

Сетевой марафон: Catalyst 9800 – новая классика WLAN

Сессия 1 – Обзор процесса миграции и лучших практик
при переходе с контроллера AireOS на Catalyst 9800

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Системный инженер Cisco



Сетевой марафон: Catalyst 9800 – новая классика WLAN

- **24 мая - Обзор процесса миграции и лучших практик при переходе с контроллеров AireOS на Catalyst 9800**
- 25 мая - Миграция Flexconnect сети на беспроводной контроллер Catalyst 9800
- 26 мая - Разворачивание, настройка и использование виртуального беспроводного контроллера Catalyst 9800
- 27 мая - Миграция на беспроводной контроллер Catalyst 9800 с использованием Prime Infrastructure и DNA Center
- 28 мая - Рекомендации по отладке и поиску неисправностей в сетях под управлением Catalyst 9800

Содержание

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Планирование миграции

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Лицензирование Catalyst 9800

Вопрос:

Какова текущая* скорость
внедрения C9800?



35%

48%

75%

5520, 8540, CTVM (Virtual WLC) → EoS анонс

- Only 3504 is End-of-Sale as of 11th January 2021
- Not EoS: Mobility Express

End of Life Milestone	Milestone Date
End-of-Life Announcement Date	January 31, 2021
End-of-Sale Date	January 31, 2022
End of SW Maintenance Releases Date	January 31, 2023
End of Vulnerability/Security Support:	January 31, 2025
Last Date of Support	January 31, 2027



Wireless re-invented with Catalyst 9800 Series Wireless Controllers

End of Sale/ End of Life Announcement of AireOS based Cisco Wireless LAN Controllers

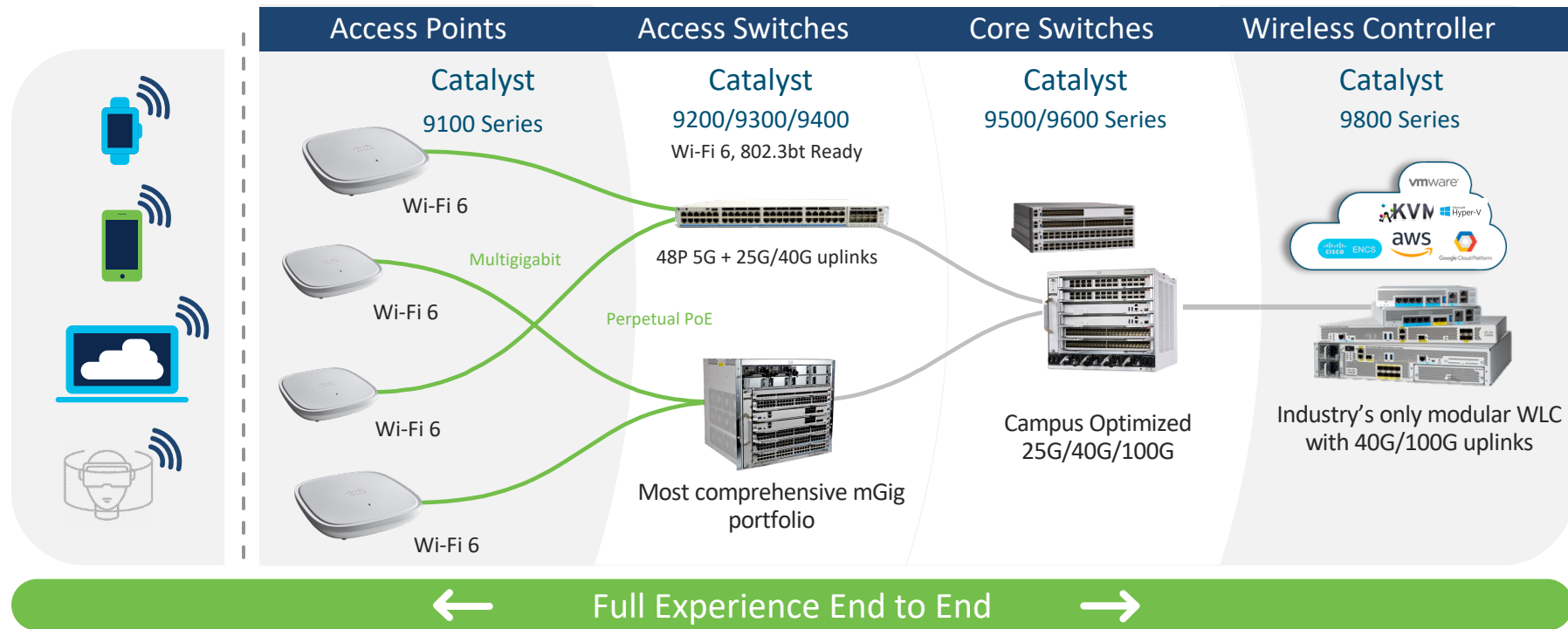
(AIR-CT-3504, AIR-CT-5520, AIR-CT8540, AIR-CTVM)

EN Sellers and Teams,

This is the announcement for End of Sale and End of Life dates for AireOS Cisco Wireless LAN Controllers - [AIR-CT-5520](#), [AIR-CT8540](#), [AIR-CTVM](#) .

In November 2018, we launched our [Catalyst 9800 Series](#)

Портфолио в корпоративном сегменте



Built for Intent-based
networking



Automation



Security



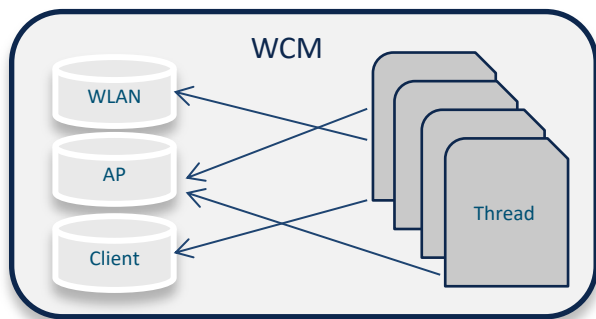
Analytics

Программное обеспечение Cisco Catalyst 9800

Архитектура AireOS

vs.

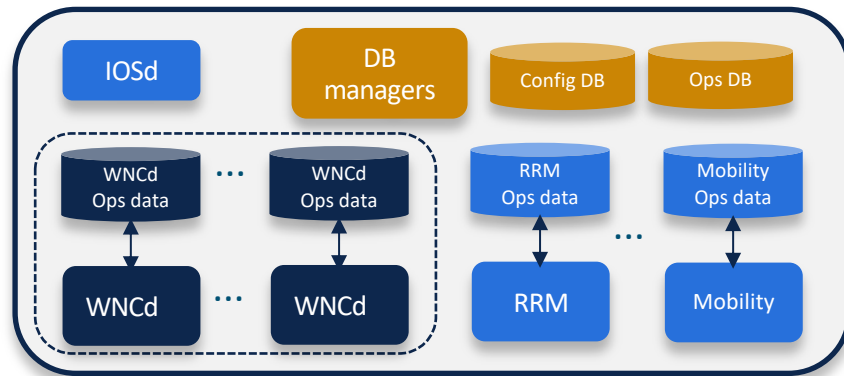
Catalyst Wireless Controller



High level view

Single process software architecture

- Wireless Controller Manager (WCM)
- 30+ threads
- Data contention cross threads
- Single memory space
- Single fault domain



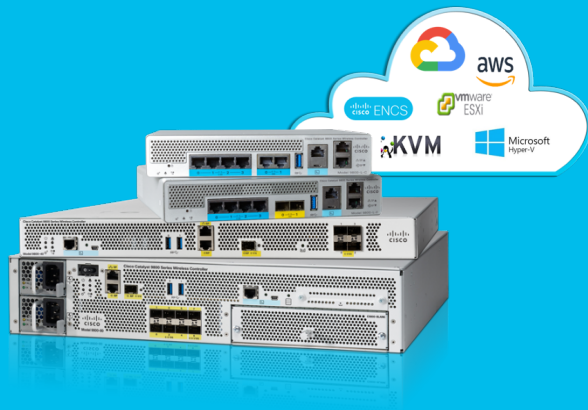
High level view

Multi-process software architecture

- Processes are single threaded, non-blocking,
- New Wireless Network Controller process (WNCd).
- Multiple WNCd for horizontal scale
- No single fault domain (e.g. memory separation)
- Data model driven & data externalization
- Process patchability & restartability
- Independent boot*

* System capable, roadmap item

Почему Catalyst 9800?

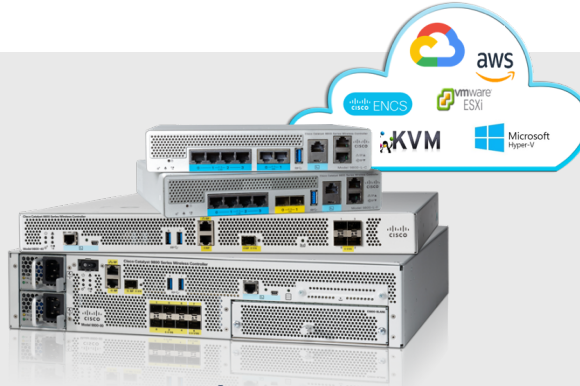


- Modular, highly available, scalable, multi-process operating system: **IOS-XE**
- **Next Gen Resiliency**: Stateful Switchover, In-Service Software Upgrades (ISSU), Rolling AP Upgrades, Patching
- Fully **Programmable** via CI/CD tools
- **Deploy Anywhere** with model, scale, and performance of your choice

Next-Generation Cisco Wireless Stack



**Catalyst 9100
Access Points**



**Catalyst 9800
Wireless Controllers**



**DNA Automation &
Assurance**



DNA Spaces

Resilient, Secure, Intelligent
with Innovations in Performance, Security and Analytics



Планирование миграции

Больше, чем просто контроллер



MSE



ISE

Services



ISE



Prime

Network
Management



Cisco DNA Center



AireOS

Wireless LAN
Controller



C9800



Access Points



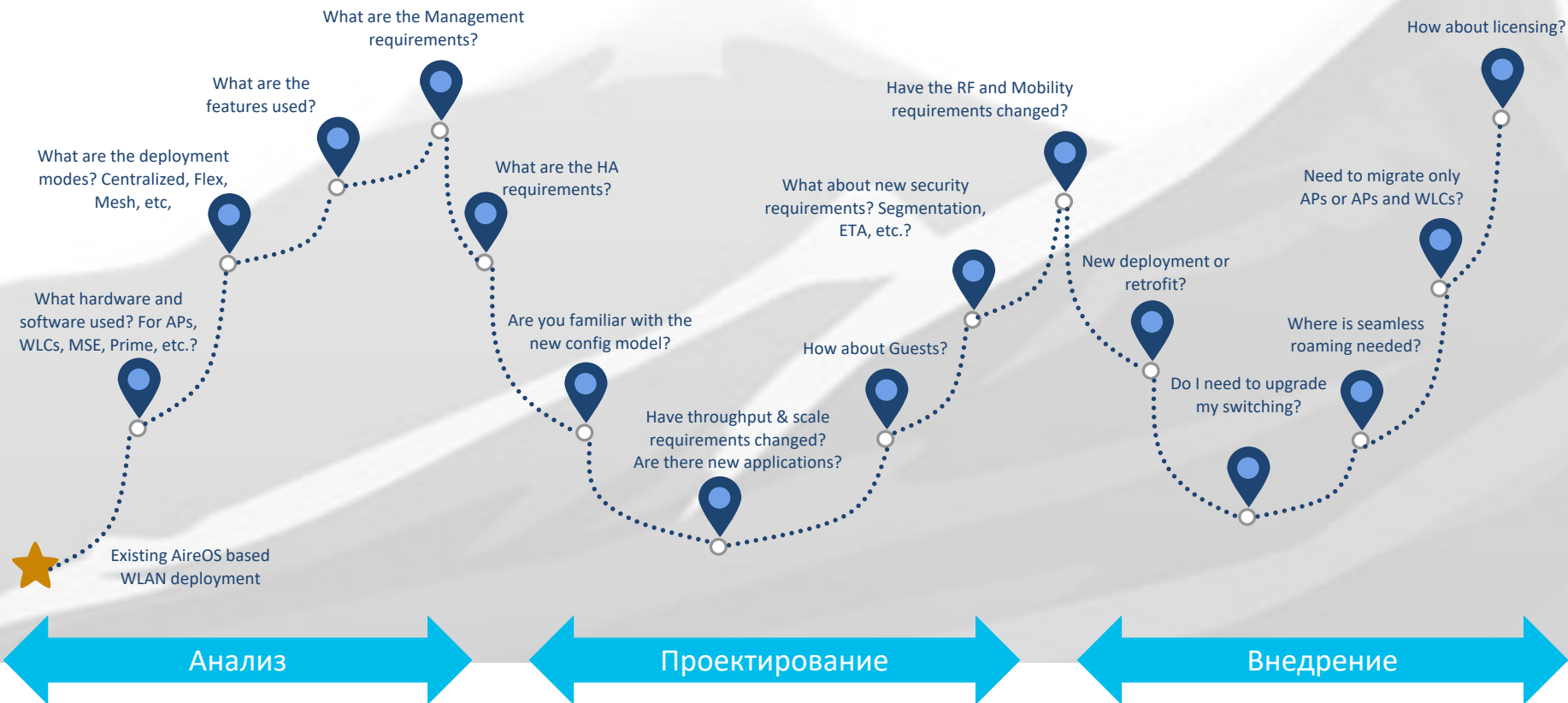
Wi-Fi 6



Clients and
Sensors



Ключевые вопросы миграции



Лучшие практики миграции

- Knowing C9800 configuration model (Profiles & Tags) is a **prerequisite** to Migration
- **Build a PoC area** with same characteristics of the production network
 - Same topology: Anchor Controller, HA config, Firewall and other network settings like AAA
 - Ideally test same client types but at least one Windows, one Android and one Apple client
 - Test the different authentication types with same version of production AAA and Portals
- **Assess the client devices** and evaluate if some changes need to be done in the RF default configuration (e.g. old devices might need lower data rates)
- Use the PoC to test the main features customer cares about
- Arrange **remote access for Engineering** to troubleshoot and verify problems reported during the migration



