Cisco Catalyst 9800 Wireless Controller Series Web UI Deployment Guide

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Introduction

This document introduces the new configuration model for the Elastic Wireless LAN Controller and provides general guidelines for its deployment. The purpose of this document is to:

- Provide an overview of the configuration model
- Highlight key use cases and deployments
- Provide details on best practices, monitoring and migration

Feature Overview

Introduction to the Best-Practice driven configuration model

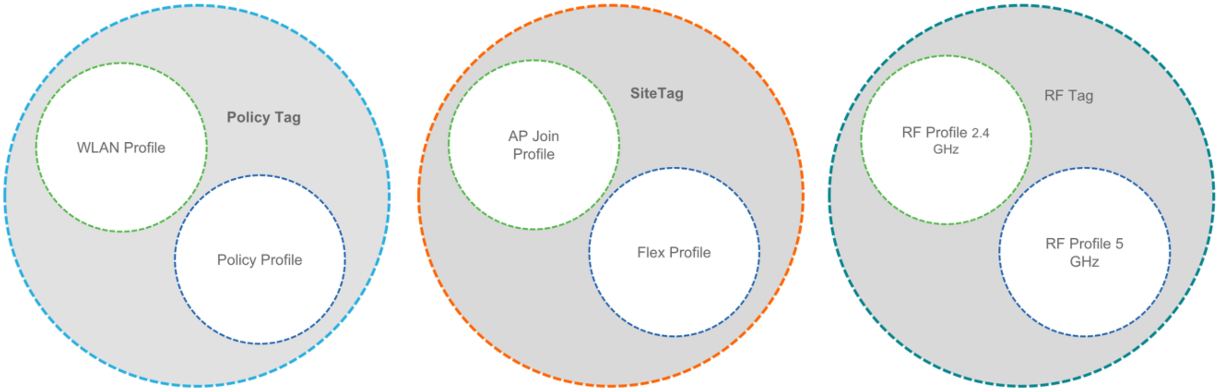
Cisco Catalyst 9800 Wireless Controller configuration data model is based on design principles of reusability, simplified provisioning, enhanced flexibility and modularization to help manage networks as they scale and simplify management of dynamically changing business and IT requirements.

This model provides a model for the client/AP devices to derive their configurations from profiles, which are contained within Tags. AP can be mapped to the tags either statically or as part of the rule engine that runs on the controller and comes into effect during the AP join process. Configuration objects are modularized as objects, which helps in reusability of configuration. In addition, a flat tag-based configuration model eliminates the complexities associated with inheritance and container-based grouping leading to a simpler and more flexible configuration that can ease change management.

Elements of the configuration model – Profiles and Tags

Profiles

Profiles define the properties of the AP or associated clients. Profiles are reusable entities, which can be used across tags. Default Policy profile, AP Join profile, Flex profile and 2.4/5GHz RF profiles are available by default on the wireless controller at boot time.



There are different kinds of profiles depending on the characteristic of the network they define. These profiles are in turn part of a larger construct called a Tag, as defined in the previous section.

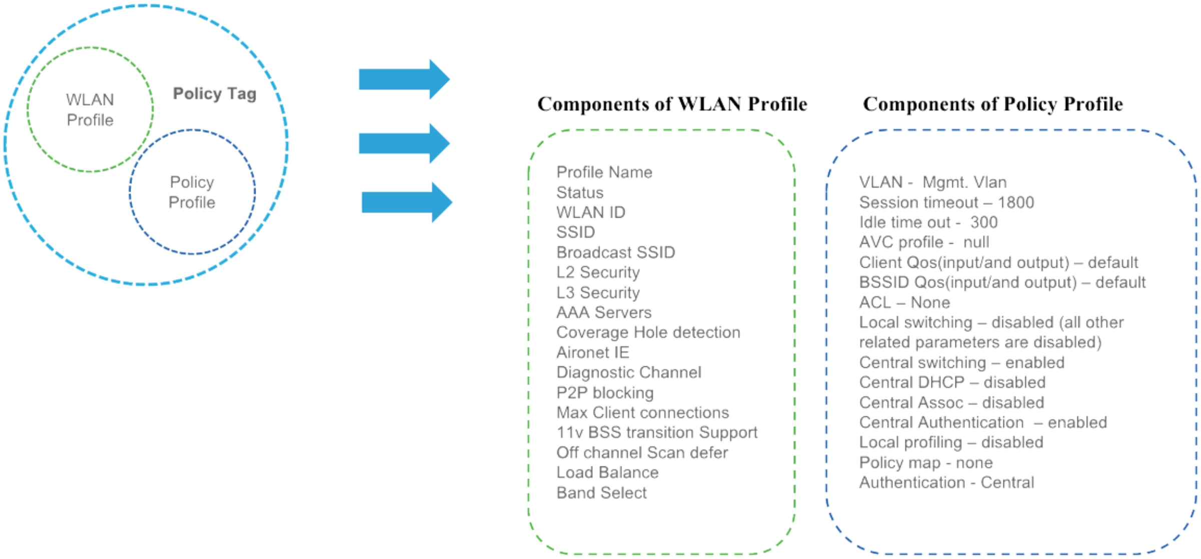
WLAN Profile

WLAN profile defines the properties of a WLAN such as Profile Name, Status, WLAN ID, L2 and L3 Security parameters, AAA Server associated with this SSID and other parameters that are specific to a particular WLAN.

Policy Profile

The policy profile defines the network policies and the switching policies for a client with the exception of QoS, which constitute the AP policies as well. Policy profile is a reusable entity across tags. Anything that is a policy for the client applied on the AP/controller is moved to the policy profile. For example, VLAN, ACL, QOS, Session timeout, Idle timeout, AVC profile, Bonjour profile, Local profiling, Device classification etc. The switching policies define central switching or local switching attribute of a WLAN.

The WLAN Profile and Policy Profile are both parts a Policy Tag and define the characteristics and policy definitions of a set of WLANs.



Components of WLAN Profile

Profile Name
Status
WLAN ID
SSID
Broadcast SSID
L2 Security
L3 Security
AAA Servers
Coverage Hole detection
Aironet IE
Diagnostic Channel
P2P blocking
Max Client connections
11v BSS transition Support
Off channel Scan defer
Load Balance
Band Select

Components of Policy Profile

VLAN - Mgmt. Vlan
Session timeout – 1800
Idle time out - 300
AVC profile - null
Client Qos(input/and output) – default
BSSID Qos(input/and output) – default
ACL – None
Local switching – disabled (all other related parameters are disabled)
Central switching – enabled
Central DHCP – disabled
Central Assoc – disabled
Central Authentication – enabled
Local profiling – disabled
Policy map - none
Authentication - Central

The intent of decoupling the policies from the SSID even though it is a one-to-one mapping, is to give more flexibility to the admin in configuring site based policies (local or remote) while keeping the WLAN definition common. A policy profile once defined can be reused across different Site Tags with same/different WLANs.

AP Join Profile

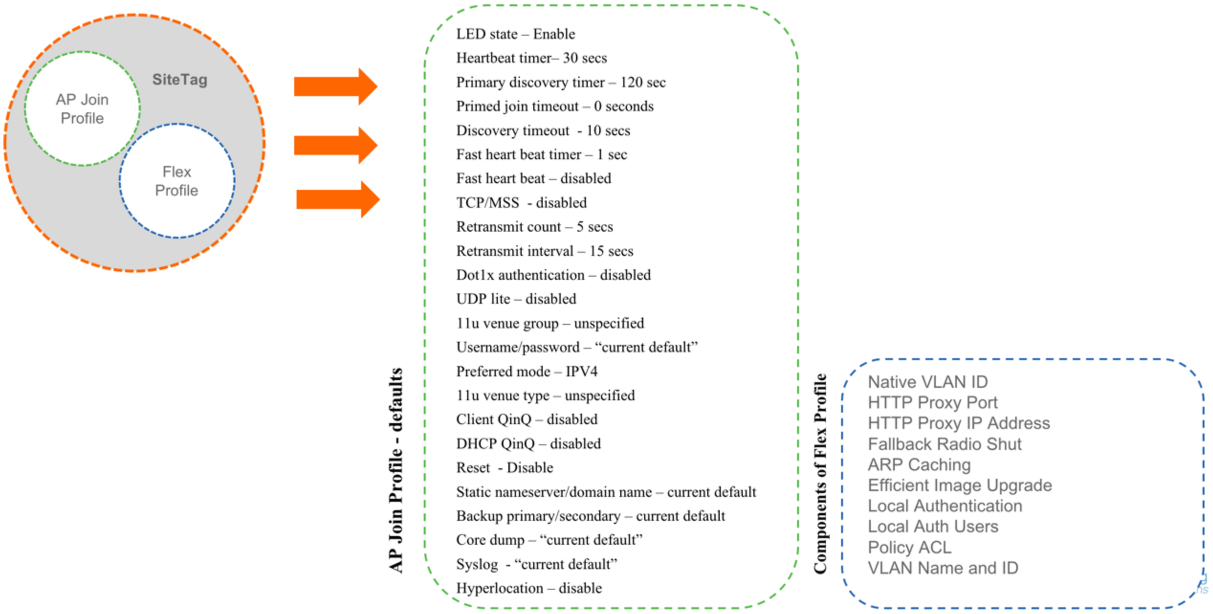
Following parameters will be part of the AP join profile – CAPWAP IPV4/IPV6, UDP Lite, High availability, Retransmit config parameters, global AP failover, Hyper location config parameters, Telnet/SSH, 11u parameters etc. For AP join profile changes, a small subset requires CAPWAP connection to be reset since these parameters pertain to the characteristic of the AP

Flex Profile

The flex profile contains the remote site-specific parameters. For example, the master and slave AP list, the EAP profiles which can be used for the case where AP acts as an authentication server, local radius server information, VLAN-ACL mapping etc.

The AP Join Profile and Flex Profile are both parts a Site Tag and define the characteristics of a local or remote site.

Note: When a site tag contains a Flex Profile, APs tagged with this site tag will be converted to FlexConnect mode. No reboot is required when AP is moving from Local to FlexConnect mode but CAPWAP is reset.

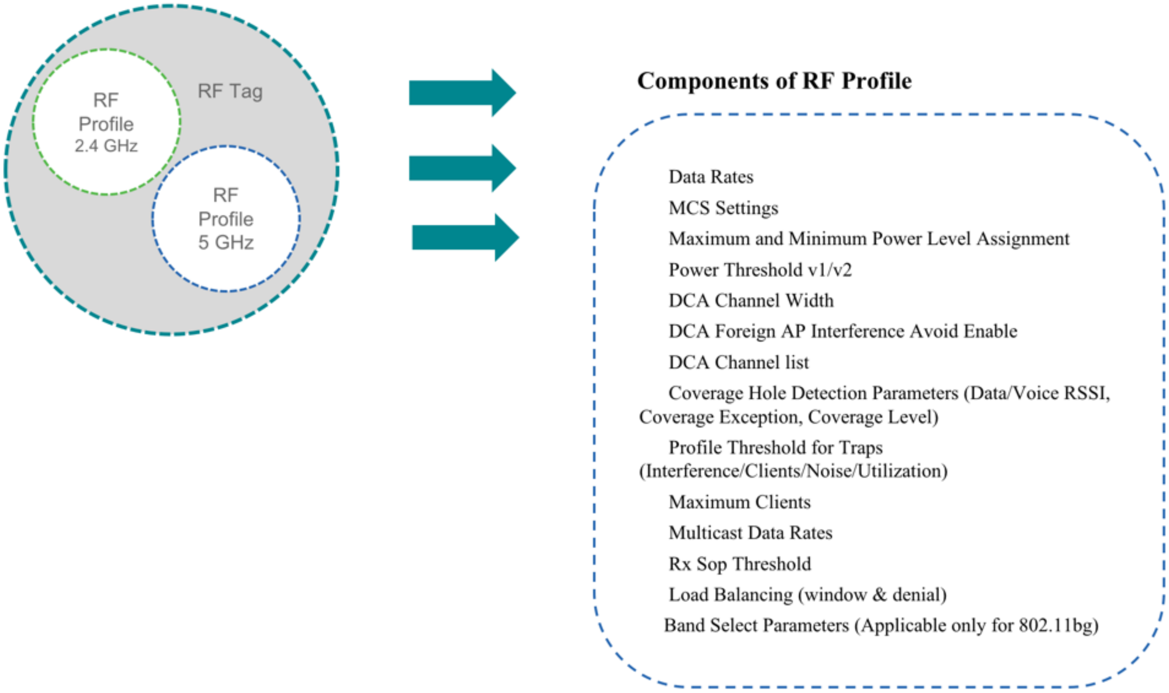


LED state – Enable
Heartbeat timer– 30 secs
Primary discovery timer – 120 sec
Primed join timeout – 0 seconds
Discovery timeout - 10 secs
Fast heart beat timer – 1 sec
Fast heart beat – disabled
TCP/MSS - disabled
Retransmit count – 5 secs
Retransmit interval – 15 secs
Dot1x authentication – disabled
UDP lite – disabled
11u venue group – unspecified
Username/password – "current default"
Preferred mode – IPV4
11u venue type – unspecified
Client QinQ – disabled
DHCP QinQ – disabled
Reset - Disable
Static nameserver/domain name – current default
Backup primary/secondary – current default
Core dump – "current default"
Syslog - "current default"
Hyperlocation – disable

Native VLAN ID
HTTP Proxy Port
HTTP Proxy IP Address
Fallback Radio Shut
ARP Caching
Efficient Image Upgrade
Local Authentication
Local Auth Users
Policy ACL
VLAN Name and ID

RF Profile

By default, there exists two default RF Profiles (one for 802.11a and one for 802.11b). RF profiles constitute the RF specific configurations such as Data rates, MCS settings, Power assignment, DCA parameters, CHDM variables and HDX features. One 802.11a RF profile and one 802.11b RF profile can be added to an RF Tag



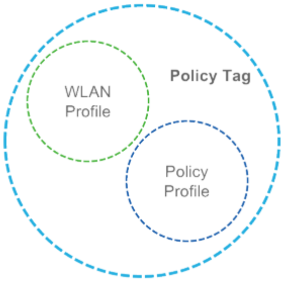
Components of RF Profile

- Data Rates
- MCS Settings
- Maximum and Minimum Power Level Assignment
- Power Threshold v1/v2
- DCA Channel Width
- DCA Foreign AP Interference Avoid Enable
- DCA Channel list
- Coverage Hole Detection Parameters (Data/Voice RSSI, Coverage Exception, Coverage Level)
- Profile Threshold for Traps (Interference/Clients/Noise/Utilization)
- Maximum Clients
- Multicast Data Rates
- Rx Sop Threshold
- Load Balancing (window & denial)
- Band Select Parameters (Applicable only for 802.11bg)

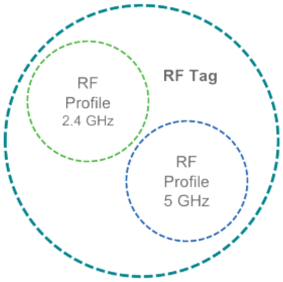
Tags

A Tag’s property is defined by the policies associated to it. This property is in turn inherited by an associated client/AP. There are various type of tags, each associated to different profiles. No two types of Tags include profiles having common properties. This helps eliminate the precedence amongst the configuration entities to a large extent. Every Tag has a default that is created when the system boots up

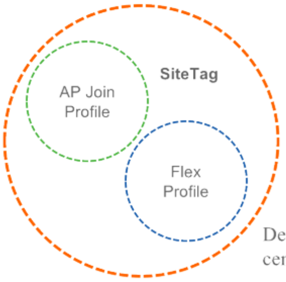
There are three kinds of tags.



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

Policy Tag

Policy tag constitutes the mapping of WLAN Profiles to Policy profiles.

A default policy tag with WLAN Profiles with WLAN ID < 16 is mapped to a default policy profile.

Site Tag

Site tag constitutes of two profiles, the flex profile and the AP join profile. The site tag defines the properties of a site, both central as well as remote (FlexConnect) site. The attributes of a site that are common across central and remote site are part of the AP Join profile. The attributes that are specific to flex/remote site are part of the flex profile.

Default Site Tag constitutes of the default AP Join profile. The default AP join profile values will be same as that for the global AP parameters today plus few parameters from the AP group in today's configuration like "preferred mode", 802.11u parameters, Location etc.

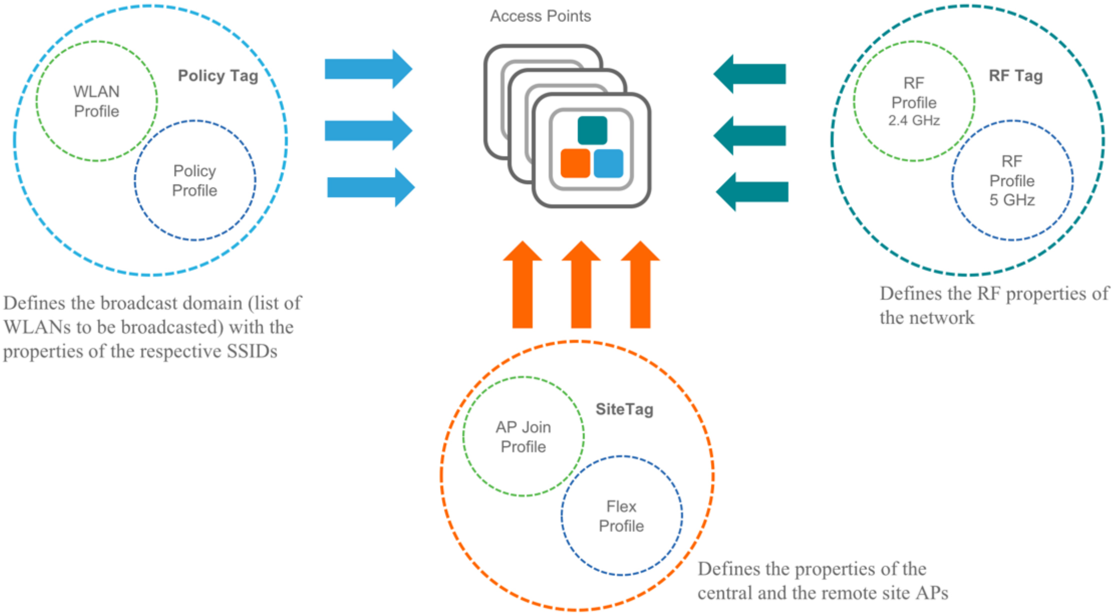
RF Tag

RF tag constitutes of the 2.4 and 5GHz RF profiles

Default RF Tag constitutes of the default 2.4GHz RF profile and the default 5GHz RF Profile. The default 2.4 and 5GHz RF profiles contain default values for global RF profiles for the respective radios.

Association of tags to APs

Access Points are tagged based on broadcast domain, the site it belongs to and the RF characteristics desired. Once tagged, the AP gets a list of WLANs to be broadcasted along with the properties of the respective SSIDs, properties of the APs on the local/remote site and the RF properties of the network. By default, an AP is tagged with the default policy, site and RF tag unless explicitly changed. When a tag associated with an AP is changed, the AP resets its CAPWAP connection.


Access Points
Policy Tag
WLAN Profile
Policy Profile
Defines the broadcast domain (list of WLANs to be broadcasted) with the properties of the respective SSIDs
RF Tag
RF Profile 2.4 GHz
RF Profile 5 GHz
Defines the RF properties of the network
SiteTag
AP Join Profile
Flex Profile
Defines the properties of the central and the remote site APs

Day 0 Express Setup

The Cisco Catalyst 9800 Wireless Controller provides a simplified first time out of box installation and configuration interface for all series of wireless controllers. This section provides a set of instructions to help easily setup the wireless controller to operate in a small, medium, or large network wireless environment, where access point(s) can join and together as a simple solution and provide various services, such as corporate employee or guest wireless access on the network.

Note that the Express Setup can be used only for the first time in out of box installations or when controller configuration is reset to factory defaults.

Configuring wireless controller

The general steps to configure the wireless controller are as follows:

Procedure

Step 1 Complete the configuration checklist.

Step 2 Unpack, connect, and power on the wireless controller.

Step 3 Connect a client machine to Service Port of the wireless controller with an Ethernet cable.

Step 4 Open a client web browser to access the wireless controller startup GUI.

Step 5 Enter the settings from the completed configuration checklist.

Step 6 Disconnect the wireless controller from client machine and connect to the network switch.

Step 7 Connect access point(s) to the network switch. Access points join the wireless controller, and the configured wireless network become available.

Step 8 Connect wireless client(s) to the available network.

Configuration Checklist

The following checklist helps you to make the installation process easier, while using the GUI wizard to configure the wireless controller. While most of the information from the list is mandatory, there is some information that is optional (*). Take a moment to fill out:

- Network switch requirement:
    - Wireless controller switch port number assigned
    - Wireless controller assigned switch port
    - Is the switch port configured as trunk?
    - Is there a management VLAN? Management VLAN ID
    - Is there a guest VLAN? Guest VLAN ID

a. Wireless controller Settings:
    - New admin account name
    - Admin account password
    - System name for the wireless controller
    - The current time zone
    - Is there an NTP server available? NTP server IP address
    - Wireless controller Management Interface:
        - IP address
        - Subnet mask
        - Default gateway
    - Management VLAN ID

- Corporate Wireless Network
- Corporate wireless name/SSID
- Is a RADIUS server required?
- Security authentication option to select:
    - WPA/WPA2 Personal
    - Corporate pass phrase (PSK)
    - WPA/WPA2 Enterprise)
    - RADIUS server IP address and shared secret
    - Is a DHCP server known? DHCP server IP address
- Guest Wireless Network - optional:

○ Guest wireless name/SSID

○ Is a password required for guest?

○ Guest pass phrase (PSK)

- Guest VLAN id (use id)
- Guest networking:
  - IP address
  - Subnet mask
  - Default gateway
- Advanced option—Configure RF Parameters for Client Density as Low, Medium, or High.

Accessing Day 0 Express Setup using Web UI

Step 1 Upon confirming that there is an IP address of **192.168.1.x** assigned to your computer, open a web browser (preferably Chrome and Safari) and open the URL: **http://192.168.1.1**. The following screen appears in your browser.

Note Keep the checklist that you have prepared earlier, as this will be very helpful to proceed with the following steps.

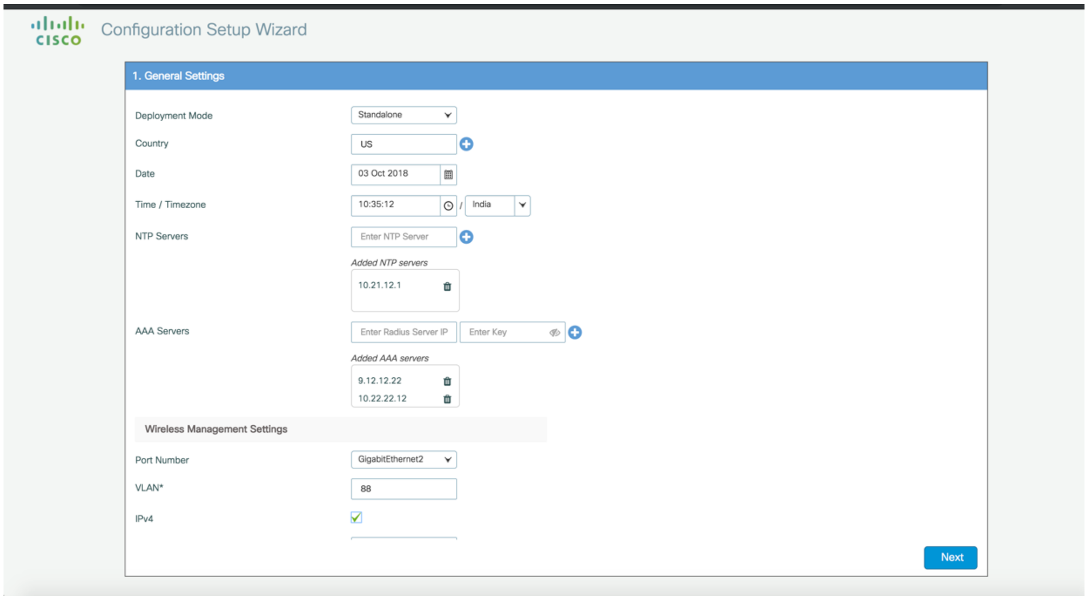
To create an admin account, do the following:
Create a new admin account name, for example, **admin**.
Provide the new admin account's password, for example, **Cisco123**.
Confirm the password.
Click **Start** to continue.

Step 2 Once you are logged into the controller, in the **General Settings** screen, with the help of the checklist, fill in the following:

- Deployment mode – standalone, Active or Standby
- Country Code
- Date
- Time/ Timezone
- NTP servers
- AAA Servers
- Wireless Management Settings
  - Port number
  - VLAN
- IPv4
  - Wireless Management IP
  - Subnet mask
  - Default gateway
  - Management VLAN DHCP Server
- IPv6
  - IPv6 Address

Note The wizard will attempt to import the clock information (date and time) from the computer via JavaScript. It is highly recommended that you confirm this before continuing. Access points rely on correct clock settings to be able to join the wireless controller.

Figure 3. Sample configuration



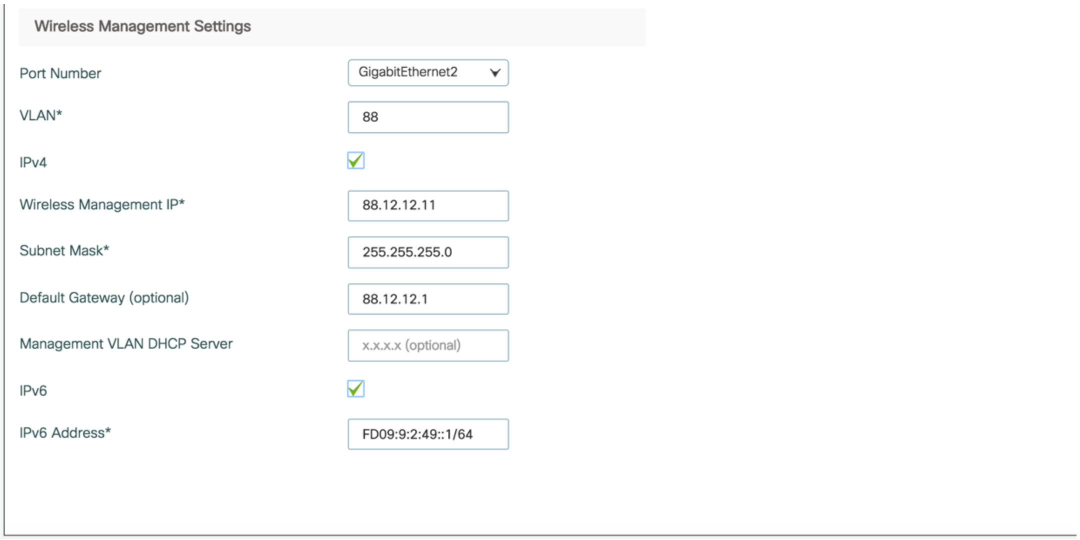
Configuration Setup Wizard

1. General Settings

Deployment Mode: Standalone
Country: US
Date: 03 Oct 2018
Time / Timezone: 10:35:12 / India
NTP Servers: Enter NTP Server
Added NTP servers: 10.21.12.1
AAA Servers: Enter Radius Server IP, Enter Key
Added AAA servers: 9.12.12.22, 10.22.22.12

Wireless Management Settings

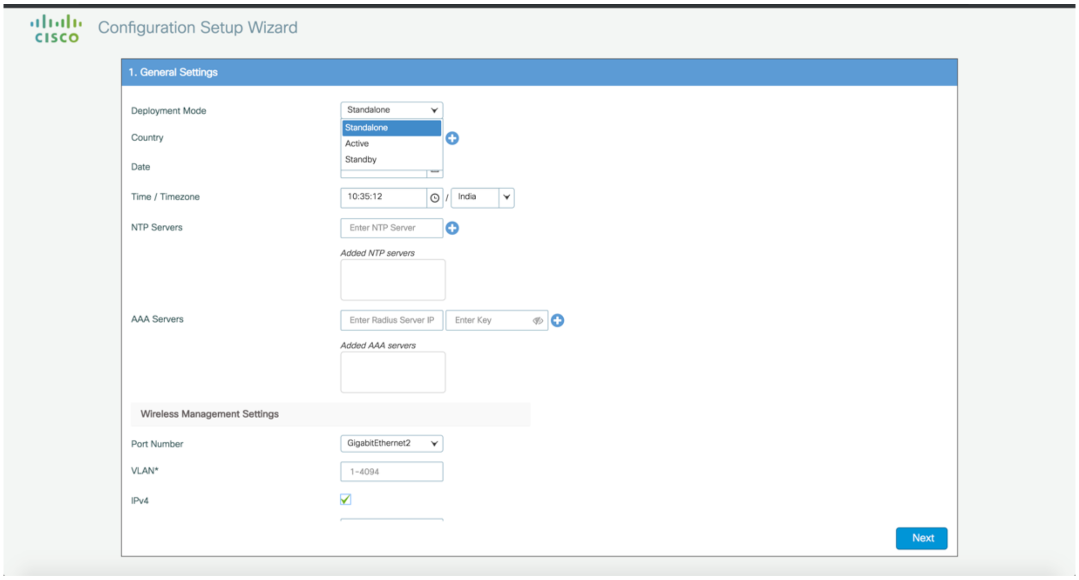
Port Number: GigabitEthernet2
VLAN*: 88
IPv4: ☑



Wireless Management Settings

Port Number: GigabitEthernet2
VLAN*: 88
IPv4: ☑
Wireless Management IP*: 88.12.12.11
Subnet Mask*: 255.255.255.0
Default Gateway (optional): 88.12.12.1
Management VLAN DHCP Server: x.x.x.x (optional)
IPv6: ☑
IPv6 Address*: FD09:9:2:49::1/64

Three modes for Day 0: Standalone, Active, Standby (Active and Standby have options to setup HA SSO with local IP, remote IP and subnet mask configuration



Configuration Setup Wizard

1. General Settings

Deployment Mode	Standalone
Country	
Date	
Time / Timezone	10:35:12 / India
NTP Servers	Enter NTP Server
	Added NTP servers
AAA Servers	Enter Radius Server IP Enter Key
	Added AAA servers

Wireless Management Settings

Port Number	GigabitEthernet2
VLAN*	1-4094
IPv4	☑

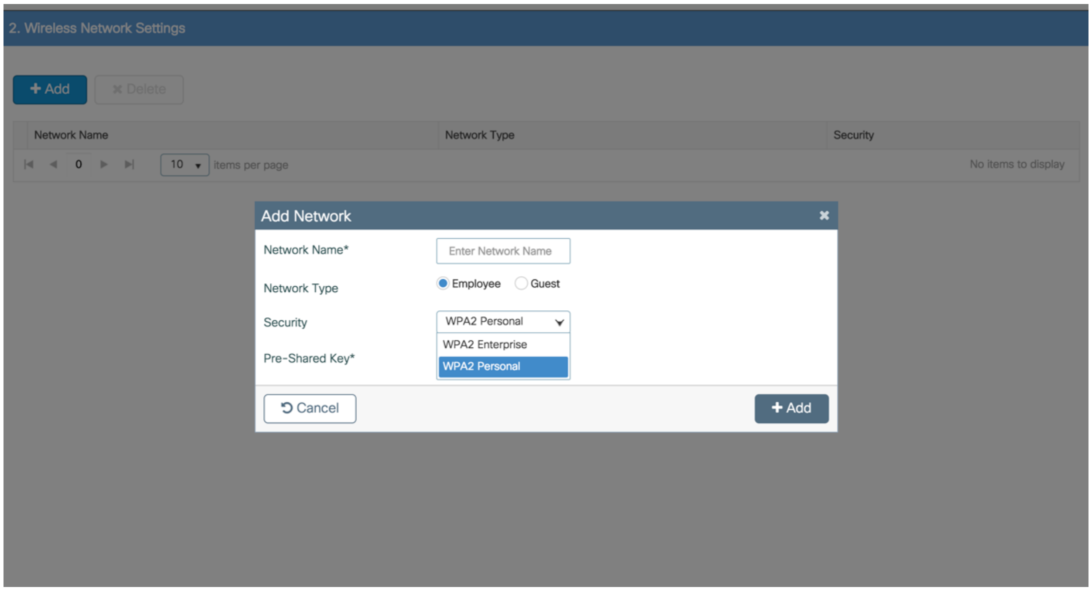
Step 5 In the **Wireless Networks Settings** screen, in the **Employee** area, with the help of the checklist, fill in the following:

Network name/SSID

Security, for example, **WPA/WPA2 Personal**

WPA/WPA2 Personal—Provide a pass phrase (PSK /for example, **Cisco123** and confirm the pass phrase).

