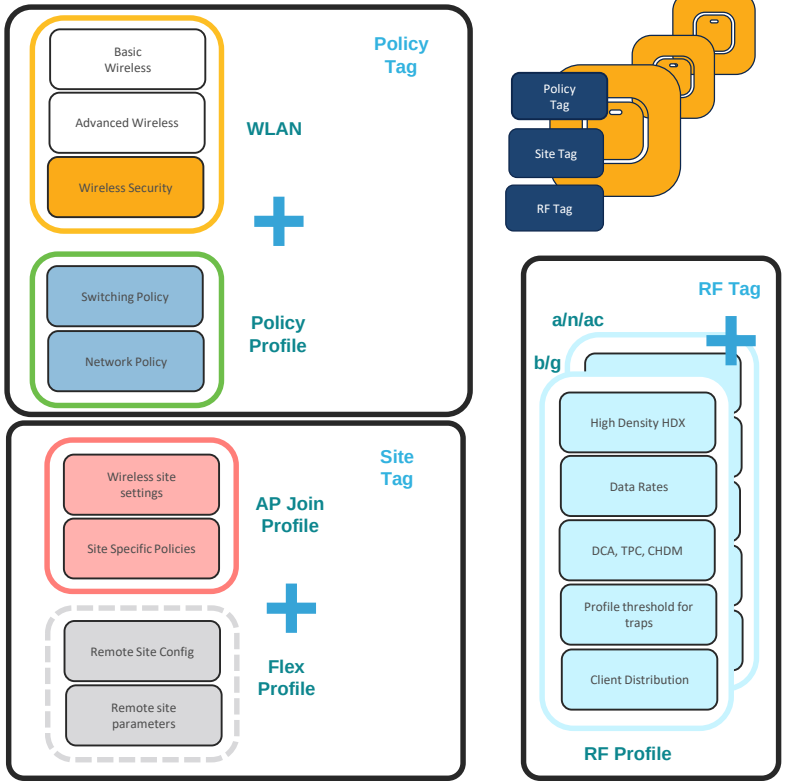


AireOS Config Model

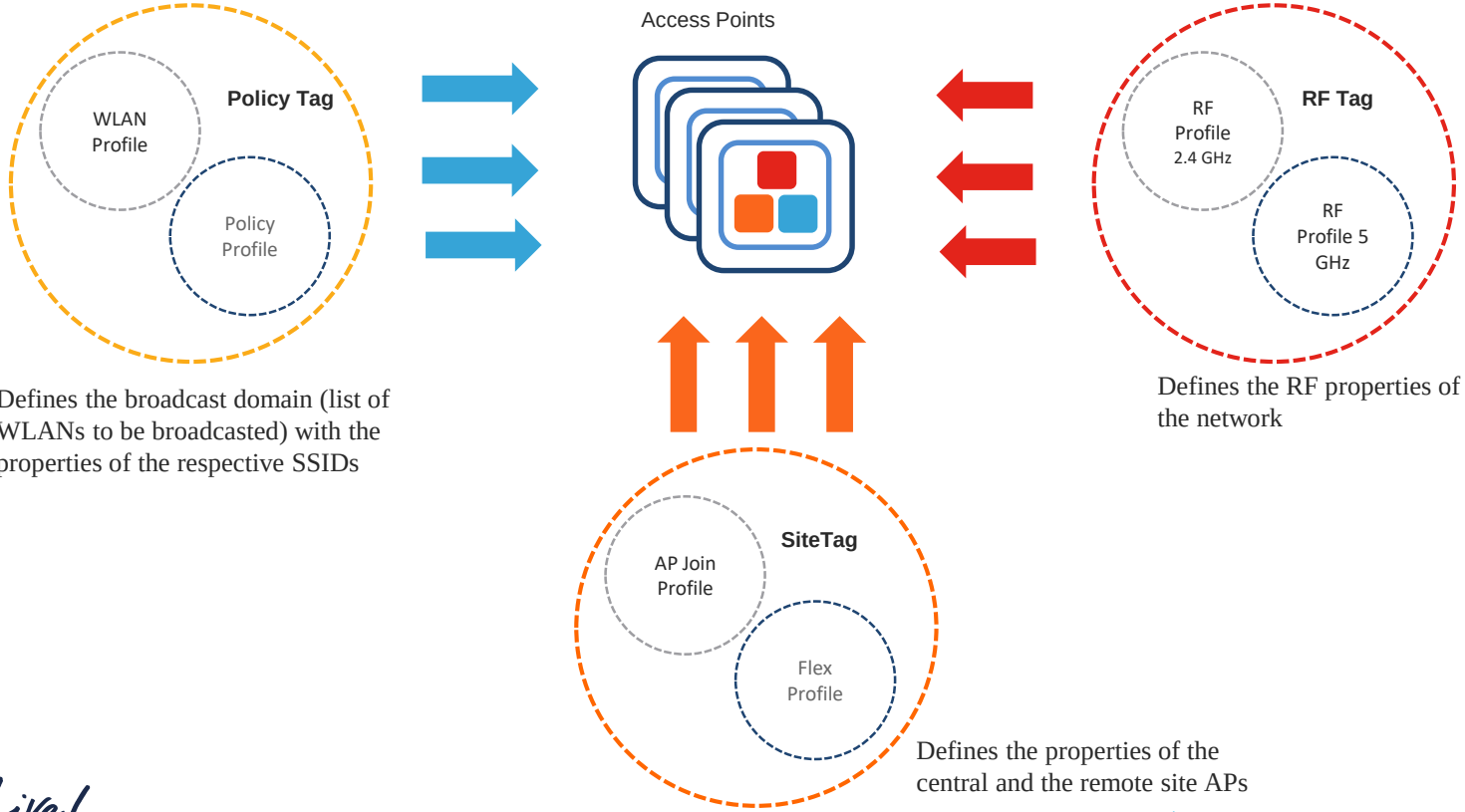
Decouple

Modularize

Granular & simplified
What **Policies** on which **Sites**
with what **RF** characteristics



Catalyst 9800 Config Model



Defines the broadcast domain (list of WLANs to be broadcasted) with the properties of the respective SSIDs