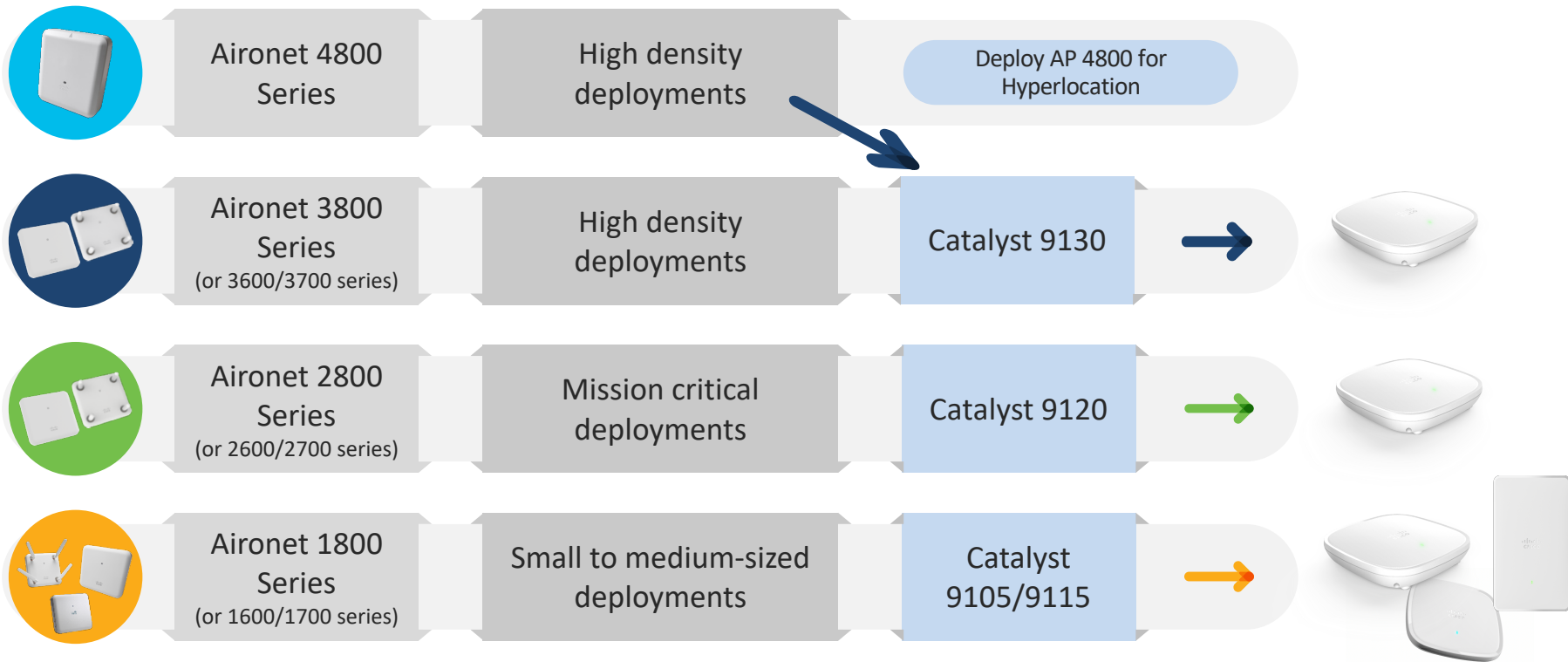
Миграция точек доступа



Reference

Переход на точки доступа 9100

Refresh legacy Aironet 1600/2600/3600 and 1700/2700/3700 to new Catalyst 9100AX



Важная информация – 802.11ac Indoor Wave 1 AP's



- Key Dates of the [End of Sales \(EoS\) announcement](#) of 802.11ac W1 APs:
 - **April 30th, 2018** - Cisco announced the **End-of-Life** of all the 802.11ac W1 APs
 - **April 29th, 2020** - The **End of Software Maintenance (EoSM)** releases date was
 - As per official policy, after this date Cisco will no longer develop, test, repair these Access Point software; in other words, no AP related bug fixes will be released after this date
 - **April 29th, 2022** - Any AP security vulnerability issues will be fixed until the **End of Vulnerability/Security Support**:
- Last Software – **AireOS 8.10.x / IOS-XE 17.3.x**
 - Any issue related to the WLC software will be fixed until the EoSM date for the controller software
 - Cisco Aironet 11ac W1 will not be able to join any wireless controller running subsequent later releases

Важная информация – 802.11ac Outdoor Wave



- Key Dates of the [End of Sales \(EoS\) announcement](#) for the Cisco Aironet 1570 outdoor 802.11ac W1 AP:
 - **May 15th, 2020** - Cisco announced the **End-of-Life** of all the 802.11ac W1 APs
 - **Nov 13th, 2021** - The **End of Software Maintenance (EoSM)** releases date
 - As per official policy, after this date Cisco will no longer develop, test, repair these Access Point software; in other words, no AP related bug fixes will be released after this date
 - **Nov 13th, 2023** - Any AP security vulnerability issues will be fixed until the **End of Vulnerability/Security Support**:
- Last Software – **AireOS 8.10.x / IOS-XE 17.3.x**
 - Any issue related to the WLC software will be fixed until the EoSM date for the controller software
 - Cisco Aironet 1570 will not be able to join any wireless controller running subsequent later releases

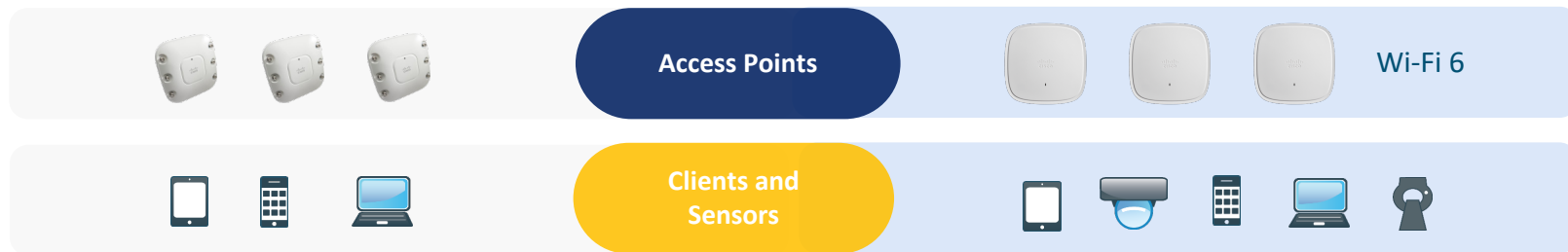
Important Note – IW3700 AP

Cisco Industrial Wireless 3700 Series Access Points: IW3700, is not affected by the End Of Sales announcement. For this AP model, customer will still receive software bug support and can still upgrade to later releases (for example to IOS-XE 17.4.1).



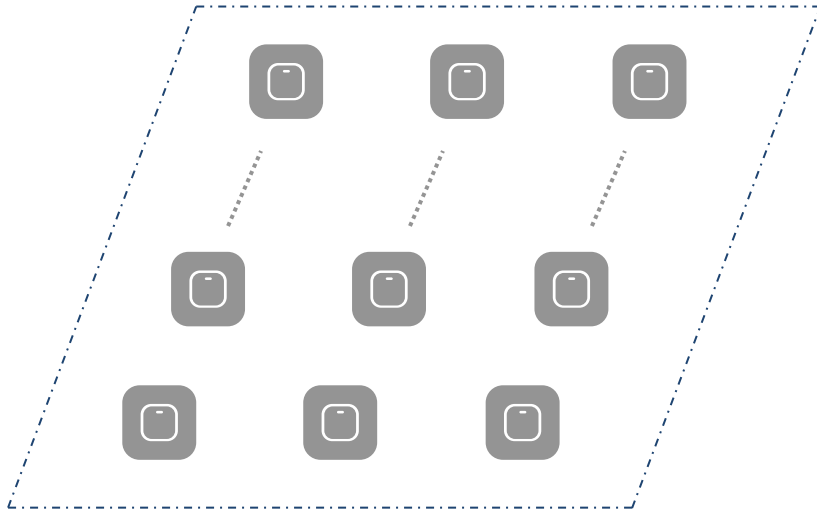
Типичные вопросы при миграции на Wi-Fi 6 точки

- Нужно ли делать новое радиообследование?
- Можно ли заменить точки доступа один-в-один?
- Можно ли смешивать точки доступа Wi-Fi 6 и предыдущих поколений?
- Нужно ли мне менять коммутатор ЛВС под точки доступа Wi-Fi 6?
- А сколько у меня Wi-Fi 6 клиентов вообще?



Нужно ли делать новое радиообследование?

- New **Site Survey** is **not mandatory** (assuming current coverage meets requirements)
- **1:1 Replacement** assumes the APs were originally installed in optimal place



Замена точек доступа 1:1 или еще одно обследование?

Access Points have been designed with 1 for 1 replacement in mind!

The design goal is to maintain a uniform coverage cell between matching generation of products but improve the connection experience (faster speeds, lower latency & less retries)

C9120AX

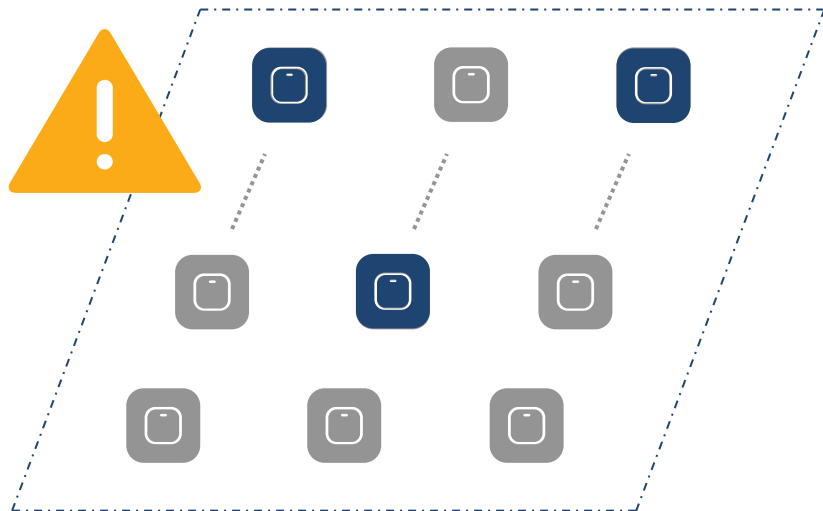



AP3802i



Можно ли смешивать точки доступа?

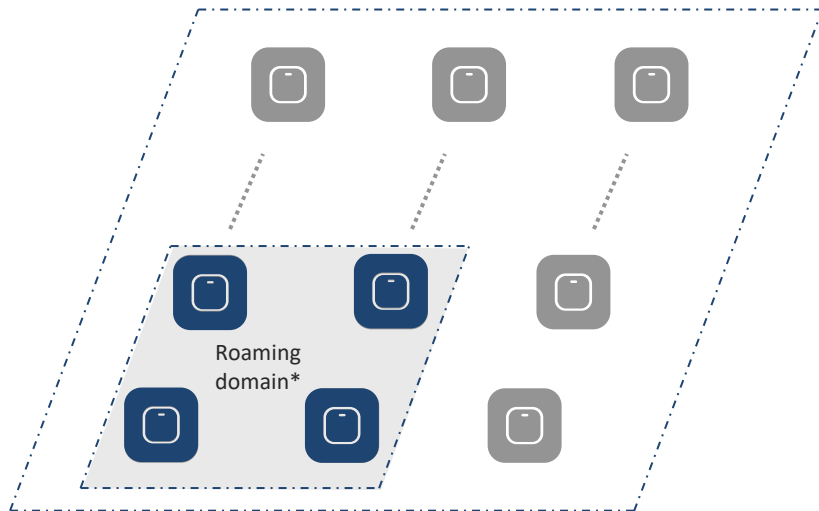
- New **Site Survey** is **not mandatory** (assuming current coverage meets requirements)
- **1:1 Replacement** assumes the APs were originally installed in optimal place




- New APs are designed to have close to the **same coverage area** as the previous gen product. Coverage will be similar but wireless **capacity will increase**
- “**salt and pepper**”  replacement is **not recommended**
- Mixing AP type will prevent customers from taking advantage of the new features being introduced in Catalyst APs (RF ASIC related and Wi-Fi 6 features)

Новое радиообследование?

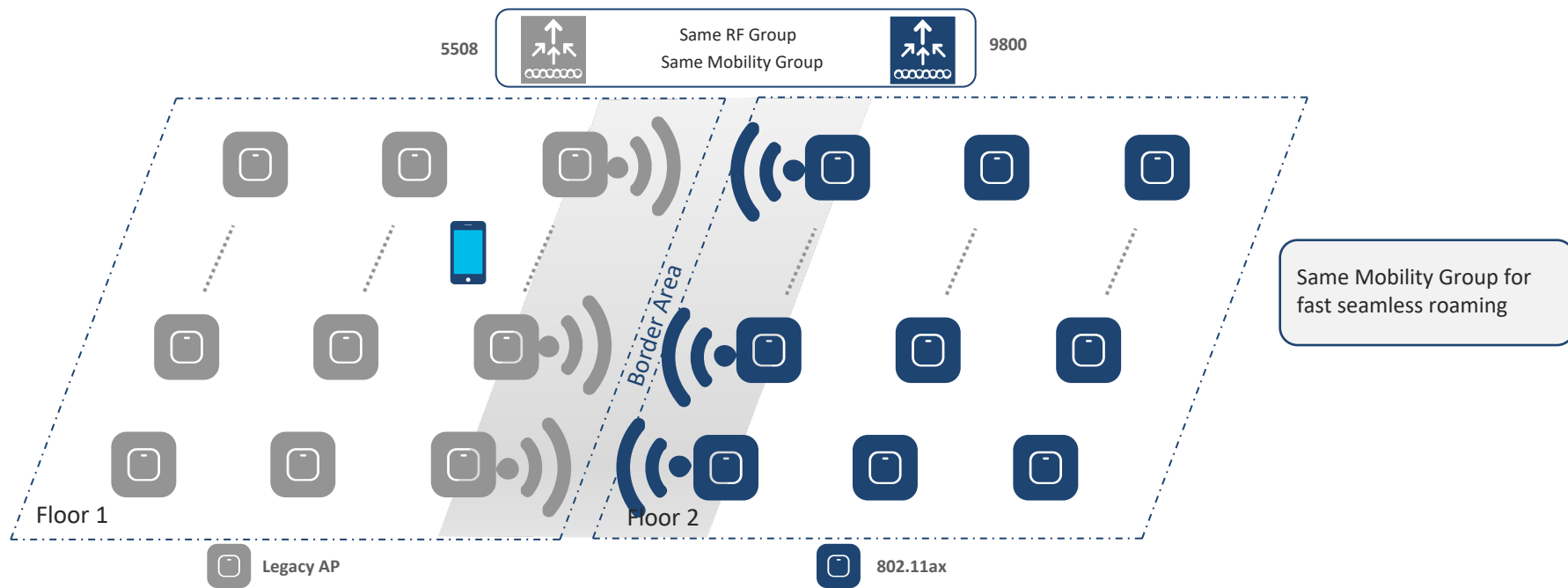
- New **Site Survey** is **not mandatory** (assuming current coverage meets requirements)
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- New APs are designed to have close to the **same coverage area** as the previous gen product. Coverage will be similar but wireless **capacity will increase**
- “**salt and pepper**”  replacement is **not recommended**
- Mixing AP type will prevent customers from taking advantage of the new features being introduced in Catalyst APs (RF ASIC related and Wi-Fi 6 features)
- **Recommendation:** keep APs of the same type together, replace the APs in a roaming domain
- Roaming domain = e.g. floor/multiple floors/building or area where people tend to roam

Что делать с пограничными зонами?

- As you replace APs per roaming domain, you will have “border areas” between two deployments
- If you have the same RF Group, Cisco **RRM takes care of setting power and channel plan** for the border areas.



Нужно ли менять коммутаторы ЛВС?

Switching infrastructure

Best

mGig ports and UPOE

E.g. C9300-48UN, C9300L-48UXG-4X



Draws 30.5W

Draws 38.2W

Catalyst 9130

Competitor AP

Full performance & features on
all Catalyst APs

Better

1G ports and POE+

E.g. C9300L-48P-4X



Needs two
cables

Catalyst 9130

Competitor AP

C9130: 8x8 support with just no USB
Full performance & features on other APs

Good

1G ports and POE

E.g. C9200-48P or one power supply
failure on higher end switches



Catalyst 9130

Competitor AP

Reduced Performance (1x1 radio)
but all SSIDs are up!