Figure 4. Example of an Employee Network Configured with WPA/WPA2 Personal Using PSK (pre-shared key / pass phrase)

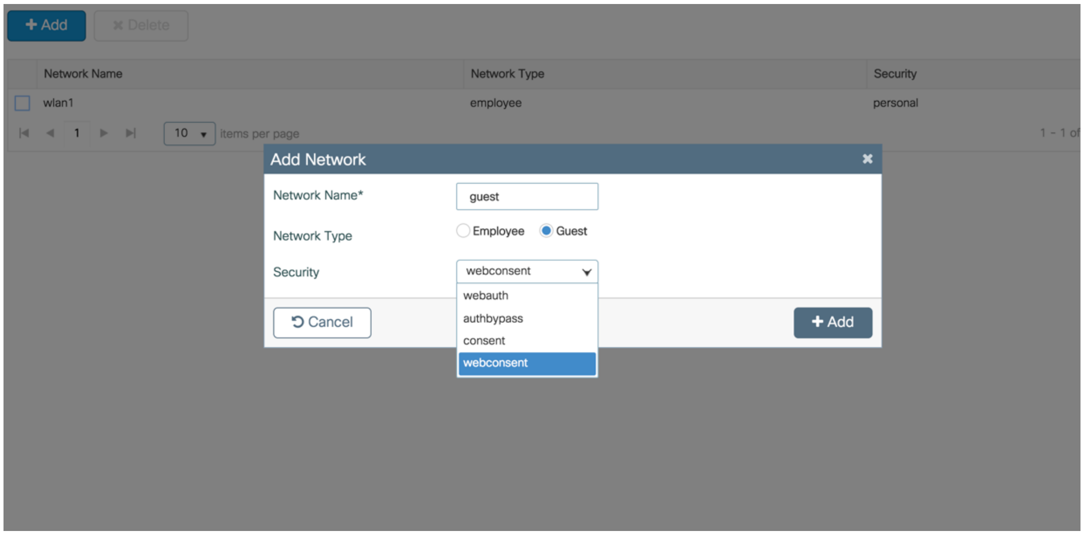


Step 6 (Optional) In the **Wireless Networks Settings** screen, in the **Guest** area, with the help of the checklist, fill in the following:

Network name/SSID, for example, **guest**

Security, for example, **Web Consent**

Figure 5. Example of a Guest Network Configured with Web Consent

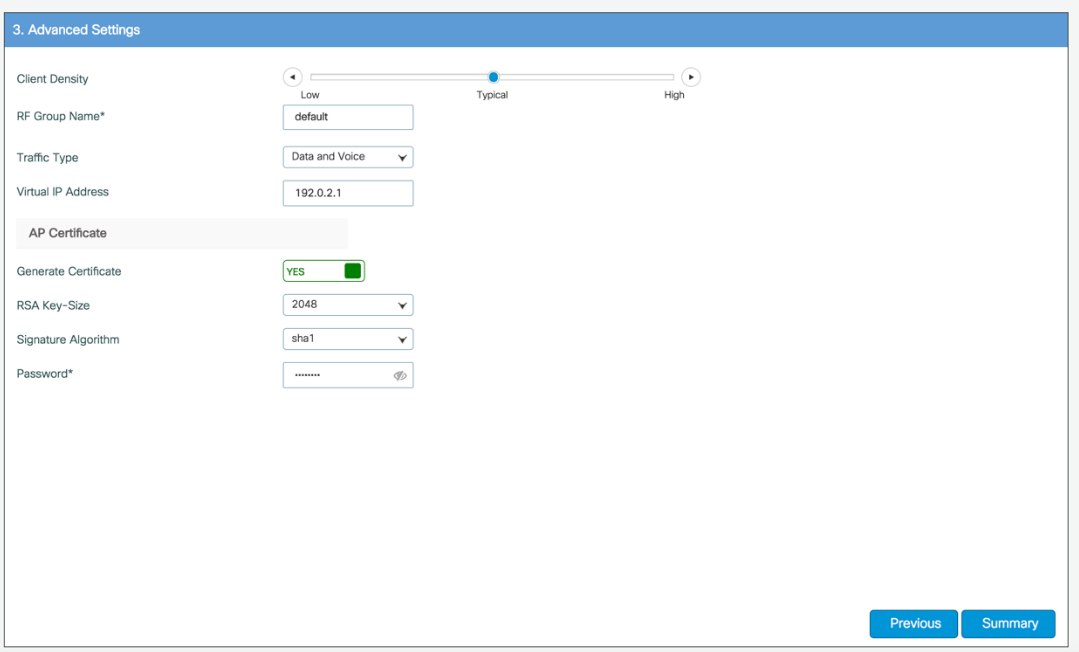


Step 7 In the **Advanced Settings** screen, in the RF Parameter Optimization area, do the following:

Select the client density as Low, Typical, or High.

Configure the RF parameters for RF Traffic Type, such as Data and Voice.

For VM and Cloud instances, AP Trustpoint certificate is generated by default as shown below


3. Advanced Settings

Client Density: Low / Typical / High (Typical selected)

RF Group Name*: default

Traffic Type: Data and Voice

Virtual IP Address: 192.0.2.1

AP Certificate

Generate Certificate: YES

RSA Key-Size: 2048

Signature Algorithm: sha1

Password*: ••••••••

The following CLIs depicts the default values when Low, Typical, or High Client density is selected

Typical-Client-Density-802.11a

```
ap dot11 5ghz rrm txpower min -10
ap dot11 5ghz rrm txpower max 30
ap dot11 5ghz rrm tpc-threshold -70
ap dot11 5ghz rx-sop threshold auto
ap dot11 5ghz rrm coverage data rssi-threshold -80
ap dot11 5ghz rrm coverage voice rssi-threshold -80
ap dot11 5ghz rrm coverage level global 3
ap dot11 5ghz cleanair
no ap dot11 5ghz rrm channel cleanair-event
ap dot11 5ghz rate RATE_12M mandatory
ap dot11 5ghz rate RATE_9M supported
ap dot11 5ghz rate RATE_6M disable
no ap dot11 5ghz rrm channel cleanair-event
wireless client band-select client-rssi -80
```

High-Client-Density-802.11a

```
ap dot11 5ghz rrm txpower min 7
ap dot11 5ghz rrm txpower max 30
ap dot11 5ghz rrm tpc-threshold -65
ap dot11 5ghz rx-sop threshold -78
ap dot11 5ghz rrm coverage data rssi-threshold -80
ap dot11 5ghz rrm coverage voice rssi-threshold -80
ap dot11 5ghz rrm coverage level global 3
ap dot11 5ghz cleanair
no ap dot11 5ghz rrm channel cleanair-event
ap dot11 5ghz rate RATE_12M mandatory
ap dot11 5ghz rate RATE_9M supported
ap dot11 5ghz rate RATE_6M disable
no ap dot11 5ghz rrm channel cleanair-event
wireless client band-select client-rssi -80
```

Low-Client-Density-802.11a

```
ap dot11 5ghz rrm txpower min -10
ap dot11 5ghz rrm txpower max 30
ap dot11 5ghz rrm tpc-threshold -60
ap dot11 5ghz rx-sop threshold -80
ap dot11 5ghz rrm coverage data rssi-threshold -90
ap dot11 5ghz rrm coverage voice rssi-threshold -90
ap dot11 5ghz rrm coverage level global 2
ap dot11 5ghz cleanair
no ap dot11 5ghz rrm channel cleanair-event
no wireless client band-select client-rssi
```

Typical-Client-Density-802.11bg

```
ap dot11 24ghz rrm txpower min -10
ap dot11 24ghz rrm txpower max 30
ap dot11 24ghz rrm tpc-threshold -70
ap dot11 24ghz rx-sop threshold auto
ap dot11 24ghz rrm coverage data rssi-threshold -80
ap dot11 24ghz rrm coverage voice rssi-threshold -80
ap dot11 24ghz rrm coverage level global 3
ap dot11 24ghz cleanair
no ap dot11 24ghz rrm channel cleanair-event
ap dot11 24ghz rate RATE_12M mandatory
ap dot11 24ghz rate RATE_9M supported
ap dot11 24ghz rate RATE_18M disable
ap dot11 24ghz rate RATE_24M disable
ap dot11 24ghz rate RATE_36M disable
ap dot11 24ghz rate RATE_48M disable
ap dot11 24ghz rate RATE_54M disable
ap dot11 24ghz rate RATE_6M disable
no ap dot11 24ghz rrm channel cleanair-event
wireless client band-select client-rssi -80
```

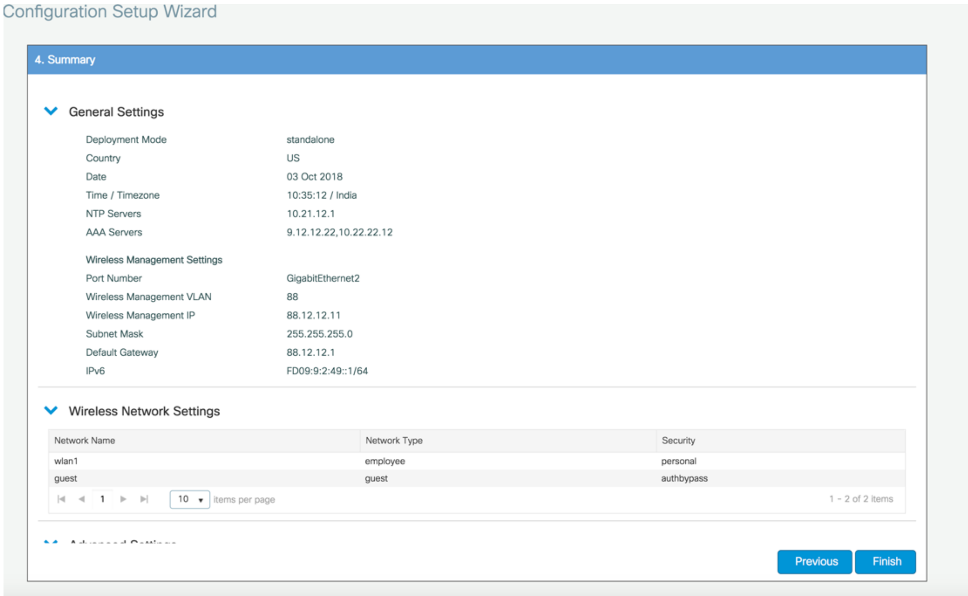
High-Client-Density-802.11bg

```
ap dot11 24ghz rrm txpower min 7
ap dot11 24ghz rrm txpower max 30
ap dot11 24ghz rrm tpc-threshold -70
ap dot11 24ghz rx-sop threshold -82
ap dot11 24ghz rrm coverage data rssi-threshold -80
ap dot11 24ghz rrm coverage voice rssi-threshold -80
ap dot11 24ghz rrm coverage level global 3
ap dot11 24ghz cleanair
no ap dot11 24ghz rrm channel cleanair-event
ap dot11 24ghz rate RATE_12M mandatory
ap dot11 24ghz rate RATE_9M supported
ap dot11 24ghz rate RATE_18M disable
ap dot11 24ghz rate RATE_24M disable
ap dot11 24ghz rate RATE_36M disable
ap dot11 24ghz rate RATE_48M disable
ap dot11 24ghz rate RATE_54M disable
ap dot11 24ghz rate RATE_6M disable
no ap dot11 24ghz rrm channel cleanair-event
wireless client band-select client-rssi -80
```

Low-Client-Density-802.11bg

```
ap dot11 24ghz rrm txpower min -10
ap dot11 24ghz rrm txpower max 30
ap dot11 24ghz rrm tpc-threshold -65
ap dot11 24ghz rx-sop threshold -85
ap dot11 24ghz rrm coverage data rssi-threshold -90
ap dot11 24ghz rrm coverage voice rssi-threshold -90
ap dot11 5ghz rrm coverage level global 2
ap dot11 24ghz cleanair
no ap dot11 24ghz rrm channel cleanair-event
ap dot11 24ghz rate RATE_12M mandatory
ap dot11 24ghz rate RATE_9M mandatory
ap dot11 24ghz rate RATE_18M mandatory
ap dot11 24ghz rate RATE_24M mandatory
ap dot11 24ghz rate RATE_36M mandatory
ap dot11 24ghz rate RATE_48M mandatory
ap dot11 24ghz rate RATE_54M mandatory
ap dot11 24ghz rate RATE_6M mandatory
no ap dot11 24ghz rrm channel cleanair-event
no wireless client band-select client-rssi
```

Step 8 If all the settings are correct, click **Finish**



Configuration Setup Wizard

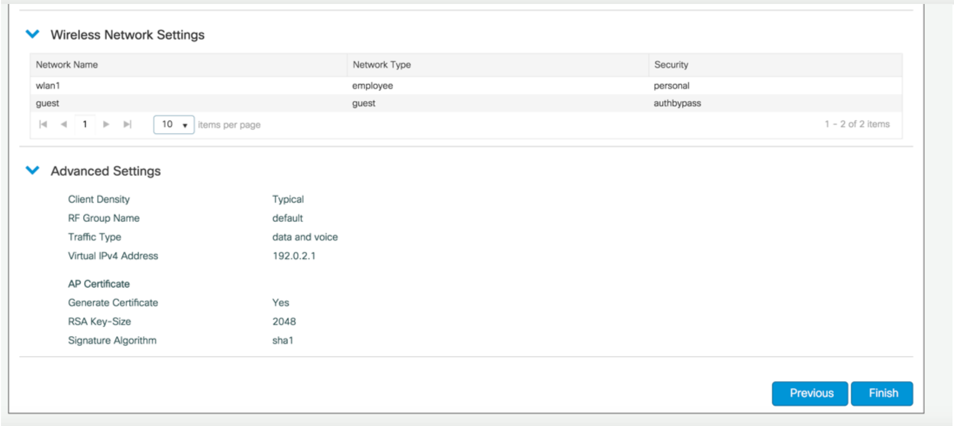
4. Summary

General Settings

Deployment Mode	standalone
Country	US
Date	03 Oct 2018
Time / Timezone	10:35:12 / India
NTP Servers	10.21.12.1
AAA Servers	9.12.12.22,10.22.22.12
Wireless Management Settings	
Port Number	GigabitEthernet2
Wireless Management VLAN	88
Wireless Management IP	88.12.12.11
Subnet Mask	255.255.255.0
Default Gateway	88.12.12.1
IPv6	FD09:9:2:49::1/64

Wireless Network Settings

Network Name	Network Type	Security
wlan1	employee	personal
guest	guest	authbypass



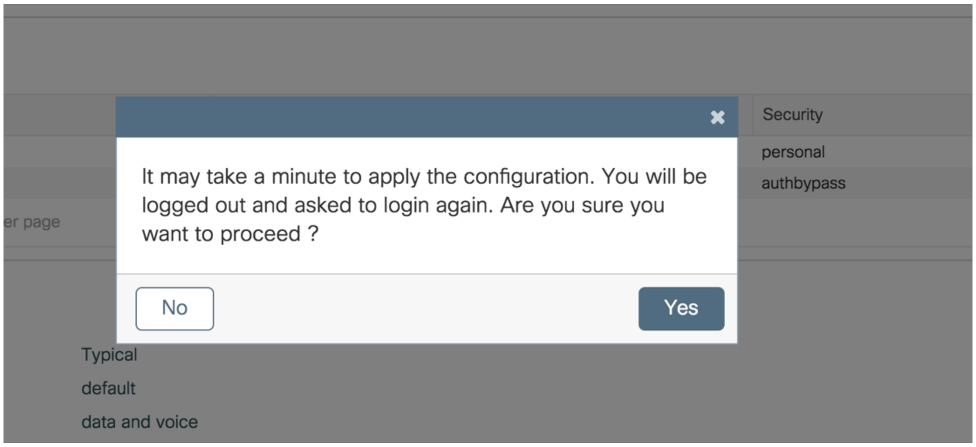
Wireless Network Settings

Network Name	Network Type	Security
wlan1	employee	personal
guest	guest	authbypass

Advanced Settings

Client Density	Typical
RF Group Name	default
Traffic Type	data and voice
Virtual IPv4 Address	192.0.2.1
AP Certificate	
Generate Certificate	Yes
RSA Key-Size	2048
Signature Algorithm	sha1

Step 9 A message appears with a prompt *It may take a minute to apply the configuration. You will be logged out and asked to login again. Are you sure you want to proceed*?'



It may take a minute to apply the configuration. You will be logged out and asked to login again. Are you sure you want to proceed ?

Click OK to apply final settings. The wireless controller logs out and the user needs to re-login to continue to the fully setup wireless controller.

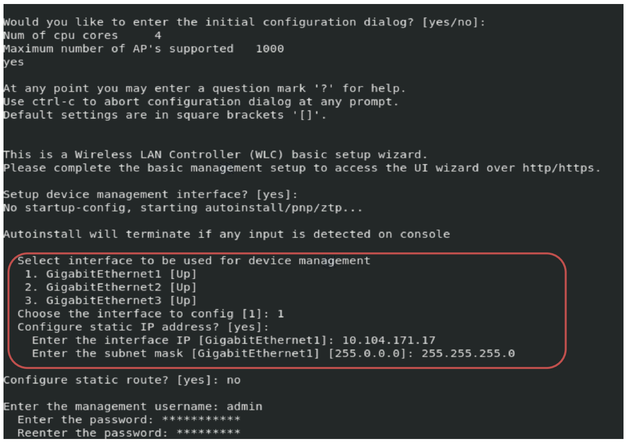
Accessing Day 0 Express Setup using CLI

Prior to Release 17.4, the default Day0 CLI wizard does not support wireless specific fields. The user is required to manually configure via config mode CLI or, partially configure the management interface and move to Web UI Day0 flow. Day 0 configuration is not available via Day 0 CLI setup and is manually configured at Day 1

Starting 17.4, a full-fledged configuration via the CLI in the Day0 of the box is available. As a result, the controller is ready for access point and client join post Day0 CLI Wizard. HA SSO can be configured at Day 0 and successful pairing happens after the controllers reload. This is supported on all physical appliances and 9800-CL private cloud. There is no support for public cloud since the images are bootstrapped and don't need a day0 configuration.

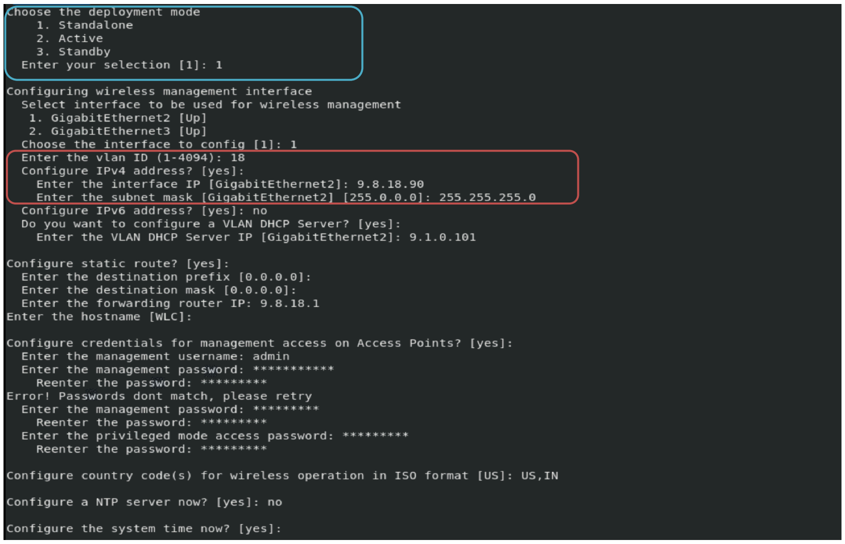
A fresh box or rebooting a pre-configured box upon 'write erase' will bring the box into day0 mode. The following screenshots show a sample Day 0 CLI flow.

- The device management and wireless management addresses should be in different subnets



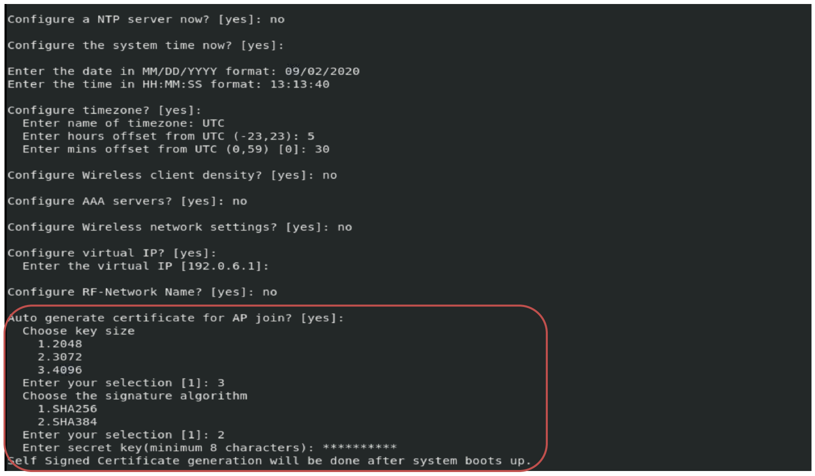
```
Would you like to enter the initial configuration dialog? [yes/no]:
Num of cpu cores     4
Maximum number of AP's supported   1000
yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.


This is a Wireless LAN Controller (WLC) basic setup wizard.
Please complete the basic management setup to access the UI wizard over http/https.

Setup device management interface? [yes]:
No startup-config, starting autoinstall/pnp/ztp...

Autoinstall will terminate if any input is detected on console

  Select interface to be used for device management
   1. GigabitEthernet1 [Up]
   2. GigabitEthernet2 [Up]
   3. GigabitEthernet3 [Up]
  Choose the interface to config [1]: 1
  Configure static IP address? [yes]:
    Enter the interface IP [GigabitEthernet1]: 10.104.171.17
    Enter the subnet mask [GigabitEthernet1] [255.0.0.0]: 255.255.255.0

Configure static route? [yes]: no

Enter the management username: admin
  Enter the password: ***********
  Reenter the password: *********
```

- The configurations required for a box configured as standby will be lesser than standalone/active boxes.
- VLAN ID is a mandatory config for wireless management interface since it is by default an SVI



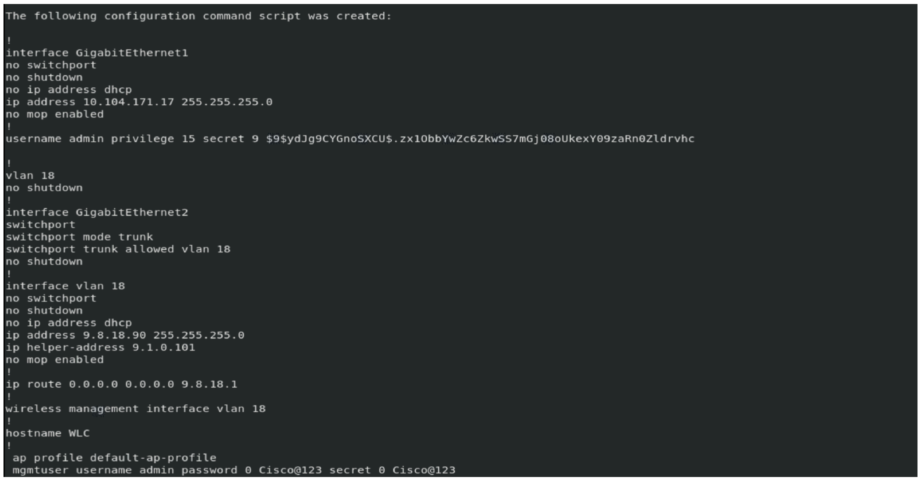
```
Choose the deployment mode
    1. Standalone
    2. Active
    3. Standby
  Enter your selection [1]: 1

Configuring wireless management interface
  Select interface to be used for wireless management
   1. GigabitEthernet2 [Up]
   2. GigabitEthernet3 [Up]
  Choose the interface to config [1]: 1
  Enter the vlan ID (1-4094): 18
  Configure IPv4 address? [yes]:
    Enter the interface IP [GigabitEthernet2]: 9.8.18.90
    Enter the subnet mask [GigabitEthernet2] [255.0.0.0]: 255.255.255.0
  Configure IPv6 address? [yes]: no
  Do you want to configure a VLAN DHCP Server? [yes]:
    Enter the VLAN DHCP Server IP [GigabitEthernet2]: 9.1.0.101

Configure static route? [yes]:
  Enter the destination prefix [0.0.0.0]:
  Enter the destination mask [0.0.0.0]:
  Enter the forwarding router IP: 9.8.18.1
Enter the hostname [WLC]:

Configure credentials for management access on Access Points? [yes]:
  Enter the management username: admin
  Enter the management password: ***********
    Reenter the password: *********
Error! Passwords dont match, please retry
  Enter the management password: *********
    Reenter the password: *********
  Enter the privileged mode access password: *********
    Reenter the password: *********

Configure country code(s) for wireless operation in ISO format [US]: US,IN

Configure a NTP server now? [yes]: no

Configure the system time now? [yes]:
```

- Self Signed Certificate generation for 9800-CL will take place once the initial configuration is applied.
- Hence the user will not be able to see it in running config before exiting the wizard



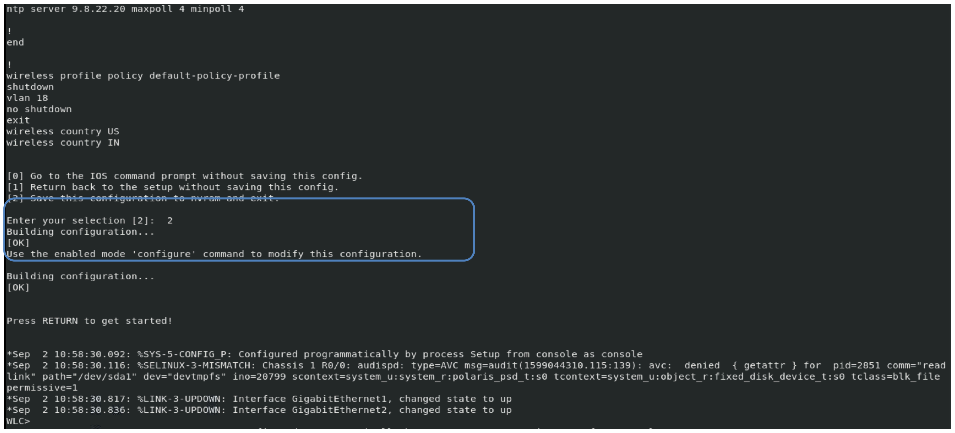
```
Configure a NTP server now? [yes]: no

Configure the system time now? [yes]:

Enter the date in MM/DD/YYYY format: 09/02/2020
Enter the time in HH:MM:SS format: 13:13:40

Configure timezone? [yes]:
  Enter name of timezone: UTC
  Enter hours offset from UTC (-23,23): 5
  Enter mins offset from UTC (0,59) [0]: 30

Configure Wireless client density? [yes]: no

Configure AAA servers? [yes]: no

Configure Wireless network settings? [yes]: no

Configure virtual IP? [yes]:
  Enter the virtual IP [192.0.6.1]:

Configure RF-Network Name? [yes]: no

Auto generate certificate for AP join? [yes]:
  Choose key size
    1.2048
    2.3072
    3.4096
  Enter your selection [1]: 3
  Choose the signature algorithm
    1.SHA256
    2.SHA384
  Enter your selection [1]: 2
  Enter secret key(minimum 8 characters): **********
Self Signed Certificate generation will be done after system boots up.
```

- Use can verify the configuration generated
- User can terminate Day-0 wizard by executing CTRL+C at any point during the process.



```
The following configuration command script was created:

!
interface GigabitEthernet1
no switchport
no shutdown
no ip address dhcp
ip address 10.104.171.17 255.255.255.0
no mop enabled
!
username admin privilege 15 secret 9 $9$ydJg9CYGnoSXCU$.zx1ObbYwZc6ZkwSS7mGj08oUkexY09zaRn0Zldrvhc

!
vlan 18
no shutdown
!
interface GigabitEthernet2
switchport
switchport mode trunk
switchport trunk allowed vlan 18
no shutdown
!
interface vlan 18
no switchport
no shutdown
no ip address dhcp
ip address 9.8.18.90 255.255.255.0
ip helper-address 9.1.0.101
no mop enabled
!
ip route 0.0.0.0 0.0.0.0 9.8.18.1
!
wireless management interface vlan 18
!
hostname WLC
!
 ap profile default-ap-profile
 mgmtuser username admin password 0 Cisco@123 secret 0 Cisco@123
```

- The user will be presented with an option to save the config or to reconfigure entire config at the end of the wizard
- There is no option to go back and modify individual config



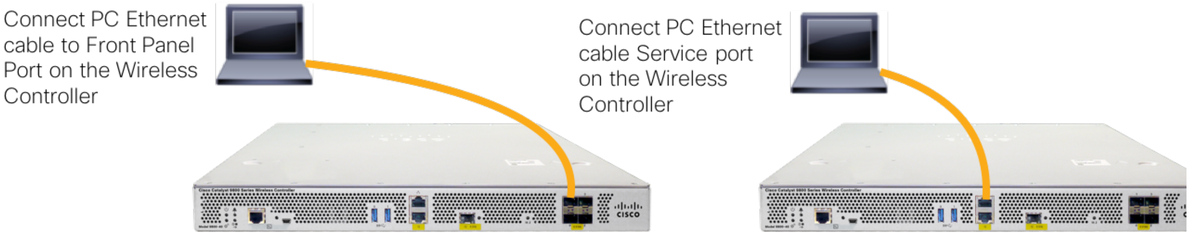
```
ntp server 9.8.22.20 maxpoll 4 minpoll 4

!
end

!
wireless profile policy default-policy-profile
shutdown
vlan 18
no shutdown
exit
wireless country US
wireless country IN


[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.

Enter your selection [2]:  2
Building configuration...
[OK]
Use the enabled mode 'configure' command to modify this configuration.

Building configuration...
[OK]


Press RETURN to get started!


*Sep  2 10:58:30.092: %SYS-5-CONFIG_P: Configured programmatically by process Setup from console as console
*Sep  2 10:58:30.116: %SELINUX-3-MISMATCH: Chassis 1 R0/0: audispd: type=AVC msg=audit(1599044310.115:139): avc:  denied  { getattr } for  pid=2851 comm="read
link" path="/dev/sda1" dev="devtmpfs" ino=20799 scontext=system_u:system_r:polaris_psd_t:s0 tcontext=system_u:object_r:fixed_disk_device_t:s0 tclass=blk_file
permissive=1
*Sep  2 10:58:30.817: %LINK-3-UPDOWN: Interface GigabitEthernet1, changed state to up
*Sep  2 10:58:30.836: %LINK-3-UPDOWN: Interface GigabitEthernet2, changed state to up
WLC>
```

Day 0 configuration for C9800-40, C9800-80 and C9800-L

Procedure

Step 1 Connect a PC laptop's wired Ethernet port directly to Front Panel Port or to the Service Port IP (DHCP or Static) of the wireless controller (see the following figure). The port LEDs blink to indicate that both machines are properly connected. To connect via service port, connect the console, connect the uplink and service port to switch ports and then remotely login to set the hostname, user credential, IP and route on the device management interface. Once this is setup Day 0 on service port can be accessed by pointing the https browser session to the statically assigned IP.

Figure 1. Front Panel and Service port support Day 0 UI



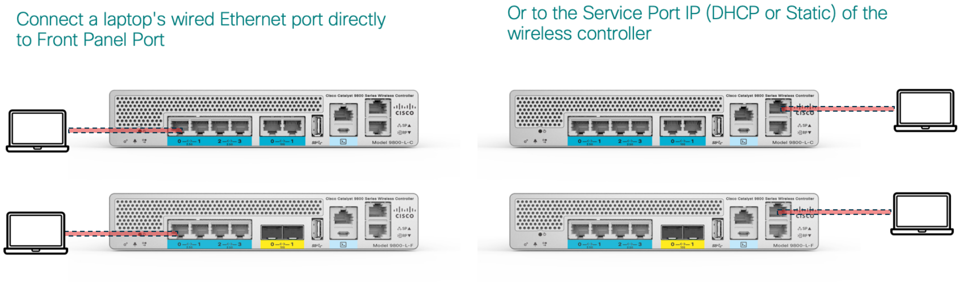
Connect PC Ethernet cable to Front Panel Port on the Wireless Controller

Connect PC Ethernet cable Service port on the Wireless Controller

Note It may take several minutes for the wireless controller to fully power on to make the GUI available to the PC. Do not auto configure controller.

