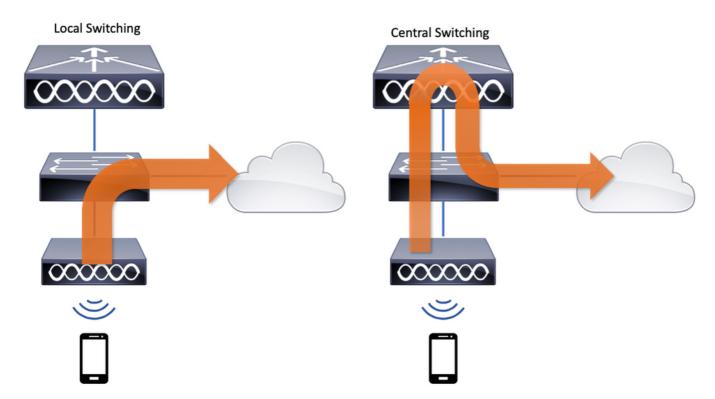
# Understand FlexConnect on Catalyst 9800 Wireless Controller

## Introduction

This document describes the FlexConnect feature and its general configuration on 9800 Wireless Controllers.

## **Background Information**

FlexConnect refers to the capability of an Access Point (AP) to decide whether the traffic from the wireless clients is put directly on the network at the AP level (Local switching) or if the traffic is centralized to the 9800 controller (Central Switching).



## Prerequisites

## Requirements

There are no specific requirements for this document.

## **Components Used**

The information in this document is based on these software and hardware versions:

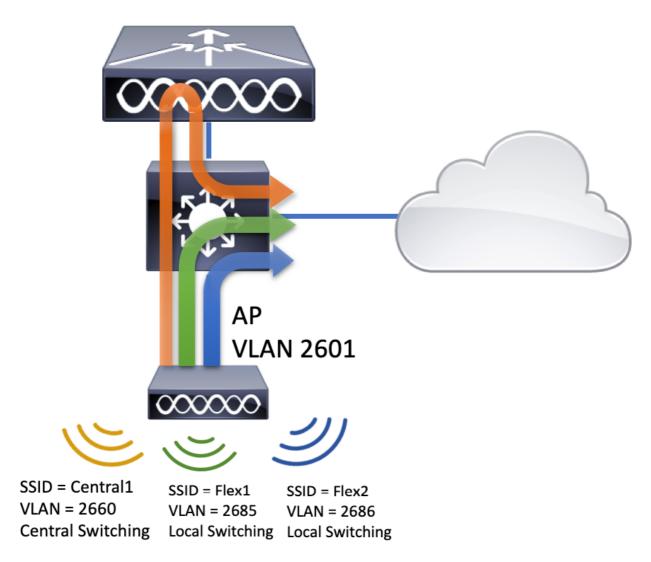
Cisco Catalyst 9800 Wireless Controllersrunning IOS-XE Gilbraltar v16.10

The information in this document was created from the devices in a specific lab environment. All of

the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

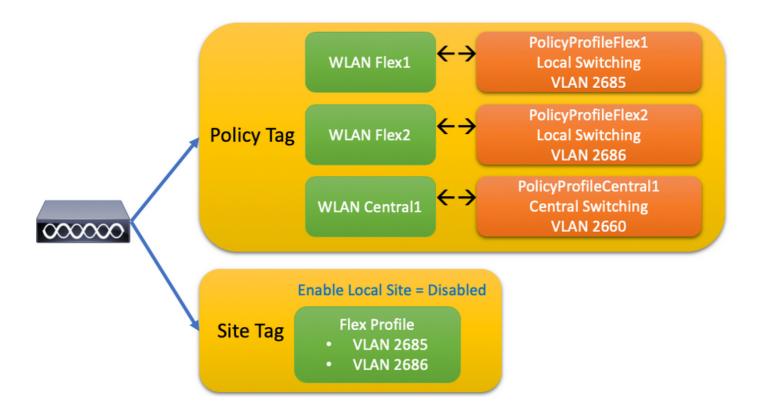
## **Network Diagram**

This document is based on this topology:



## Configurations

This is the visual scheme of the configuration that is needed to accomplish the scenario of this document:



In order to configure a FlexConnect Local Switching Service Set Identifier (SSID) here are the general steps you need to follow:

- 1. Create/Modify a WLAN profile
- 2. Create/Modify a Policy Profile
- 3. Create/Modify a Policy Tag
- 4. Create/Modify a Flex Profile
- 5. Create/Modify a Site Tag
- 6. Policy Tag Assignment to AP

These sections explain how to configure each them, step by step.

## **Create/Modify a WLAN Profile**

You can use this guide to create the three SSIDs:

Create your SSID

Q Search Menu Items	WIRELESS NETWORKS		
📰 Dashboard	+ Add X Delete	Enable WLAN	Disable WLAN
Monitoring >			2015
Configuration >	Name     Flex1	~ ID 2	<ul> <li>SSID</li> <li>Flex1</li> </ul>
(O)     Administration	Flex2	3	Flex2
	Central1	4	Central1

## **Create/Modify a Policy Profile**

Step 1. Navigate to **Configuration > Tags & Profiles > Policy.** Either select the name of a preexisting one or click **+ Add** to add a new one.

Ad	ld Policy P	Profile					×
	General	Access Policies	QOS and AVC	Mobility	Advanced		
		A Configuring	in enabled state will res	ult in loss of co	nnectivity for clients associated wit	h this profile.	
	Name*		PolicyProfileFlex1		WLAN Switching Policy		
	Description	n	Enter Description		Central Switching	DISABLED	
	Status		ENABLED		Central Authentication	ENABLED	
	Passive Cl	lient	DISABLED		Central DHCP	DISABLED	
	Encrypted	Traffic Analytics	DISABLED		Central Association	DISABLED	
	CTS Polic	су			Flex NAT/PAT	DISABLED	
	Inline Tago	ging					
	SGACL En	forcement					
	Default SG	ат	2-65519				
	Cancel					Apply to De	vice

When you disable **Central Switching** this warning message appears, click **Yes** and continue with the configuration.

	^
Disabling Central Switching will cause Export Anch disabled	nor to be
No	Yes

Step 2. Go to the **Access Policies** tab and type the VLAN (You do not see it in the dropdown list because this VLAN does not exists on the 9800 WLC).

After that, click Save & Apply to Device.

Ad	d Policy Profile						×
	General	Access Policies	QOS and AVC	Mobility	/	Advanced	
4	WLAN Local Profi	ling			WLAN AC	L	
	HTTP TLV Caching				IPv4 ACL	Search or Select	•
	RADIUS Profiling				IPv6 ACL	Search or Select	•
i	DHCP TLV Caching				URL Filters	S	
	Local Subscriber Po	blicy Name	Search or Select 🔻		Pre Auth	Search or Select	•
	VLAN				Post Auth	Search or Select	•
	VLAN/VLAN Group		2685 🔻				
	Multicast VLAN		Enter Multicast VLAN				
	Cancel					o Device	

**Note**: It is possible to use a VLAN that already exists on the 9800 WLC as local switching. If you select the VLAN from the dropdown list, you are selecting the VLAN name, not the VLAN ID, so pay a lot of attention to it, as you need to use the exact same VLAN name selected in the Policy Profile when you add the the VLANs in the Flex Profile. This bug has been filed for this behavior: <u>CSCvn48234</u>