Reference

Гибкое энергопитание точек доступа 9100:

	AP Model	Power source	Power Type	2.4 GHz Radio	5 GHz Radio	Link Speed	USB	Power Draw
9130	C9130AXI / C9130AXE	802.3at (PoE+)	PoE+	4x4	8x8	5G	OFF	25.5W
	C9130AXI	802.3at	PoE+	4x4	4x4	5G	ON	25.4W
	C9130AXI / C9130AXE	802.3bt (UPoE)	UPoE	4x4	8x8	5G	ON	30.5W
	C9130AXI / C9130AXE	802.3af	PoE	1x1	1x1	1G	OFF	13.4W
9120	C9120AXI	802.3at	PoE+	4x4	4x4	2.5G	ON	25.5W
	C9120AXE	802.3at	PoE+	4x4	4x4	2.5G	ON	25.5W
	C9120AXI / C9120AXE	802.3af	PoE	1x1	1x1	1G	OFF	13.4 W
	C9120AXI / C9120AXE	802.3af	PoE	2x2	N	1G	OFF	13.4 W
	C9120AXI / C9120AXE	802.3af	PoE	N	2x2	1G	OFF	13.4 W
9115	C9115AXI / C9115AXE	802.3at	PoE+	4x4	4x4	2.5G	ON	20.4W
	C9115AXI / C9115AXE	802.3af	PoE	2x2	2x2	1G	OFF	15.4W
9117	C9117AXI	802.3bt	UPoE	4x4	8x8	5G	ON	28.9W
	C9117AXI	802.3at	PoE+	4x4	8x8	5G	OFF*	25.4W
	C9117AXI	802.3af	PoE	2x2	2x2	2.5G	OFF	13.5W

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* If USB is enabled, 5GHz will be reduced to 4x4

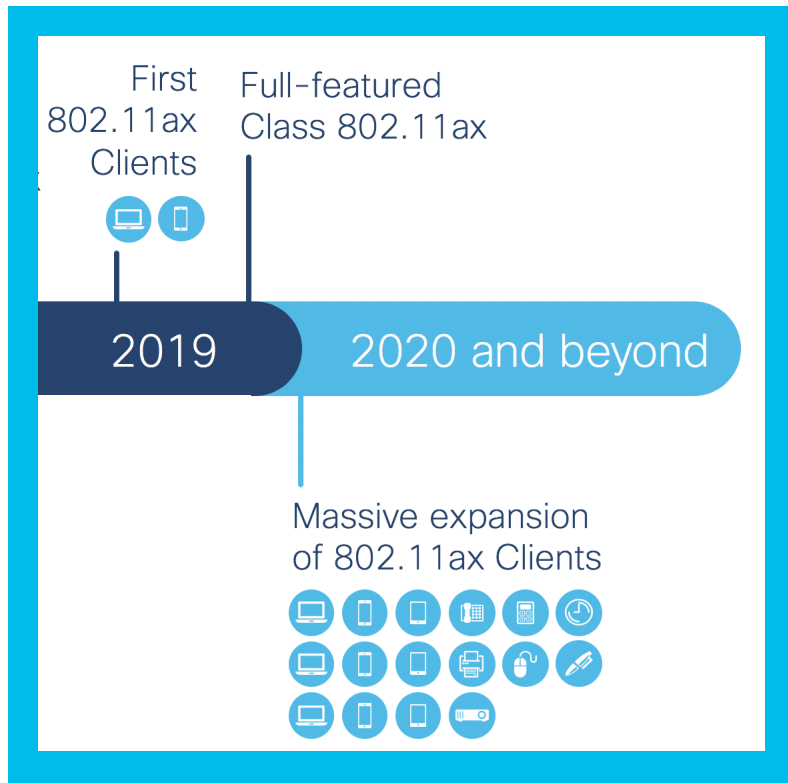
Гибкое электропитание точек доступа 9100: 802.3af поддерживается для всех Wi-Fi 6 ТД



Reference

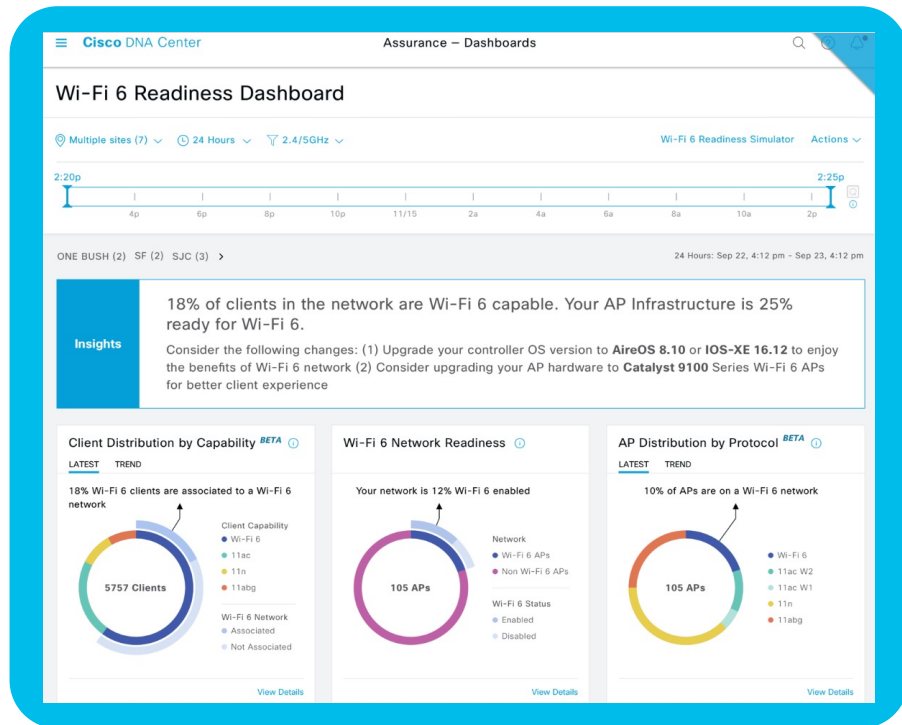
	AP Model	Power source	Power Type	2.4 GHz Radio	5 GHz Radio	Link Speed	USB	Power Draw
9130	C9130AXI / C9130AXE	802.3at (PoE+)	PoE+	4x4	8x8	5G	OFF	25.5W
	C9130AXI	802.3at	PoE+	4x4	4x4	5G	ON	25.4W
	C9130AXI / C9130AXE	802.3bt (UPoE)	UPoE	4x4	8x8	5G	ON	30.5W
	C9130AXI / C9130AXE	802.3af	PoE	1x1	1x1	1G	OFF	13.4W
9120	C9120AXI	802.3at	PoE+	4x4	4x4	2.5G	ON	25.5W
	C9120AXE	802.3at	PoE+	4x4	4x4	2.5G	ON	25.5W
	C9120AXI / C9120AXE	802.3af	PoE	1x1	1x1	1G	OFF	13.4 W
	C9120AXI / C9120AXE	802.3af	PoE	2x2	N	1G	OFF	13.4 W
	C9120AXI / C9120AXE	802.3af	PoE	N	2x2	1G	OFF	13.4 W
9115	C9115AXI / C9115AXE	802.3at	PoE+	4x4	4x4	2.5G	ON	20.4W
	C9115AXI / C9115AXE	802.3af	PoE	2x2	2x2	1G	OFF	15.4W
9117	C9117AXI	802.3bt	UPoE	4x4	8x8	5G	ON	28.9W
	C9117AXI	802.3at	PoE+	4x4	8x8	5G	OFF*	25.4W
	C9117AXI	802.3af	PoE	2x2	2x2	2.5G	OFF	13.5W

А сколько у меня Wi-Fi 6 клиентов вообще?

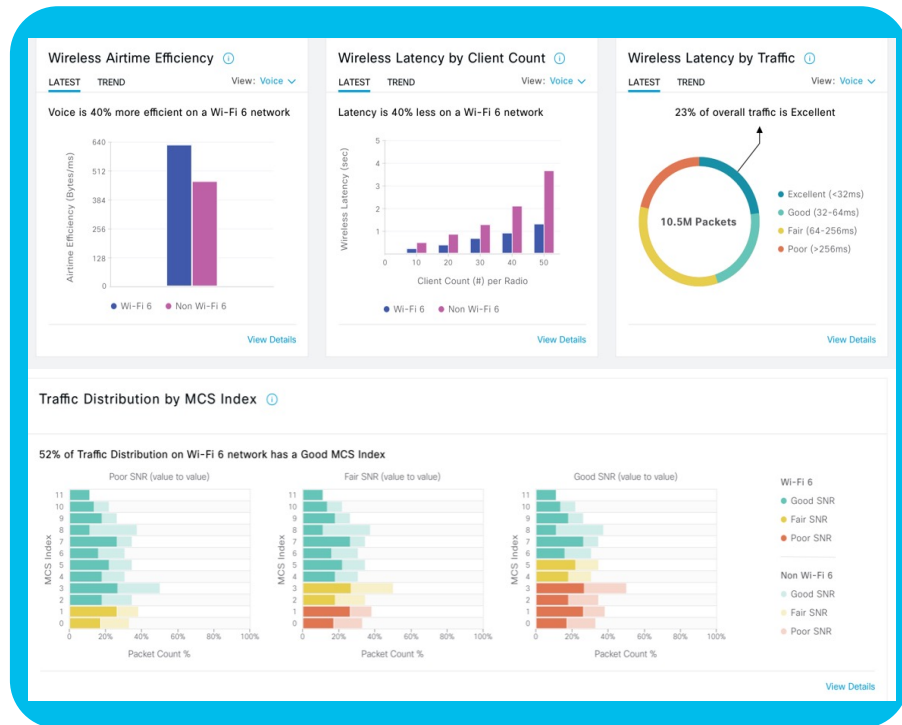


- Catalyst APs are **fully backward compatible** for legacy clients.
- All clients experience improvement because of:
 - RF ASIC on 9120 & 9130 will improve performance with **off-channel RRM scanning** feature
 - C9130 is a **tri-radio** AP allowing for dual 5 GHz + 2.4 GHz
- Mixture of Wi-Fi 6 and legacy clients are fine – but significant improvements are realized when Wi-Fi 6 clients reach +30%

Wi-Fi 6 аналитика на Cisco DNA Center



Identify Wi-Fi 6 Readiness for Client and AP



Measure Wi-Fi 6 benefits: Latency, Air-time Efficiency and Traffic Distribution

Новый дизайн точек доступа

Aironet 2800 series

Catalyst 9120 series



Compact design without Compromise



Efficient power consumption



Deploy using same existing brackets
AIR-AP-BRACKET-1 and -2



C9115

Weight : 38% lighter

Volume : 30% lower

Relative to AP1850-I

Power: 2x2 radios will work with just 15.4W

C9120

Weight : 13% lighter

Volume : 25% lower

Relative to AP2800-I

Power: 1x1 radios will work with just 15.4W

C9130

Weight : 29% lighter

Volume : 26% lower

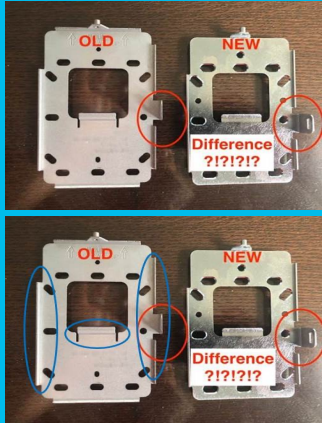
Relative to AP3800-I

Power: 8x8 radios will work with <30W for 5Ghz

Easy to deploy with same Aironet series mounting brackets

Монтажный комплект Catalyst 9105

9105AXW – Wall plate AP



This AP uses AIR-AP-BRACKET-W4

9105AXI – Ceiling Mount

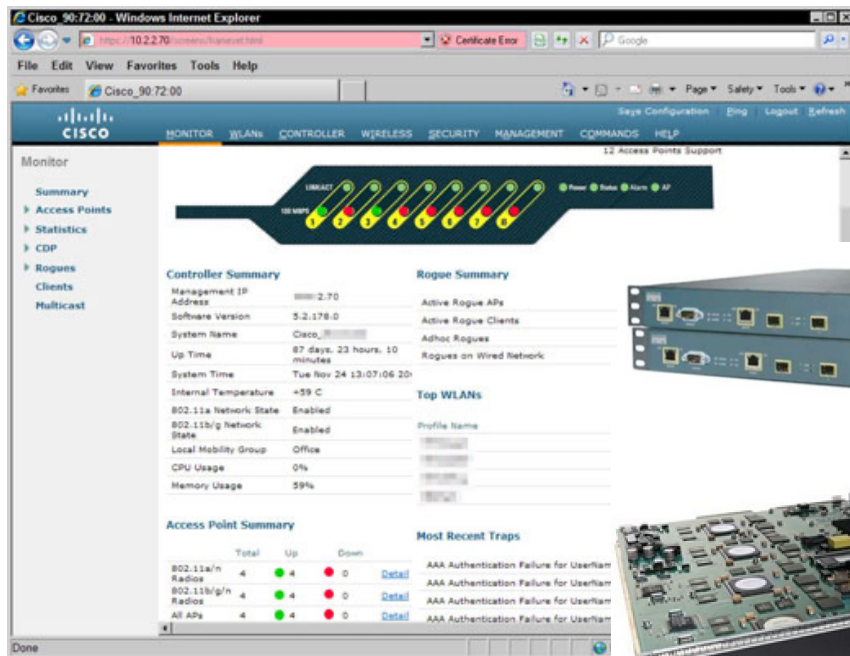


This AP uses AIR-AP-BRACKET-8=

The background is a dark blue field filled with numerous small, semi-transparent squares and dots in various colors including light blue, green, yellow, orange, and red. These elements are scattered across the frame, with a higher concentration of yellow and orange squares forming a diagonal band from the top right towards the bottom right. The text is positioned on the left side of the image.