The LEDs on the front panel provide system status:
The system is not ready – LEDs is OFF
The controller is ready – LED is solid green

On the Catalyst 9800-L wireless controller, connect a PC laptop's wired Ethernet port directly to Front Panel Port or Service Port to access the Express Day 0 UI as shown below

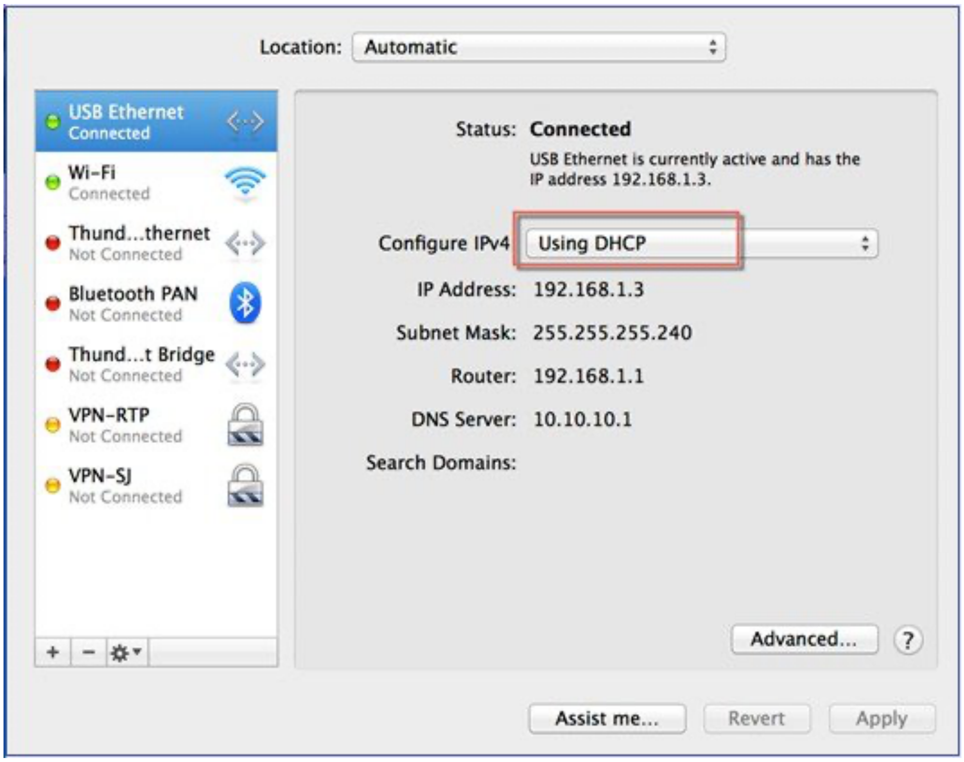


Connect a laptop's wired Ethernet port directly to Front Panel Port

Or to the Service Port IP (DHCP or Static) of the wireless controller

Step 2 Configure DHCP option on the Laptop if connecting to the Front Panel port. This assigns an IP address to your Laptop (192.168.1.X) or you can assign static IP address 192.168.1.X to your Laptop to access the wireless controller GUI; both options are supported.

The following figure shows an example of the Mac Laptop getting an IP address from the DHCP service port for the initial configuration of the controller.



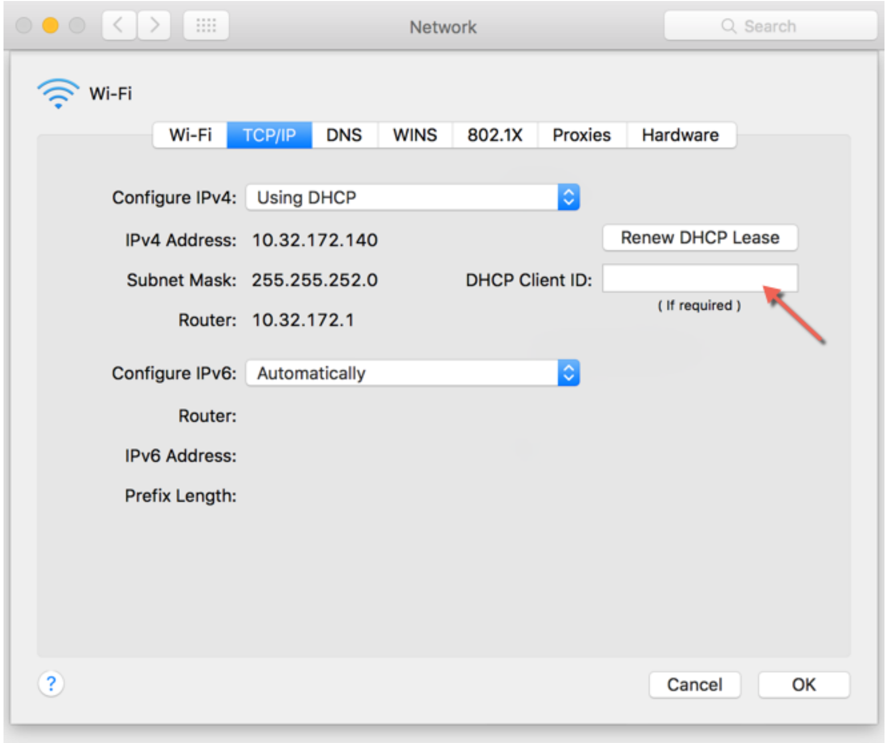
Location: Automatic

- USB Ethernet — Connected
- Wi-Fi — Connected
- Thund...thernet — Not Connected
- Bluetooth PAN — Not Connected
- Thund...t Bridge — Not Connected
- VPN-RTP — Not Connected
- VPN-SJ — Not Connected

Status: Connected
USB Ethernet is currently active and has the IP address 192.168.1.3.

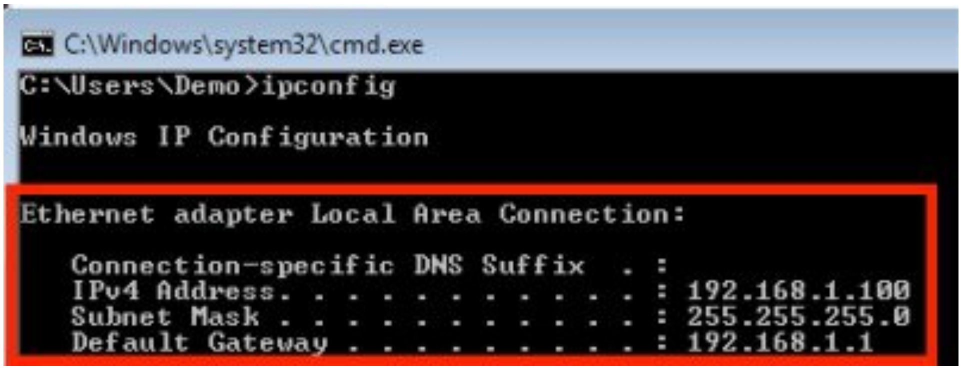
Configure IPv4: Using DHCP
IP Address: 192.168.1.3
Subnet Mask: 255.255.255.240
Router: 192.168.1.1
DNS Server: 10.10.10.1
Search Domains:

Show DHCP client-id needs to be populated when connecting via the front panel port



Configure IPv4: Using DHCP
IPv4 Address: 10.32.172.140
Subnet Mask: 255.255.252.0
Router: 10.32.172.1
DHCP Client ID:
Configure IPv6: Automatically
Router:
IPv6 Address:
Prefix Length:

The following figure shows an example of network settings on Windows PC (**Start > Run > CMD > ipconfig**).



```
C:\Users\Demo>ipconfig

Windows IP Configuration

Ethernet adapter Local Area Connection:

   Connection-specific DNS Suffix  . :
   IPv4 Address. . . . . . . . . . . : 192.168.1.100
   Subnet Mask . . . . . . . . . . . : 255.255.255.0
   Default Gateway . . . . . . . . . : 192.168.1.1
```

DAY 0 configuration for C9800-CL on Private Cloud

Configuring the basic C9800-CL settings

Let's configure the minimal configuration to then connect to the web GUI interface of C9800-CL and use the DAY 0 guided flow to get the controller fully operational.

At FCS, DAY 0 assumes that the box has two separated virtual interfaces (one for device management and one for wireless management and client traffic) and that the first login happens on the device management (out of band) interface. The wireless management interface is configured via the DAY 0. If you have a different setup and for example you want to use only one interface, please see the next section on how you can skip DAY 0 guided flow and configure the initial settings via CLI.

Connect to the CLI via the VGA console and follow these steps for the basic configuration:

- Terminate the configuration wizard (this is the general ios CLI wizard and it's not specific for wireless)

```
Would you like to enter the initial configuration dialog? [yes/no]: no

Would you like to terminate autoinstall? [yes]:yes
```

- Optionally set the hostname:

```
WLC(config)#hostname C9800
```

- Add login credentials using the following command:

```
C9800(config)#username <name> privilege 15 password <yourpwd>
```

- Add an IP address on the device Management interface. The example assumes you have mapped GigabitEthernet 1 to the out of band/device management network during VM bootstrap:

```
C9800(config)#interface g1

C9800(config-if)#no switchport

C9800(config-if)#ip address 10.58.55.5 255.255.255.0
```

- Add the route to the remote network where you want to manage the C9800-CL from

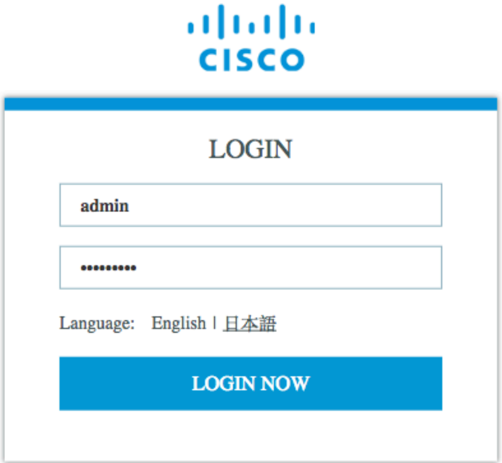
```
C9800(config)#ip route 10.58.0.0 255.255.0.0 10.58.55.254
```

Verify that you can ping your management station and then from there just https://<IP of the device management interface>. Use the credentials you have entered earlier. Since the box has never been configured, the web GUI will redirect you to the DAY 0 page. Please see the DAY 0 section later in the document

C9800-CL Day-0 Configuration Setup Wizard

To simplify the bootstrap process of a Catalyst wireless controller, a Day-0 wizard will appear after a virtual instance is deployed, with network connectivity but without any other wireless configuration.

To connect to the DAY 0 GUI, login to the defined Device Management interface via https.



LOGIN

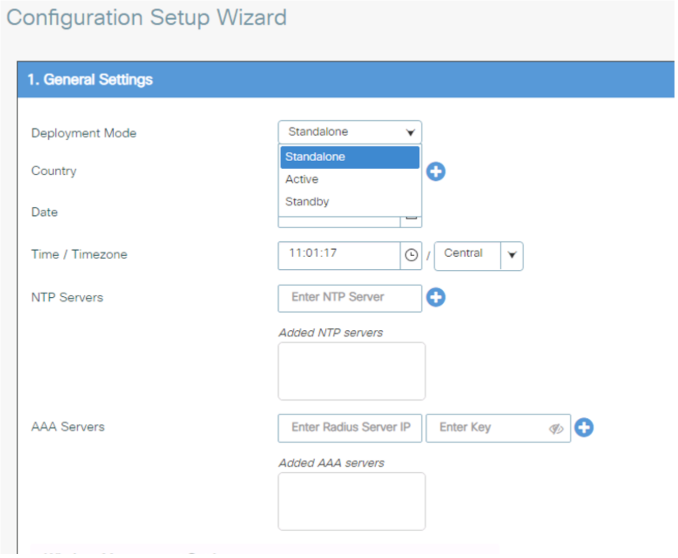
admin

•••••••••

Language: English | 日本語

To login use the username and password credentials given during the C9800 instance creation described in the previous sections.

Once logged in, the user is presented with a simplified configuration flow to set the basic parameters and have the controller fully operational. In the first page, enter the required information:



Configuration Setup Wizard

1. General Settings

Deployment Mode: Standalone

Country

Date

Time / Timezone: 11:01:17 / Central

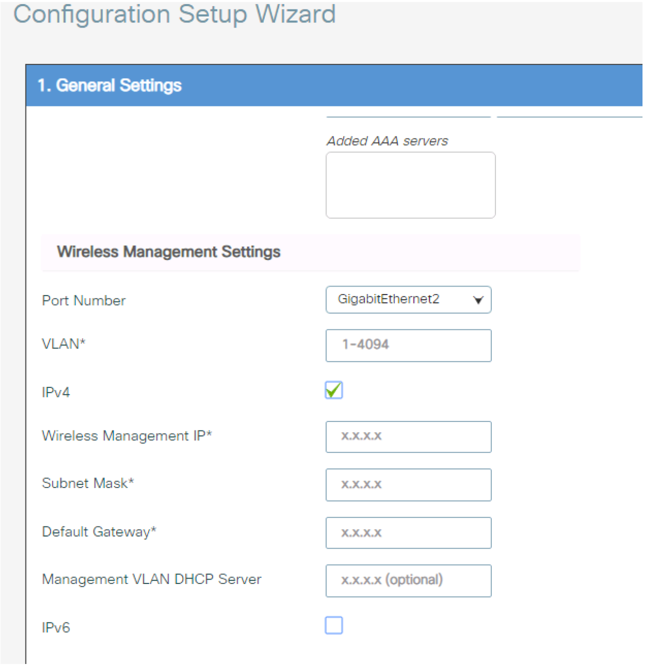
NTP Servers: Enter NTP Server

Added NTP servers

AAA Servers: Enter Radius Server IP | Enter Key

Added AAA servers

These are: Deployment mode, Country code, Date and Time, NTP (optional) and AAA Server (optional). Note how for the VM you can chose standalone or active/standby if you want to configure SSO.
Then enter the wireless Management interface configuration:



Configuration Setup Wizard

1. General Settings

Added AAA servers

Wireless Management Settings

Port Number: GigabitEthernet2

VLAN*: 1-4094

IPv4: ☑

Wireless Management IP*: x.x.x.x

Subnet Mask*: x.x.x.x

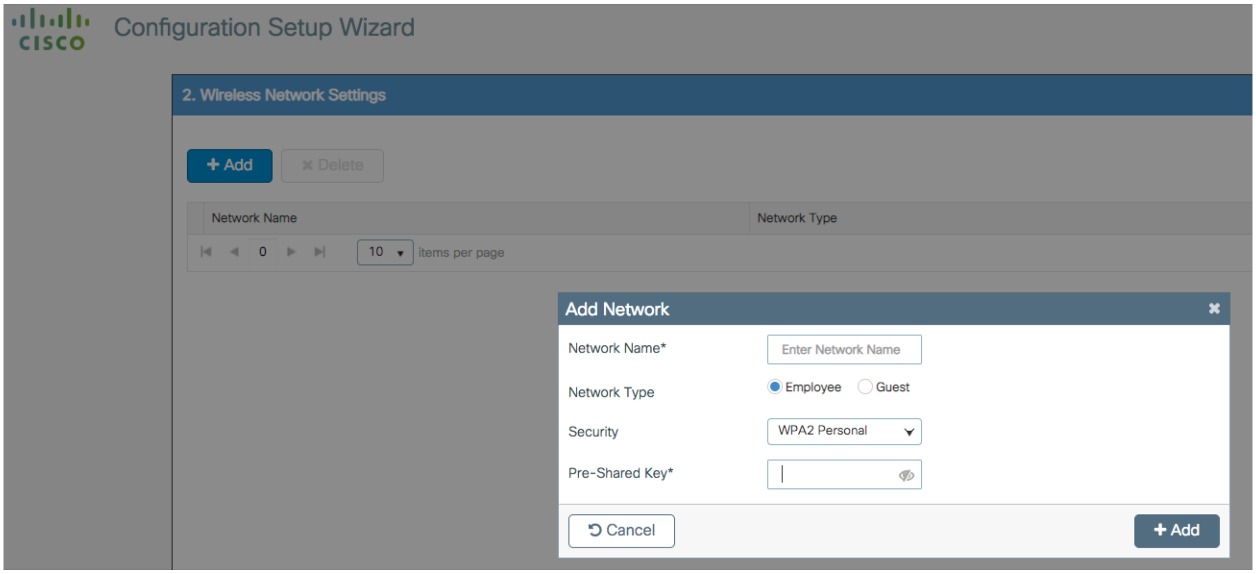
Default Gateway*: x.x.x.x

Management VLAN DHCP Server: x.x.x.x (optional)

IPv6: □

Notice that you can only select an interface that is different from the one you used to access the GUI (so you can either select gig 2 or gi3 in this case). You can configure the interface Gigabit 2 by choosing the VLAN, the IP address and the default gateway. This will automatically configure the interface as trunk, the SVI interface for wireless management and the default gateway. Click Next

In the next page you can add a WLAN (optional) so that clients can connect. In this example the PSK dialogue is shown:



Configuration Setup Wizard

2. Wireless Network Settings

Network Name	Network Type

Add Network

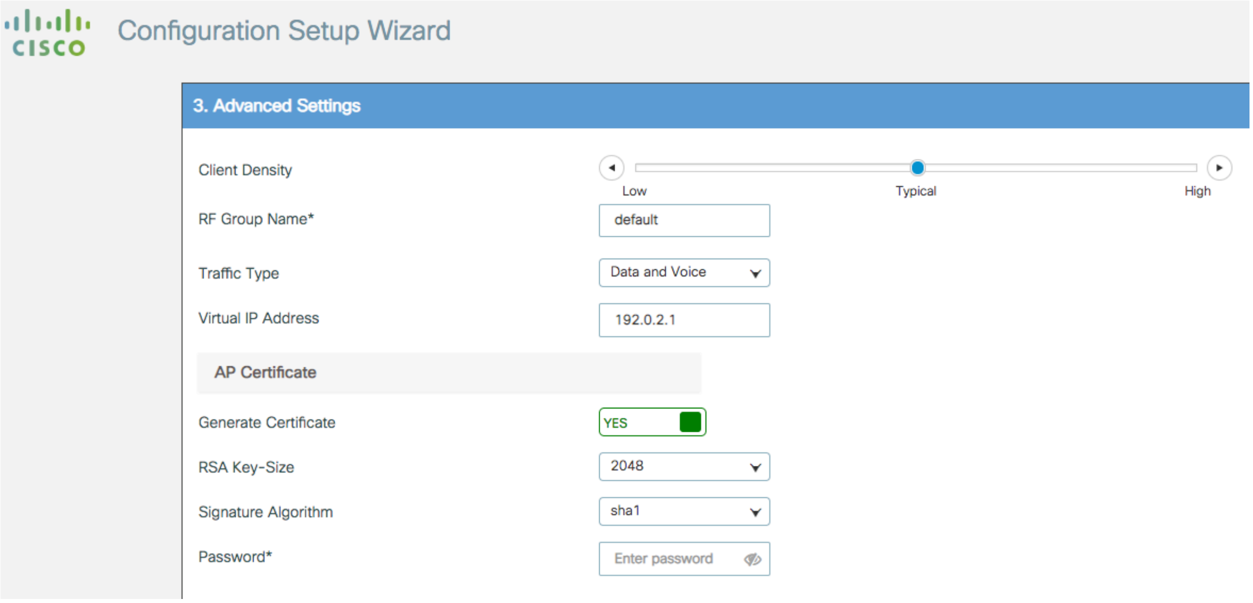
Network Name*: Enter Network Name

Network Type: ● Employee ○ Guest

Security: WPA2 Personal

Pre-Shared Key*:

In the next page the user can set some basic RF parameters and the AP certificate.


Configuration Setup Wizard

3. Advanced Settings

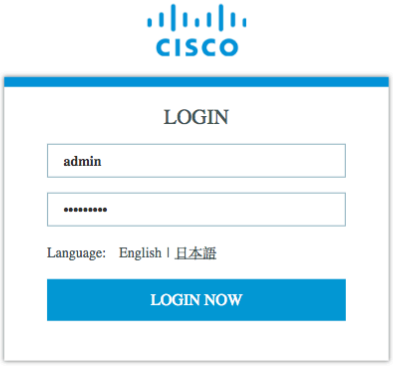
Client Density: Low / Typical / High (Typical)
RF Group Name*: default
Traffic Type: Data and Voice
Virtual IP Address: 192.0.2.1

AP Certificate

Generate Certificate: YES
RSA Key-Size: 2048
Signature Algorithm: sha1
Password*: Enter password

A trust point is basically a certificate authority that you trust, and it is called a trust point because you implicitly trust this authority. A trust point certificate is a self-signed certificate, hence the name trust point, since it does not rely on the trust of anyone else or other party. A trust point is needed for AP to join the C9800-CL and the user can decide to auto generate one during DAY 0, or can toggle the "Generate Certificate" to NO and then it will have to configure its own certificate authority at DAY 1 for APs to join.

Click Summary to review the configuration and then click Finish. The configuration and trust point will be pushed to the device and the user will be logged out. The 9800-CL controller will not reboot but it will take about 60s to prompt the user to login again; enter the same credentials:


LOGIN

admin

•••••••••

Language: English | 日本語

This time it will skip the DAY 0 page since the box has already an initial configuration, and the user will be redirected to the main Dashboard for DAY 1 configuration

C9800-CL configuring via CLI: skipping the DAY 0 guided flow

If the user doesn't want to use two separated virtual interfaces for device management and wireless management, then he/she can configure the day zero configuration via CLI and then access the GUI for DAY 1 configuration.

Follow these steps to configure the c9800 with a wireless management interface and skip the DAY 0. This example assumes that Gigabit Ethernet 1 is connected to a trunk interface on the switch and you want to configure multiple VLANs and dedicate one for Wireless Management interface

Step 1. Access the CLI via the vga/monitor console of ESXi

Step 2. Terminate the configuration wizard (this wizard it's not specific for wireless controller)

```
Would you like to enter the initial configuration dialog? [yes/no]: no

Would you like to terminate autoinstall? [yes]:yes
```

Step 3. Optionally set the hostname:

```
WLC(config)#hostname C9800
```

Step 4. Enter the config mode and add login credentials using the following command:

```
C9800(config)#username <name> privilege 15 password <yourpwd>
```

Step 5. Configure the VLAN for wireless management interface

```
C9800#conf t
Enter configuration commands, one per line.  End with CNTL/Z.

C9800(config)#vlan 122

C9800(config-vlan)#name wireless_management
```

Step 6. Configure the SVI for wireless management interface, for example:

```
C9800(config)#int vlan 122

C9800(config-if)#ip address 172.20.229.21 255.255.255.192

C9800(config-if)#no shutdown
```

Step 7. Configure the interface gigabit 1 as trunk:

```
C9800(config-if)#interface GigabitEthernet1

C9800(config-if)#switchport mode trunk

C9800(config-if)#switchport trunk allowed vlan 122

C9800(config-if)#shut
```

```
C9800(config-if)#no shut
```

Step 8. Configure a default route (or a more specific route) to reach the box:

```
C9800(config-if)#ip route 0.0.0.0 0.0.0.0 172.20.229.1
```

Step 9. Disable the wireless network to configure the country code:

```
C9800(config)#ap dot11 5ghz shutdown

Disabling the 802.11a network may strand mesh APs.

Are you sure you want to continue? (y/n)[y]: y

C9800(config)#ap dot11 24ghz shutdown

Disabling the 802.11b network may strand mesh APs.

Are you sure you want to continue? (y/n)[y]: y
```

Step 10. Configure the AP country domain. This configuration is what will trigger the GUI to skip the DAY 0 flow as the C9800 needs a country code to be operational:

```
C9800(config)# c9800-10-30(config)#ap country ?
  WORD  Enter the country code (e.g. US,MX,IN) upto a maximum of 20 countries
```

Step 11. A certificate is needed for the AP to join the virtual C9800. This can be created automatically via the DAY 0 flow or manually using the following commands

- Specify the interface to be the wireless management interface

  ```
  C9800(config)#wireless management interface vlan 122
  ```

- in exec mode, issue the following command:

  ```
  C9800(#wireless config vwlc-ssc key-size 2048 signature-algo sha256 password 0 <pwd>
  Configuring vWLC-SSC…
  Script is completed
  ```

  This is a script the automates the whole certificate creation:

- Verifying Certificate Installation:

  ```
  C9800#show wireless management trust point
  Trustpoint Name : ewlc-default-tp
  Certificate Info : Available
  Certificate Type : SSC
  Certificate Hash : e55e61b683181ff0999ef317bb5ec7950ab86c9e
  Private key Info : Available
  ```

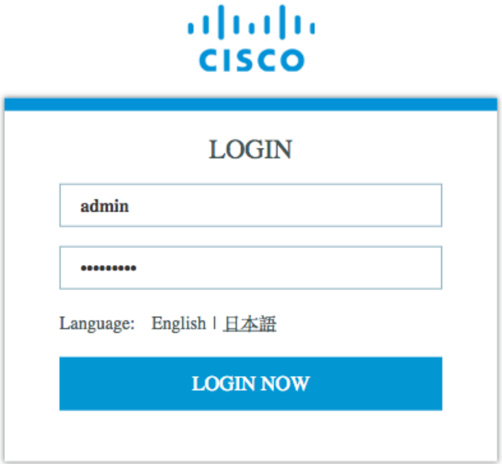
Note: you can skip the certificate/trust point configuration but if you do it, APs will not able to join. You would need to go to the GUI and configure it from there by importing the desired certificate.

Verify that you can ping the wireless management interface and then just https://<IP> of the device wireless management interface>. Use the credentials you have entered earlier. Since the box has a country code configured, the GUI will skip DAY 0 page and you will get access to the main Dashboard for DAY 1 configuration.

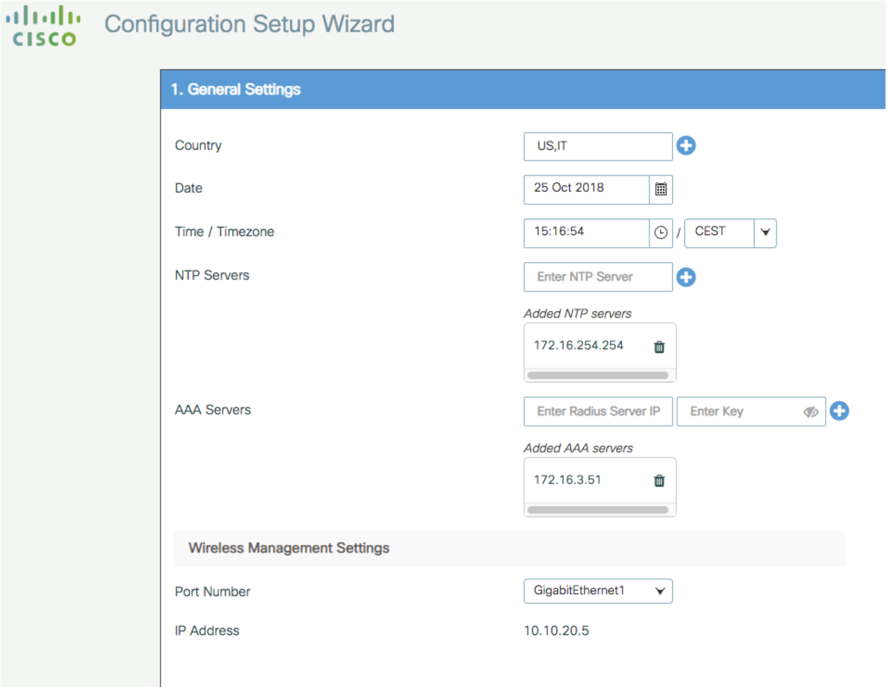
DAY 0 configuration for C9800-CL on Public Cloud

The purpose of the DAY 0 Web Graphical User Interface (GUI) is to facilitate the first Catalyst 9800 Wireless Controller setup and provide the instance with the necessary configurations for APs and clients to join. The DAY 0 GUI is triggered every time the wireless controller has not been configured with a Regulatory Country Domain and hence is not operational.

To connect to the DAY 0 GUI, login to the defined Device Management/Wireless Management interface via https.



To login use the username and password credentials given during the C9800 instance creation described in the previous sections.
Once logged in, the user is presented with a simplified configuration flow to set the basic parameters and have the controller fully operational.
In the first page, enter the required information:



Configuration Setup Wizard

1. General Settings

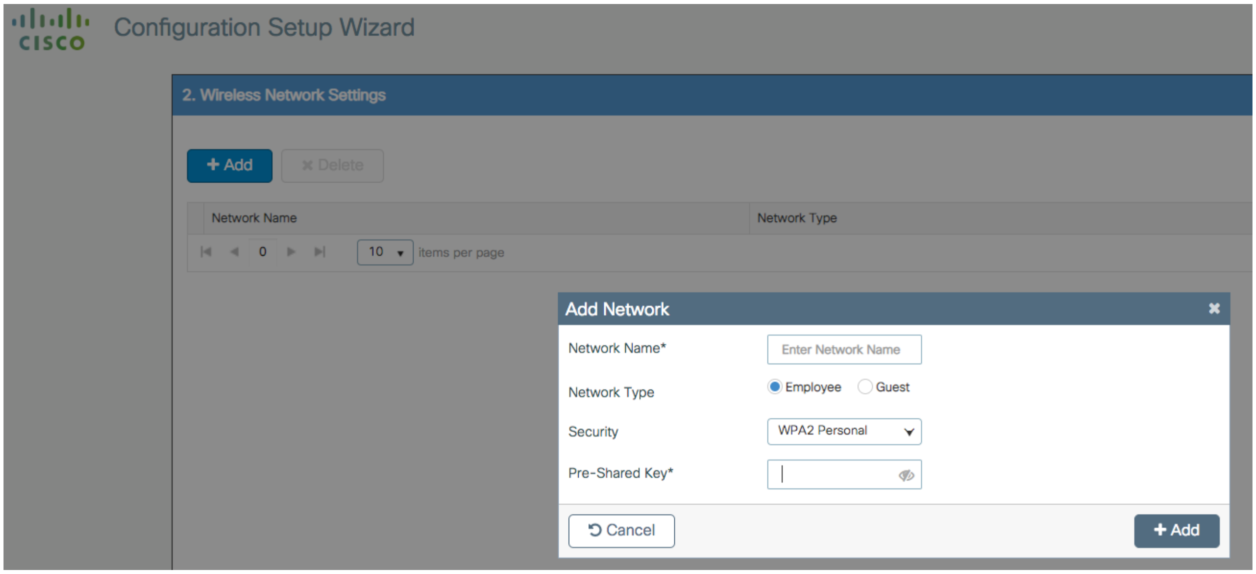
Country	US,IT
Date	25 Oct 2018
Time / Timezone	15:16:54 / CEST
NTP Servers	Enter NTP Server Added NTP servers 172.16.254.254
AAA Servers	Enter Radius Server IP, Enter Key Added AAA servers 172.16.3.51

Wireless Management Settings

Port Number	GigabitEthernet1
IP Address	10.10.20.5

These are: Country code, Date and Time, NTP (optional) and AAA Server (optional). Notice that only interface Gigabit 1 is present on the box as only one interface is supported. Click Next

In the next page you can add a WLAN (optional) so that clients can connect. In this example the PSK dialogue is shown:



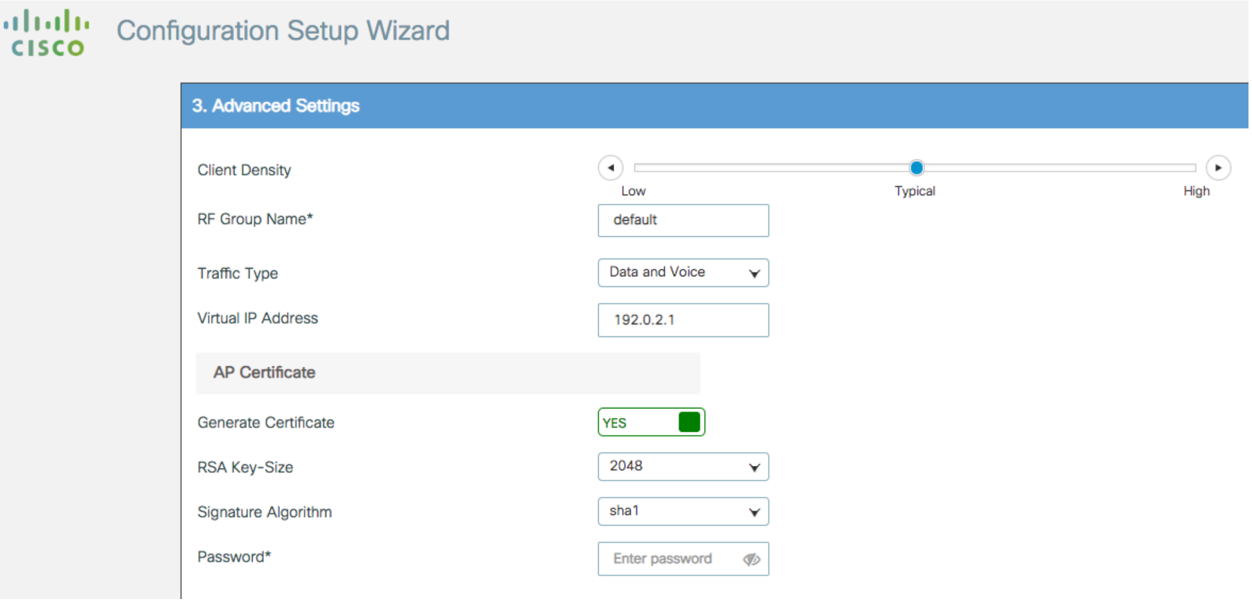
Configuration Setup Wizard

2. Wireless Network Settings

Add Network

Network Name*	Enter Network Name
Network Type	● Employee ○ Guest
Security	WPA2 Personal
Pre-Shared Key*	

In the next page the user can set some basic RF parameters and the AP certificate.