Step 3. Repeat the same for the PolicyProfileFlex2

	Profile						
General	Access Policies	QOS and AVC	Mobility	Advanced			
	A Configuring	in enabled state will re	sult in loss of c	onnectivity for clients	associated	d with this profile.	
Name*		PolicyProfileFlex2		WLAN Switch	ng Polic	У	
Descriptio	n	Enter Description		Central Switching	ng	DISABLE	D
Status		ENABLED		Central Authent	ication	ENABLED	
Passive C	lient	DISABLED		Central DHCP		DISABLE	D
Encrypted	Traffic Analytics	DISABLED		Central Associa	tion	DISABLE	D
CTS Poli	су			Flex NAT/PAT		DISABLE	D
Inline Tag	ging						
SGACL Er	nforcement						
Default SC	GT	2-65519					
Cancel							y to De
d Policy P	Profile Access Polici	ies QOS a	and AVC	Mobility	Ac	Appl	y to De
d Policy P General	Access Polic	ies QOS a	and AVC	Mobility	Ac AN ACL		y to De
d Policy P General WLAN Loca	Access Polic	ies QOS a	and AVC	WL			y to De
d Policy P General WLAN Loca	Access Polic	ies QOS a	and AVC	WL IPv4	AN ACL	dvanced	
d Policy P General WLAN Loca HTTP TLV Ca RADIUS Profi	Access Polic	ies QOS a	and AVC	WL IPv4 IPv6	AN ACL ACL ACL	dvanced Search or Select	
d Policy P General WLAN Loca HTTP TLV Ca RADIUS Profi	Access Polic	ies QOS a		WL IPv4 IPv6	AN ACL ACL ACL Filters	dvanced Search or Select Search or Select	<ul> <li>▼</li> <li>▼</li> </ul>
d Policy P General MLAN Loca ATTP TLV Ca ADIUS Profi DHCP TLV C Local Subscr	Access Polic al Profiling aching aching aching			WL IPv4 IPv6 URI Pre	AN ACL ACL ACL Filters Auth	dvanced Search or Select Search or Select Search or Select	•
d Policy P General WLAN Loca ATTP TLV Ca ADIUS Profi DHCP TLV C Local Subscr	Access Polic			WL IPv4 IPv6 URI Pre	AN ACL ACL ACL Filters	dvanced Search or Select Search or Select	<ul> <li>▼</li> <li>▼</li> </ul>
Cancel d Policy P General WLAN Loca HTTP TLV Ca ADIUS Profi DHCP TLV C Local Subscr VLAN /LAN/VLAN	Access Polic al Profiling aching iling aching riber Policy Name Group	Search or S	elect v	WL IPv4 IPv6 URI Pre	AN ACL ACL ACL Filters Auth	dvanced Search or Select Search or Select Search or Select	•

Step 4. For the centrally switched SSID, ensure its needed VLAN exists on the 9800 WLC and if not, create it.

**Note**: In Flex Connect APs with locally switched WLANs, the traffic is switched at the AP and the DHCP requests from the client will go into the wired network via the AP interface directly. The AP does not have any SVI in the client subnet so it is not able to do DHCP proxy, and thus, the DHCP relay configuration (DHCP Server IP Address), in the Policy Profile > Advanced tab, has no meaning for locally switched WLANs. In these scenarios, the switchport needs to allow the client VLAN and then, if the DHCP server is in a different VLAN, you need the IP helper configured in the client SVI/default gateway so that it knows where to send the DHCP request from the client.

#### **Declare Client's VLANs**

Step 5. Create a Policy Profile for the Central SSID.

Navigate to **Configuration > Tags & Profiles > Policy.** Either select the name of a pre-existing one or click **+ Add** to add a new one.