Миграция контроллеров Catalyst 9800

Спасибо тебе, AireOS



Переход на контроллеры 9800

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, vWLC




C9800-L



C9800-CL
C9800 for cloud

150 to 1500 APs



Medium Campus



5508, 5520
Wireless Controller, vWLC




C9800-40



C9800-CL
C9800 for cloud

1500 to 6000 APs



Large Campus



7510, 8510, 8540, vWLC
Wireless Controller



C9800-80



C9800-CL
C9800 for cloud

Важные даты жизненного цикла AireOS

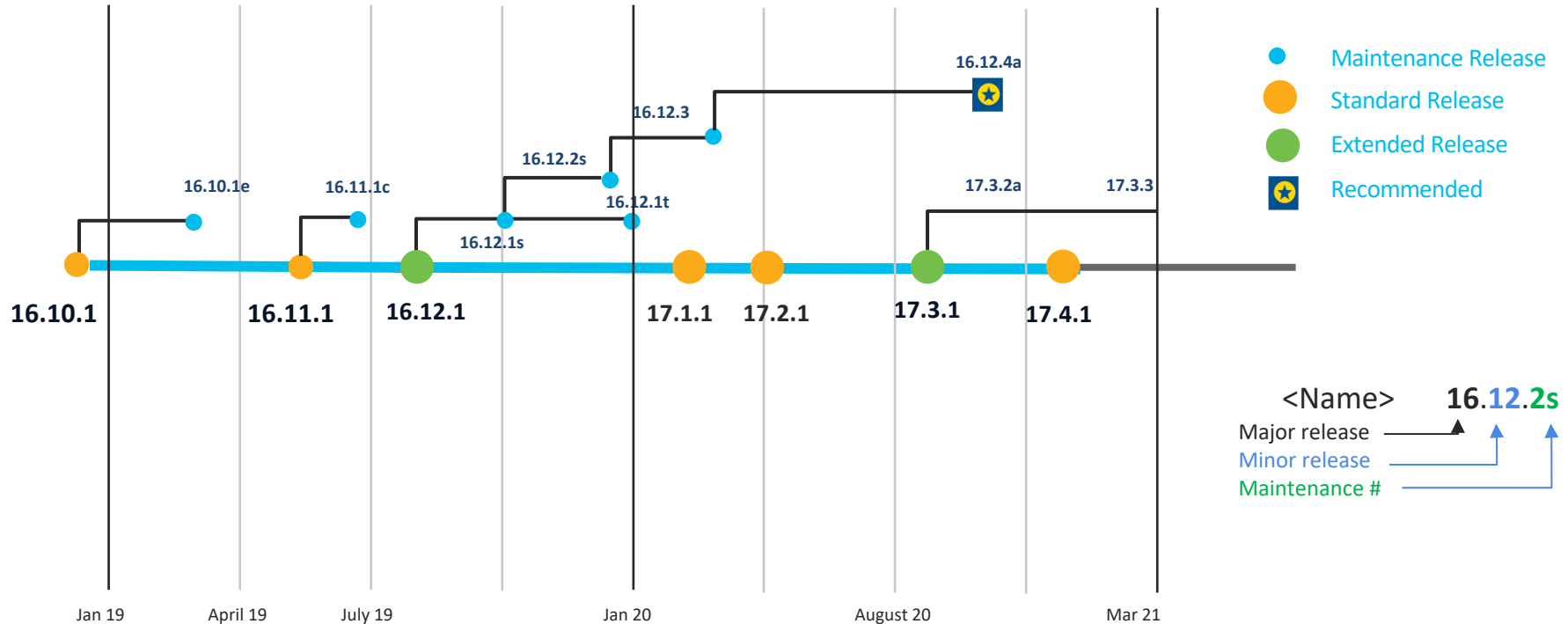
- **8.10 – Active release**
- 8.9 – Deferred
- 8.8 – End of Software Maintenance Nov 29 2020
- 8.7 – End of Software Support Nov 15 2019
- 8.6 – Deferred
- 8.5 – Active, but **End of Software Maintenance Dec 30 2021**

See TAC recommend release: <http://cs.co/recommendedaireos>

Паритет функций AireOS и IOS XE

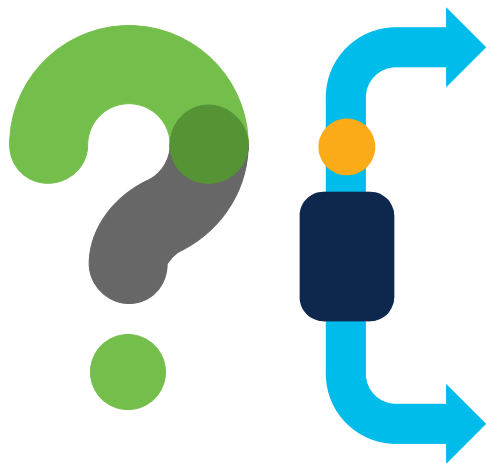
- It is a journey, but we are nearly there
- Use the online Config Migration tool
- Check the parity list:
https://www.cisco.com/c/en/us/td/docs/wireless/controller/technotes/8-8/AireOS_Cat_9800_Feature_Comparison_Matrix.pdf
- Verify with your Cisco Partner, Systems Engineer or Technical Solutions Architect

Развитие ПО Cisco IOS-XE



See TAC recommend release: <http://cs.co/recommendediosxe>

Какая рекомендованная версия ПО IOS XE?



Choose 16.12.4a for:

- Most stable release
- Most deployed software in the field
- Hardened IRCM testing done with AireOS 8.5.164
- Less interested in the latest features
- Prime support up to 3.7.1



Choose 17.3.2a for:

- AP hardware support for 9130E, 9105, IW3700, IW6300
- HyperV support for C9800-CL
- Latest features like: HA SSO parity, aWIPS, Wi-Fi6 features (BSS coloring, TWT), C9130 tri-radio support, etc.
- Deployment with Cisco DNA Center 2.1.2 and Prime 3.8.1
- Embedded 9800 in Catalyst switches (SDA)
- Go with 17.3.3 when available (Feb 2021)

Always check TAC Recommendations: <http://cs.co/recommendediosxe>

C9800 Configuration Migration Tool

- Import AireOS configuration to verify if there are any feature gap
- Migration tool managed by TAC: <https://cway.cisco.com/wlc-config-converter/>

Cisco TAC Tool - WLC Config Converter

✓ Welcome to our new interface

WLC Config Converter

Migrating wireless controllers to or from across any of these platforms: 2500/5500/7500/8500/WISM2/3650/3850/4500 S8E/5760/Catalyst 9800 controllers?

Please upload the following:
AireOS: "show run-config commands" output or TFTP config backup
Converged Access: "show running-config" output

Details

TFTP config backup or 'show run-config commands' output from AireOS WLC.

AIR-CT3504-K9.cfg
22.5 KB

Platform Conversion Type
AirOS-->Catalyst 9800

Run

Choose the AireOS to C9800 converter and hit run

Drop the AireOS config file:

- Upload it from directly from GUI:

Cisco TAC Tool - WLC Config Converter

Commands

Upload file from Controller

File Type: Configuration

Configuration File Encryption: ☐

Transfer Mode: TFTP

Server Details

IP Address (IPv4/IPv6): 1.1.1.1

File Path: /path/to/ftp

File Name: aireos-config.cfg

or

- use the "show run-config command" output and put it in a .txt file

- Analyze tool output

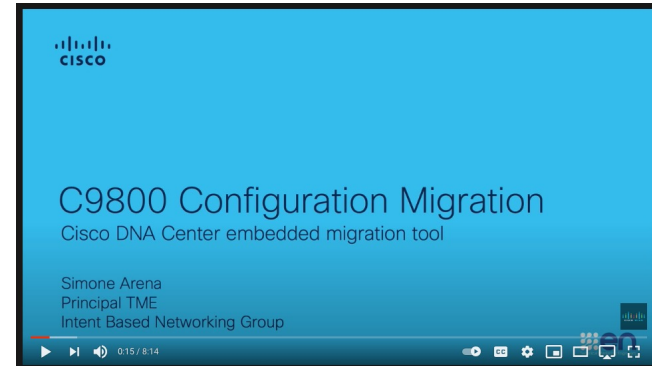
Tool provides following config:

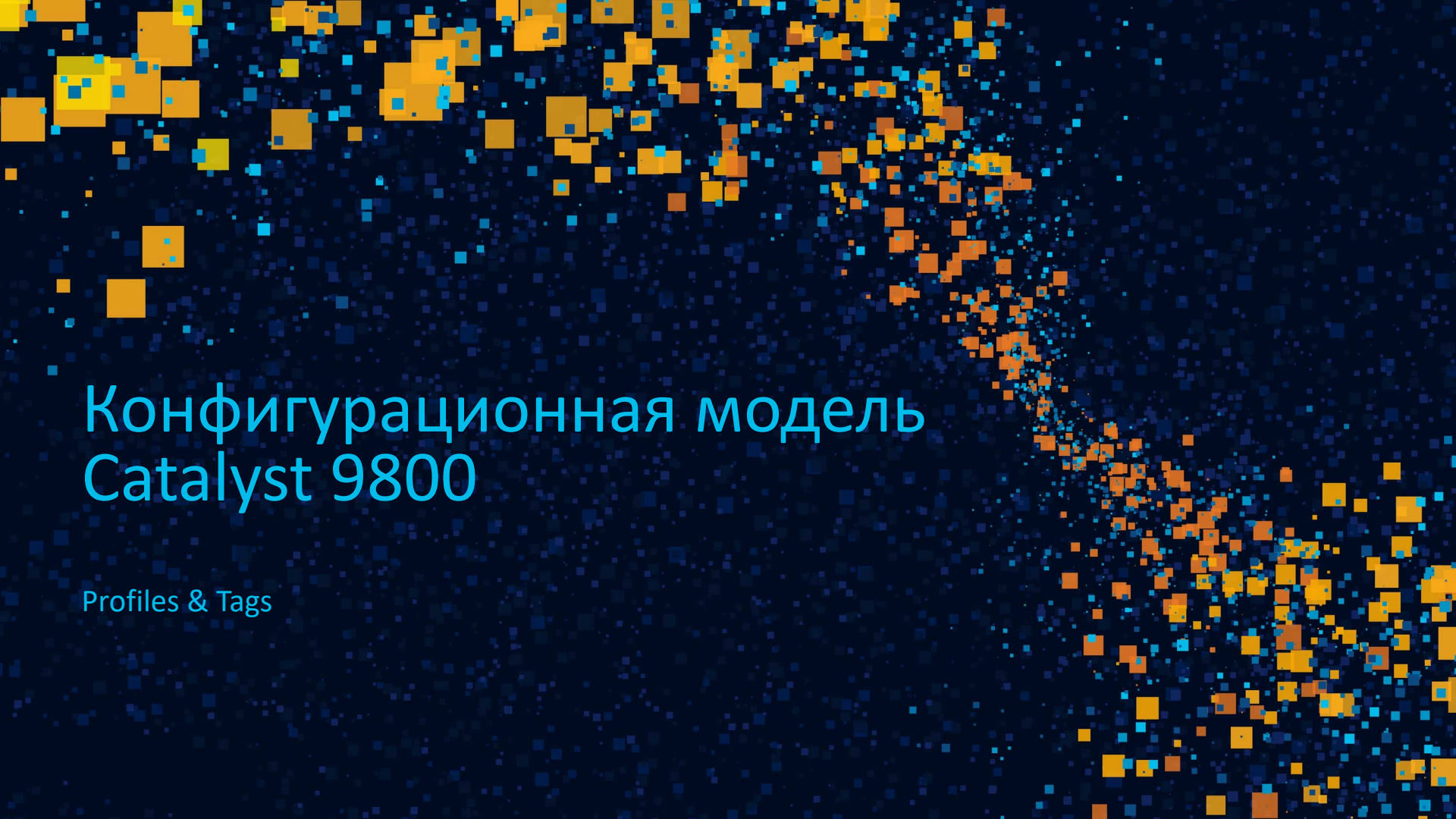
- **Translated** (translated in IOS-XE)
 - **Unmapped** (supported but not translated)
 - **Unsupported** (not supported in C9800)
 - **Not Applicable** (deprecated)
-
- AireOS CLIs and the correspondent translated IOS-XE commands
-
- Always recommended to analyze the translated config before paste it

Cisco DNA Center Controller Configuration Migration Tool



[Demo](#) on Cisco WLAN
YouTube channel



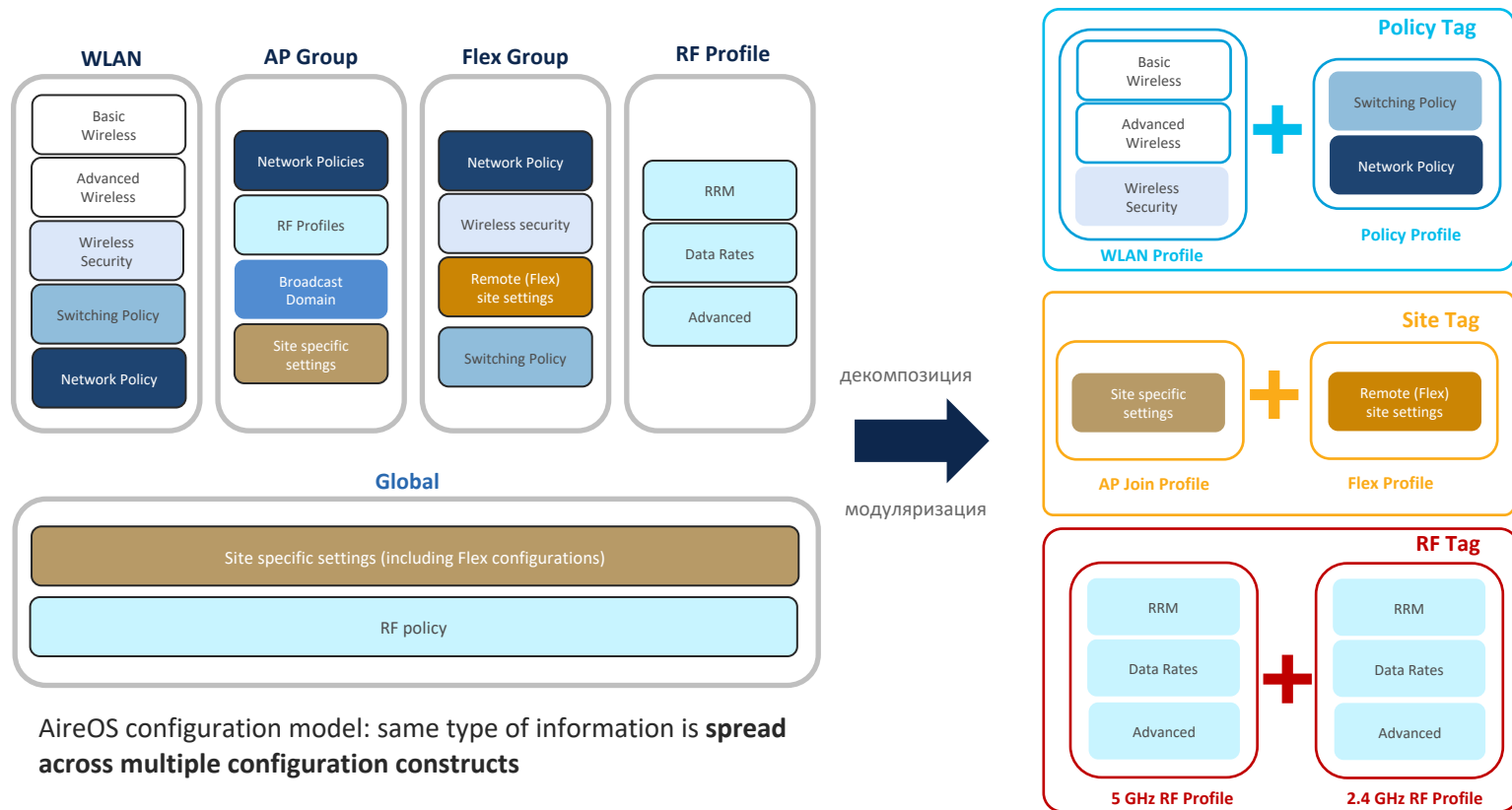


Конфигурационная модель Catalyst 9800

Profiles & Tags

Конфигурационная модель AireOS vs. Catalyst 9800

Модульная модель с логическим разделением на конфигурационные сущности



AireOS configuration model: same type of information is **spread across multiple configuration constructs**