Configuration Setup Wizard

3. Advanced Settings

Client Density: Low — Typical — High (Typical)

RF Group Name*: default

Traffic Type: Data and Voice

Virtual IP Address: 192.0.2.1

AP Certificate

Generate Certificate: YES

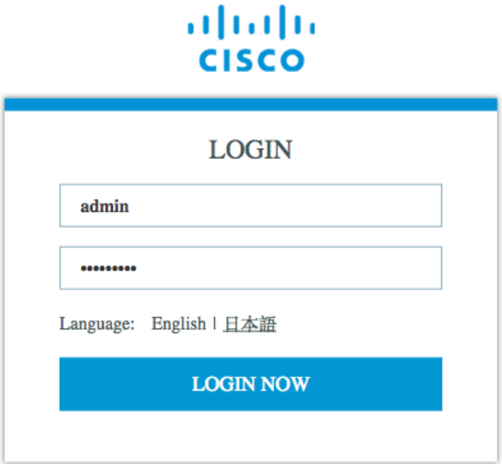
RSA Key-Size: 2048

Signature Algorithm: sha1

Password*: Enter password

A trust point is basically a certificate authority that you trust, and it is called a trust point because you implicitly trust this authority. A trust point certificate is a self-signed certificate, hence the name trust point, since it does not rely on the trust of anyone else or other party. A trust point is needed for AP to join the C9800-CL and the user can decide to auto generate one during DAY 0, or can toggle the "Generate Certificate" to NO and then it will have to configure its own certificate authority at DAY 1 for APs to join.

Click Summary to review the configuration and then click Finish. The configuration and trust point will be pushed to the device and the user will be logged out. The 9800-CL controller will not reboot but it will take about 60s to prompt the user to login again; enter the same credentials:



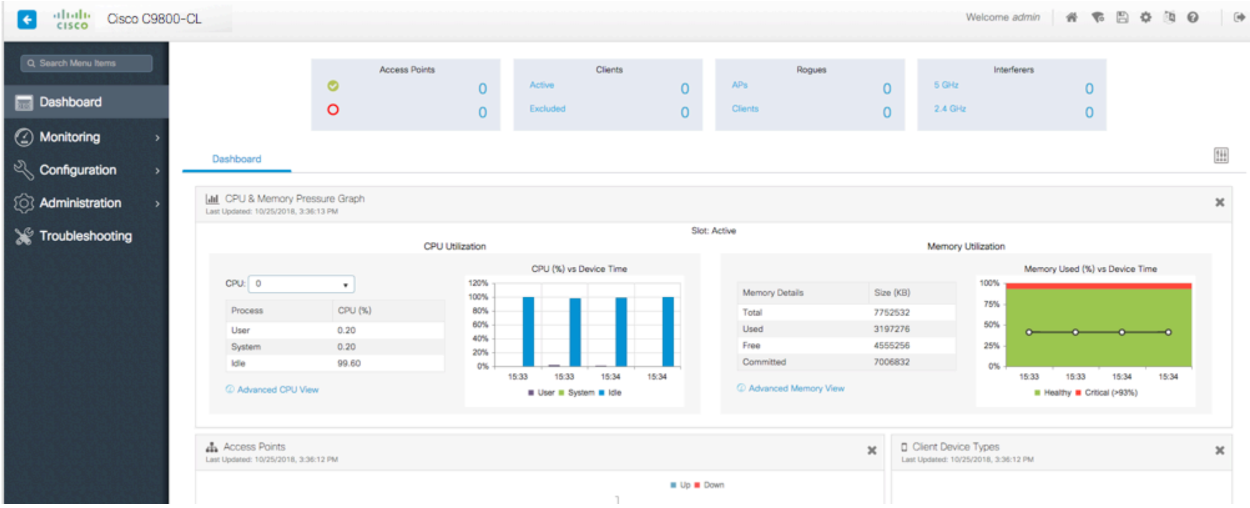
LOGIN

admin

•••••••••

Language: English | 日本語

This time it will skip the DAY 0 page since the box has already an initial configuration, and the user will be redirected to the main Dashboard:



Process	CPU (%)
User	0.20
System	0.20
Idle	99.60

Memory Details	Size (KB)
Total	7752532
Used	3197276
Free	4555256
Committed	7006832

Configuring the AP certificate manually

In case the customer skips day 0 and goes directly to the DAY 1 GUI of the controller, the user has to do the following steps before he can access the controller main GUI:

1) Assign a country code via the ios command

   ```
   c9800-10-30(config)#ap country <country code>
   ```

   Once set, the GUI will skip the DAY 0

2) For APs you join you need to create a certificate. If you want to have an internally generated certificate, you can it manually running the following script:

   ```
   C9800-CL(config)# wireless config vwlc-ssc key-size 2048 signature-algo sha256 password
   ```

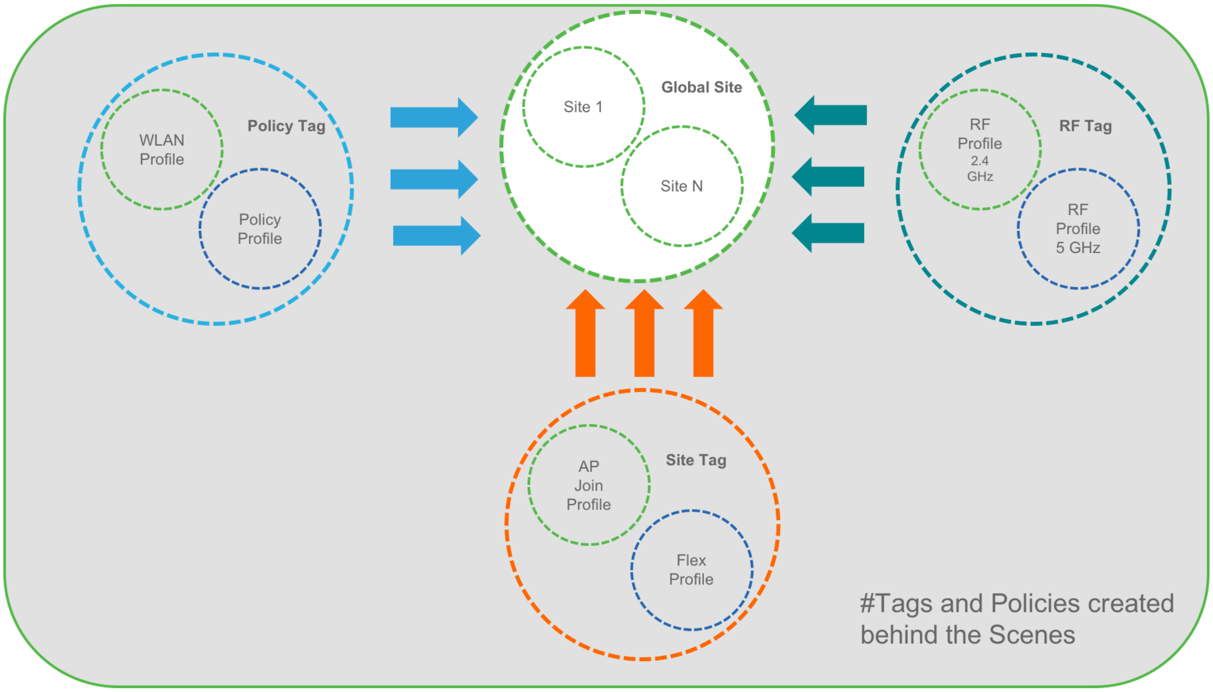
   Verify the command is successful and that you can

   ```
   c9800-CL#sh wireless management trust point
   Trustpoint Name  : ewlc-default-tp
   Certificate Info : Available
   Certificate Type : SSC
   Certificate Hash : 10c07d17e69c8a04658ff96262db9c7babc55247
   Private key Info : Available
   FIPS suitability : Not Applicable
   ```

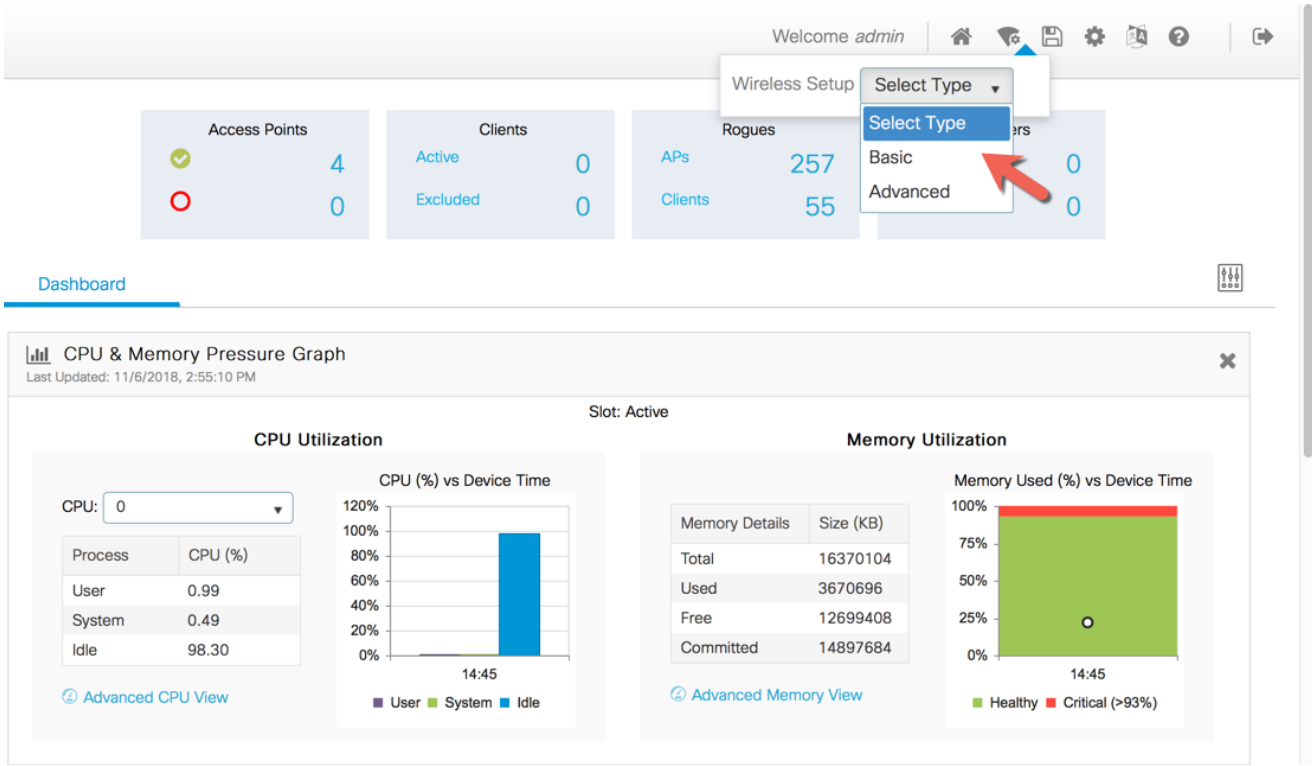
Your Cisco Catalyst 9800 is ready to use! Please use the general configuration guide for DAY 1 configuration

Wireless Basic Workflow

The wireless basic setup uses intent-based workflows to define local and remote sites, create wireless networks for these sites, define policies such as VLAN, ACL and QoS and also fine-tune RF characteristics. Corresponding policies and tags are created in the backend in accordance with the new configuration model but are transparent to the end-user. Access points are assigned to the site and in turn are assigned policy, RF and site tags.



In order to access the Basic Wireless Setup, click on the Wireless Setup Icon on the top-right hand corner of the dashboard page and select 'Basic' as shown below

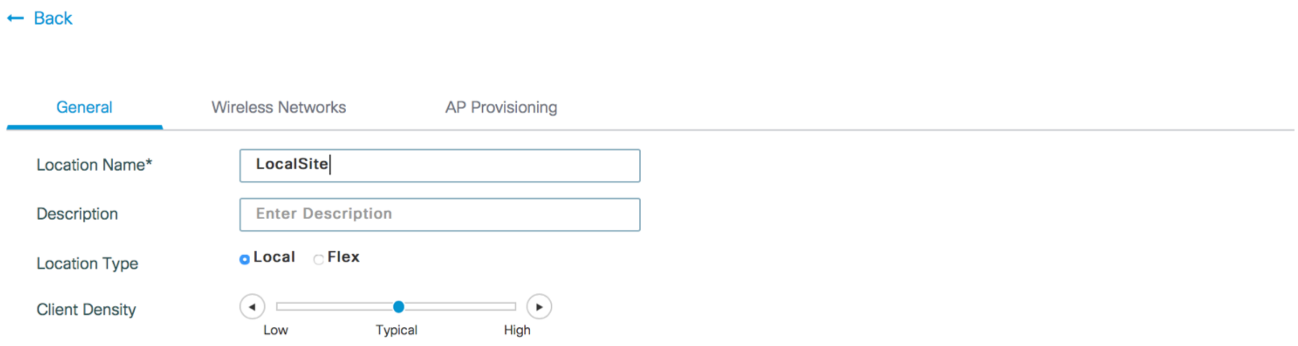


Process	CPU (%)
User	0.99
System	0.49
Idle	98.30

Memory Details	Size (KB)
Total	16370104
Used	3670696
Free	12699408
Committed	14897684

Step 1: Creation of new site and General Site Settings

A location is defined as a site either in the campus(local) or across the WAN in a branch (remote) that has a specific set of services, policies and RF. Select a Name, description and Location type (Local or Flex) as well as client density as Low, Typical, or High. In the flow below, a local site is created with the name LocalSite



Location Name* LocalSite

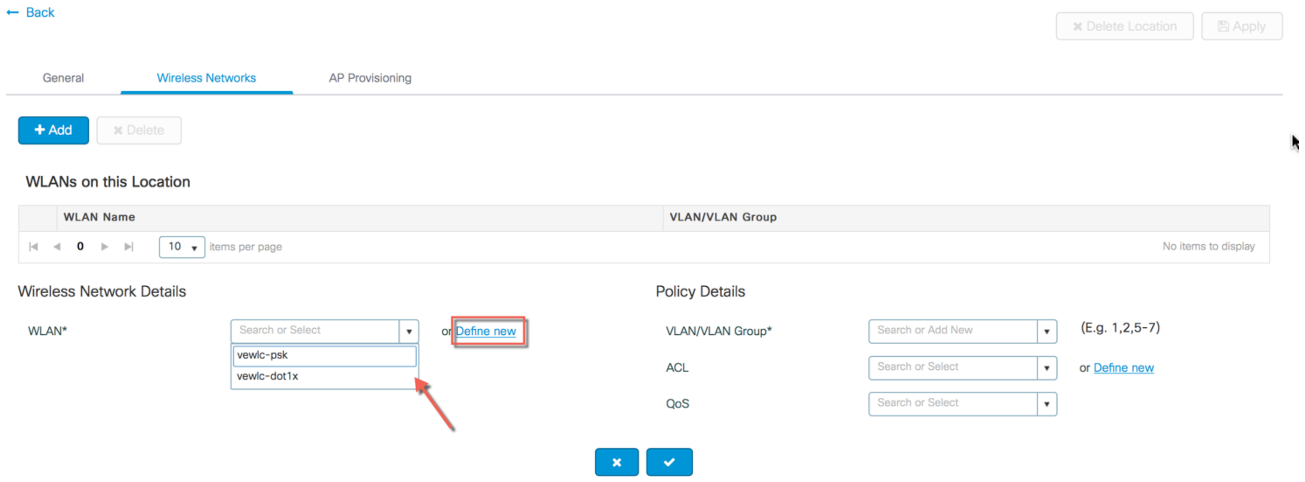
Description Enter Description

Location Type ● Local ○ Flex

Client Density Low Typical High

Step 2: Creation of Wireless Network and policies within the site

WLANs created as part of Day 0 setup are available to add to this site. These WLANs can be added as is or modified for the policy details that are required for this network in the local site. Alternatively, new SSIDs can be created using the Define new button.



WLANs on this Location

WLAN Name	VLAN/VLAN Group

0 · 10 items per page · No items to display

Wireless Network Details

WLAN* Search or Select or Define new
- vewlc-psk
- vewlc-dot1x

Policy Details

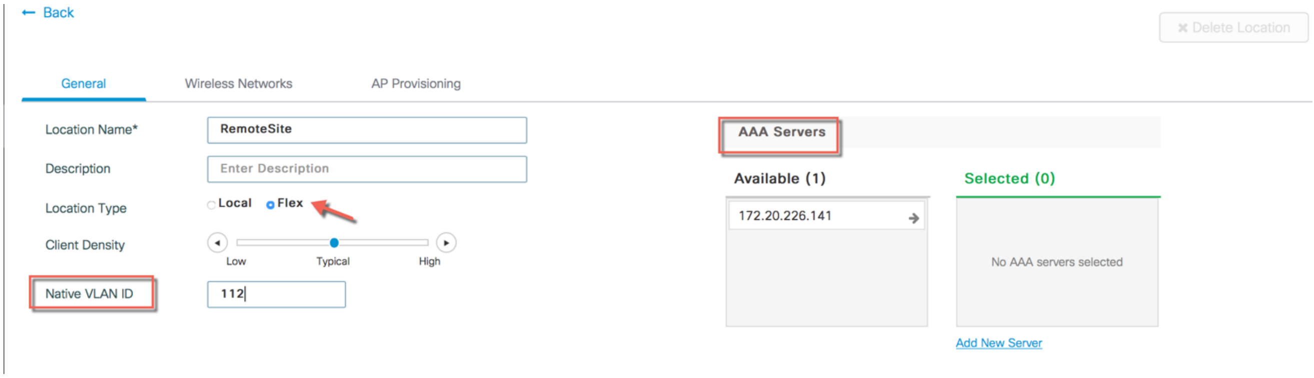
VLAN/VLAN Group* Search or Add New (E.g. 1,2,5-7)

ACL Search or Select or Define new

QoS Search or Select

Creation of a Remote Site

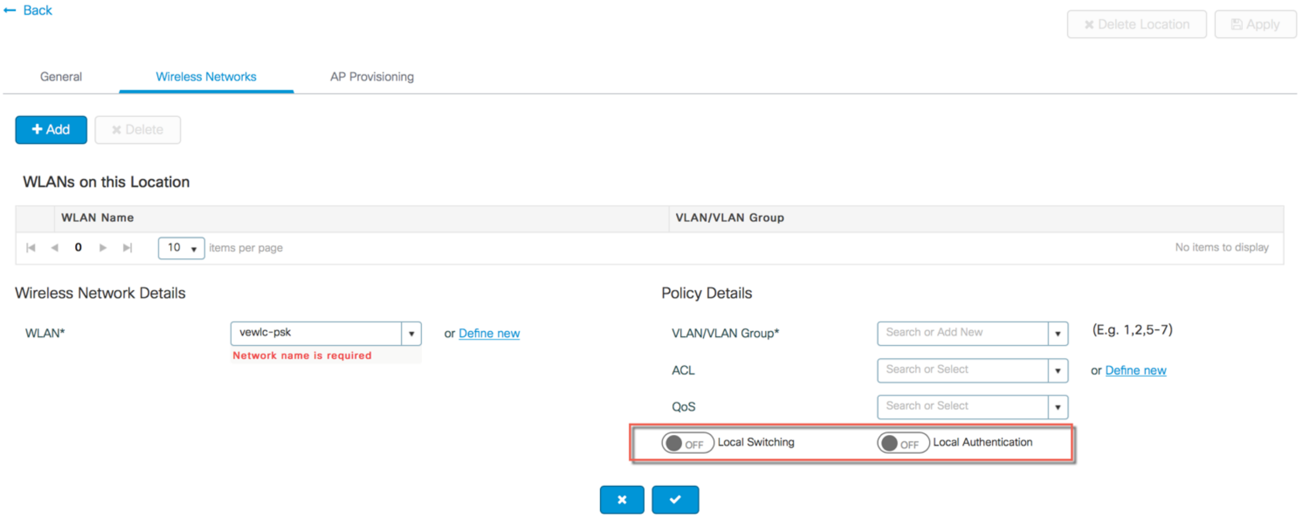
Similarly, selecting Location type as “Flex” can create a remote site. In addition to the field available on the local site, remote site-specific parameters such as native VLAN ID and local AAA Servers can be configured on this page. Globally defined AAA server can be used or a new server can be added using the ‘Add New Server’ link.



Location Name* RemoteSite
Description Enter Description
Location Type ○ Local ● Flex
Client Density Low Typical High
Native VLAN ID 112

AAA Servers
Available (1): 172.20.226.141
Selected (0): No AAA servers selected
Add New Server

On the Wireless networks tab, the SSID being added to the remote site can be configured as a local switching, local authentication SSID.



WLANs on this Location

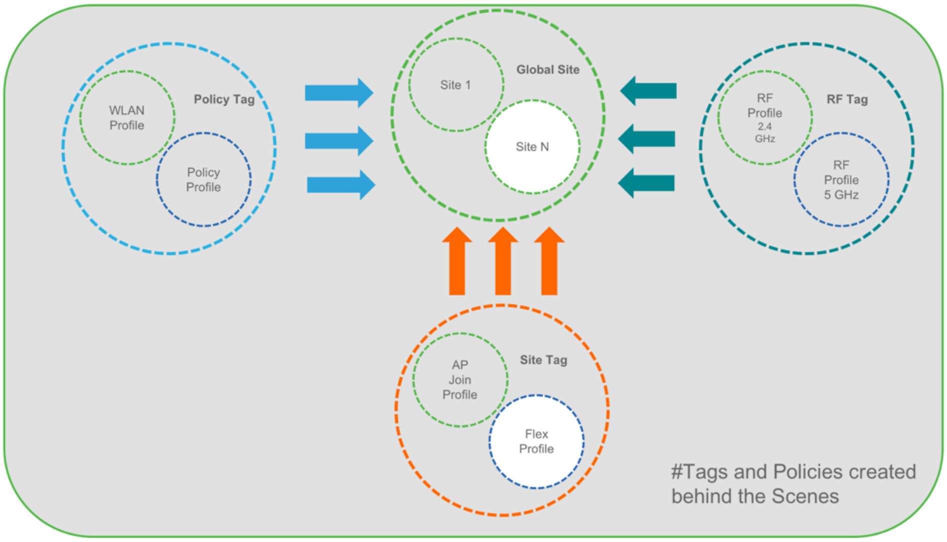
WLAN Name	VLAN/VLAN Group

0 | 10 items per page | No items to display

Wireless Network Details
WLAN* vewlc-psk or Define new
Network name is required

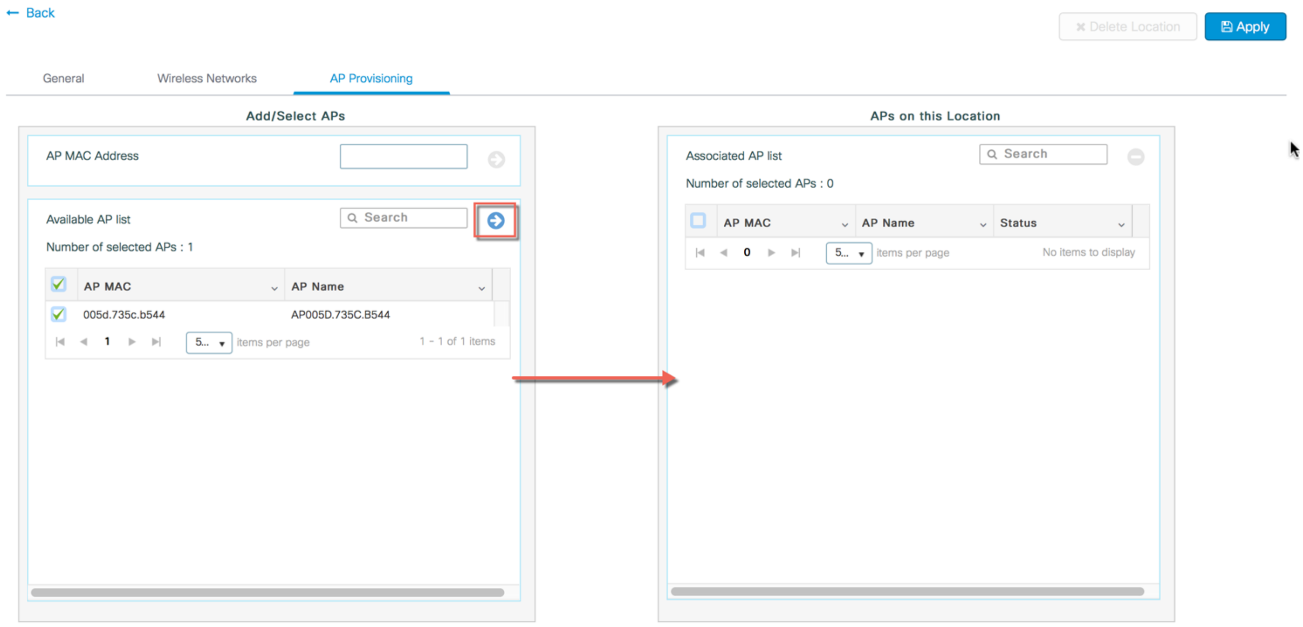
Policy Details
VLAN/VLAN Group* Search or Add New (E.g. 1,2,5-7)
ACL Search or Select or Define new
QoS Search or Select
OFF Local Switching
OFF Local Authentication

In the backend, a custom Site tag with a custom Flex profile is defined and associated with this remote site



Step 3 : Provisioning APs to Site

Once the Wireless network and RF characteristics are setup, Access points can be added to the local/remote site either using static AP MAC address assignment or by assigning already joined APs to a specific location



Add/Select APs

AP MAC Address

Available AP list

Search

Number of selected APs : 1

☑	AP MAC	AP Name
☑	005d.735c.b544	AP005D.735C.B544

1 | 5... items per page | 1 - 1 of 1 items

APs on this Location

Associated AP list

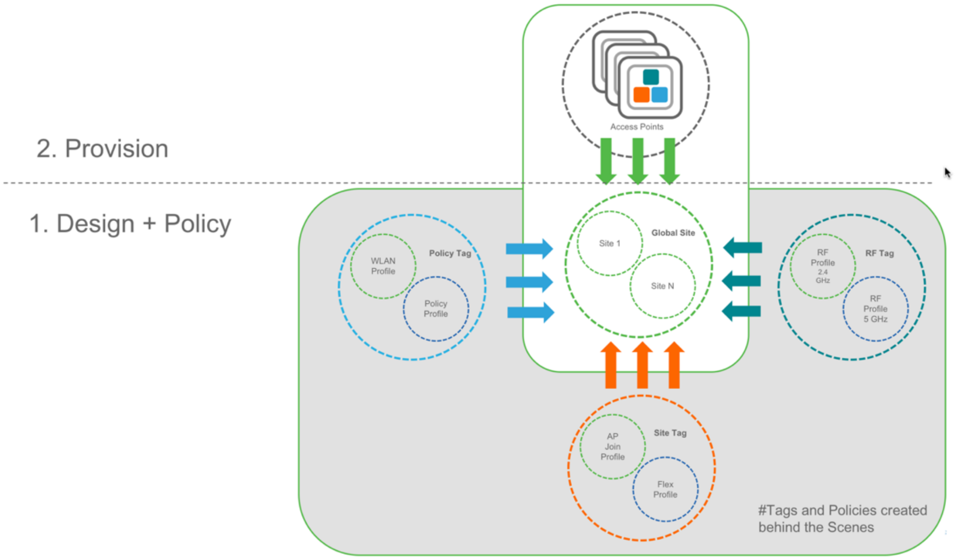
Search

Number of selected APs : 0

□	AP MAC	AP Name	Status

0 | 5... items per page | No items to display

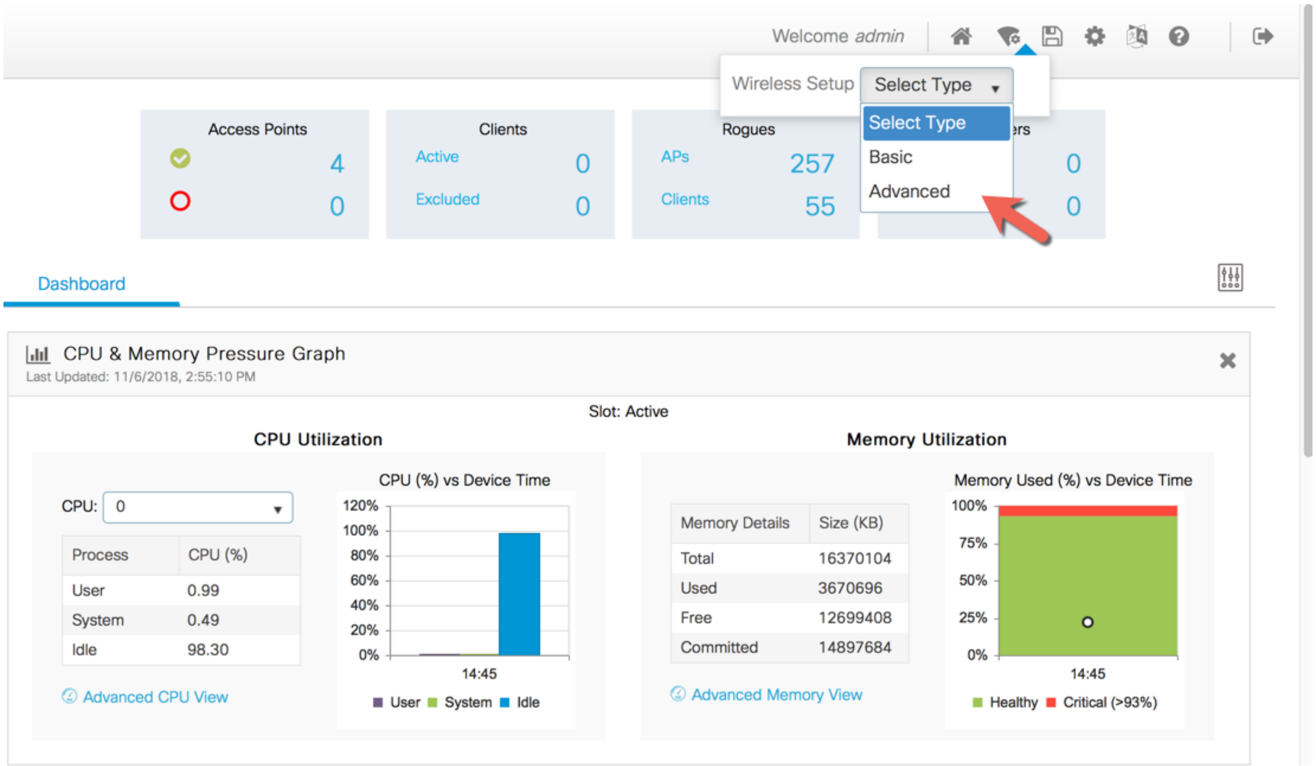
Policy, Site and RF tags are automatically pushed to the access points upon provisioning.