Defines the RF properties of the network

Defines the properties of the central and the remote site APs

Catalyst 9800 Migration

You make networking **possible**

Wireless Controller Positioning and Transition

Refresh old 2504, 5508, 8510 to 9800 and position 9800 in new opportunities

Up to 100 APs

SMB, Small Campus and branch

Mobility Express

2504 Wireless Controller

Embedded Wireless in Catalyst APs

100-150 APs

Distributed Branch, Small Campus

3504 Wireless Controller

C9800-L

C9800-CL C9800 for cloud

150 to 1500 APs

Medium Campus

5508, 5520 Wireless Controller

C9800-40

C9800-CL C9800 for cloud

1500 to 6000 APs

Large Campus

7510, 8510, 8540 Wireless Controller

C9800-80

C9800-CL C9800 for cloud

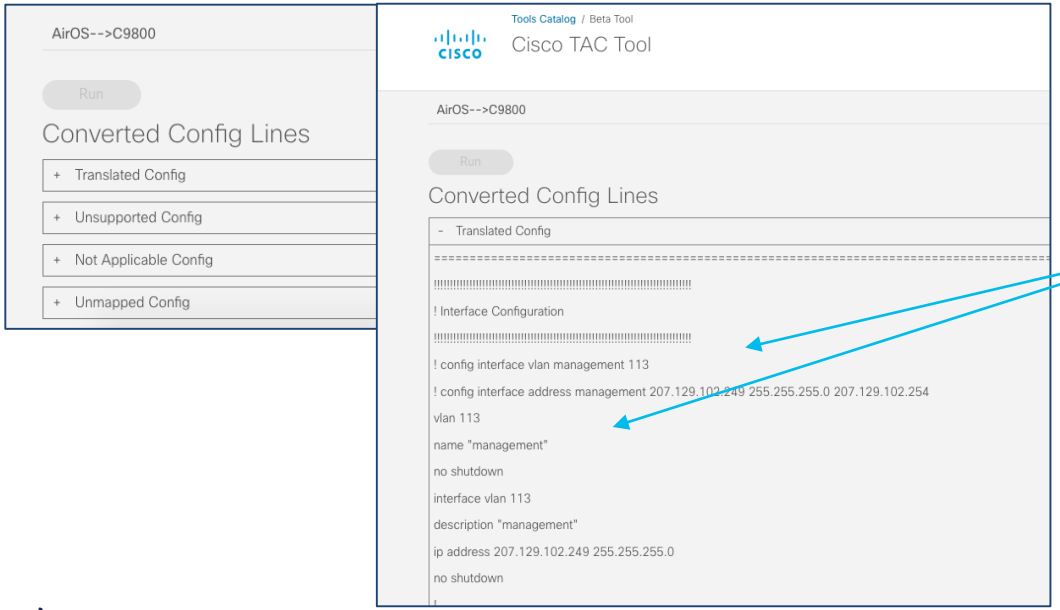
Migration Tools