Конфигурационная модель Catalyst 9800 - Преимущества



 Policy Tag

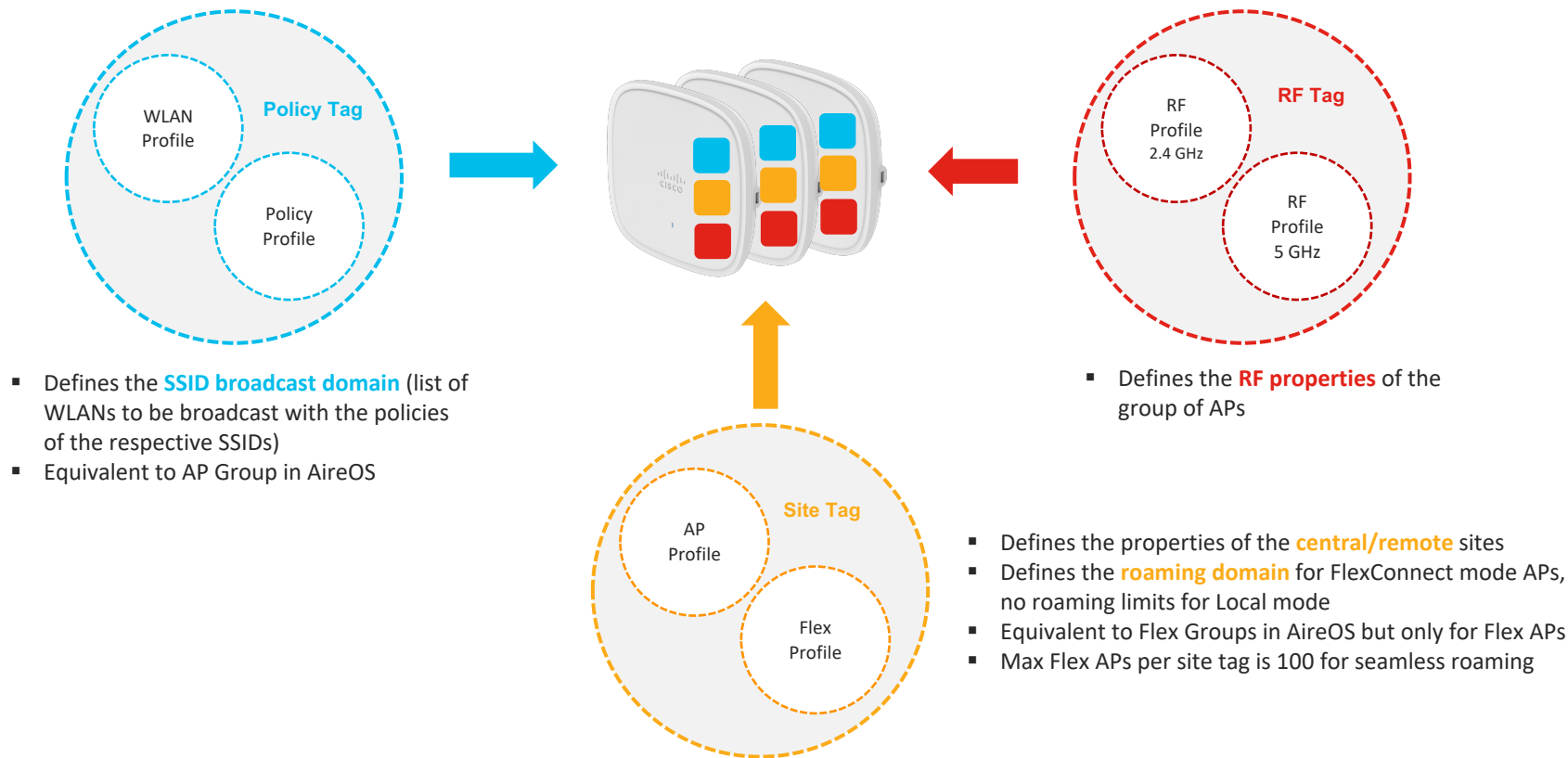
 Site Tag

 RF Tag

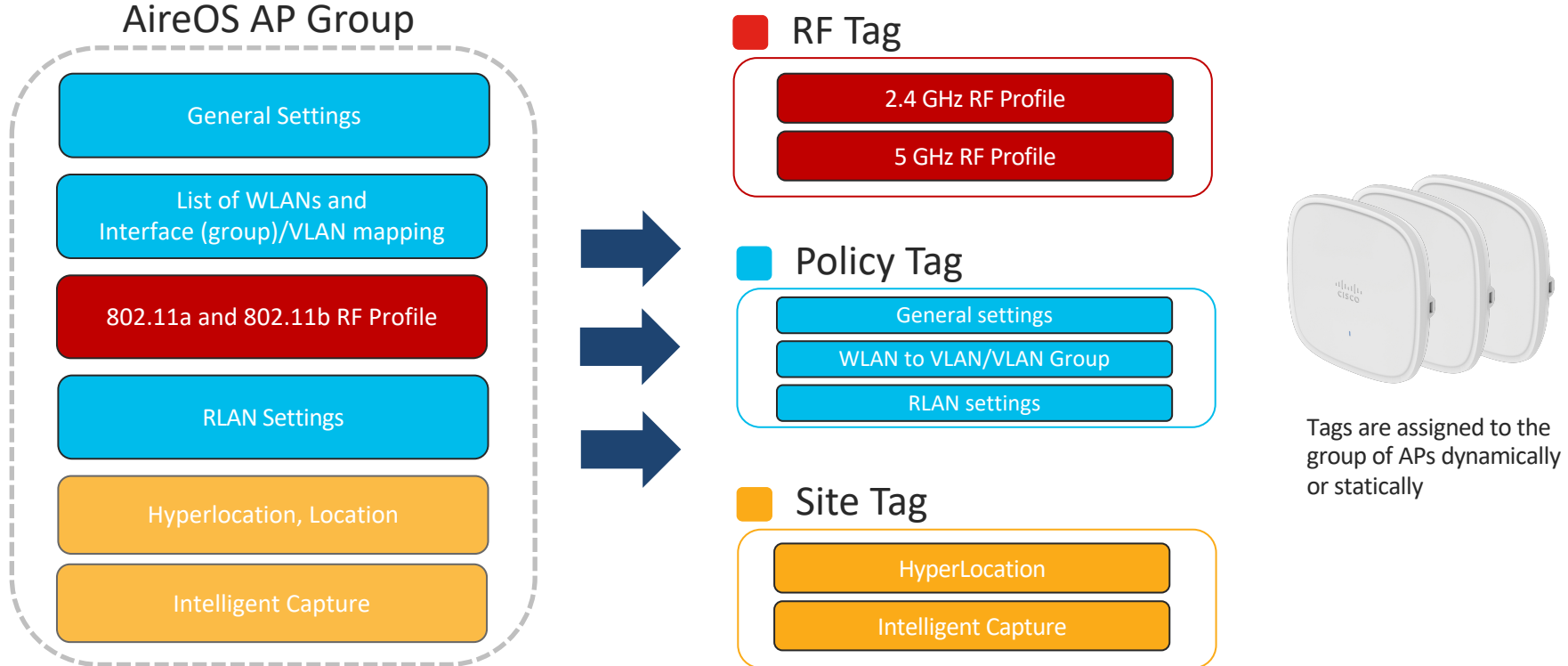
Преимущества Профилей (Profiles) и Меток (Tags):

- **Modular** and reusable configuration constructs
- **Flexible** in assigning configuration to a group of APs
- **Easy to manage** site specific configuration across geo-distributed locations
- **No reboot** needed when applying config changes via tags (remember AP groups?)

Новая конфигурационная модель Catalyst 9800 – Декомпозиция и модуляризация

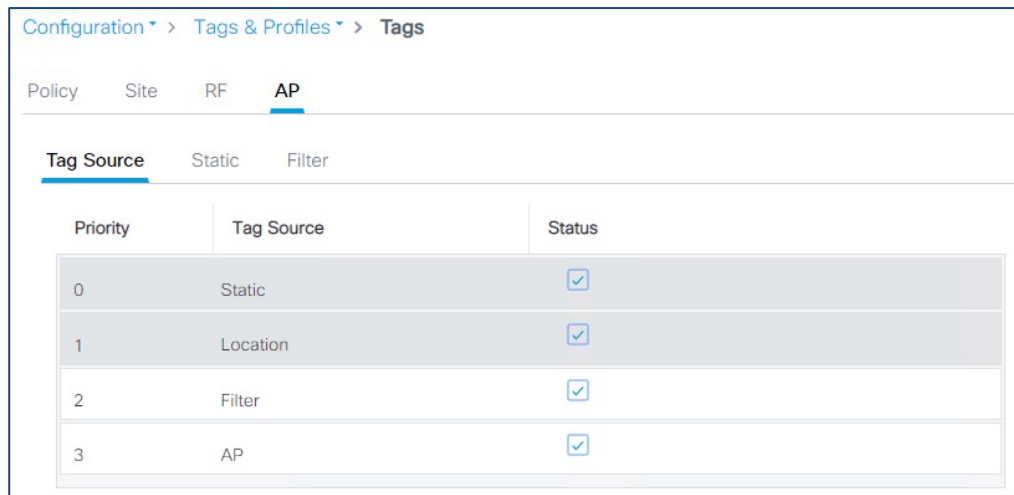


Преобразование AP Group в Policy, Site and RF Tags



Назначение метки точке доступа

- Without previous configuration, when the AP joins the C9800 it gets assigned the default tags: namely the **default-policy-tag**, **default-site-tag** and **default-rf-tag**
- The AP can have multiple tag sources:



Configuration > Tags & Profiles > Tags		
Policy	Site	RF
AP		
Tag Source	Static	Filter
Priority	Tag Source	Status
0	Static	<input checked="" type="checkbox"/>
1	Location	<input checked="" type="checkbox"/>
2	Filter	<input checked="" type="checkbox"/>
3	AP	<input checked="" type="checkbox"/>

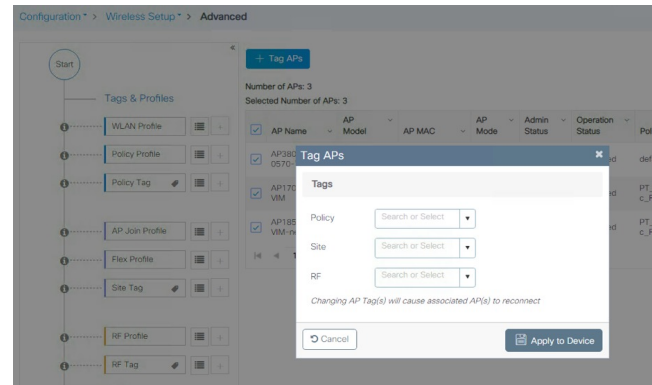
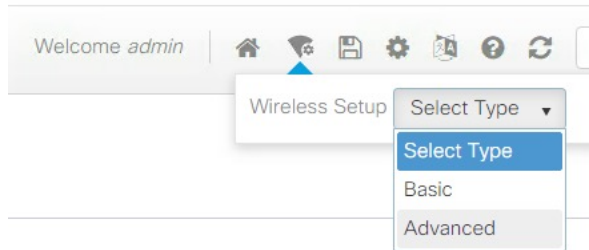
- Static: user configuration
- Location*: Basic Setup flow
- Filter: regular expression
- AP: the tag is saved on AP

These are in order of priority

(*) Location here is not the AP Location but a config construct internal to C9800

Назначение метки точке доступа

- The **static** Tag <> AP binding is based on AP's MAC and it's a configuration on the Controller: upon joining the C9800, the configuration gets applied and AP gets assigned to the selected tags
- Note: when the AP joins another controller that doesn't have the static mapping configured, it will get assigned to the default tags
- To statically assign Tags to multiple APs, you can use the Advanced Wireless Setup



Назначение метки точке доступа – GUI /CLI Проверка

- Available in 16.12.2s and later: Configuration > Wireless > Access Points

Configuration > Administration > **ap_configuration_viewer**

AP Name	AP Model	common_slots	Admin Status	IP Address	Base Radio MAC	AP Mode	Operation Status	Policy Tag	Site Tag	RF Tag	Tag Source	Location	Country
LABap_2802	AIR-CT5502-K9	2	✓	192.168.68.195	0027.e38f.33a0	Flex	Registered	default-policy-tag	default-site-tag	default-rf-tag	Default	default location	BE

LABap_2802

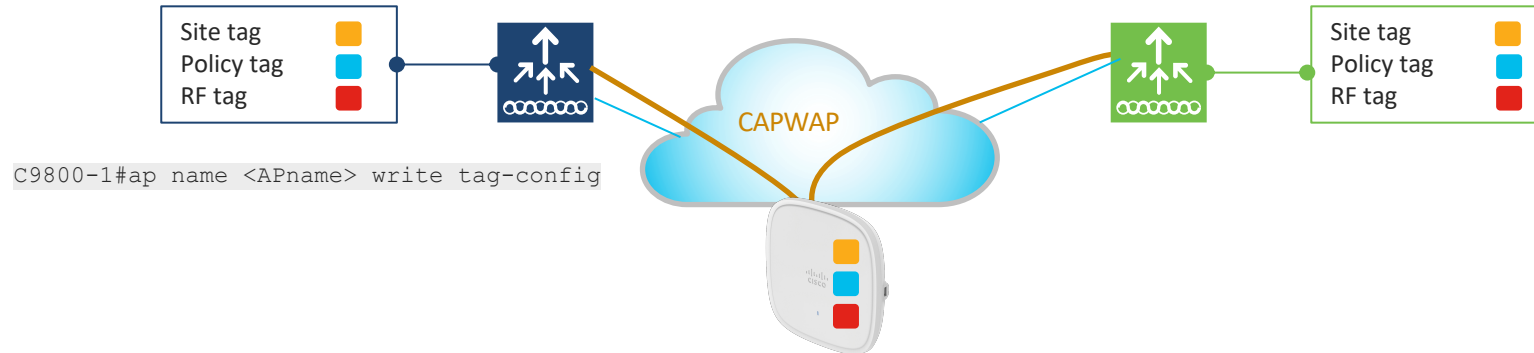
- wlans_and_policies (default-policy-tag)
 - WLAN : ACLtest
Policy : leap
VLAN ID : 1468
Security : Open
 - WLAN : ndarchis_leap
Policy : leap
VLAN ID : 1468
Security : WPA2
- site_properties (default-site-tag)
 - AP Join : default-ap-profile
LED State :
 - Rogue Detection :
 - Flex Profile ...
Native VLAN ID : 1
- rf_properties (default-rf-tag)
 - 5 GHz Band : Global Config
 - 2.4 GHz Band : Global Config

```
C9800-US-WEST#sh ap tag summary
Number of APs: 1
```

AP Name	AP Mac	Site Tag Name	Policy Tag Name	RF Tag Name	Misconfigured	Tag Source
AP0081.C4F4.2972	0081.c4f4.2972	NH	NH Policy Tag	default-rf-tag	No	Static

Назначение метки точке доступа

- You have the option to save the tags directly to the AP
- The AP will retain its tags assignments when moved between two controllers if the tags are saved to the AP (with the `write tag-config` command) and the tags are defined on both controllers. If not defined, the AP is assigned default tags.