Access Points
2. Provision
1. Design + Policy
Policy Tag
WLAN Profile
Policy Profile
Global Site
Site 1
Site N
RF Tag
RF Profile 2.4 GHz
RF Profile 5 GHz
Site Tag
AP Join Profile
Flex Profile
#Tags and Policies created behind the Scenes

Wireless Advanced Workflow

Guided workflow and Use cases

In order to access the Advanced Wireless Setup, click on the Wireless Setup Icon on the top-right hand corner of the dashboard page and select 'Advanced' as shown below



Access Points	
✓	4
○	0

Clients	
Active	0
Excluded	0

Rogues	
APs	257
Clients	55

ers
0
0

CPU & Memory Pressure Graph
Last Updated: 11/6/2018, 2:55:10 PM

Slot: Active

CPU Utilization

CPU (%) vs Device Time

CPU: 0

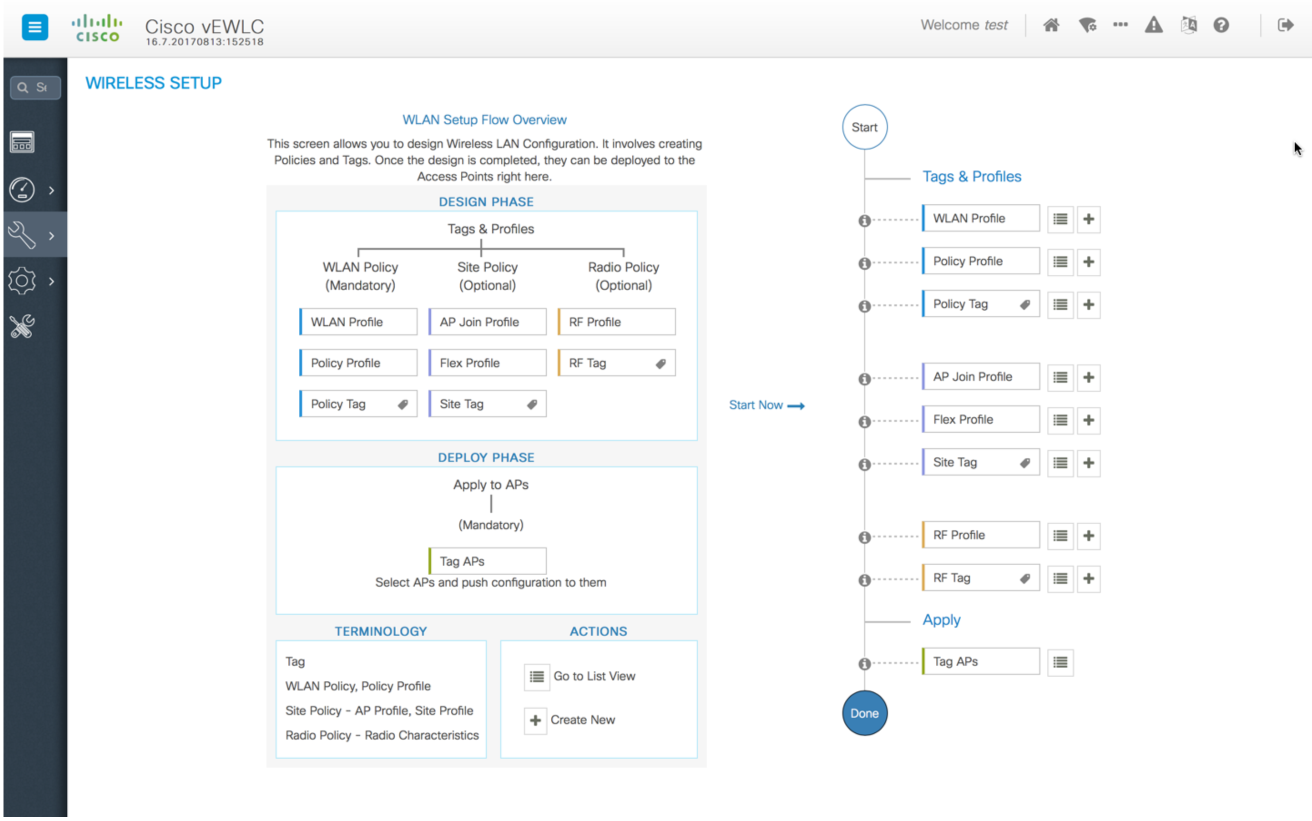
Process	CPU (%)
User	0.99
System	0.49
Idle	98.30

Memory Utilization

Memory Used (%) vs Device Time

Memory Details	Size (KB)
Total	16370104
Used	3670696
Free	12699408
Committed	14897684

A guided workflow has been created for easy navigation thru the steps required to setup the network using Cisco Catalyst 9800 Wireless Controller.



This screen allows you to design Wireless LAN Configuration. It involves creating Policies and Tags. Once the design is completed, they can be deployed to the Access Points right here.

Select APs and push configuration to them

TERMINOLOGY

Tag
WLAN Policy, Policy Profile
Site Policy - AP Profile, Site Profile
Radio Policy - Radio Characteristics

The following set of steps defines the logical order of configuration. Note that apart from the WLAN profile, all profiles and tags have a default object associated with it

1. Creation of profiles

- Create the required WLAN profiles (SSIDs)
- Create the policy profiles(if non-default needed)
- Create the RF profiles(if non-default needed)
- Create the Site profile (if non-default needed)

2. Creation of Tags

- Create the Policy tag(if non-default needed)and map the SSIDs above to the policy profiles as required
- Create the RF Tag (if non-default needed) and add the RF profiles for 11a and 11b to it
- Create the Site tag(if non-default needed) and add the Flex profile (if site is a remote site) and the AP join profile(most cases will use the default)

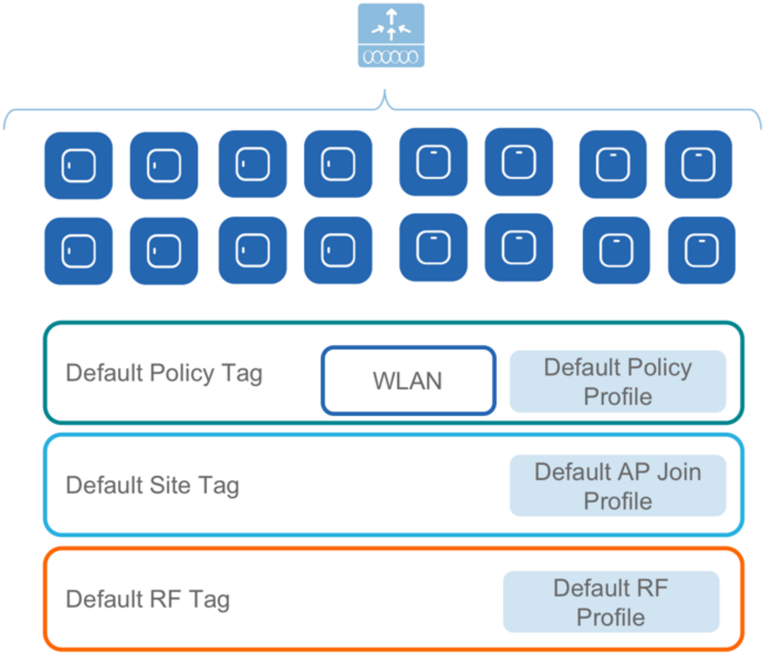
3. **Associate the Tags to APs**

If no custom tags are needed, this step is not required as default tags are associated with the APs
If the tag to be associated is non-default, associate the tags to the APs

- Associate RF Tag to the AP/set of APs
- Associate Policy Tag to the AP/set of APs
- Associate Site Tag to the AP/ set of APs

Use Case 1 - Global SSID(s) across the campus

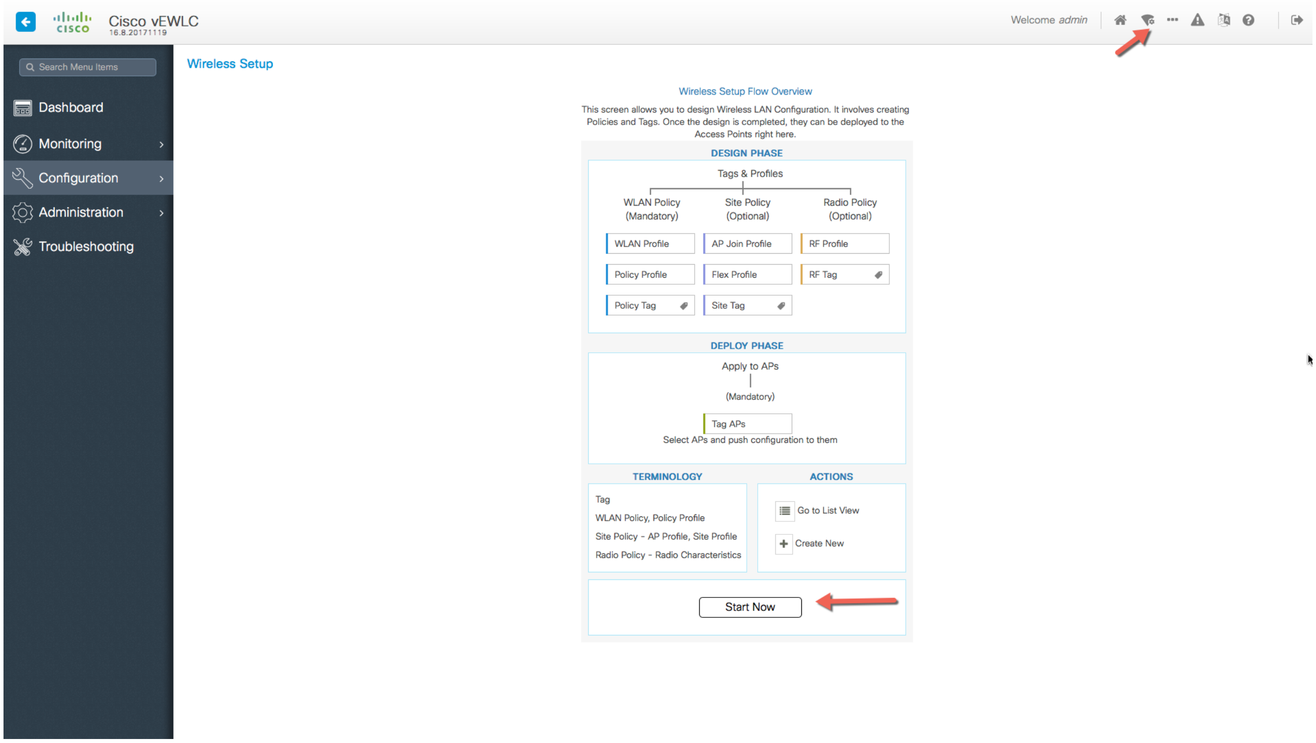
This is a simple use-case where an enterprise has the requirement of setting up an 802.1x, IOT or Guest SSID across the campus such that it is broadcasted on all access points across the deployment. The same policies and RF characteristics are applicable to all APs that are part of this global site. This section explains how that can be achieved using the Advanced Wireless Setup workflow



Central site – Default config with minimal changes

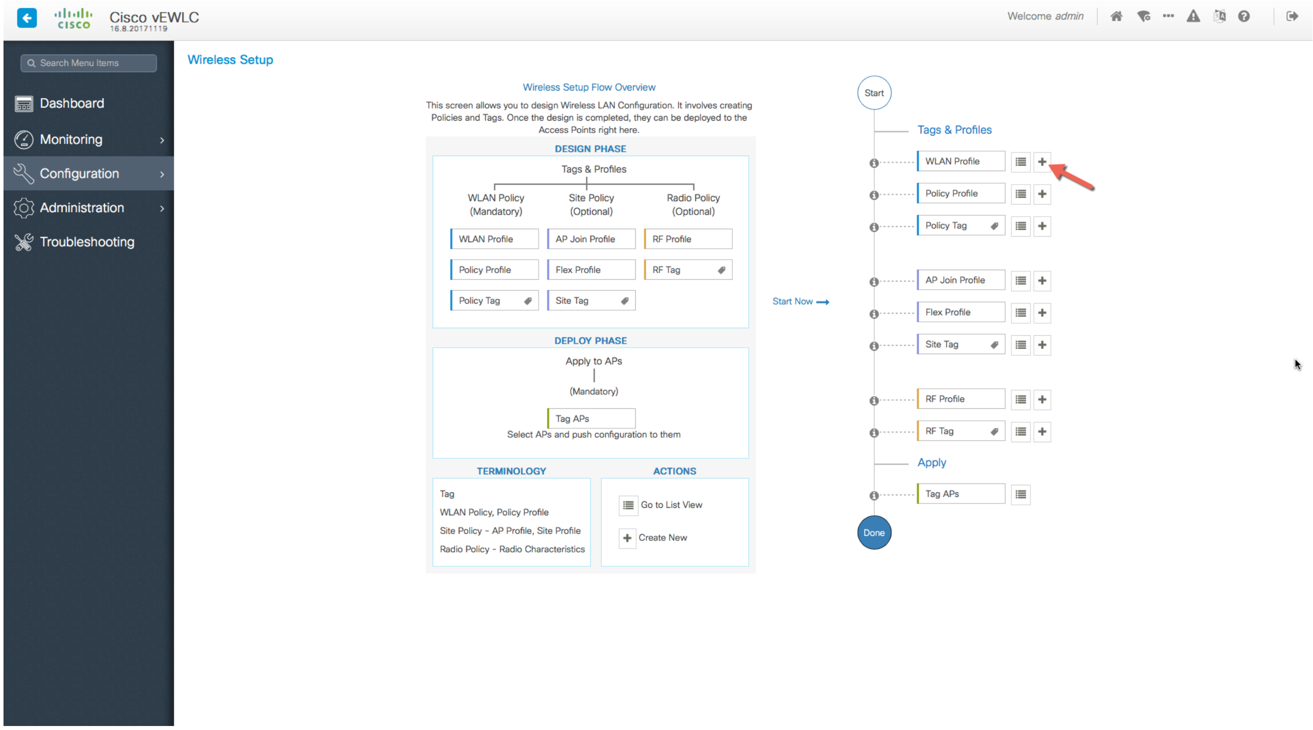
1. Create SSIDs [WLAN ID between 1-16]

    1. Click on the Wireless Setup button on the top right hand menu of the dashboard and click on Start Now after reviewing the notes on this page. The flow chart describes the set of steps in the general workflow of the Cisco Catalyst 9800 Wireless Controller configuration.



This screen allows you to design Wireless LAN Configuration. It involves creating Policies and Tags. Once the design is completed, they can be deployed to the Access Points right here.

    2. Begin the WLAN configuration by clicking the '+' sign next to WLAN Profile

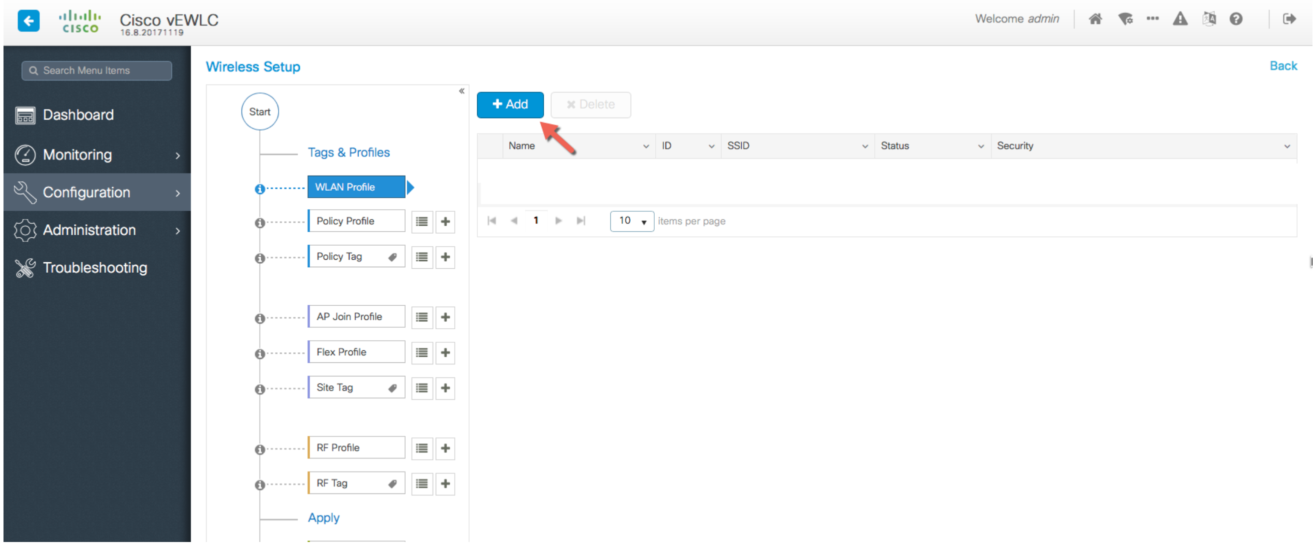


This screen allows you to design Wireless LAN Configuration. It involves creating Policies and Tags. Once the design is completed, they can be deployed to the Access Points right here.

Select APs and push configuration to them

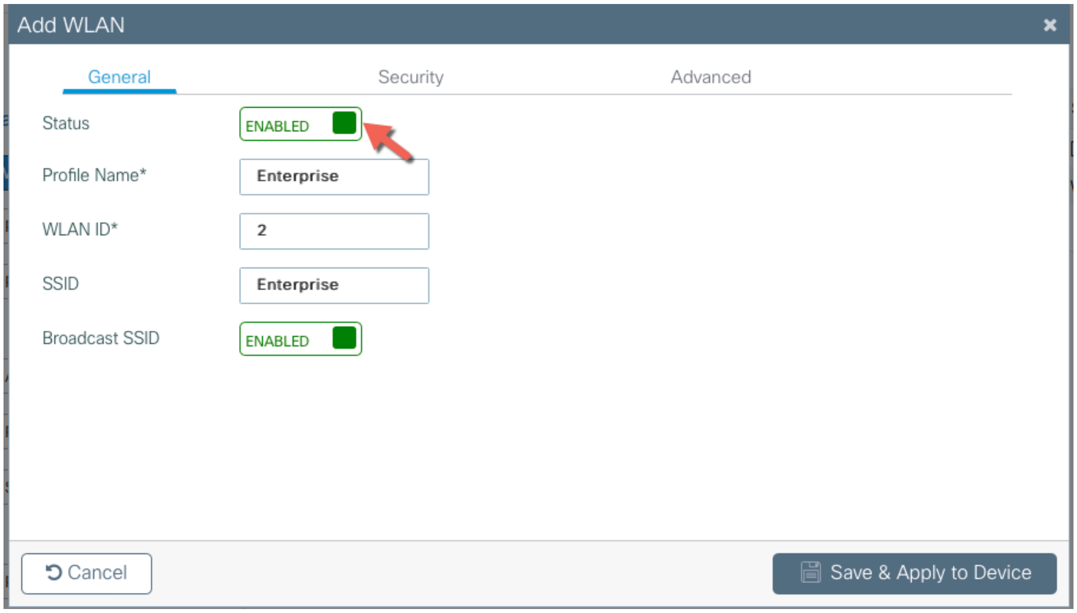
Tag
WLAN Policy, Policy Profile
Site Policy - AP Profile, Site Profile
Radio Policy - Radio Characteristics

3. Click on Add button



Note: SSIDs created during the Day 0 flow will automatically show up here on the WLAN profiles page

4. Specify the Profile Name of your choice, WLAN ID 1 – 16 and set the Status toggle button to Enabled.



Add WLAN

General | Security | Advanced

Status: ENABLED

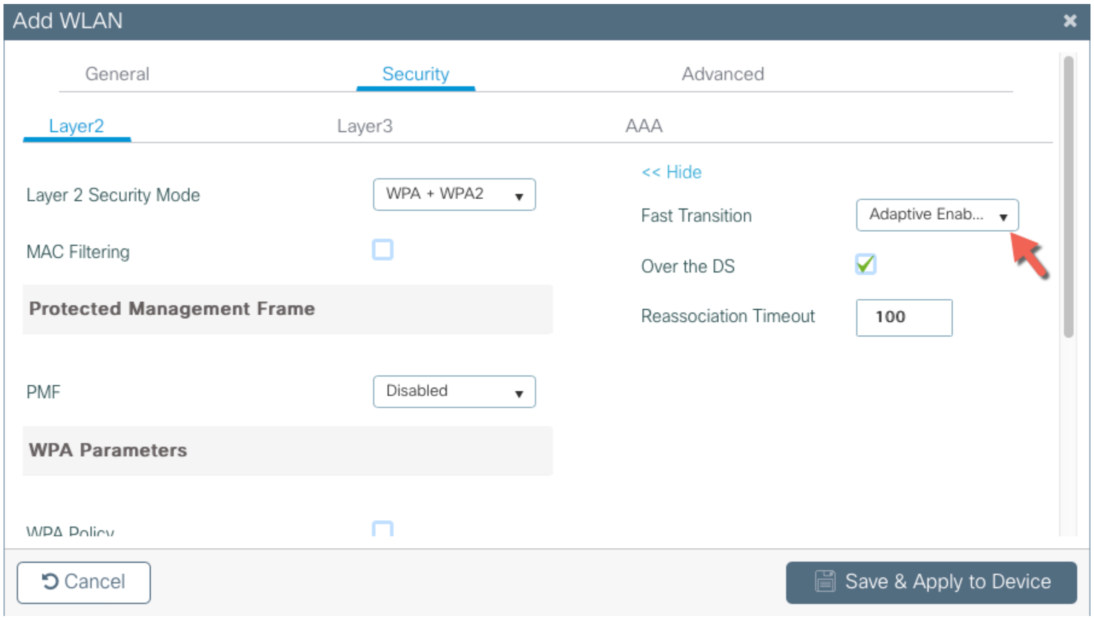
Profile Name*: Enterprise

WLAN ID*: 2

SSID: Enterprise

Broadcast SSID: ENABLED

Adaptive 11r and other best practices are turned on by default



Add WLAN

General | Security | Advanced

Layer2 | Layer3 | AAA

Layer 2 Security Mode: WPA + WPA2

MAC Filtering: □

Protected Management Frame

PMF: Disabled

WPA Parameters

WPA Policy: □

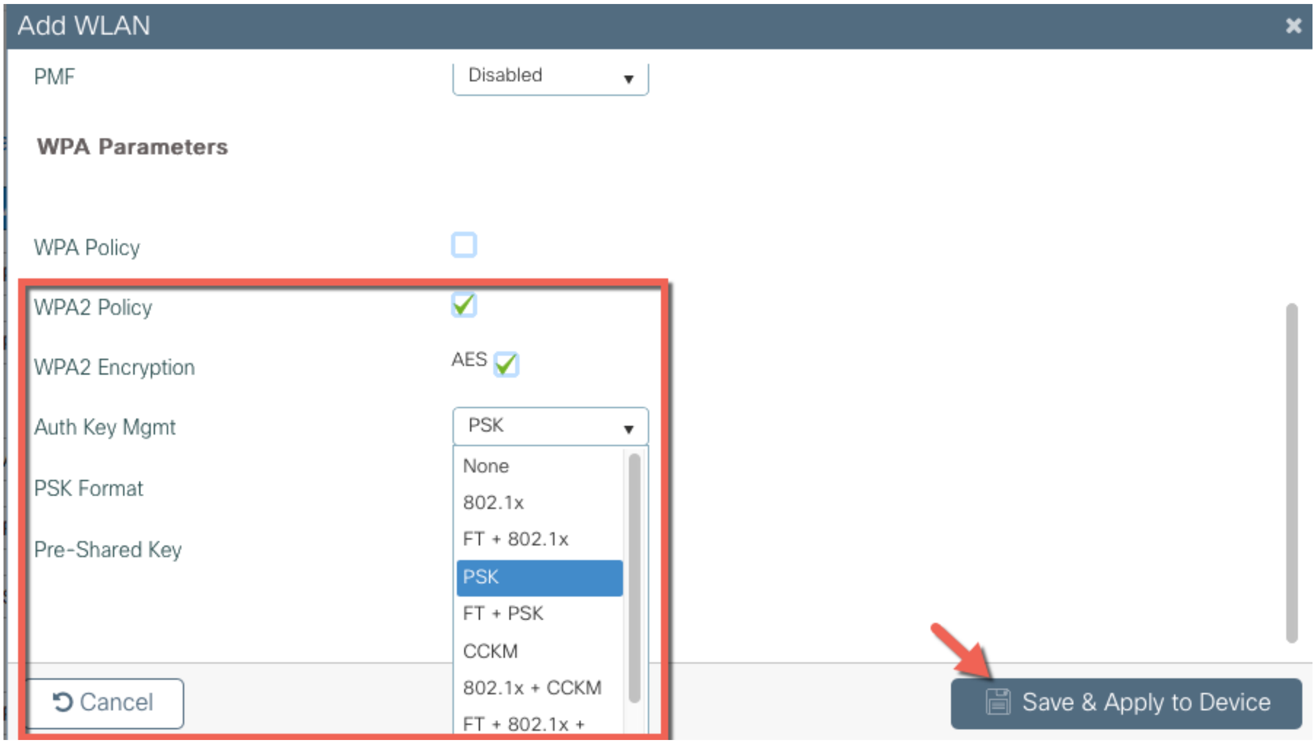
<< Hide

Fast Transition: Adaptive Enab...

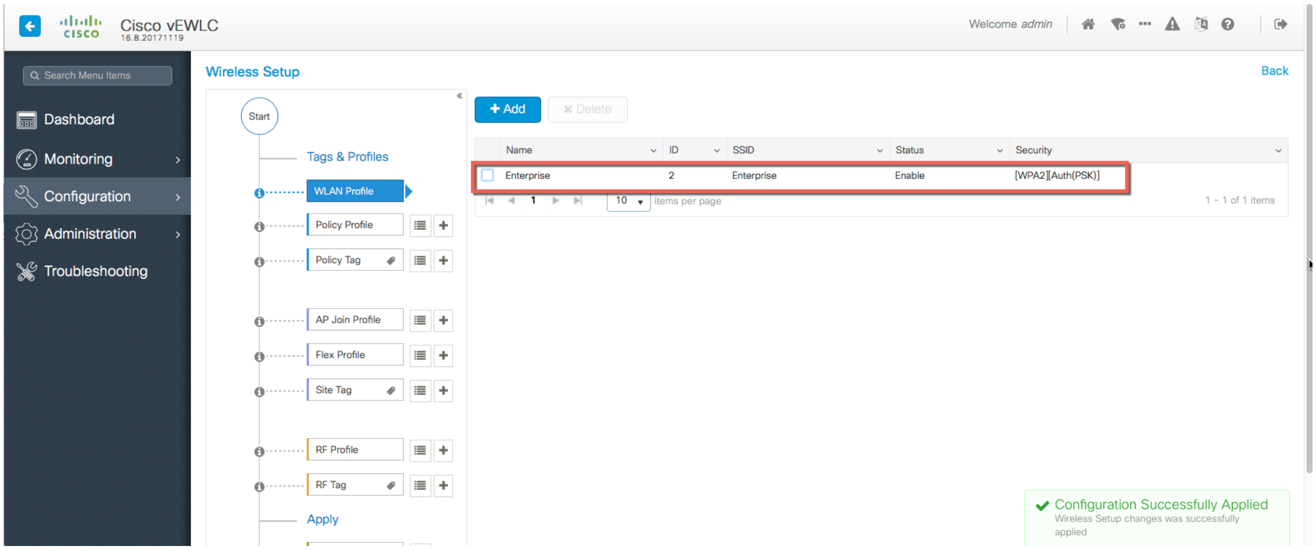
Over the DS: ☑

Reassociation Timeout: 100

5. Select PSK or 802.1x as the Authentication Key Management (AKM) under the security tab .Save and Apply to device.



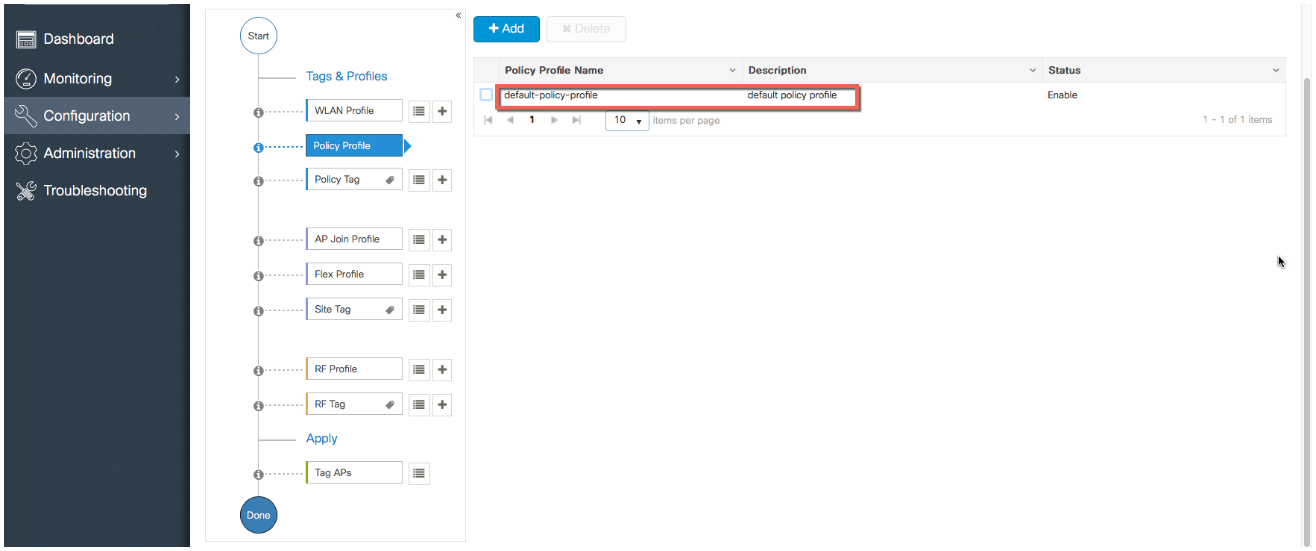
Verify that a WLAN profile is created as follows



	Name	ID	SSID	Status	Security
□	Enterprise	2	Enterprise	Enable	[WPA2][Auth(PSK)]

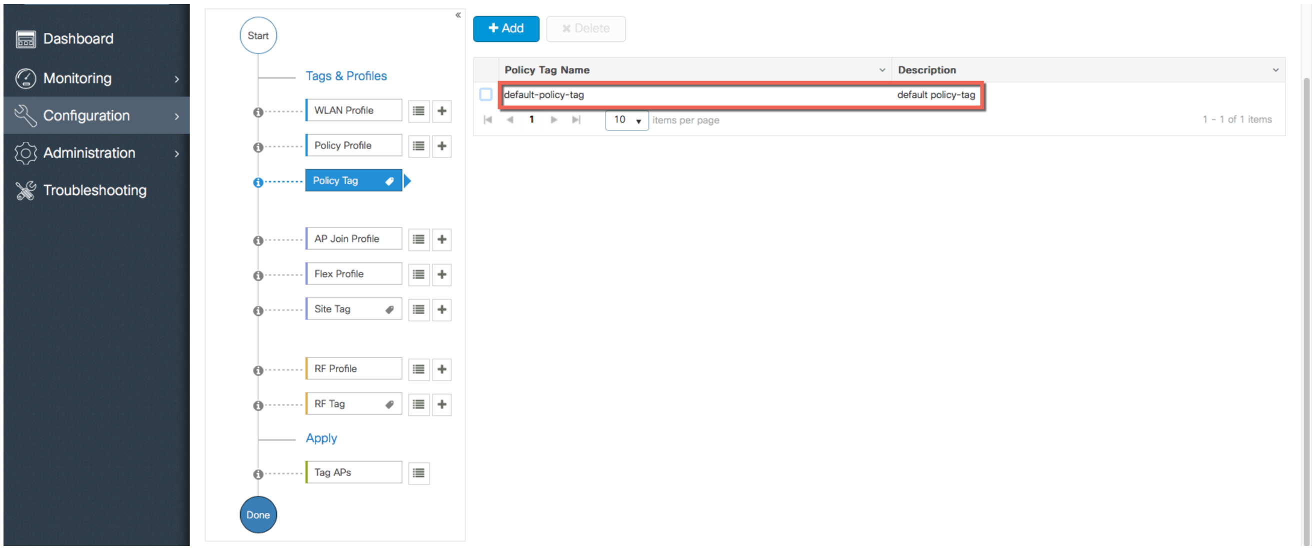
✓ Configuration Successfully Applied
Wireless Setup changes was successfully applied