Migration from AireOS WLC to C9800 with DNAC

- It covers AireOS to C9800 migration using DNAC
- Step by step configuration
- **Note**: DNAC only learns a subset of configurations from AireOS, the ones that are mapped to the Design flow
- Direct link

Migration Tool

- Migration tool is now alive and managed by TAC
- Tool is available here https://cway.cisco.com/tools/WirelessConfigConverter/



Tool provides following config:

- Translated
- Unmapped
- Unsupported
- Not Applicable

- AireOS CLIs and the correspondent translated IOS-XE commands

- Always recommended to analyze the translated config before paste it

Integrating with existing AireOS Deployments

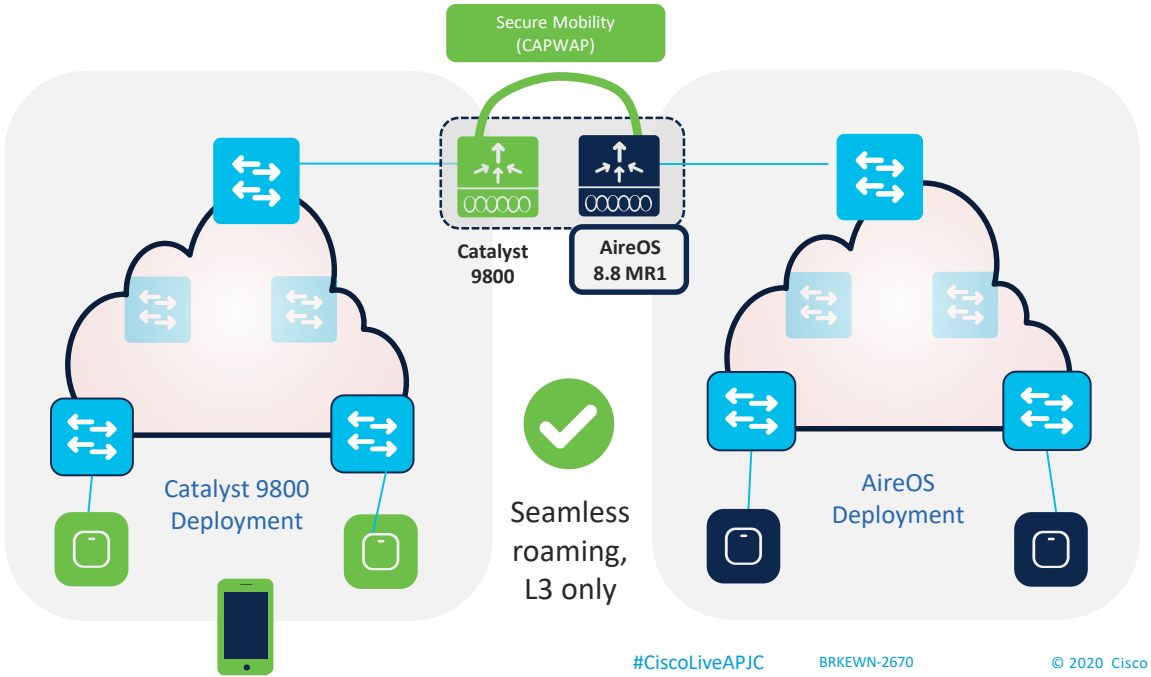
Inter Release Controller Mobility (**IRCM)** for AireOS and Catalyst 9800