Ad	d Policy Profile					×
	General Acce	ess Policies	QOS and AVC	Mobility	Advanced	
	🛦 Co	nfiguring in enabled	d state will result in loss of c	onnectivity for clients ass	sociated with this profile	9.
	Name*	PolicyF	rofileCentral 1	WLAN Switching	g Policy	
•	Description	Enter D	escription	Central Switching		
	Status	ENABLED		Central Authentica	ation 🗹	
	Passive Client	DIS/	ABLED	Central DHCP		
	Encrypted Traffic Analyt	ics DIS/	ABLED	Central Associatio	on 🗹	
	CTS Policy			Flex NAT/PAT		
	Inline Tagging					
	SGACL Enforcement					
	Default SGT	2-655	19			
	<b>O</b> Cancel				🛛 📋 Save & A	Apply to Device

A	dd Policy Profi	lle					×
	General	Access Policies	QOS and AVC	Mobility	Ac	dvanced	
	WLAN Local Pro	ofiling			WLAN ACL		
	HTTP TLV Cachir	ng			IPv4 ACL	Search or Select	•
	RADIUS Profiling				IPv6 ACL	Search or Select	•
	DHCP TLV Cachi	ng			URL Filters		
	Local Subscriber	Policy Name	Search or Select 🔻		Pre Auth	Search or Select	•
	VLAN				Post Auth	Search or Select	
	VLAN/VLAN Grou	up	VLAN2660		1 OST AUT		
	Multicast VLAN		Enter Multicast VLAN				
	<b>D</b> Cancel					📔 Save & Apply to	Device

You should end up with three Policy Profiles.

	Policy Profile Name	Description
	PolicyProfileFlex1	
	PolicyProfileFlex2	
	PolicyProfileCentral1	
≪	1    ▶    ▶	

CLI:

# config t

# vlan 2660
# exit # wireless profile policy PolicyProfileFlex1 # no central switching # vlan 2685 # no
shutdown # exit # wireless profile policy PolicyProfileFlex2 # no central switching # vlan 2686
# no shutdown # exit # wireless profile policy PolicyProfileCentral1 # vlan VLAN2660 # no
shutdown # end

## Create/Modify a Policy Tag

The Policy tag is the setting that allows you to specify which SSID is linked to which Policy Profile.

Step 1. Navigate to **Configuration > Tags & Profiles > Tags > Policy**. Either select the name of a pre-existing one or click **+ Add** to add a new one.

Q Search Menu Items	Manage Tags				
Dashboard	Policy	Site	RF	AP	
Monitoring	+ Add	× Delete			
$\sim$ Configuration $\rightarrow$	Policy Tag N	Name			
(Ô) Administration →	PT1				
X Troubleshooting	PT2				
Troubleshooting	PT3 PolTag1				
	new-policy				

Step 2. Inside the Policy Tag, click **+Add**, from the drop down list select the**WLAN Profile**name you want to add to the Policy Tag and **Policy Profile** to which you want to link it. After that click the check mark.

Add Policy Tag				×
Name*	PolicyTag1			
Description	Enter Description			
+ Add × Dele				
WLAN Profile		$\sim$	Policy Profile	~
	10 🔻 items per pag	8		No items to display
Cancel				Save & Apply to Device

Add Policy Tag				×
Name*	PolicyTag1			
Description	Enter Description			
+ Add X Dela				
WLAN Profile		$\sim$	Policy Profile	~
	10 🔹 items per page			No items to display
Map WLAN and Poli	су			
WLAN Profile*	Flex1		Policy Profile*	PolicyProfileFlex1
	(	×	~	
Cancel				🖹 Save & Apply to Device

Repeat for the three SSIDs, after that click Save & Apply to Device.

Add Policy Tag			×
Name*	PolicyTag1		
Description	Enter Description		
+ Add × Dela			
WLAN Profile		<ul> <li>Policy Profile</li> </ul>	~
Flex1		PolicyProfileFlex1	
Flex2		PolicyProfileFlex2	
Central1		PolicyProfileCentral1	
	10 🔹 items per page		1 - 3 of 3 items
Cancel			Save & Apply to Device

CLI:

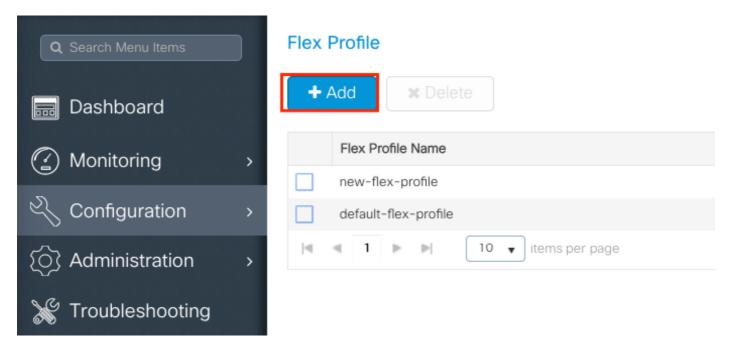
# config t

# wireless tag policy PolicyTag1
# wlan Flex1 policy PolicyProfileFlex1
# wlan Flex2 policy PolicyProfileFlex2
# wlan Central1 policy PolicyProfileCentral1

### **Create/Modify a Flex Profile**

In the topology used for this document you notice that there are two SSIDs in Local Switching with two different VLANs. Inside the Flex Profile is where you specify the AP's VLAN (Native VLAN) and any other VLAN that the AP needs to be aware of, in this case, the VLANs used by the SSIDs.

Step 1. Navigate to **Configuration > Tags & Profiles > Flex** and either create a new one or modify an existing one.



Step 2. Define a name for your Flex Profile and specify the AP's VLAN (Native VLAN ID).

Add Flex Profile				×
General Local	Authentication Polic	y ACL	VLAN	
Name*	FlexProfileLab		Multicast Overridden Interface	
Description	Enter Description		Fallback Radio Shut	
Native VLAN ID	2601		Flex Resilient	
			ARP Caching	
HTTP Proxy Port	0		Efficient Image Upgrade	
HTTP-Proxy IP Address	0.0.0.0		Office Extend AP	
CTS Policy			Join Minimum Latency	
Inline Tagging				
SGACL Enforcement				
CTS Profile Name	default-sxp-profile x			
Cancel				Save & Apply to Device

Step 3. Navigate to the VLAN tab and specify the needed VLAN.

In this scenario, there are clients on VLANs 2685 and 2686. These VLANs does not exist on the

9800 WLC, add them to the Flex Profile so they exists on the AP.

Add Flex Profile		×
General Local Authentication Policy ACL	VLAN	
+ Add × Delete		
VLAN Name v ID v ACL Name	~	
I I ▼ items per page No items to	display	
D Cancel		Save & Apply to Device
4		
VLAN Name*	vlan-name	
VLAN Id*	2685	
	Select ACL	
ACL Name	Select ACL	•
✓ Save		Cancel

**Note**: When you created the Policy Profile, If you selected a VLAN name instead of VLAN ID, ensure the VLAN name here in the Flex Profile is the exact same one. This bug has been filed for this behavior: <u>CSCvn48234</u>

#### Repeat for the needed VLANs.

١dd	Flex Profil	le			
G	eneral	Local Auth	enticatior	n Policy	ACL VLAN
+	- Add	× Delete			
	VLAN Name	э 、	/ ID v	ACL Name	~
	VLAN2685		2685		
	VLAN2686		2686		
4	≪ 1 ⇒	• • •	10 🗸 it	ems per page	
					1 - 2 of 2 items
C	Cancel				

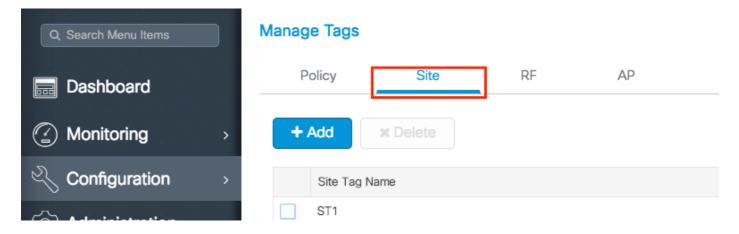
Notice that the VLAN used for Central switching was not added, as the AP does not need to be aware about it.