2. A Default Policy Profile and Default Policy Tag are pre-configured so no specific policy configuration is required. By default, WLAN IDs 1-16 are associated with the default policy tag



	Policy Profile Name	Description	Status
□	default-policy-profile	default policy profile	Enable

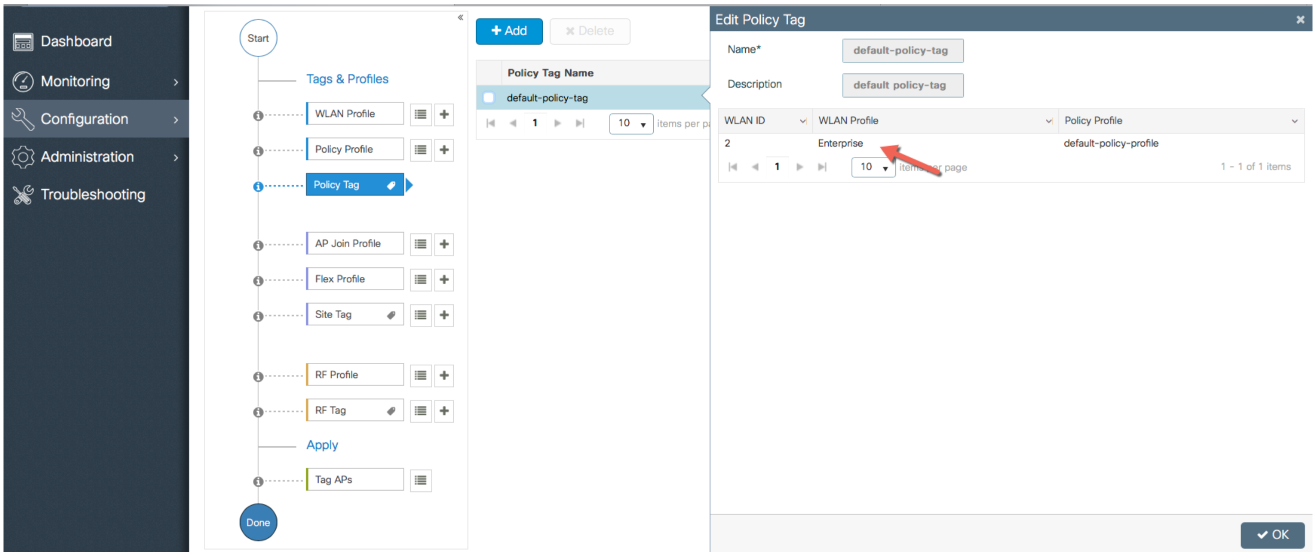
1 10 items per page 1 - 1 of 1 items



	Policy Tag Name	Description
□	default-policy-tag	default policy-tag

1 10 items per page 1 - 1 of 1 items

The SSID created in the first step is automatically added to this Default Policy Tag as shown below



Policy Tag Name
default-policy-tag

10 items per page

Edit Policy Tag

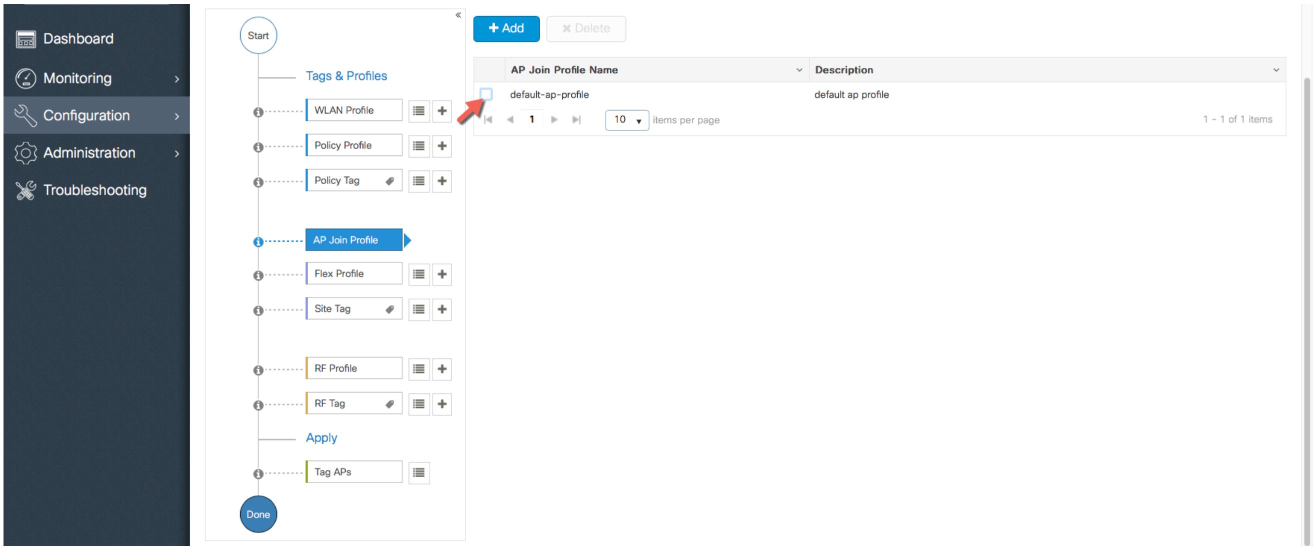
Name* default-policy-tag

Description default policy-tag

WLAN ID	WLAN Profile	Policy Profile
2	Enterprise	default-policy-profile

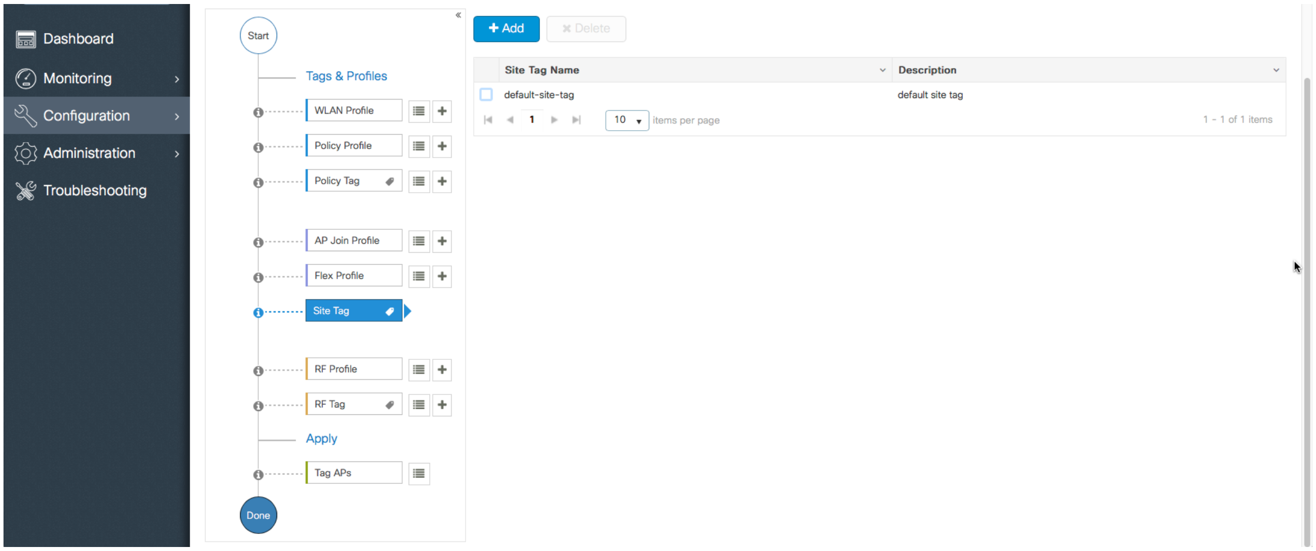
10 items per page 1 - 1 of 1 items

3. A Default AP Join Profile and Site Tag is available automatically so no specific site configuration is required



AP Join Profile Name	Description
default-ap-profile	default ap profile

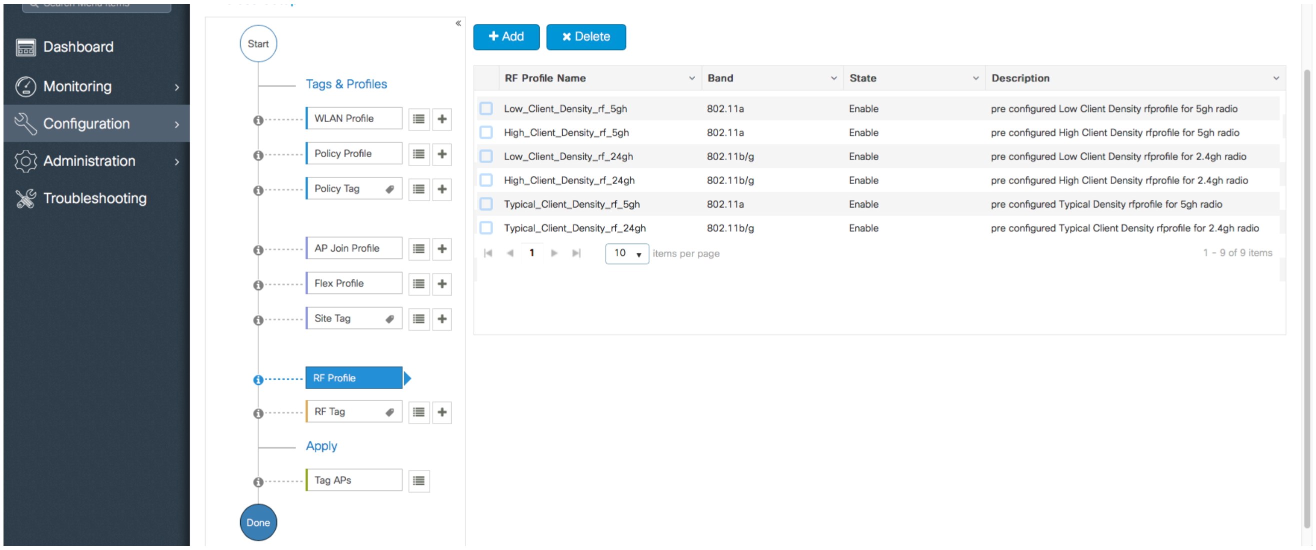
10 items per page 1 - 1 of 1 items



Site Tag Name	Description
default-site-tag	default site tag

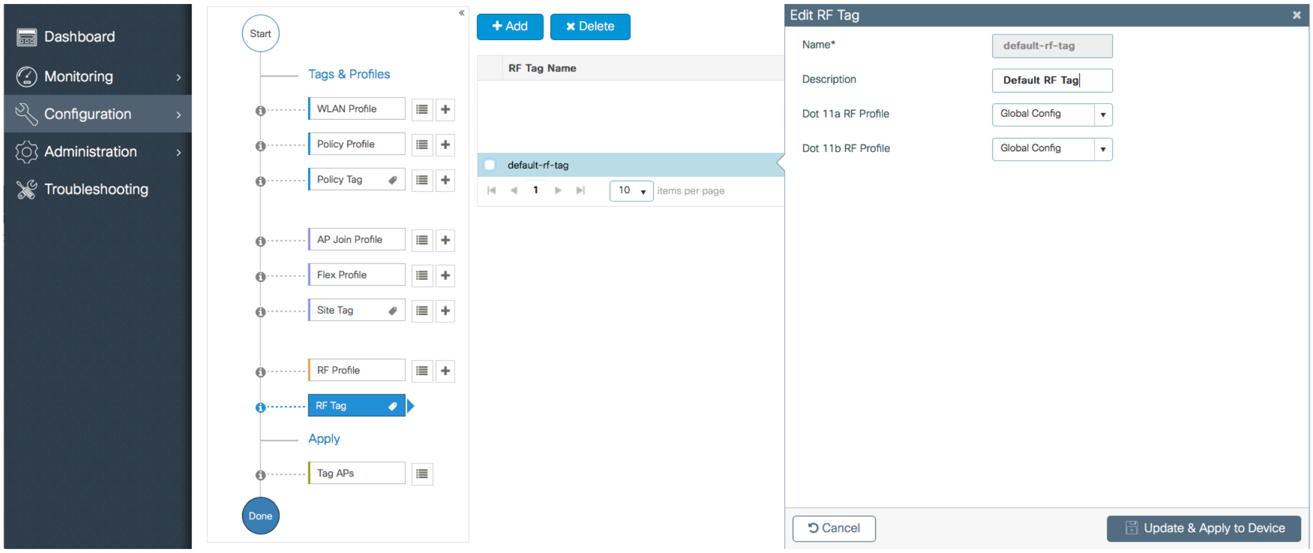
10 items per page 1 - 1 of 1 items

4. A Default RF Profiles and RF Tag is pre-configured so no RF configuration is required



RF Profile Name	Band	State	Description
Low_Client_Density_rf_5gh	802.11a	Enable	pre configured Low Client Density rfprofile for 5gh radio
High_Client_Density_rf_5gh	802.11a	Enable	pre configured High Client Density rfprofile for 5gh radio
Low_Client_Density_rf_24gh	802.11b/g	Enable	pre configured Low Client Density rfprofile for 2.4gh radio
High_Client_Density_rf_24gh	802.11b/g	Enable	pre configured High Client Density rfprofile for 2.4gh radio
Typical_Client_Density_rf_5gh	802.11a	Enable	pre configured Typical Density rfprofile for 5gh radio
Typical_Client_Density_rf_24gh	802.11b/g	Enable	pre configured Typical Client Density rfprofile for 2.4gh radio

10 items per page 1 - 9 of 9 items



default-rf-tag

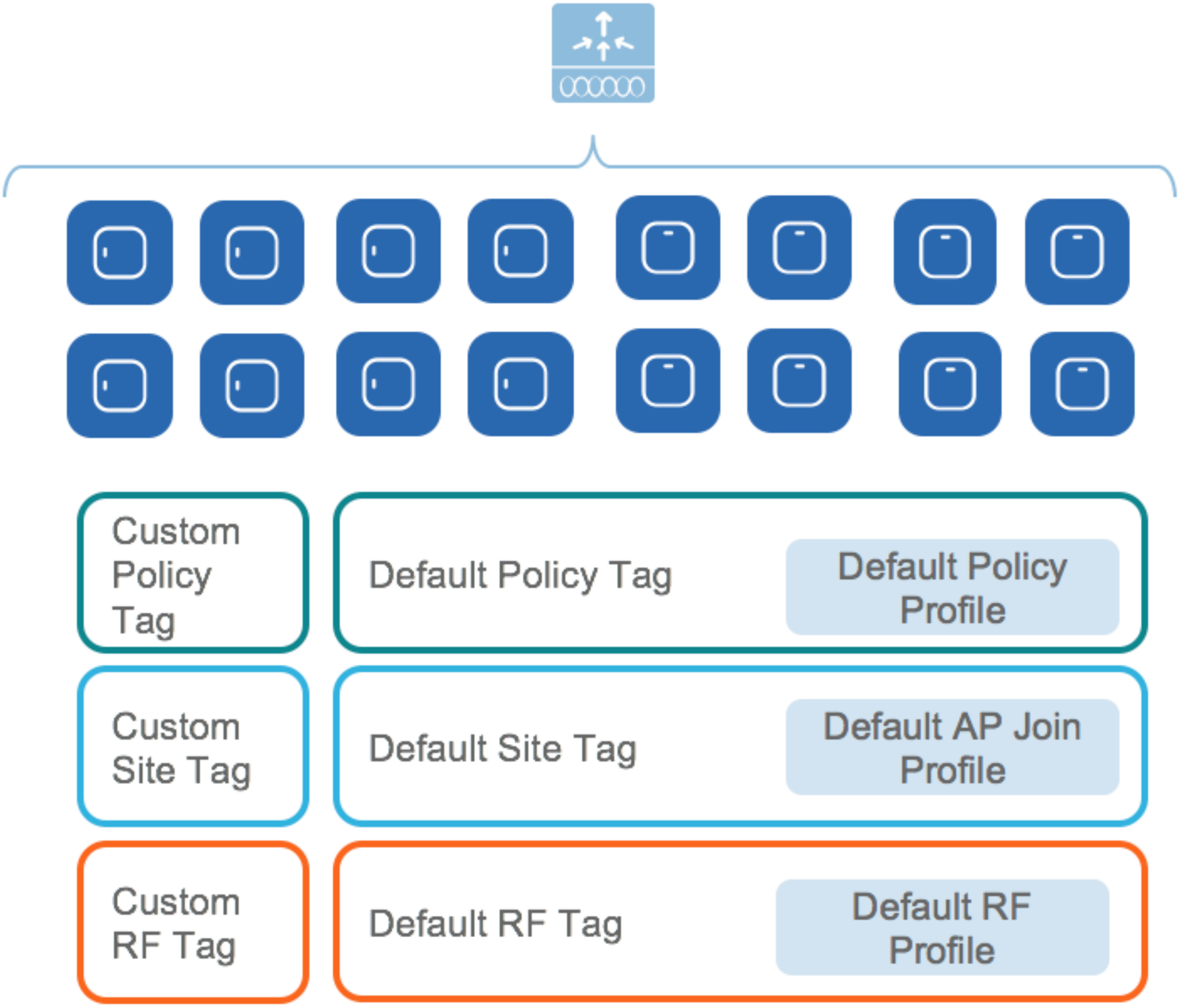
Edit RF Tag

Name*	default-rf-tag
Description	Default RF Tag
Dot 11a RF Profile	Global Config
Dot 11b RF Profile	Global Config

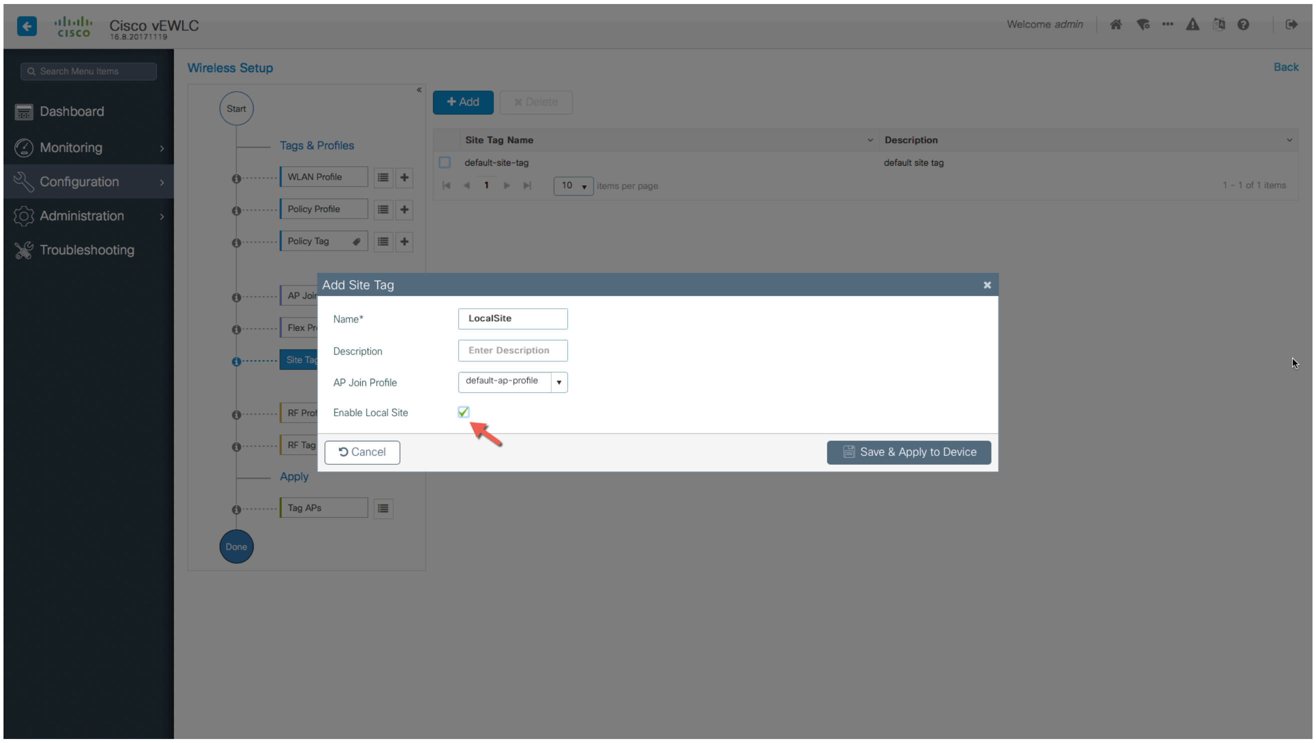
5. APs are tagged with the default policy, site and RF tags automatically so no explicit tagging is needed and the SSIDs will start broadcasting across the campus network

Use Case 2 – Local sites within a Campus

This use-case adds a local site to the campus deployment with custom SSIDs, Policies and RF characteristics. For example, a building in an enterprise campus that has the requirement to broadcast a custom SSID with a custom policy and has RF characteristics that are specific to a given site.



1. Create a custom Site Tag to tags APs belonging to this local site



Site Tag Name	Description
default-site-tag	default site tag

1 of 1 items · 10 items per page

Add Site Tag

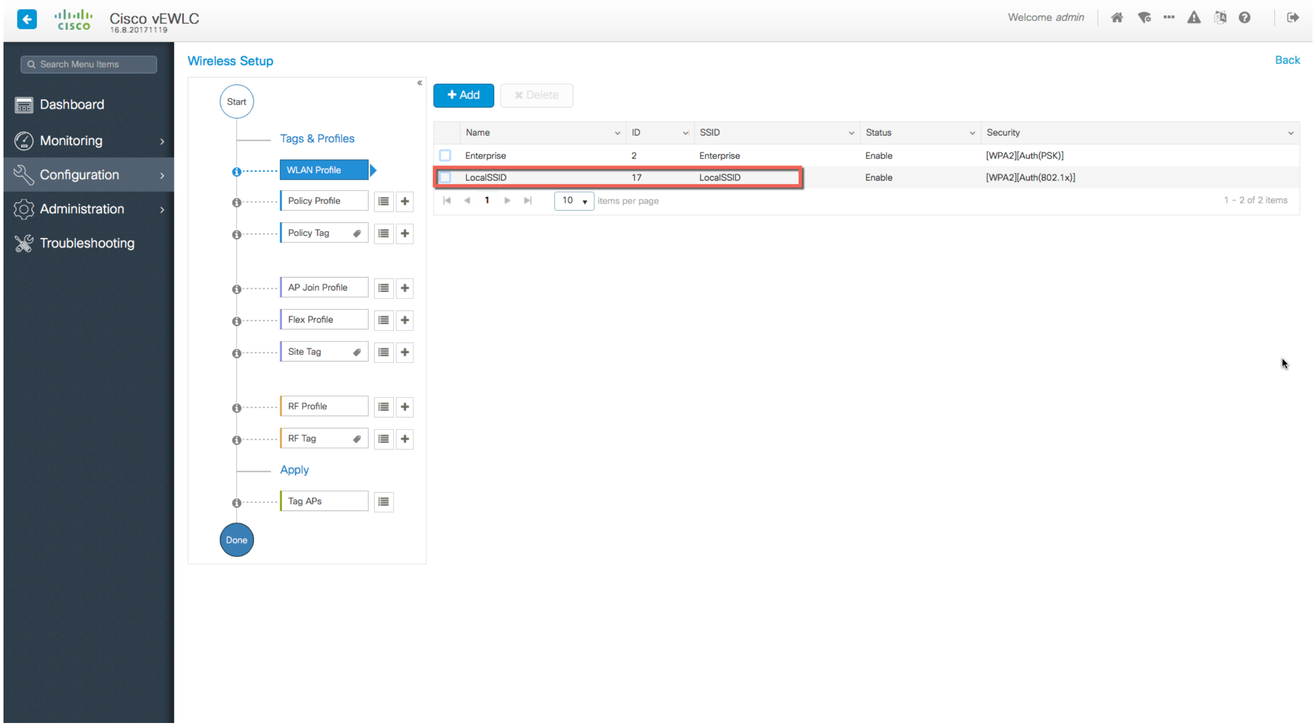
Name*: LocalSite

Description: Enter Description

AP Join Profile: default-ap-profile

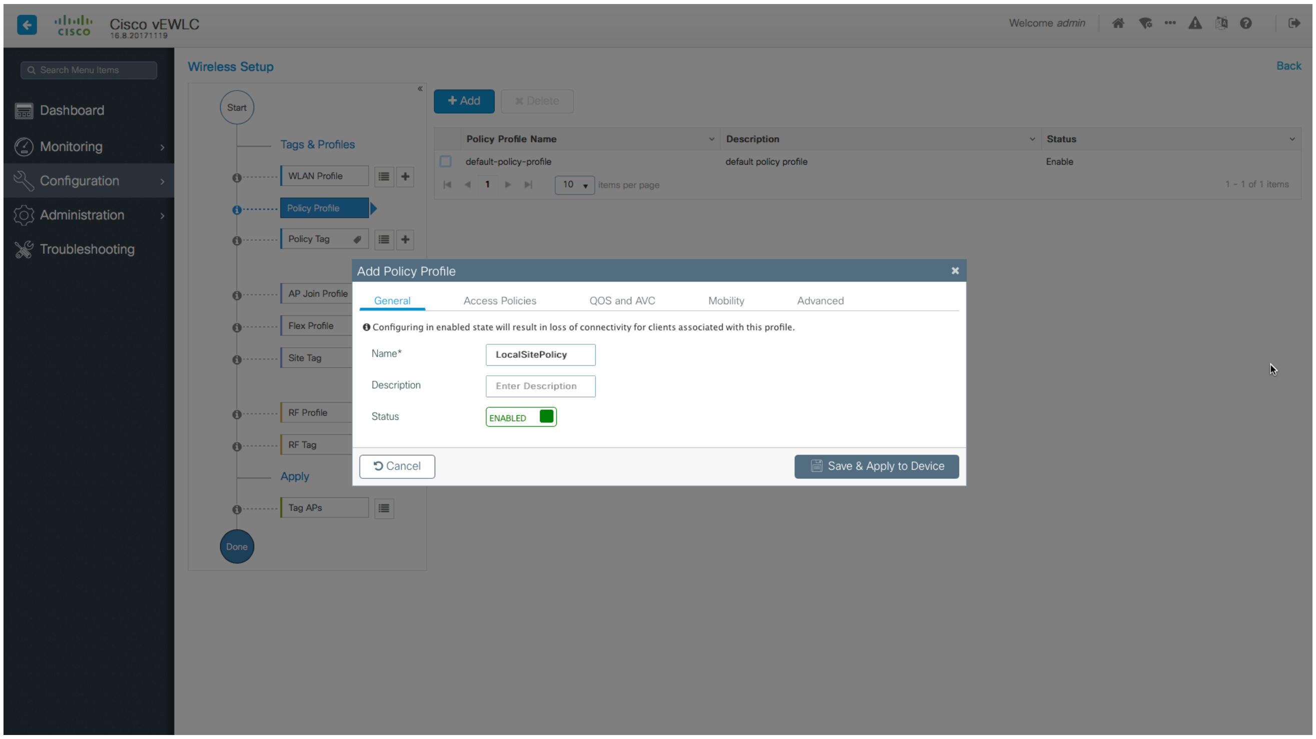
Enable Local Site: ☑

2. Creation of site-specific SSIDs and Policies for the Local site



Name	ID	SSID	Status	Security
Enterprise	2	Enterprise	Enable	[WPA2][Auth(PSK)]
LocalSSID	17	LocalSSID	Enable	[WPA2][Auth(802.1x)]

1 - 2 of 2 items · 10 items per page



Policy Profile Name	Description	Status
default-policy-profile	default policy profile	Enable

10 items per page — 1 - 1 of 1 items

Add Policy Profile

General | Access Policies | QOS and AVC | Mobility | Advanced

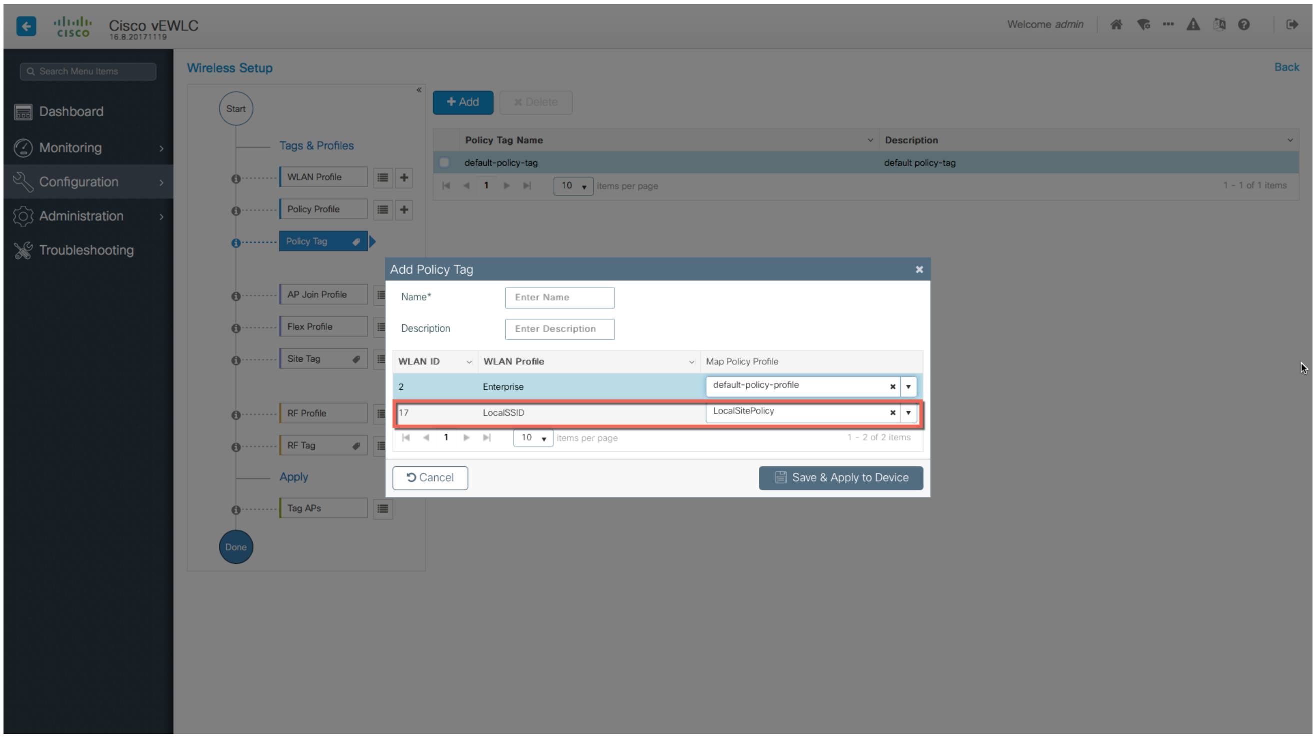
Configuring in enabled state will result in loss of connectivity for clients associated with this profile.