You make networking **possible**

IRCM : AireOS and Cisco Catalyst 9800

Secure Mobility (CAPWAP)

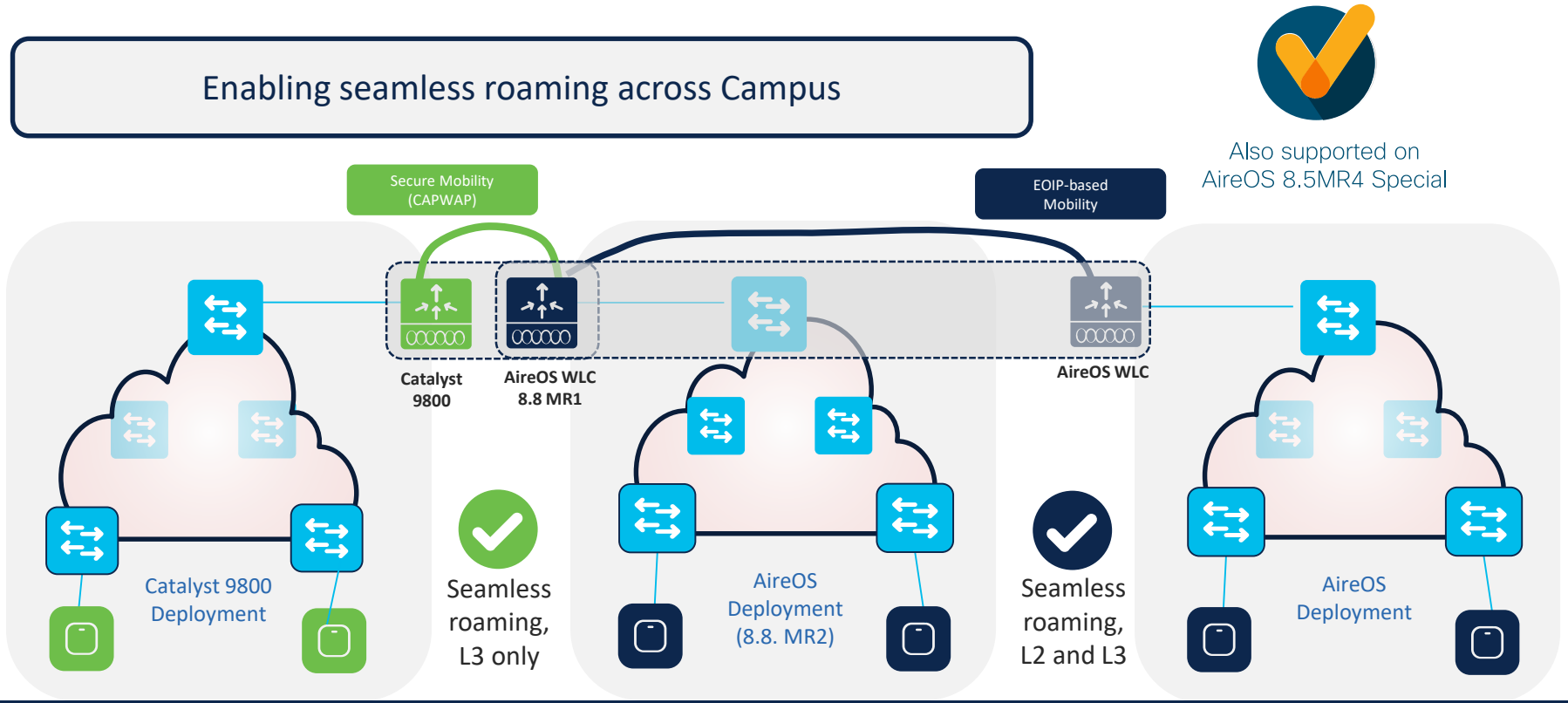
Seamless roaming b/w Catalyst 9800 and AireOS 8.8 MR1 (3504/5520/8540)