# config t
# wireless profile flex FlexProfileLab # native-vlan-id 2601 # vlan-name VLAN2685 # vlan-id 2685
# vlan-name VLAN2686 # vlan-id 2686 # end

### Create/Modify a Site Tag

The Site tag is the setting that allows you to specify which AP join and/or Flex Profile is assigned to the APs.

Step 1. Navigate to **Configuration > Tags & Profiles > Tags > Site**. Either select the name of a pre-existing one or click **+ Add** to add a new one.



Step 2. Inside the Site Tag, disable **Enable Local Site**option (Any AP that receives a Site Tag with the **Enable Local Site** setting disabled is converted into FlexConnect mode). Once it is disabled you can also select the **Flex Profile.** After that click Save & Apply to Device.

Add Site Tag		
Name*	FlexSite1	
Description	Enter Description	
AP Join Profile	default-ap-profile	•
Flex Profile	FlexProfileLab	•
Control Plane Name		•
Enable Local Site		
Cancel		

#### CLI:

```
# config t
# wireless tag site FlexSite1
# flex-profile FlexProfileLab
# no local-site
```

Policy Tag Assignment to AP

You can assign a Policy Tag directly to an AP or assign the same Policy Tag to a group of APs at the same time. Choose the one that fits you.

#### Policy Tag Assignment per AP

Navigate to **Configuration > Wireless > Access Points > AP name > General > Tags.** From the **Site**dropdown list select the desired Tags and click **Update & Apply to Device.** 

### Edit AP

General	Interfaces	High Availability	Inver	ntory	Advanced					
General				Versior	1					
AP Name*		AP1702-05		Primary	Software Version		16.10.1.0			
Location*		karlcisn-WS		Predow	nloaded Status		N/A			
Base Radio M	AC	0060.0020.2000		Predow	nloaded Version		N/A			
Ethernet MAC		00f:::::::::::::::::::::::::::::::::::		Next Re	try Time		N/A			
Admin Status		Enabled v		Boot Ve	rsion		15.3.0.0			
AP Mode		Flex •		IOS Ven	sion		15.3(3)JPG1\$			
Operation Sta	tus	Registered		Mini IOS	S Version		0.0.0.0			
Fabric Status		Disabled		IP Cont	fig					
Tags				CAPWA	P Preferred Mode	Not C	Configured			
				DHCP IF	Pv4 Address	172.1	16.1.110			
	lags will cause t ssociation with t	he AP to momentarily lose he Controller.		Static IP	P (IPv4/IPv6)					
			1	Time S	tatistics					
Policy		PolicyTag1 v		Up Time	9		6 days 20 hrs			
Site		FlexSite1					6 days 20 hrs 27 mins 53 secs			
RF		default-rf-tag 🔻		Controll	er Association Later	псу	5 days 18 hrs 0 mins 30 secs			
Cancel							🗄 Update & Apply to De			

**Note**: Be aware that after change the policy tag on an AP, it loses its association to the 9800 WLCs and join back within about 1 minute.

×

**Note**: If the AP is configured in Local mode (or any other mode) and then it gets a Site Tag with **Enable Local Site** setting disabled, the AP reboots and comes back in FlexConnect mode.

CLI:

```
# config t
# ap <ethernet-mac-addr>
# site-tag <site-tag-name>
# end
```

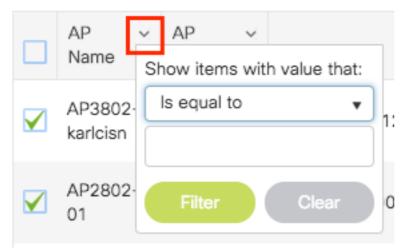
Policy Tag Assignment for Multiple APs

#### Navigate to Configuration > Wireless Setup > Advanced > Start Now

Click on **Tag APs** := icon, after that select the list of APs that you want to assign the tags to (You can click on the point down arrow next to **AP name** [or any other field] to filter the list of APs).