Name*: LocalSitePolicy

Description: Enter Description

Status: ENABLED

Cancel | Save & Apply to Device



Policy Tag Name	Description
default-policy-tag	default policy-tag

10 items per page — 1 - 1 of 1 items

Add Policy Tag

Name*: Enter Name

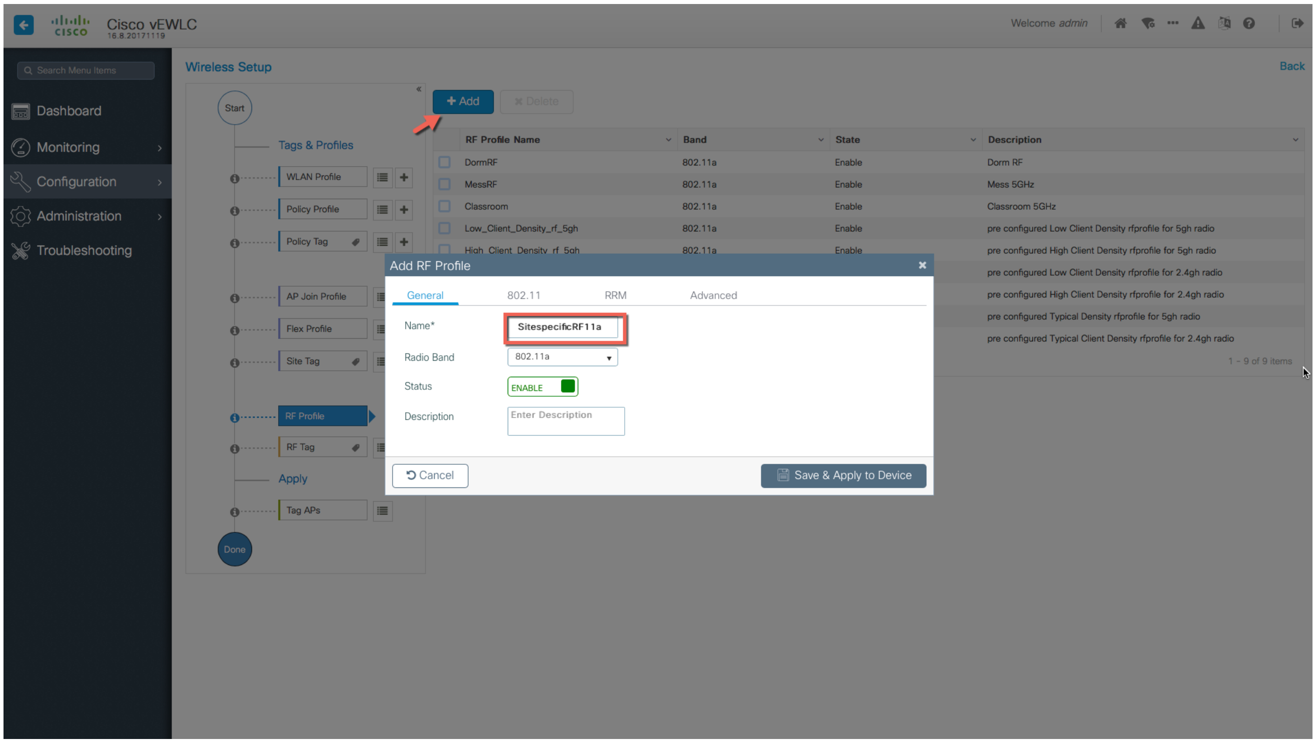
Description: Enter Description

WLAN ID	WLAN Profile	Map Policy Profile
2	Enterprise	default-policy-profile
17	LocalSSID	LocalSitePolicy

10 items per page — 1 - 2 of 2 items

Cancel | Save & Apply to Device

3. Creation of specific RF profile and tag for the local site



RF Profile Name	Band	State	Description
DormRF	802.11a	Enable	Dorm RF
MessRF	802.11a	Enable	Mess 5GHz
Classroom	802.11a	Enable	Classroom 5GHz
Low_Client_Density_rf_5gh	802.11a	Enable	pre configured Low Client Density rfprofile for 5gh radio
High_Client_Density_rf_5gh	802.11a	Enable	pre configured High Client Density rfprofile for 5gh radio
			pre configured Low Client Density rfprofile for 2.4gh radio
			pre configured High Client Density rfprofile for 2.4gh radio
			pre configured Typical Density rfprofile for 5gh radio
			pre configured Typical Client Density rfprofile for 2.4gh radio

1 – 9 of 9 items

Add RF Profile

General | 802.11 | RRM | Advanced

Name*: SitespecificRF11a

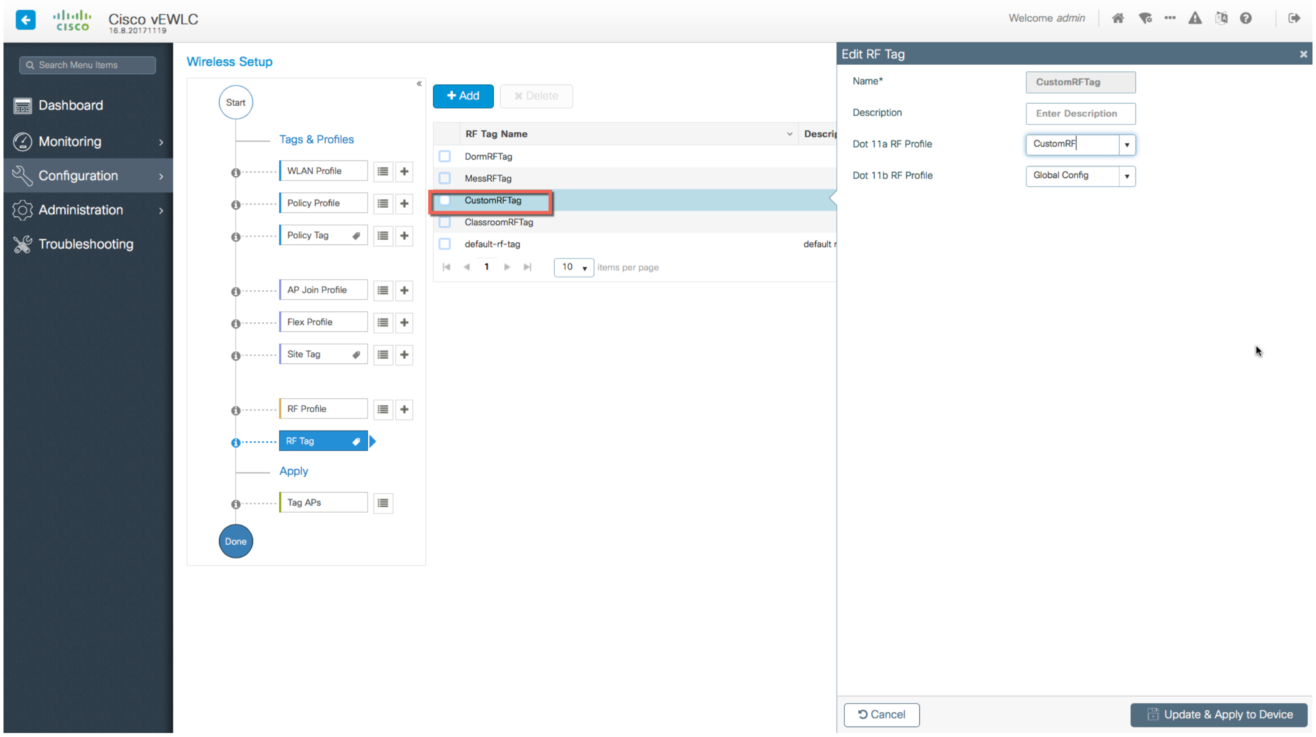
Radio Band: 802.11a

Status: ENABLE

Description: Enter Description

↺ Cancel

Save & Apply to Device



RF Tag Name	Descri
DormRFTag	
MessRFTag	
CustomRFTag	
ClassroomRFTag	
default-rf-tag	default r

1 | 10 items per page

Edit RF Tag

Name*: CustomRFTag

Description: Enter Description

Dot 11a RF Profile: CustomRF

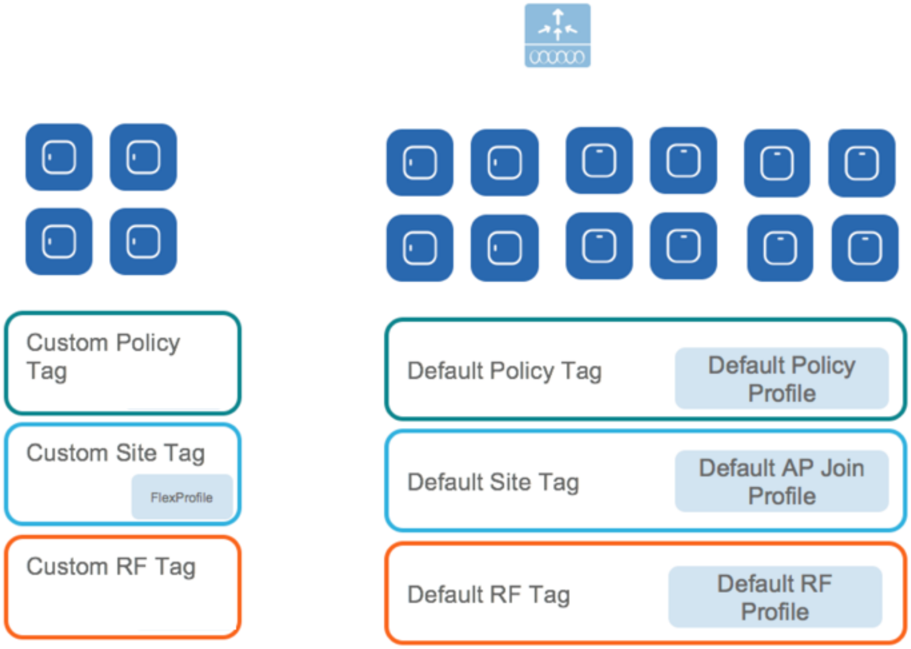
Dot 11b RF Profile: Global Config

↺ Cancel

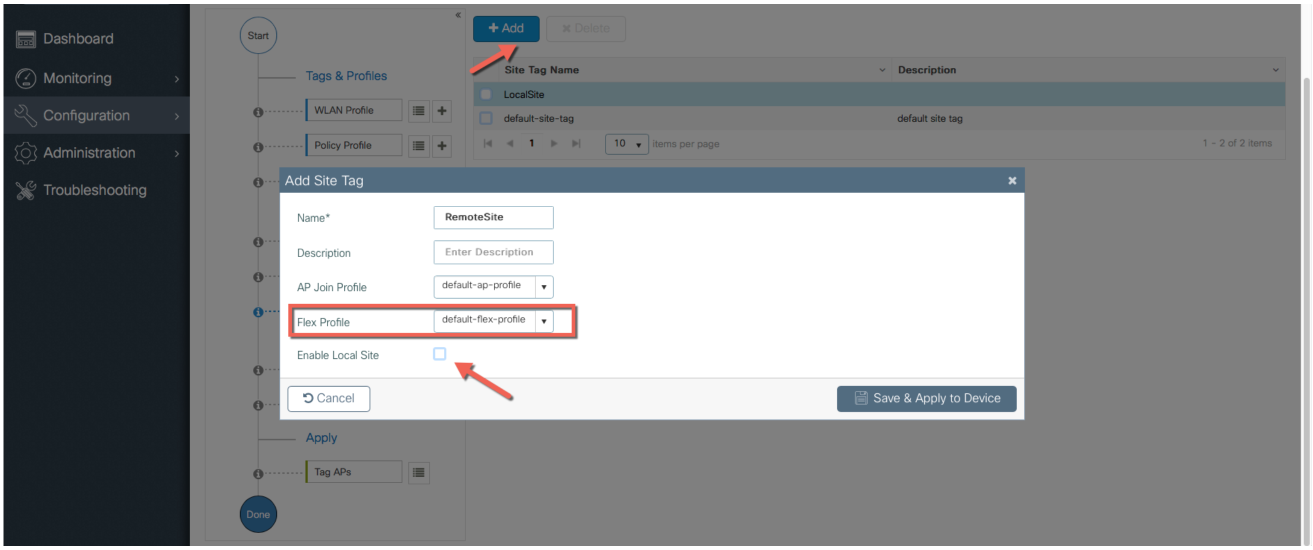
Update & Apply to Device

Use Case 3 – Remote sites across the WAN

1. Creation of Remote sites with site-specific SSIDs and RF



Simply creating another site Tag and unchecking the box "Local Site" to add a Flex Profile can add a remote site. An existing site can also be converted to a remote site with this simple action.



Site Tag Name	Description
LocalSite	
default-site-tag	default site tag

10 items per page 1 - 2 of 2 items

Add Site Tag

Name* RemoteSite

Description Enter Description

AP Join Profile default-ap-profile

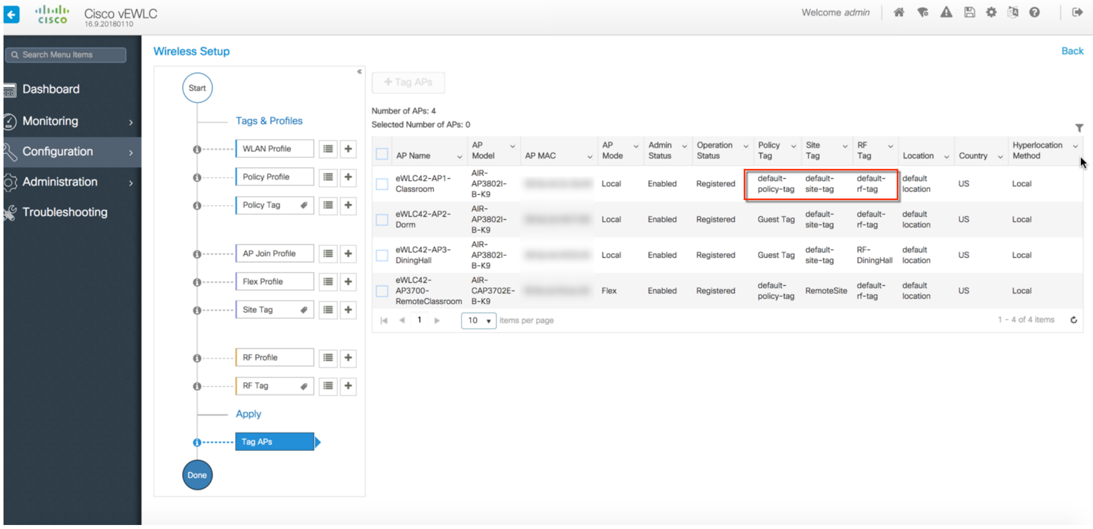
Flex Profile default-flex-profile

Enable Local Site □

2. The APs in the remote site now need to be Tagged with the RemoteSite Tag and with the Policy and RF Tag if non-default configuration is required. Once tagged with the remote site TAG, the AP s will be converted to FlexConnect mode dynamically.

Tagging APs with Tags

By Default, APs are tagged with the default policy tag, default site tag and default RF Tag

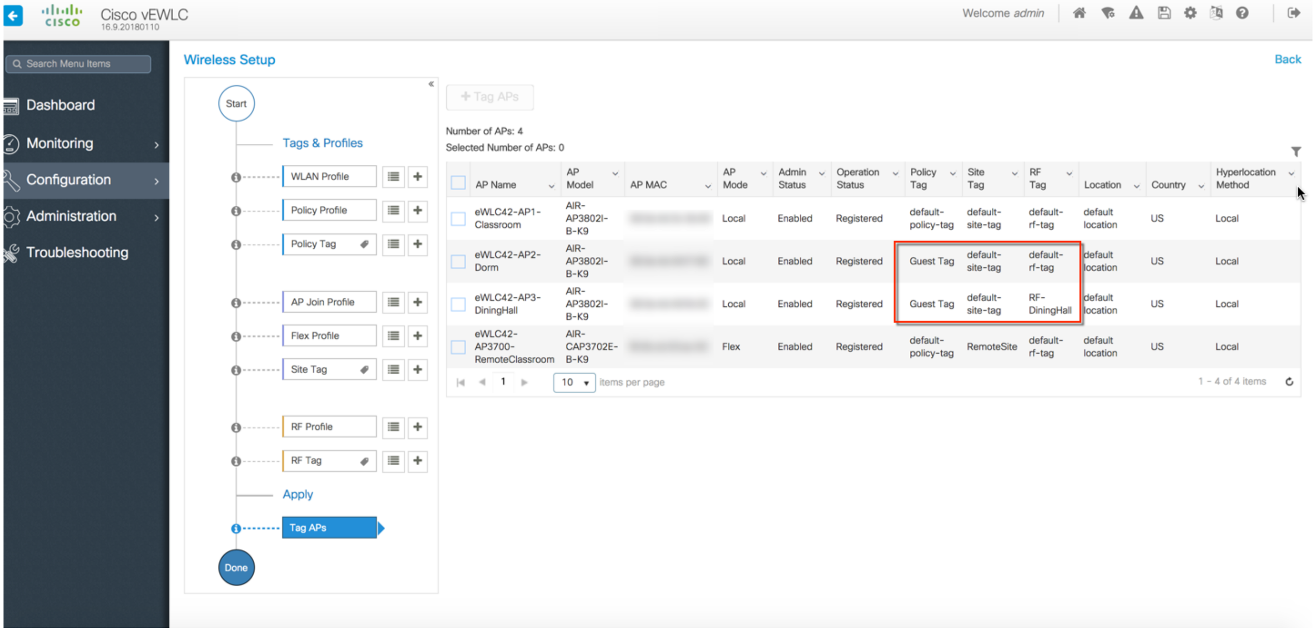


Number of APs: 4
Selected Number of APs: 0

	AP Name	AP Model	AP MAC	AP Mode	Admin Status	Operation Status	Policy Tag	Site Tag	RF Tag	Location	Country	Hyperlocation Method
□	eWLC42-AP1-Classroom	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	default-policy-tag	default-site-tag	default-rf-tag	default location	US	Local
□	eWLC42-AP2-Dorm	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	Guest Tag	default-site-tag	default-rf-tag	default location	US	Local
□	eWLC42-AP3-DiningHall	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	Guest Tag	default-site-tag	RF-DiningHall	default location	US	Local
□	eWLC42-AP3700-RemoteClassroom	AIR-CAP3702E-B-K9	[redacted]	Flex	Enabled	Registered	default-policy-tag	RemoteSite	default-rf-tag	default location	US	Local

1 10 items per page 1 - 4 of 4 items

Specific/custom Policy, site and RF Tags can be added to APs as shown below

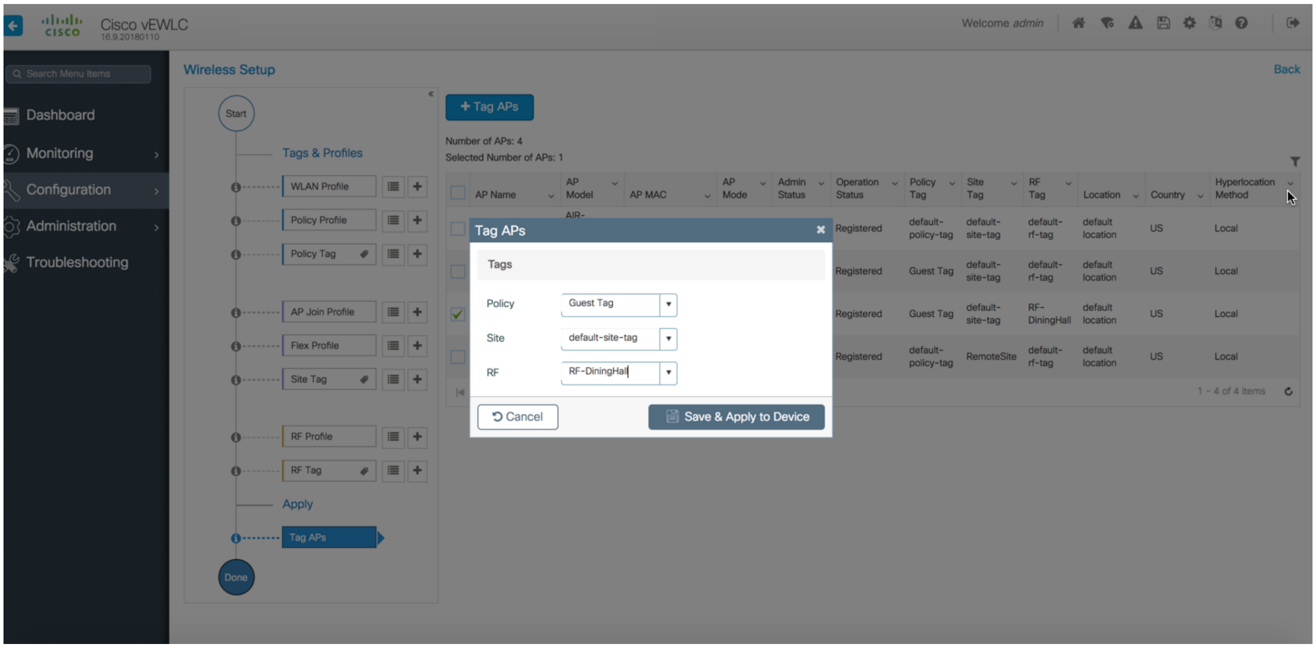


Number of APs: 4
Selected Number of APs: 0

	AP Name	AP Model	AP MAC	AP Mode	Admin Status	Operation Status	Policy Tag	Site Tag	RF Tag	Location	Country	Hyperlocation Method
□	eWLC42-AP1-Classroom	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	default-policy-tag	default-site-tag	default-rf-tag	default location	US	Local
□	eWLC42-AP2-Dorm	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	Guest Tag	default-site-tag	default-rf-tag	default location	US	Local
□	eWLC42-AP3-DiningHall	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	Guest Tag	default-site-tag	RF-DiningHall	default location	US	Local
□	eWLC42-AP3700-RemoteClassroom	AIR-CAP3702E-B-K9	[redacted]	Flex	Enabled	Registered	default-policy-tag	RemoteSite	default-rf-tag	default location	US	Local

1 10 items per page 1 - 4 of 4 items

In the example below a custom Policy tag for Guest SSID and a custom RF Tag is being added to an AP



Number of APs: 4
Selected Number of APs: 1

Operation Status	Policy Tag	Site Tag	RF Tag	Location	Country	Hyperlocation Method
Registered	default-policy-tag	default-site-tag	default-rf-tag	default location	US	Local
Registered	Guest Tag	default-site-tag	default-rf-tag	default location	US	Local
Registered	Guest Tag	default-site-tag	RF-DiningHall	default location	US	Local
Registered	default-policy-tag	RemoteSite	default-rf-tag	default location	US	Local

1 - 4 of 4 items

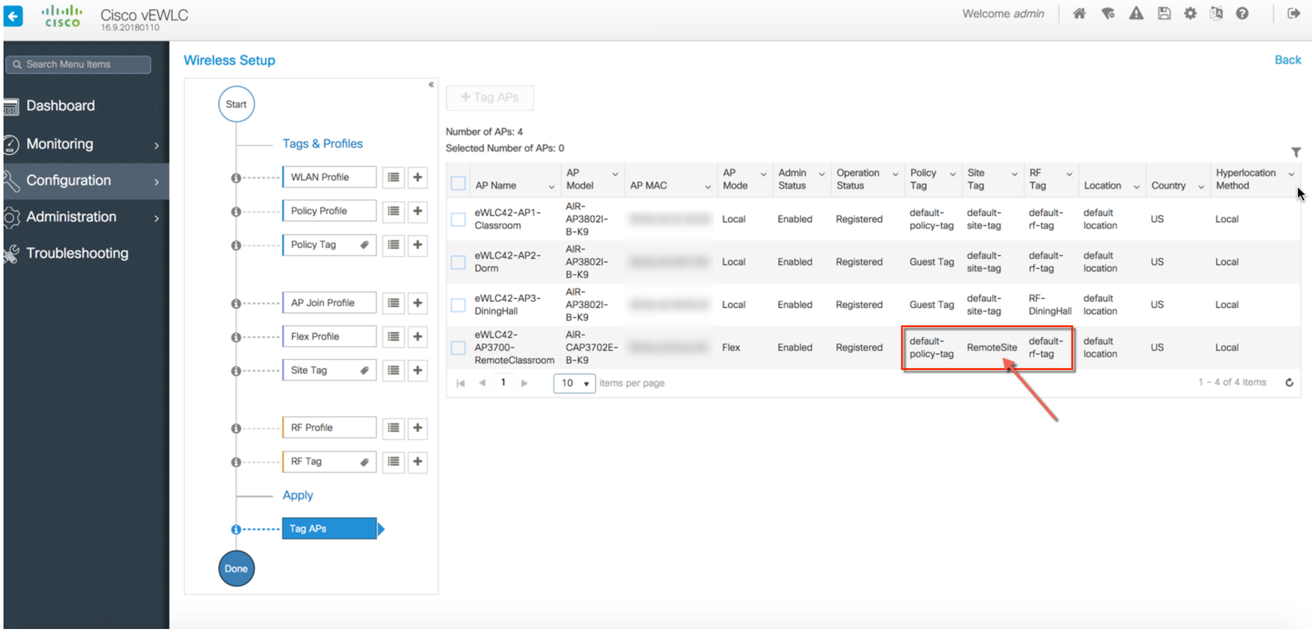
Tag APs

Tags

Policy: Guest Tag
Site: default-site-tag
RF: RF-DiningHall

Cancel | Save & Apply to Device

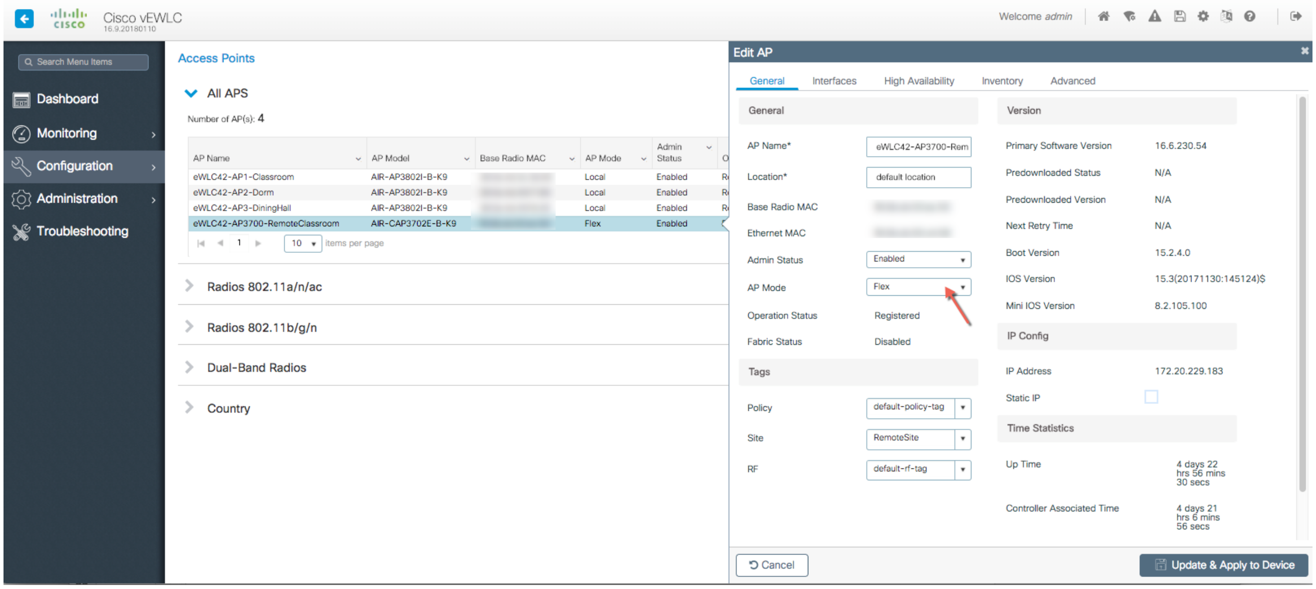
For remote sites, a site tag with a default/custom flex profile needs to be added



Number of APs: 4
Selected Number of APs: 0

AP Name	AP Model	AP MAC	AP Mode	Admin Status	Operation Status	Policy Tag	Site Tag	RF Tag	Location	Country	Hyperlocation Method
eWLC42-AP1-Classroom	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	default-policy-tag	default-site-tag	default-rf-tag	default location	US	Local
eWLC42-AP2-Dorm	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	Guest Tag	default-site-tag	default-rf-tag	default location	US	Local
eWLC42-AP3-DiningHall	AIR-AP3802I-B-K9	[redacted]	Local	Enabled	Registered	Guest Tag	default-site-tag	RF-DiningHall	default location	US	Local
eWLC42-AP3700-RemoteClassroom	AIR-CAP3702E-B-K9	[redacted]	Flex	Enabled	Registered	default-policy-tag	RemoteSite	default-rf-tag	default location	US	Local

1 | 10 items per page | 1 - 4 of 4 items



Access Points

All APS

Number of AP(s): 4

AP Name	AP Model	Base Radio MAC	AP Mode	Admin Status
eWLC42-AP1-Classroom	AIR-AP3802I-B-K9	[redacted]	Local	Enabled
eWLC42-AP2-Dorm	AIR-AP3802I-B-K9	[redacted]	Local	Enabled
eWLC42-AP3-DiningHall	AIR-AP3802I-B-K9	[redacted]	Local	Enabled
eWLC42-AP3700-RemoteClassroom	AIR-CAP3702E-B-K9	[redacted]	Flex	Enabled

1 | 10 items per page

Radios 802.11a/n/ac

Radios 802.11b/g/n

Dual-Band Radios

Country

Edit AP

General | Interfaces | High Availability | Inventory | Advanced

General

AP Name*	eWLC42-AP3700-Rem
Location*	default location
Base Radio MAC	[redacted]
Ethernet MAC	[redacted]
Admin Status	Enabled
AP Mode	Flex
Operation Status	Registered
Fabric Status	Disabled

Tags

Policy	default-policy-tag
Site	RemoteSite
RF	default-rf-tag

Version

Primary Software Version	16.6.230.54
Predownloaded Status	N/A
Predownloaded Version	N/A
Next Retry Time	N/A
Boot Version	15.2.4.0
IOS Version	15.3(20171130:145124)$
Mini IOS Version	8.2.105.100

IP Config

IP Address	172.20.229.183
Static IP	□

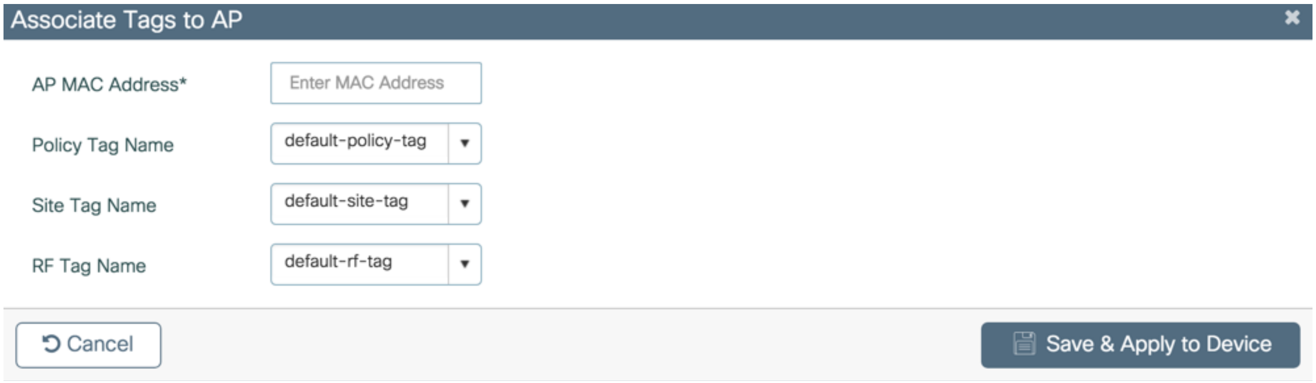
Time Statistics

Up Time	4 days 22 hrs 56 mins 30 secs
Controller Associated Time	4 days 21 hrs 6 mins 56 secs

Once tagged with the remote site TAG, the AP s will be converted to FlexConnect mode dynamically.