Also supported on AireOS 8.5MR4 Special

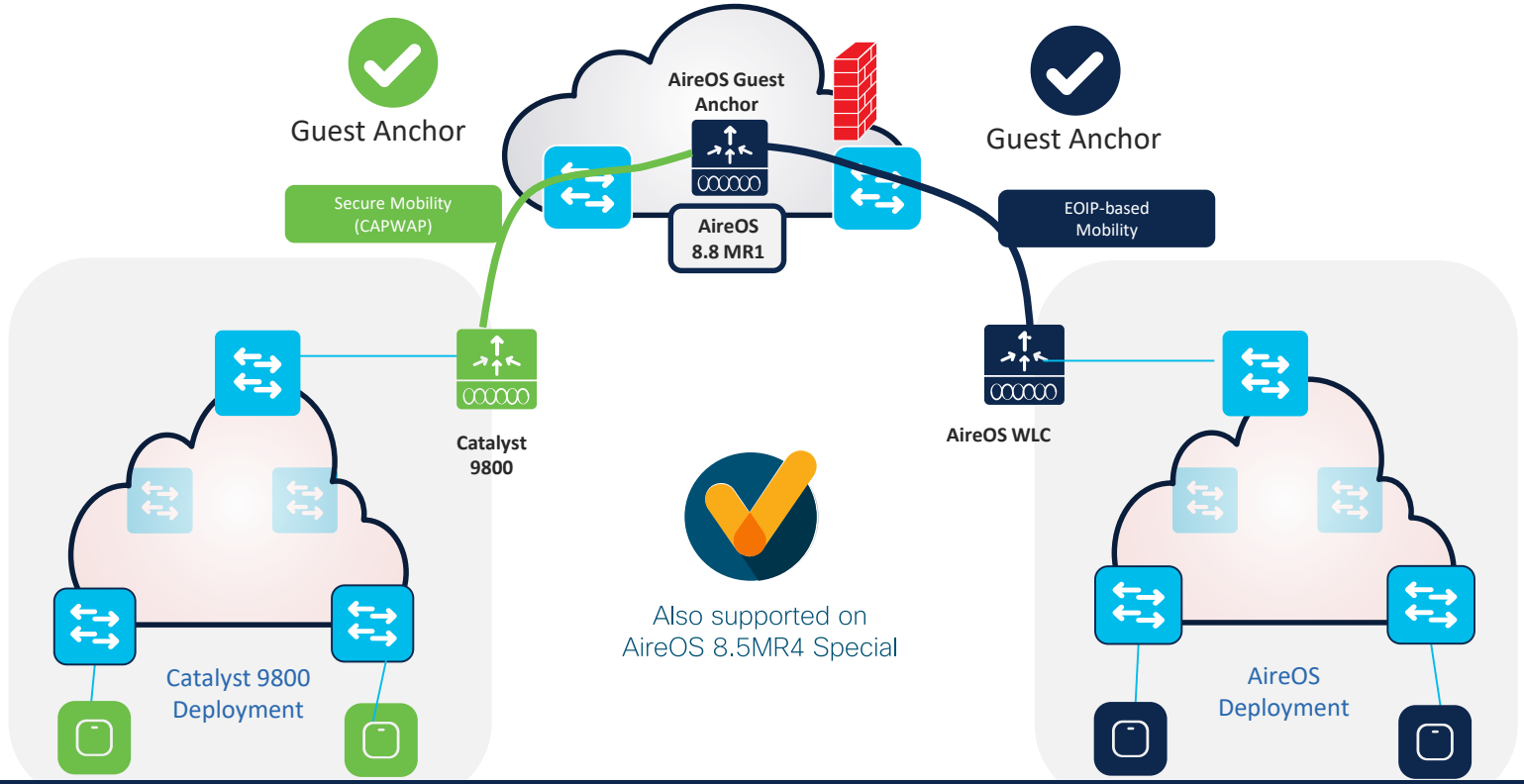
IRCM: AireOS and Cisco Catalyst 9800

Enabling seamless roaming across Campus



Upgrade only the AireOS controller in the roaming path

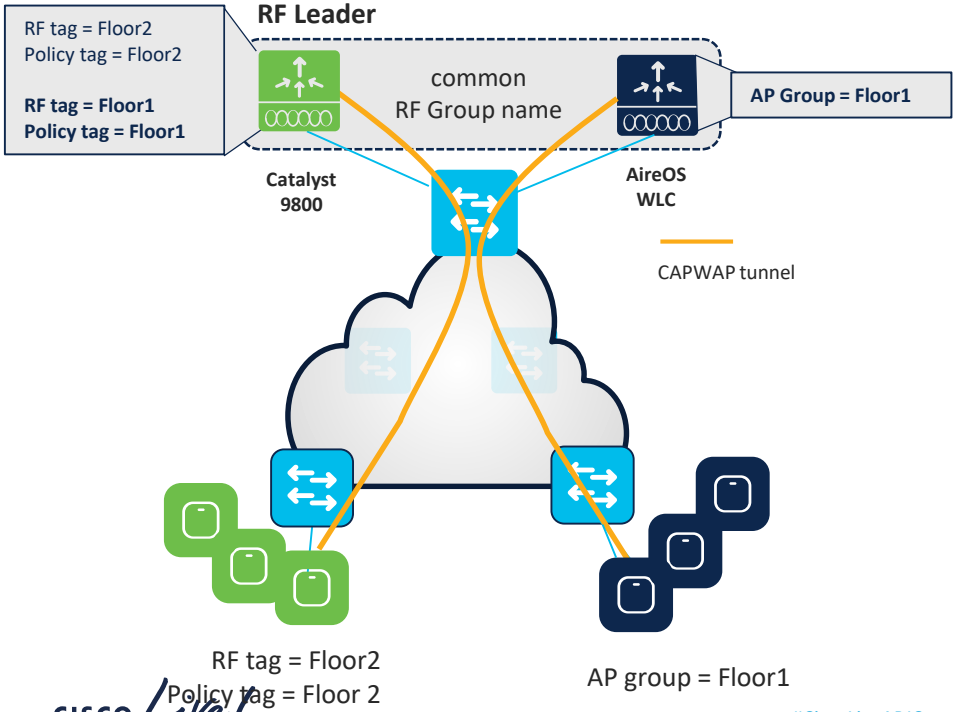
Guest : AireOS and Cisco Catalyst 9800