Inter-Release Controller Mobility (IRCM)

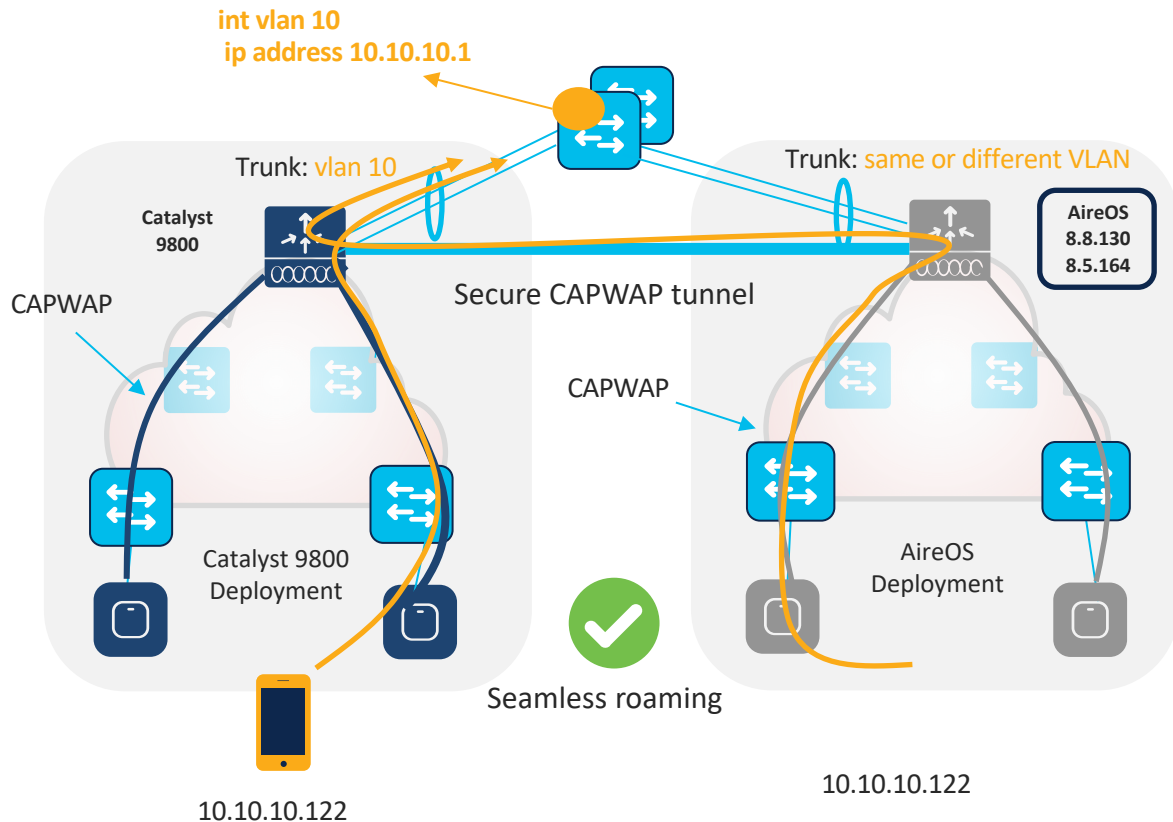
Typical use cases for IRCM:

- You cannot replace/move APs in one go; AireOS and Catalyst 9800 deployment will coexist and seamless roaming is needed
- You have an existing Anchor controller and want to continue to leverage the investment

How:

- Catalyst 9800 utilizes **Secure Mobility** (CAPWAP based) as the mobility protocol > supported only on 5508, 8510, 3504, 5520, 8540 AireOS controllers running 8.5 IRCM/8.8/8.10
- Roaming between AireOS and IOS-XE controllers is **always a Layer 3 roam**

AireOS / Catalyst 9800 IRCM - Роуминг



- All client roaming between AireOS and C9800 controllers are **Layer 3 roaming**
- The client session will be anchored to the first controller that the client has joined
- **The point of attachment to the wired network doesn't change** when roaming between C9800 and AireOS and vice versa
- This is independent of the VLAN mapped to the SSID on the wired side

Рекомендованные релизы для IRCM

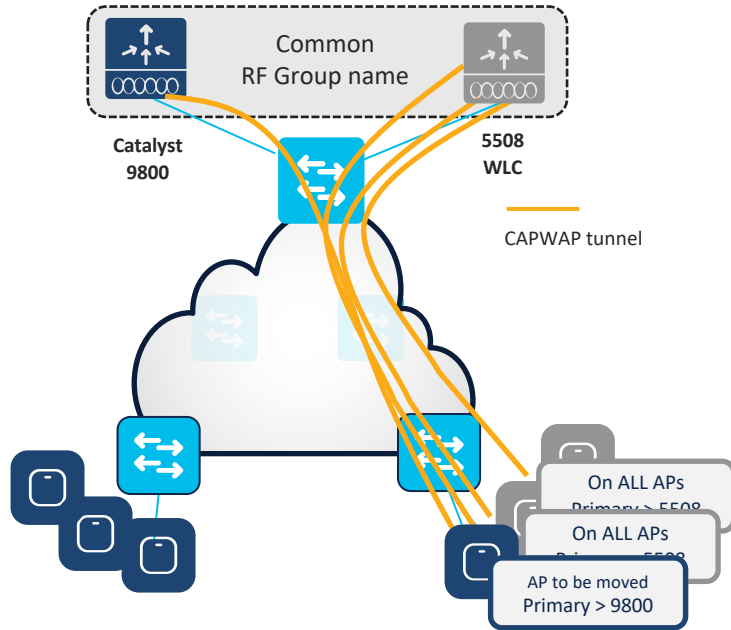
Catalyst 9800 IOS-XE	Access points	IRCM with Gen 1 AireOS 5508/8510	IRCM with Gen 2 AireOS 3504/5520/8540
16.12.4a	802.11ax 802.11ac	8.5.164 (8.5.164.215 ESC for same VLAN deployment)	8.10.142
17.3.2	802.11ax 802.11ac	8.5.164 (8.5.164.215 ESC for same VLAN deployment)	8.10.142

Please check these links for the recommended releases by Cisco TAC

Catalyst 9800 controllers: <http://cs.co/recommendediosxe>

AireOS controllers: <http://cs.co/recommendedaireos>

Миграция точек доступа с AireOS на Catalyst 9800



- **Recommendation:** set the primary WLC on all APs to existing WLC (in this customer case to 5508)
- Move APs setting Primary WLC to C9800

From GUI:

MONITOR		WLANs		CONTROLLER		WIRELESS		SECURITY		MANAGEMENT		COMMANDS		HELP		FEEDBACK	
All APs > Details for AP3800I-5080-SJ																	
General Credentials Interfaces High Availability Inventory Advanced Intelligent Capture																	
		Name		Management IP Address(Ipv4/Ipv6)													
Primary Controller		c9800-SJ		172.16.201.11													
Secondary Controller																	
Tertiary Controller																	

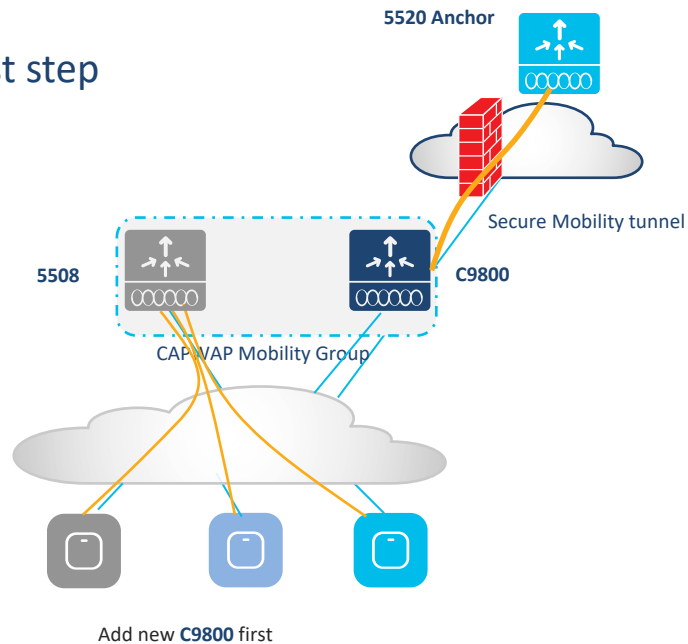
From AP CLI: `capwap ap primary-base <name> <IPaddress>`

Using Prime AP Template to set the Primary WLC

- APs will download the new image and reboot
- For new APs to discover C9800:
 - If using a different subnet: just set the DHCP/DNS options to point to the new 9800
 - If using a common subnet, first make sure all legacy APs have primary WLC set to AireOS and then advertise new C9800 in DHCP/DNS

Миграция на C9800 при наличии Guest Anchor

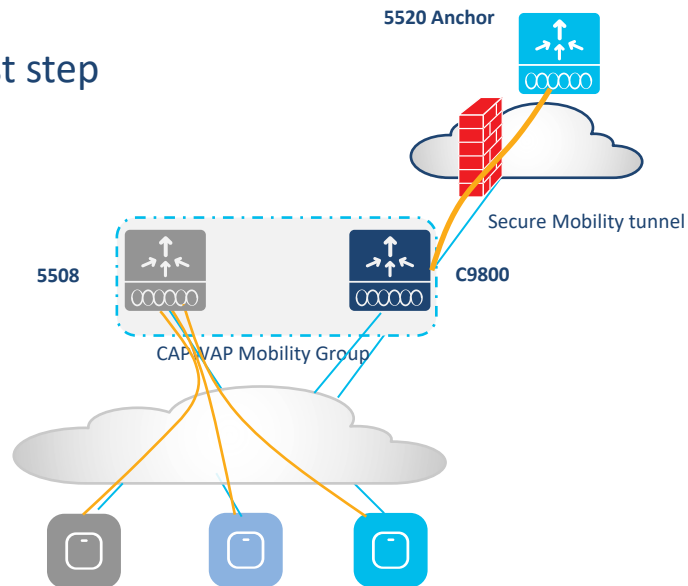
First step



- Upgrade 5508 to 8.5.161 IRCM image
- Upgrade 5520 to 8.5.161 IRCM image
- Add C9800 to the network
- Create CAPWAP Mobility Group with 5508
- Configure Secure Mobility with 5520
- Migrate configuration to C9800

Миграция на C9800 при наличии Guest Anchor

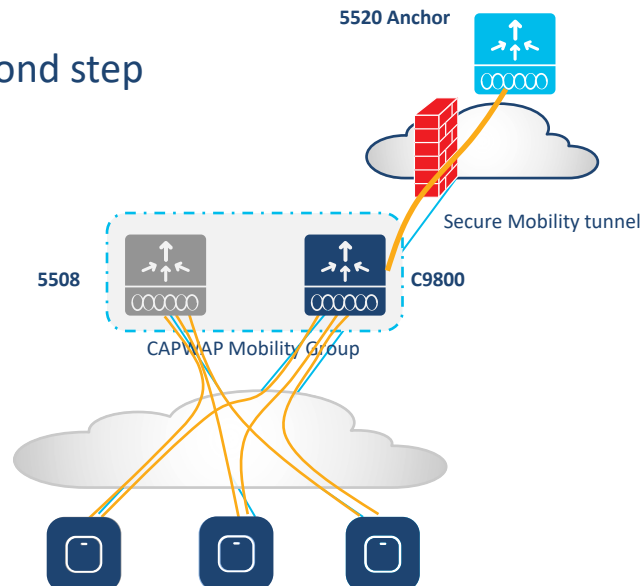
First step



Add new **C9800** first

- Upgrade 5508 to 8.5.161 IRCM image
- Upgrade 5520 to 8.5.161 IRCM image
- Add C9800 to the network
- Create CAPWAP Mobility Group with 5508
- Configure Secure Mobility with 5520
- Migrate configuration to C9800

Second step



- Replace **802.11n** and **W1 802.11ac** APs with 11ax APs
1:1 AP replacement if coverage is correct
Don't "Salt & Pepper" old with new AP model
Connect new 802.11ax APs to 9800
- Move **W2 11ac** APs to 9800
- Replace or move APs per roaming domain area
- Decommission 5508
- Replace **W2 11ac** APs with new 11ax APs for full stack

The background is a dark blue field filled with numerous small squares in shades of orange and light blue. These squares are scattered across the frame, with a higher concentration in the upper left and lower right corners, creating a dynamic, pixelated effect.

Демо Catalyst 9800

Настройка Tags & Profiles

Demo: Configuring Tags and Profiles







Corporate SSID

- **Traffic:** Centrally switched via CAPWAP
- **Authentication:** PSK
- **Encryption:** WPA2/WPA3 PSK
- **Availability:** Broadcast on all APs

Guest SSID

- **Traffic:** Centrally switched via CAPWAP
- **Authentication:** Open
- **Encryption:** None
- **Availability:** Broadcast on all APs

Search Menu Items

-  Dashboard
-  Monitoring
-  Configuration
-  Administration
-  Licensing
-  Troubleshooting

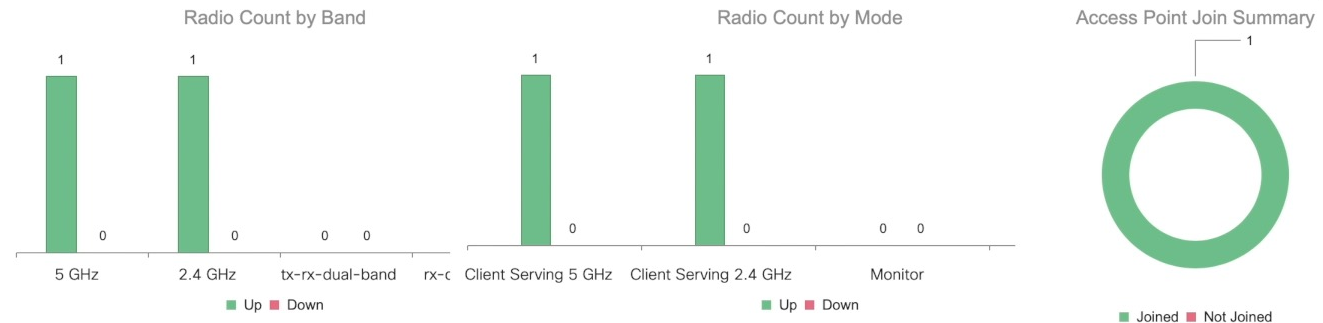
Dashboard



Overview

Access Points

Last Updated: 3/7/2021, 3:10:08 PM



Top Access Points

Loading...

Top WLANs

Last Updated: 3/7/2021, 3:10:08 PM

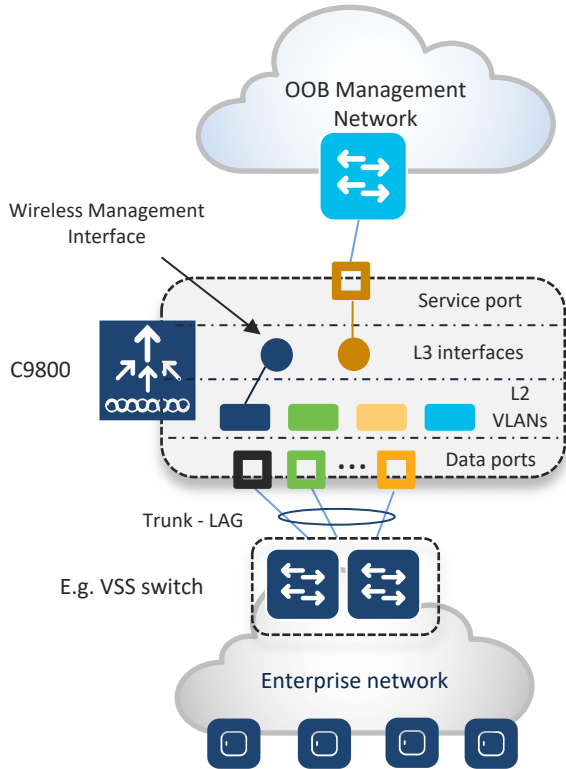
Client Device Types

Last Updated: 3/7/2021, 3:10:08 PM



Особенности дизайна Catalyst 9800

Сетевая связность (SVIs, VLANs, etc)



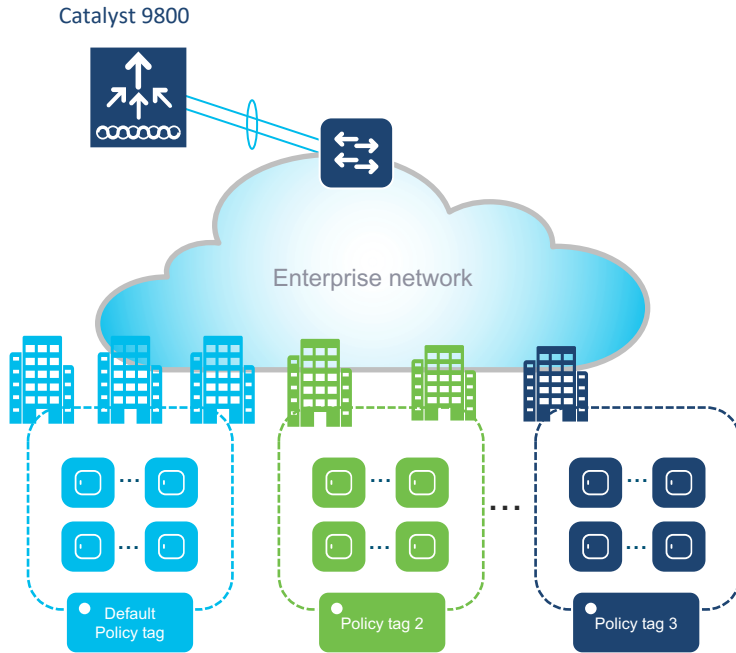
Facts:

- It's **mandatory** to have a **L3 interface** configured as **Wireless Management Interface**. AP CAPWAP traffic is terminated to the wireless management interface. There is only **one Wireless Management Interface**.
- For centrally switched traffic, is **mandatory to configure a L2 VLAN** mapped to the SSID; but the corresponding L3 interface (SVI) is optional, unless you need mDNS feature – this is different from AireOS where Dynamic interface is required.
- Service Port on the appliance belongs to the Management VRF. On the C9800-CL this can be created as a L3 interface but no VRF supported

Design best practices:

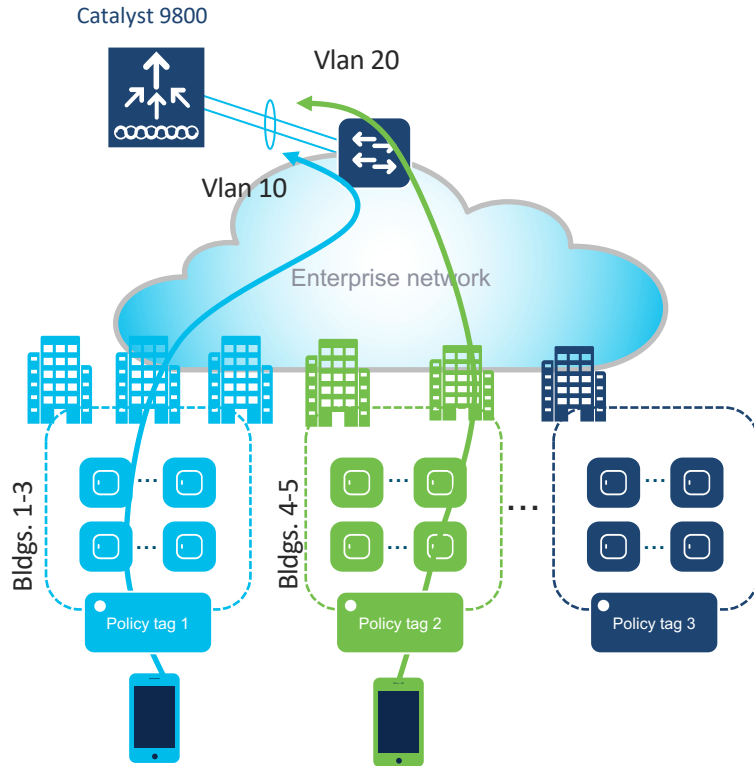
- **Uplink ports** follow AireOS best practices: port-channel configured as trunk to a pair of VSS/VSL pair of switches or to a multi-switch stack.
- **C9800-CL in Public Cloud** must use a L3 port. Sniffer Mode and Hyperlocation not supported.
- **C9800 Appliances and C9800-CL in Private Cloud** use an L3 SVI for Wireless Management Interface, otherwise above limits will apply.

Policy Tags – Default Policy Tag



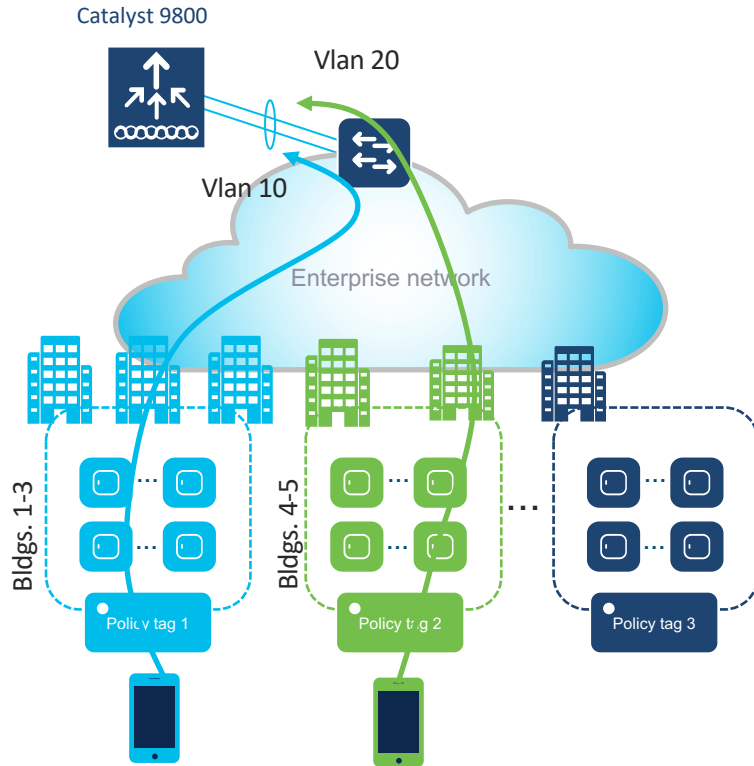
- **Policy Tag** defines which SSID is broadcasted by the AP or group of APs and the associated policy (VLAN, QoS, AVC, etc). In this, it's equivalent to the AP Group in AireOS
- Like any other tags, policy tag has a default-policy-tag that gets assigned by default when the AP first join the Catalyst controller
- User must explicitly map any WLAN (no matter the WLAN ID) to the default-policy-profile via the default policy tag for the SSID to be broadcasted. In other words, no SSID will be broadcasted by default, which will **save precious air time**.

Policy Tags – Roaming across Policy Profiles



- **Policy Tags** can be used to assign different policies to the same SSID in different locations or group of APs.
- Use Case: IT wants to assign a different VLAN to the campus wide SSID according to client joining location. For example: if client joins from bldg. 1-3 assign it to VLAN 10, if it joins from bldg. 4-5, assign VLAN 20 and so on...
- This can be easily achieved by using a different policy tag per group of APs in those buildings and mapping the same SSID to a different policy profile (where the different VLAN is defined).
- **Starting from 17.3**, if the policy profiles differ only for certain parameters (VLAN and ACL being the most important), then **seamless roaming is allowed across policy profiles** (and related policy tags)
- To configure the feature, enter the following command in global config mode:
`c9800(config)#wireless client vlan-persistent`

Policy Tags – Roaming across Policy Profiles

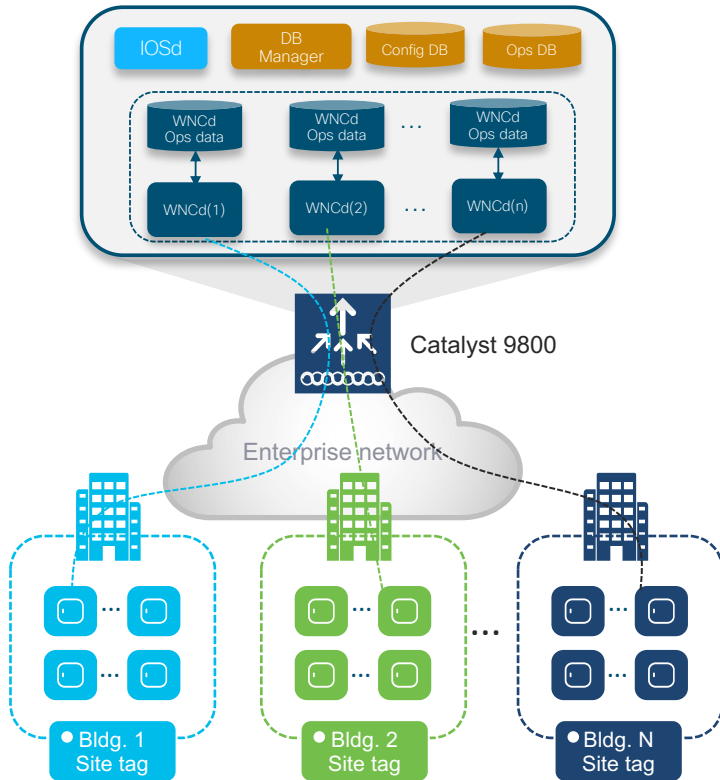


- Before 17.3, if two policy tags are created to associate a different policy profile to same SSID (e.g. different client VLAN), upon roaming, client will need to go through a reauth to re-evaluate the change in policy > client roaming is not seamless
- **Starting from 17.3**, if the policy profiles differ only for certain parameters (VLAN and ACL being the most important), then **seamless roaming is allowed across policy profiles** (and related policy tags)
- To configure the feature, enter the following command in global config mode:
`c9800(config)#wireless client vlan-persistent`

For a complete list of attributes please go to:

https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-3/config-guide/b_wl_17_3_cg/m_client_roaming_policy_profile.html

Site Tags – Design Considerations



Important facts:

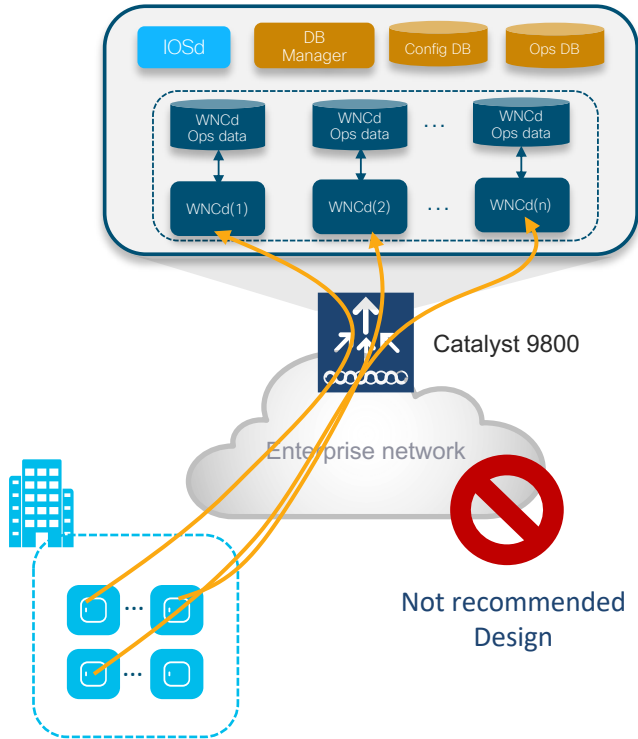
- C9800 has a multi-process software architecture
- APs are distributed across Wireless Network Controller processes (WNCd) within a C9800
- Load balancing of APs (and clients) across WNCd gives better scale and performance
- The number of WNCds varies:

Platform	# of WNCd instances
EWC (on AP or C9k switch)	1
C9800-L	1
C9800-CL (small)	1
C9800-CL (medium)	3
C9800-40	5
C9800-CL (large)	7
C9800-80	8

Following command shows the # of WNCds processes:

```
9800#sh processes platform | inc wncd
```

Site Tags – AP to WNCd Distribution



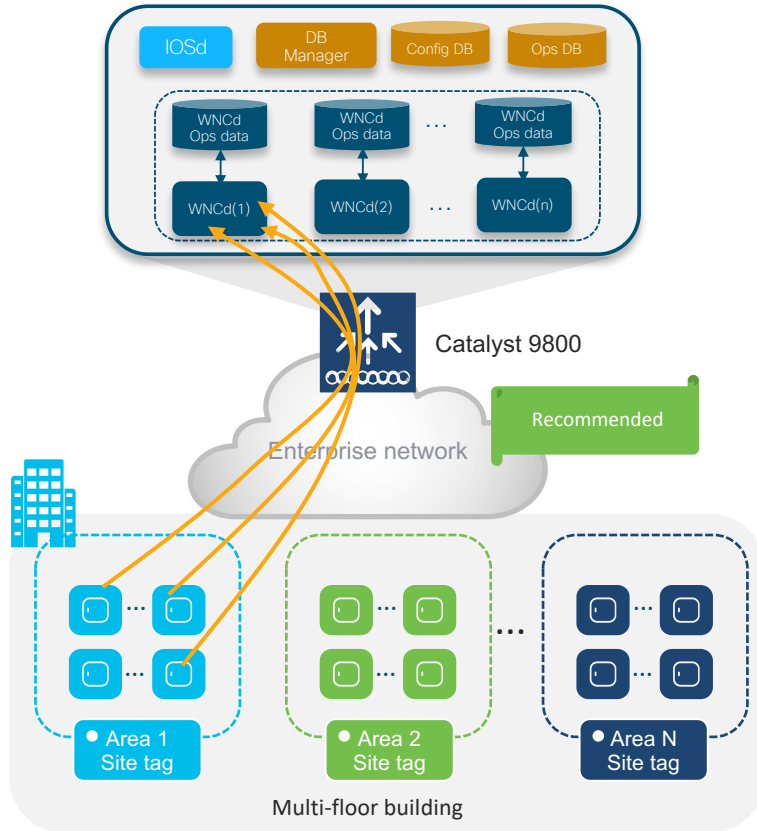
How AP distribution works:

- Load balancing applies to APs only (not directly to clients)
- Today **AP distribution** is based on **Site Tag**: APs with the same site-tag are managed by the same WNCd

Let's consider what happens if using the **default-site-tag**:

- As APs come online and register to the C9800, they are load balanced across WNCd instances in a **round robin** fashion
- Each neighbor AP will be assigned to a different WNCd > lot of inter-process roaming > not optimal design
- **11k/v and Coverage Hole detection (CHD)** are managed within a WNCd process. These features **may break if neighbor APs are on different WNCd**
- **Take Away**: Full AP scale support and Fast Seamless Roaming (802.11r, CCKM, OKC) always works across site tags in Local mode (for FlexConnect is limited to one site tag)

Site Tags – AP to WNCd Distribution

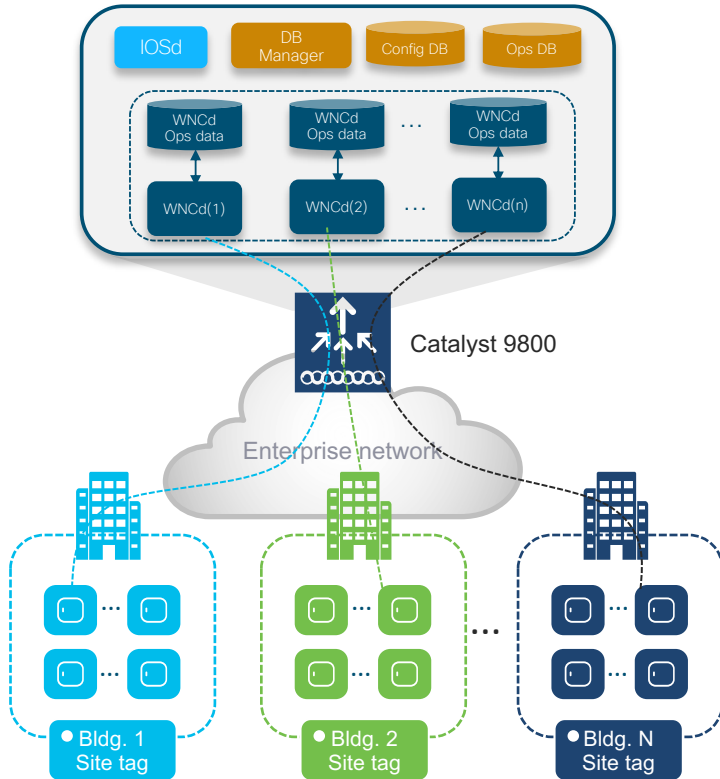


How AP distribution works:

- For best performance, **use custom site tag** and group APs at a roaming domain level > **Site Tag = Roaming Domain**
- In this case, neighbor APs will end up joining the same WNCd process and hence optimizing performances
- To show how APs are load-balanced across WNCds:

```
c9800#sh wireless loadbalance ap affinity wncd
```
- Syslog which informs the user of a WNCd overload:
"Process overload detected, handling %u Access Points. Ensure that the number of Access Points in a Site Tag is following recommendation."