Number of APs: 2

Selected Number of APs: 2



Once you have selected the desired APs, click on + Tag APs.

Start			«	+	Tag APs	•											
_	Tags & Profiles				per of APs: ted Numbe	2 er of APs: 2											
<b>0</b>	WLAN Profile	≣	+		AP Name	AP Model	AP MAC	AP Mode	Admin ~ Status	Operation ~ Status	Policy ~ Tag	Site ~ Tag	RF ~ Tag	Location	~ Count	try ~	Hyper Metho
<b>0</b>	Policy Profile	=	+		AP3802- karlcisn	AIR- AP3802I- A-K9	0042.68c6.412	) Local	Disabled	Registered	Location - typical - density	Location- typical- density	Location- typical- density	default location	MX		Local
0	Policy Tag 🧳	=	+		AP2802- 01	AIR- AP2802I- B-K9	2c5a.0f40.6900	Local	Enabled	Registered	PT1	default- site-tag	default- rf-tag	CALO	US		Local
				_												1 - 2 c	f 2 items
<b>0</b>	AP Join Profile		+	4	⊴_1	▶ 10	▼ items per pag	0									
0			+	H	1	▶ 10	items per pag	0									
Ĭ	Flex Profile			×	⊴ 1	▶ 10	• items per pag	0									
0	Flex Profile Site Tag		+	H	< 1	▶ <u>10</u>	items per pag	0									
0 0	Flex Profile Site Tag		+	H I	< 1	▶ <u>10</u>	• items per pag	0									
0 0 0	Flex Profile Site Tag Ø RF Profile		+	×	4 1	▶ <u>10</u>	Items per pag	D									

Select the tags that you want to assign to the APs and click **Save & Apply to Device**.

Tag APs			×
Tags			
Policy	PT1	•	
Site	ST1	•	]
RF	default-rf-tag	•	
Changing AP Tag	a(s) will cause as	sociated A	P(s) to reconnect
Cancel			Save & Apply to Device

Note: Be aware that after change the policy tag on an AP, it loses its association to the 9800 WLCs and join back within about 1 minute.

**Note**: If the AP is configured in Local mode (or any other mode) and then it gets a Site Tag with **Enable Local Site** setting disabled, the AP reboots and comes back in FlexConnect mode.

CLI:

There is no CLI option to assign the same Tag to multiple APs.

## Verification

You can use these commands to verify the configuration.

#### VLANs/Interfaces Configuration

# show vlan brief
# show interfaces trunk
# show run interface <interface-id>

#### WLAN Configuration

```
# show wlan summary
# show run wlan [wlan-name] # show wlan { id <wlan-id> | name <wlan-name> | all }
```

#### **AP Configuration**

```
# show ap summary
# show ap tag summary
# show ap name <ap-name> tag { info | detail }
# show ap name <ap-name> tag detail
AP Name : AP2802-01 AP Mac : 0896.ad9d.143e Tag Type Tag Name ------
Policy Tag PT1 RF Tag default-rf-tag Site Tag default-site-tag Policy tag mapping ------
---- WLAN Profile Name Policy Name VLAN Central Switching IPv4 ACL IPv6 ACL ------
---- psk-pbl-ewlc
ctrl-vl2602 VLAN0210 ENABLED Not Configured Not Configured Site tag mapping -------
Flex Profile : default-flex-profile AP Profile : default-ap-profile Local-site : Yes RF tag
mapping ------- 5ghz RF Policy : Global Config 2.4ghz RF Policy : Global Config
```

#### **Tag Configuration**

# show wireless tag { policy | rf | site } summary
# show wireless tag { policy | rf | site } detailed <tag-name>

#### **Profile Configuration**

```
# show wireless profile { flex | policy } summary
# show wireless profile { flex | policy } detailed <profile-name> # show ap profile <AP-join-
profile-name> detailed
```