Upgrade the AireOS Guest Anchor to 8.8 MR1 (on 3504/5520/8540) and manage both Catalyst 9800 and AireOS Foreign

Brownfield Scenario – Common RF Plan

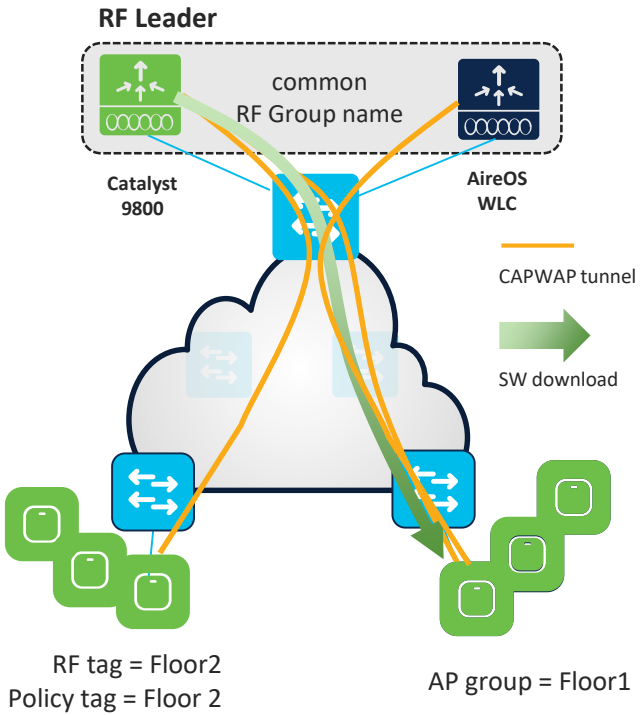
Adding C9800 to a AireOS network. RRM works in a mixed controller environment:



- C9800 and AireOS controllers can create one RF domain and share a **common RF plan**
- The **RF group name** on both AireOS and C9800 controllers needs to match
- 8.8 is required on AireOS (8.8MR1 recommended)
  - A RF leader is elected (based on controller capacity) and common channel and power plan will be used for all APs
  - APs will be not show up as rogue on the other controller
- **NOTE**: in a scenario where you want to have custom RF profiles or enable FRA, then the leader (e.g. C9800 controller) needs to have Policy and RF tags matching the names of the AP Group names on AireOS WLC. Of course the settings of RF profiles on both controllers need to match as well.

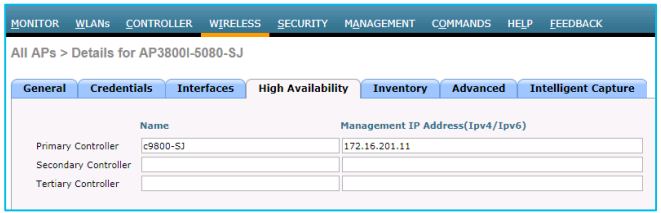
Brownfield Scenario – AP Move

AP migration should happen in chunks (floor or roaming domain (e.g. building)



Things to keep in mind:

- Make sure the AP can join the c9800 (W1/W2/AX APs)
- To move the AP from AireOS to C9800:
- From GUI:



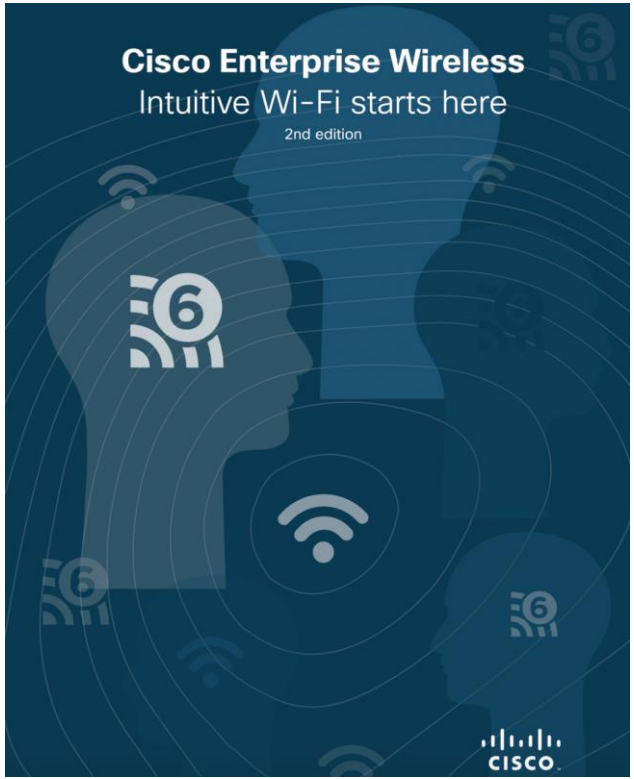
from CLI: "*capwap ap primary-base <name> <IPaddress>*"

- The first time you move an AP from AireOS to C9800 (or vice versa), the AP will download the new image
- The AP will reboot and join the new controller
- If the AP has the image as a backup because had already joined that controller, then there is no download

Additional Resources

- Deployment guides (CCO)
- Configuration Examples and Tech notes
- Cisco Wireless YouTube channel

Don’t Miss the Cisco Wireless Book…



It’s an e-book and you can download it from here

https://www.cisco.com/c/dam/en/us/products/collateral/wireless/nb-06-wireless-wifi-starts-here-ebook-cte-en.pdf

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