Site Tags – Design for Campus (Local Mode)



Example of **Campus with multiple buildings**: if most of the roaming is within a building, a good design choice would be to choose **a site tag per building** (this is the DNA Center criteria)

Recommendations:

- You do not want to assign all the APs to the same site tag (WNCd) as this will not be very efficient
- For **Local mode** APs, the recommended number is 500 APs per Site Tag. But it should not exceed the following limit:

Platform	Max APs per site tag
9800-80, 9800-CL (Medium and Large)	1600
9800-40	800
Any other 9800 form factor	Max AP supported



Лучшие практики Catalyst 9800

Лучшие практики миграции

- **Understand** the IOS-XE Configuration Model (Profiles & Tags)
 - **Build a test area** with same characteristics of the production network
 - Same topology: Anchor Controller, HA config, Firewall and other network settings like AAA
 - Ideally test same client types but at least one Windows, one Android and one Apple client
 - Test the different authentication types with same version of production AAA and Portals
 - **Assess** the client devices and evaluate if some changes need to be done in the RF default configuration (e.g. old devices might need lower data rates)
- 💡 **Tip:** No hardware? Download C9800-CL virtual machine from Cisco.com or use dCloud
- 💡 **Tip:** Split corporate SSID in 2.4 GHz and 5 GHz and allow 5 GHz capable devices use 5 GHz

Руководство по лучшим практикам на Cisco.com

<http://cs.co/c9800-BP>

Products & Services / Wireless / Wireless LAN Controller / Cisco Catalyst 9800 Series Wireless Controllers / White Papers /

Cisco Catalyst 9800 Series Configuration Best Practices

Updated: May 7, 2020

Contact Cisco

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Security settings
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Introduction

The Cisco® Catalyst® 9800 Series (C9800) is the next-generation wireless LAN controller from Cisco. It combines RF excellence gained in 25 years of leading the wireless industry with Cisco IOS® XE software, a modern, modular, scalable, and secure operating system. The Catalyst Wireless solution is built on three main pillars of network excellence: Resiliency, Security, Intelligence:



Cisco Catalyst 9800 Series Wireless Controllers

Power by Cisco IOS® XE Open and programmable



Cisco Catalyst 9100 Access Points

Power by Wi-Fi technology Superior RF experience

Resilient



ISSU

Secure



User Define Network

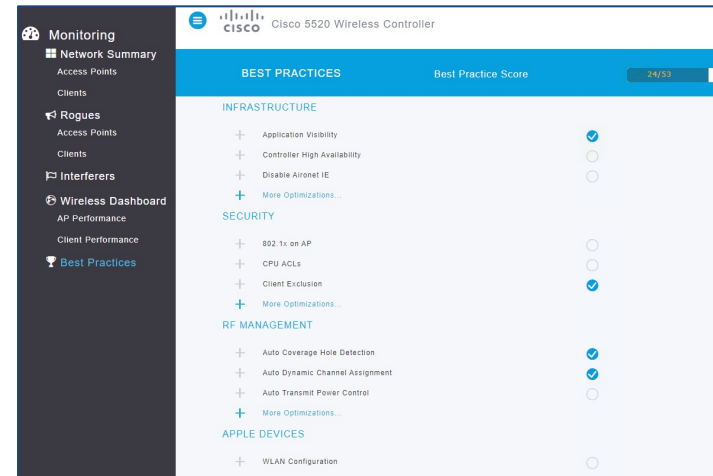
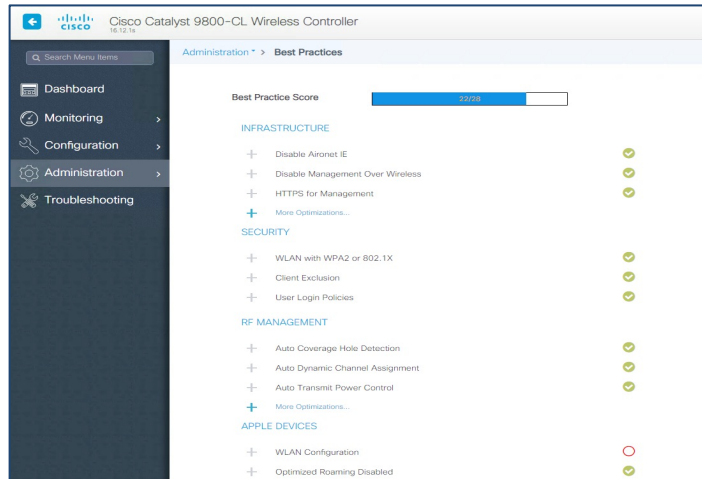
Intelligent



11ax Analytics
Samsung Analytics

Лучшие практики в Catalyst 9800

C9800 (in 16.12.1s and later) introduces the same Best Practice dashboard



There are some differences that you should be aware of...

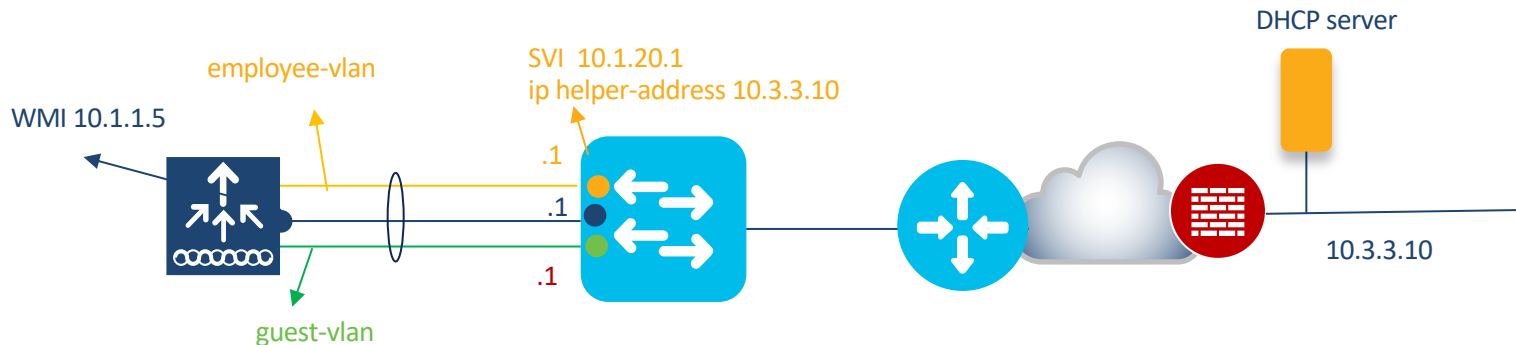
Лучшие практики – DHCP proxy/relay

- **DHCP Proxy mode:**

- In AireOS, enabling DHCP Proxy for wireless clients is a best practice
- In C9800 DHCP proxy is not needed as IOS-XE has embedded security features like DHCP snooping, ARP inspection, etc. that don't require a L3 interface

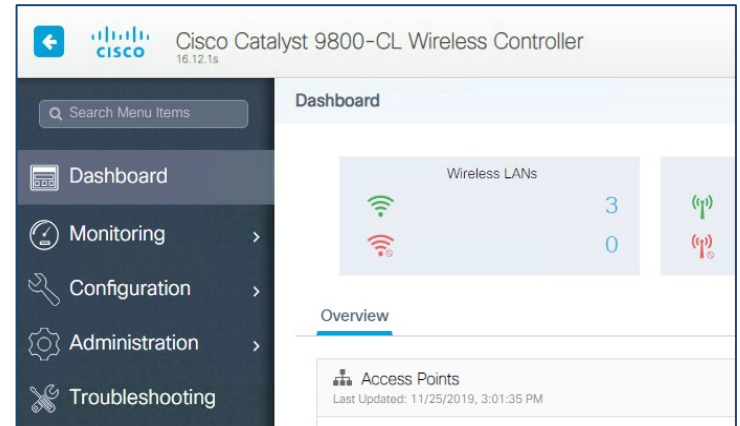
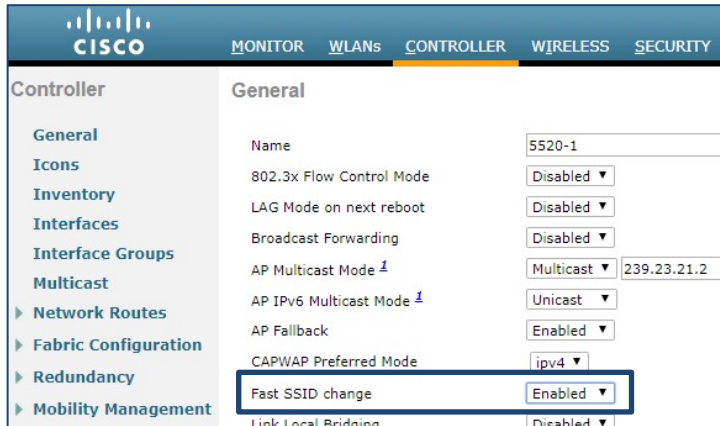
- **DHCP relay or bridging mode?**

- DHCP bridging is the **recommended mode** and should be used if DHCP relay can be configured on the upstream switch or if the DHCP server is on the client VLAN



Лучшие практики – Fast SSID Change

- In AireOS, Fast SSID change is a best practice to allow clients to roam faster between different SSIDs



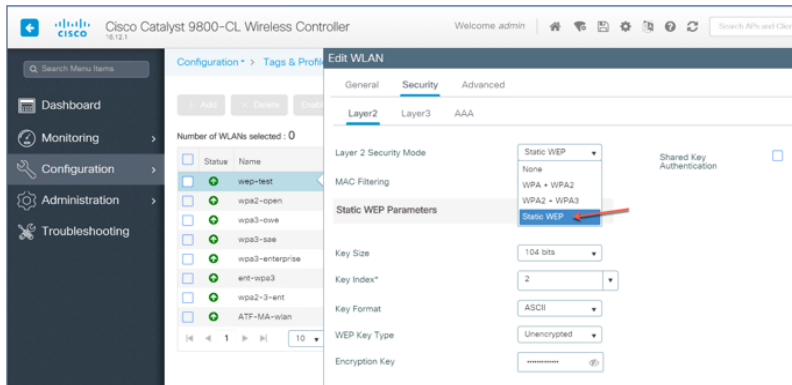
In C9800 there **no setting called Fast SSID** change and is not required as **C9800 allows this behavior by default**

Only if TKIP and WEP Support is Required

- TKIP and WEP are deprecated by WFA. However...
- TKIP configuration is available in CLI only (same as in AireOS) and supported on all APs

```
C9800-1(config)#wlan psk-psk 17 sj-psk  
C9800-1(config-wlan)#security wpa wpa1 ciphers tkip
```

- WEP configuration is also available on C9800 and is supported with Wave-1 APs only (x700 series and 1570). Wave 2 APs or new Catalyst 9100 APs will not broadcast SSID configured with WEP.



Лицензирование Catalyst 9800

Cisco Wireless DNA Packages

Cisco DNA Premier

Automation, Assurance, Software-Defined Access, Security, Segmentation, Location

Cisco DNA Advantage

Automation, Assurance, Software-Defined Access, Location

Cisco DNA Essentials

Base Automation, Base Assurance

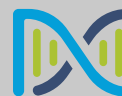
Choose one tier and either 3, 5 or 7 year subscription

Simply match the number of DNA packages and APs

Wireless will continue to operate at the end of subscription period!

Check out the EN Wireless Discounts & Offers!

Contact your Cisco representative



Migrate from perpetual license (AP license or Cisco One) to Wi-Fi 6/Catalyst 9800

Subscription FAQ

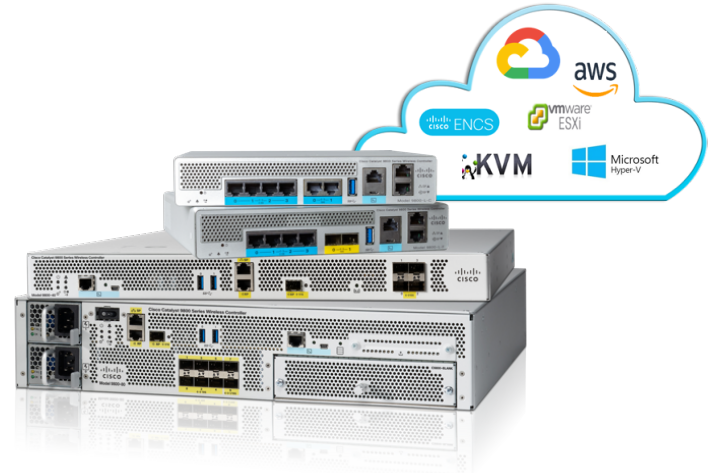
<https://www.cisco.com/c/en/us/products/collateral/software/one-wireless-subscription/nb-06-dna-access-wl-sw-faq-ctp-en.html>

Software Support Service (SWSS) included in all subscriptions

Основные выводы

ОСНОВНЫЕ ВЫВОДЫ

- Use the Migration Tool and review the conversion output
- Understand the IOS-XE Configuration Model
- Review your requirements for AireOS and IOS-XE co-existence
- Utilize deployment Best Practices



Полезные ссылки



[Migration to the New Catalyst Wireless Stack, a practical guide!](#) - Recorded Cisco Live content is **available free of charge to you**



[Campus LAN and WLAN Solution Design CVD](#)

[C9800 Release Notes](#)

[C9800 Configuration Guides](#)

[C9800 Technical References](#)

[C9800 Command References](#)

[C9800 Configuration Examples and Tech Notes](#)

[C9800 Deployment Best Practices](#)

[C9800 WLC Configuration Model](#)

[WLC Configuration Converter](#)

[WLC Compatibility Matrix](#)

[AireOS to IOS-XE Command Mapping](#)

[AireOS to C9800 Wireless Controller Feature Comparison Matrix](#)

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Data-optimized intelligence with security

Enterprise



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New Wi-Fi 6 Dashboard in Cisco DNA Center

CiscoWLAN • 438 views • 1 month ago

Cisco DNA Center 2.1.1 got new Wi-Fi 6 Readiness Insight and Airtime Efficiency and Latency Analytics, providing Wi-Fi 6 latency and efficiency comparison between Wi-Fi 6 and other legacy

Cisco DNA Center Wireless Solution



PLAY ALL



Cisco Aironet Active Sensor
| Episode 1 - Product...



Cisco Aironet Active Sensor
| Episode 2 - Deployment &...



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- 25 мая - Миграция Flexconnect сети на беспроводной контроллер Catalyst 9800
- 26 мая - Разворачивание, настройка и использование виртуального беспроводного контроллера Catalyst 9800
- 27 мая - Миграция на беспроводной контроллер Catalyst 9800 с использованием Prime Infrastructure и DNA Center
- 28 мая - Рекомендации по отладке и поиску неисправностей в сетях под управлением Catalyst 9800

Thank you