Static Tagging of APs

Optionally, APs can be tagged statically by specifying the MAC Address under **Configuration> Tags & Profiles> Tags**

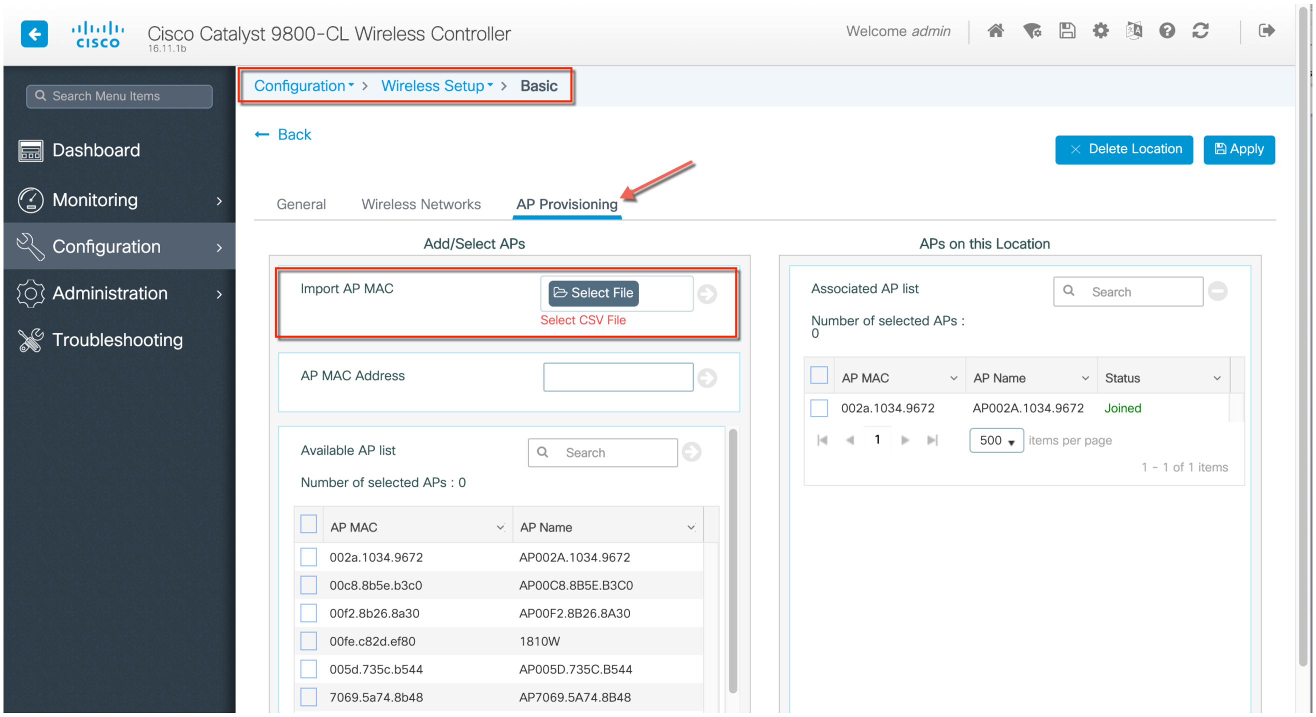


Associate Tags to AP

AP MAC Address*	Enter MAC Address
Policy Tag Name	default-policy-tag
Site Tag Name	default-site-tag
RF Tag Name	default-rf-tag

Static Tagging of APs using CSV file import

Static tagging of APs using a CSV file for MAC address import is available on the Wireless Basic > AP Provisioning Page

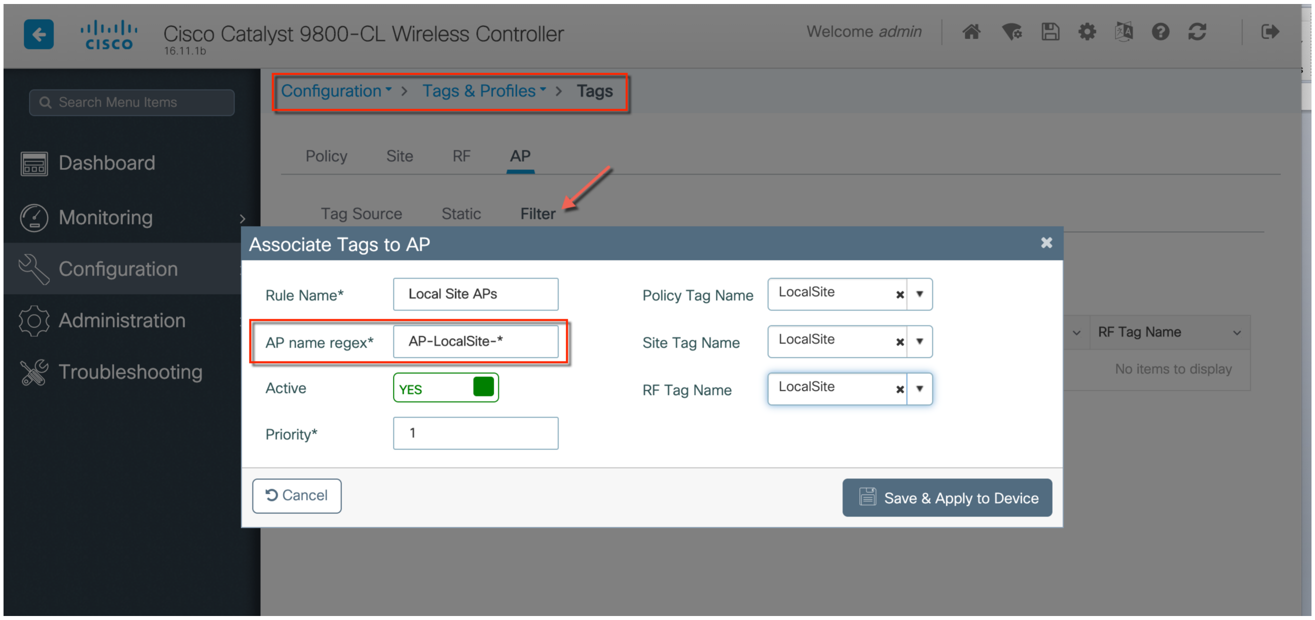


AP MAC	AP Name
002a.1034.9672	AP002A.1034.9672
00c8.8b5e.b3c0	AP00C8.8B5E.B3C0
00f2.8b26.8a30	AP00F2.8B26.8A30
00fe.c82d.ef80	1810W
005d.735c.b544	AP005D.735C.B544
7069.5a74.8b48	AP7069.5A74.8B48

AP MAC	AP Name	Status
002a.1034.9672	AP002A.1034.9672	Joined

Regular-expression Based rules for AP Tagging

Regular expression based rules can be configured to match on access point name and associate the appropriate policy, site and RF tags to access points.



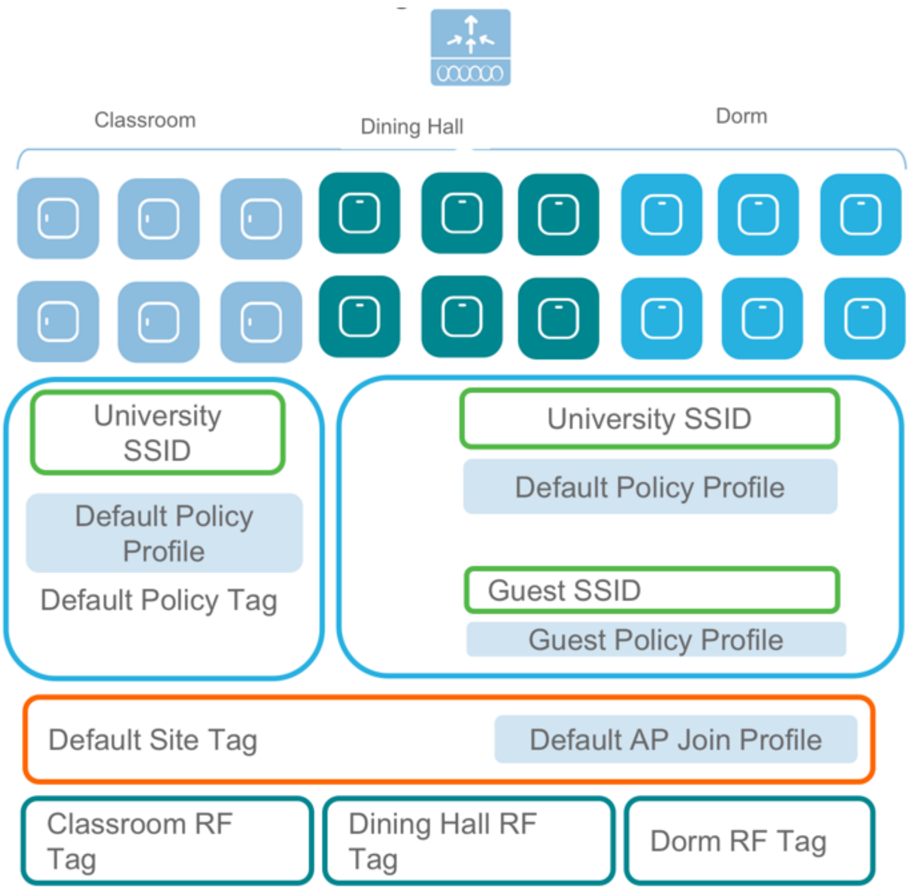
Rule Name*: Local Site APs
AP name regex*: AP-LocalSite-*
Active: YES
Priority*: 1
Policy Tag Name: LocalSite
Site Tag Name: LocalSite
RF Tag Name: LocalSite

Once the configuration is complete, the SSIDs start broadcasting and clients can now be connected.

Additional Use case Examples

More involved use-cases can also be achieved with the configuration model detail in this document.

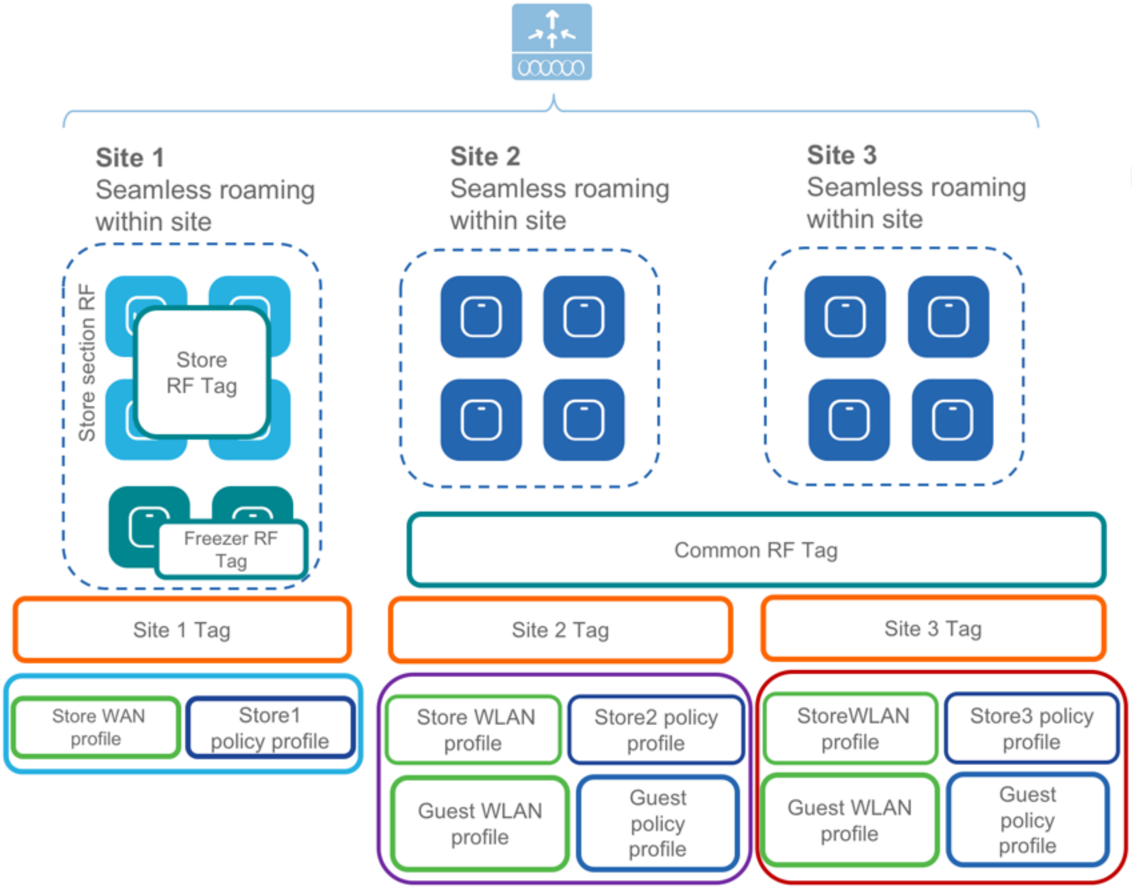
1. For example, a University Deployment with the following requirements can be deployed with profiles and tags as shown in the figure below:
2. Campus-wide University SSID for students and teachers
3. Dorms and Dining Halls to broadcast Guest SSID
4. Custom Guest policies for VLAN segregation
5. Custom RF characteristic of Dining Hall, classrooms and dorms



A multi-site retail deployment with the following requirements can be deployed with profiles and tags as shown in the figure below:

1. All sites should broadcast the same common SSID ‘Store’
2. All the sites should have same policies per SSID

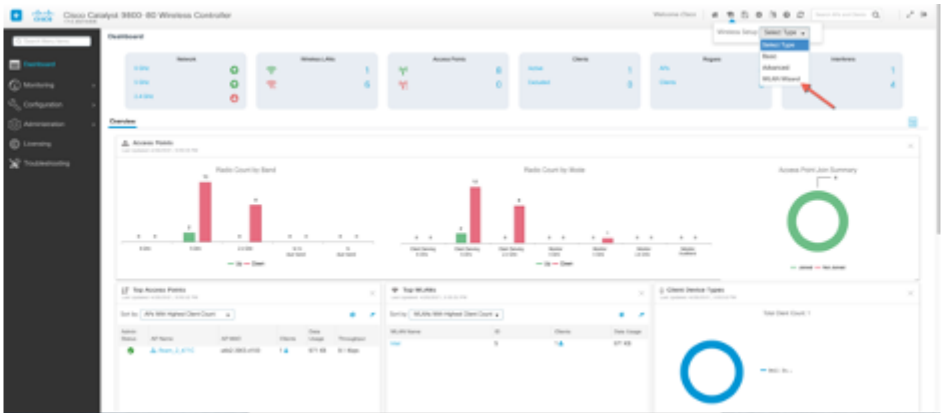
3. Roaming is expected per store/flex-grp
4. All sites should have the same Site parameters
5. APs near freezer needs to have a different RF policy
6. Site 2 and 3 have additionally ‘Guest’ SSIDs
7. Independent Per site parameters
8. The Common SSID need to have store-specific policies



Note: It is not recommended to mix and match basic with advanced workflow. When using the basic setup workflow for creating local and remote sites, corresponding policies and tags are created in the backend in accordance with the new configuration model. The tags and policies, thus, created shouldn't be modified using the advanced workflow.

WLAN Wizard Overview

With Cisco IOS XE 17.6 Release, a WLAN Wizard is available under the Wireless Setup icon. This wizard eases the process of creating WLANs for Local Mode, FlexConnect Mode and guest access by guiding the user in a step-by-step workflow.



The following WLAN types are supported through this wizard.

Local Mode

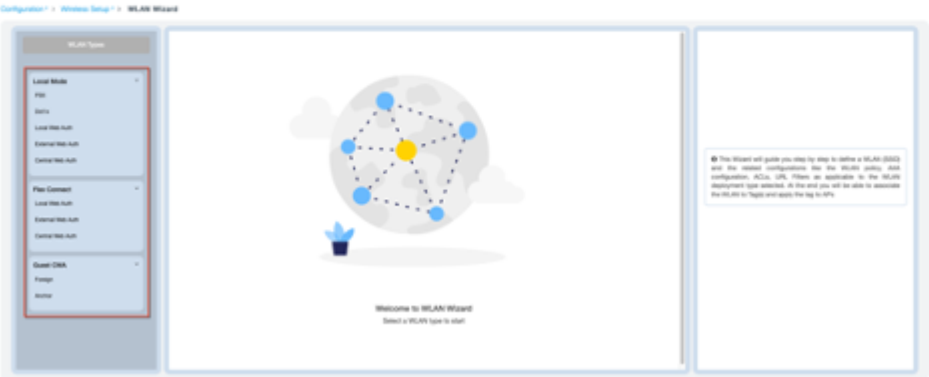
- PSK
- Dot1x
- Local Webauth
- External Webauth
- Central Web Auth

FlexConnect Mode

- Local Webauth
- External Webauth
- Central Web Auth

Guest CWA

- Foreign
- Anchor

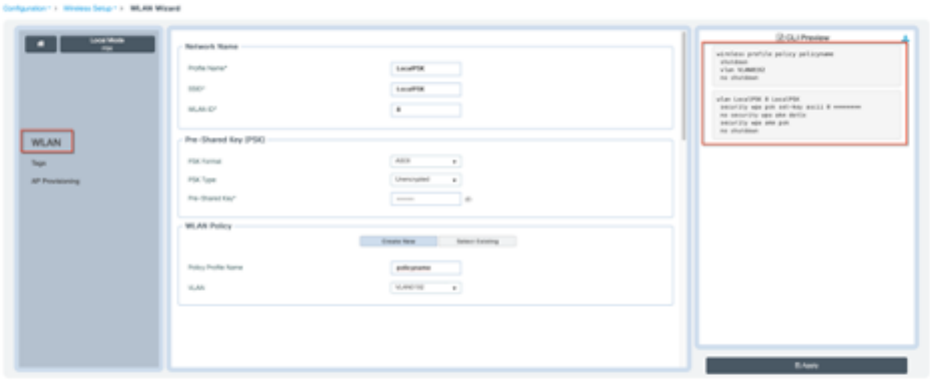


This Wizard will guide you step by step to define a WLAN (SSID) and the related configurations like the WLAN policy, AAA configuration, ACLs, URL Filters as applicable to the WLAN deployment type selected. At the end you will be able to associate the WLAN to Tag(s) and apply the tag to APs.

Creating a PSK SSID

The following section demonstrates the process of creating a PSK SSID in Local Mode using this wizard.

Step 1: Create the WLAN by specifying the Profile Name, SSID and PSK Pre-Shared key. Specify the WLAN Policy either by creating a new policy or selecting an existing policy.
As you can see on the right hand side, the CLI preview of the entered configuration is generated in real-time for reference.



Network Name

Profile Name*: LocalPSK
SSID*: LocalPSK
WLAN ID*: 8

Pre-Shared Key (PSK)

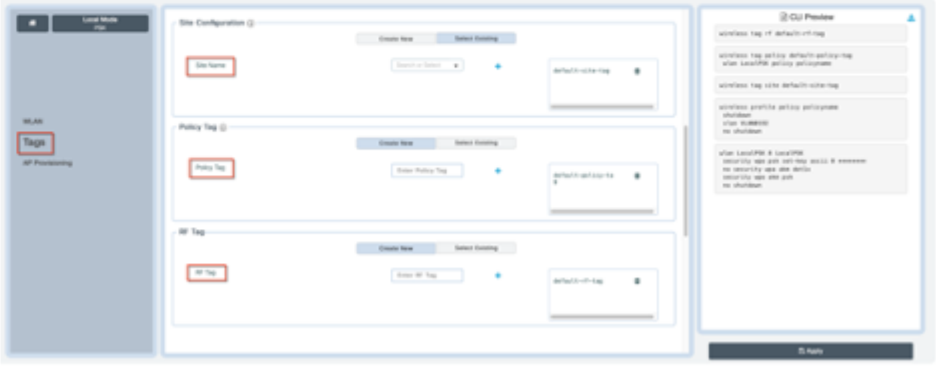
PSK Format: ASCII
PSK Type: Unencrypted
Pre-Shared Key*: ••••••

WLAN Policy

Policy Profile Name: policyname
VLAN: VLAN0102

```
wireless profile policy policyname
 shutdown
 vlan VLAN0102
 no shutdown

wlan LocalPSK 8 LocalPSK
 security wpa psk set-key ascii 0 ********
 no security wpa akm dot1x
 security wpa akm psk
 no shutdown
```

Step 2: Click on Tags and specify the Site Tag, Policy Tag and RF Tag either by creating new tags or selecting existing tags. Click on the blue '+' sign to enter the selection. Again, note the corresponding CLI commands that are auto-generated.

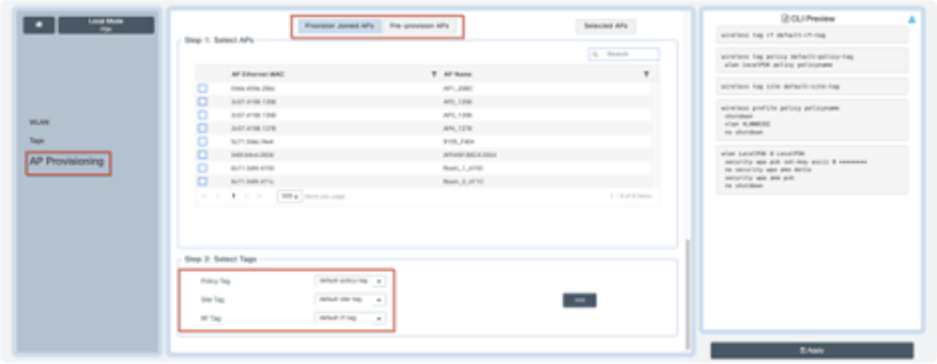


```
wireless tag rf default-rf-tag

wireless tag policy default-policy-tag
 wlan LocalPSK policy policyname

wireless tag site default-site-tag

wireless profile policy policyname
 shutdown
 vlan VLAN0102
 no shutdown

wlan LocalPSK 8 LocalPSK
 security wpa psk set-key ascii 0 ********
 no security wpa akm dot1x
 security wpa akm psk
 no shutdown
```

Step 3: Click on AP Provisioning to associate tags with APs. This can be done in two ways:

- Provision joined APs by selecting them from a list and associating the site, policy and RF tags.
- Pre-provision APs using MAC address or a CSV file before the APs join the controller.

Once done, Click Apply. And optionally, you can also download the CLI Preview file by clicking on the download icon on the CLI Preview box.

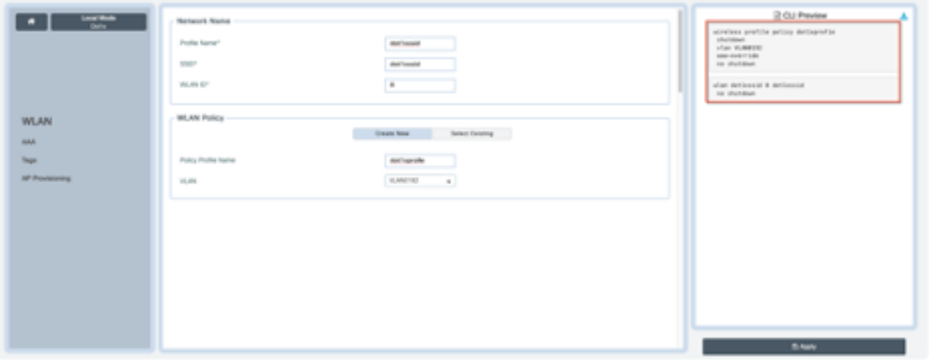


```
wireless tag rf default-rf-tag

wireless tag policy default-policy-tag
 wlan LocalPSK policy policyname

wireless tag site default-site-tag

wireless profile policy policyname
 shutdown
 vlan VLAN0102
 no shutdown

wlan LocalPSK 4 LocalPSK
 security wpa psk set-key ascii 0 ********
 no security wpa akm dot1x
 security wpa akm psk
 no shutdown
```

Creating a DOT1X SSID

The following section demonstrates the process of creating a Dot1x SSID in Local Mode using this wizard.

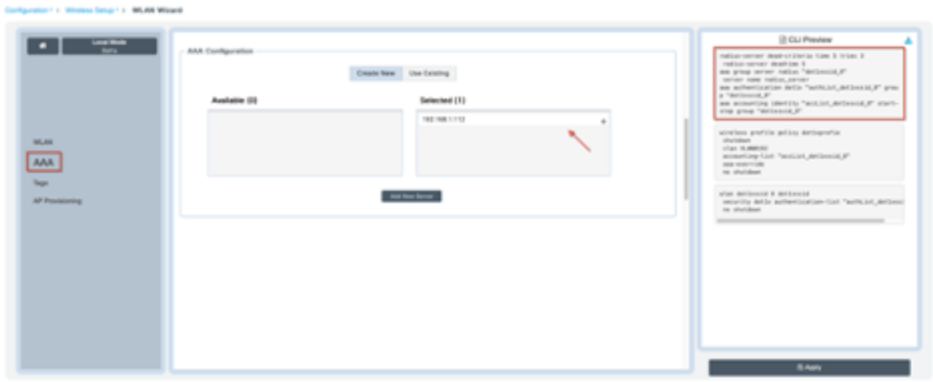
Step 1: Create the WLAN by specifying the Profile Name and SSID. Specify the WLAN Policy either by creating a new policy or selecting an existing policy.
As you can see on the right hand side, the CLI preview of the entered configuration is generated in real-time for reference.



Profile Name*: dot1xssid
SSID*: dot1xssid
WLAN ID*: 8
Policy Profile Name: dot1xprofile
VLAN: VLAN0102

```
wireless profile policy dot1xprofile
 shutdown
 vlan VLAN0102
 aaa-override
 no shutdown

wlan dot1xssid 8 dot1xssid
 no shutdown
```

Step 2: Click on AAA and either create a new AAA server or use existing.



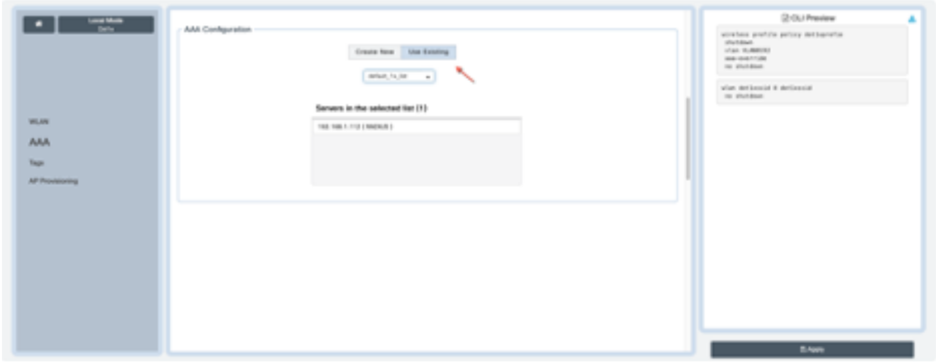
192.168.1.112

```
radius-server dead-criteria time 5 tries 3
 radius-server deadtime 5
aaa group server radius "dot1xssid_8"
 server name radius_server
aaa authentication dot1x "authlist_dot1xssid_8" grou
p "dot1xssid_8"
aaa accounting identity "acctlist_dot1xssid_8" start-
stop group "dot1xssid_8"
```

```
wireless profile policy dot1xprofile
 shutdown
 vlan VLAN0032
 accounting-list "acctlist_dot1xssid_8"
 aaa-override
 no shutdown
```

```
wlan dot1xssid 8 dot1xssid
 security dot1x authentication-list "authlist_dot1xssi
 no shutdown
```

If choosing an existing AAA server, select the server from the list as shown below.



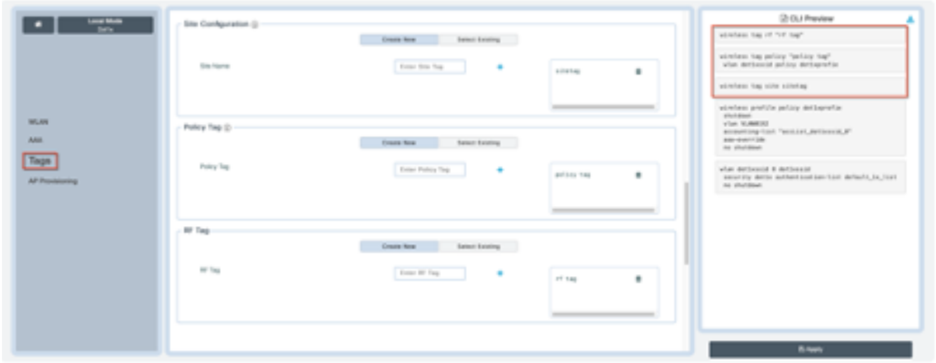
default_tx_list

192.168.1.112 (RADIUS)

```
wireless profile policy dot1xprofile
 shutdown
 vlan VLAN0032
 aaa-override
 no shutdown
```

```
wlan dot1xssid 8 dot1xssid
 no shutdown
```

Step3: Click on Tags and specify the Site Tag, Policy Tag and RF Tag either by creating new tags or selecting existing tags. Click on the blue '+' sign to enter the selection. Again, note the corresponding CLI commands that are auto-generated.



sitetag

policy tag

rf tag

```
wireless tag rf "rf tag"
```

```
wireless tag policy "policy tag"
 wlan dot1xssid policy dot1xprofile
```

```
wireless tag site sitetag
```

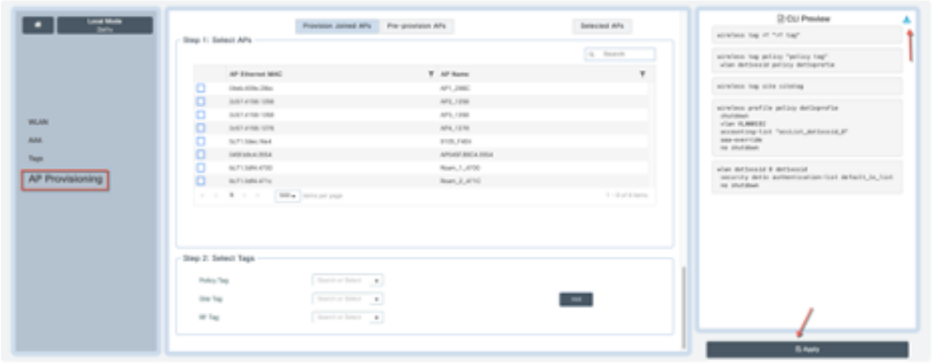
```
wireless profile policy dot1xprofile
 shutdown
 vlan VLAN0032
 accounting-list "acctlist_dot1xssid_8"
 aaa-override
 no shutdown
```

```
wlan dot1xssid 8 dot1xssid
 security dot1x authentication-list default_tx_list
 no shutdown
```

Step 4: Click on AP Provisioning to associate tags with APs. This can be done in two ways:

- Provision joined APs by selecting them from a list and associating the site, policy and RF tags.
- Pre-provision APs using MAC address or a CSV file before the APs join the controller.

Once done, Click Apply. And optionally, you can also download the CLI Preview file by clicking on the download icon on the CLI Preview box.



	AP Ethernet MAC	AP Name
□	[illegible]	AP1_298C
□	[illegible]	AP2_1256
□	[illegible]	AP3_1268
□	[illegible]	AP4_1276
□	[illegible]	9105_F4E4
□	[illegible]	AP0A5F.B6C4.3554
□	[illegible]	Roam_1_470D
□	[illegible]	Roam_2_471C

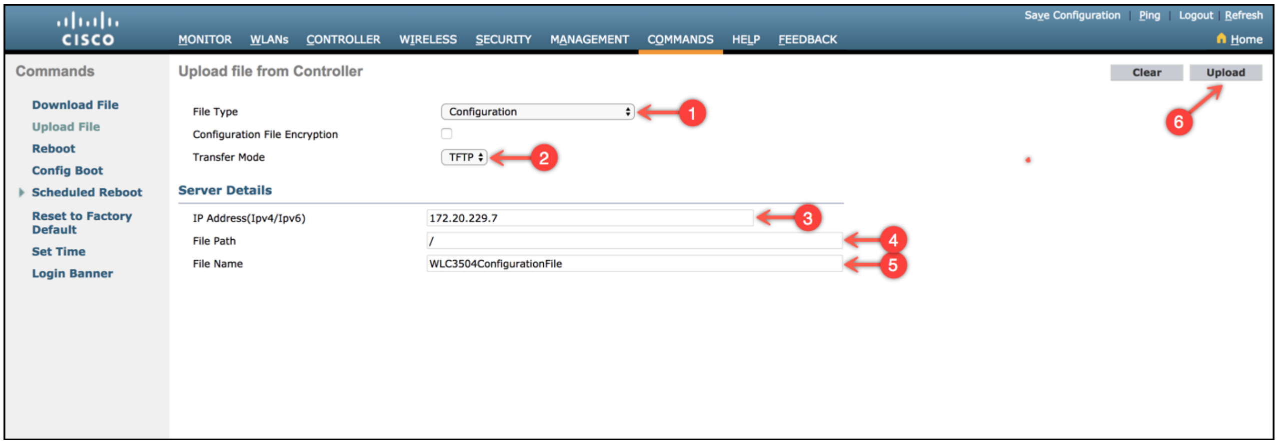
```
wireless tag rf "rf tag"

wireless tag policy "policy tag"
 wlan dot1xssid policy dot1xprofile

wireless tag site sitetag

wireless profile policy dot1xprofile
 shutdown
 vlan VLAN0102
 accounting-list "acclist_dot1xssid_#"
 aaa-override
 no shutdown

wlan dot1xssid 8 dot1xssid
 security dot1x authentication-list default_le_list
 no shutdown
```

AireOS to Catalyst 9800 Wireless Controller Migration

Migration Web Tool

The migration tool provides configuration transition and is designed to translate AireOS configuration to the new configuration model for the Catalyst 9800 Wireless Controller. The migration tool is available as an offline tool or as an embedded tool in the C9800 Web UI. It uses as input the AireOS configuration commands (exported as a file to TFTP server) and AP Group information (through the "show run-config" command).

Step 1: Export AireOS configuration to a TFTP server



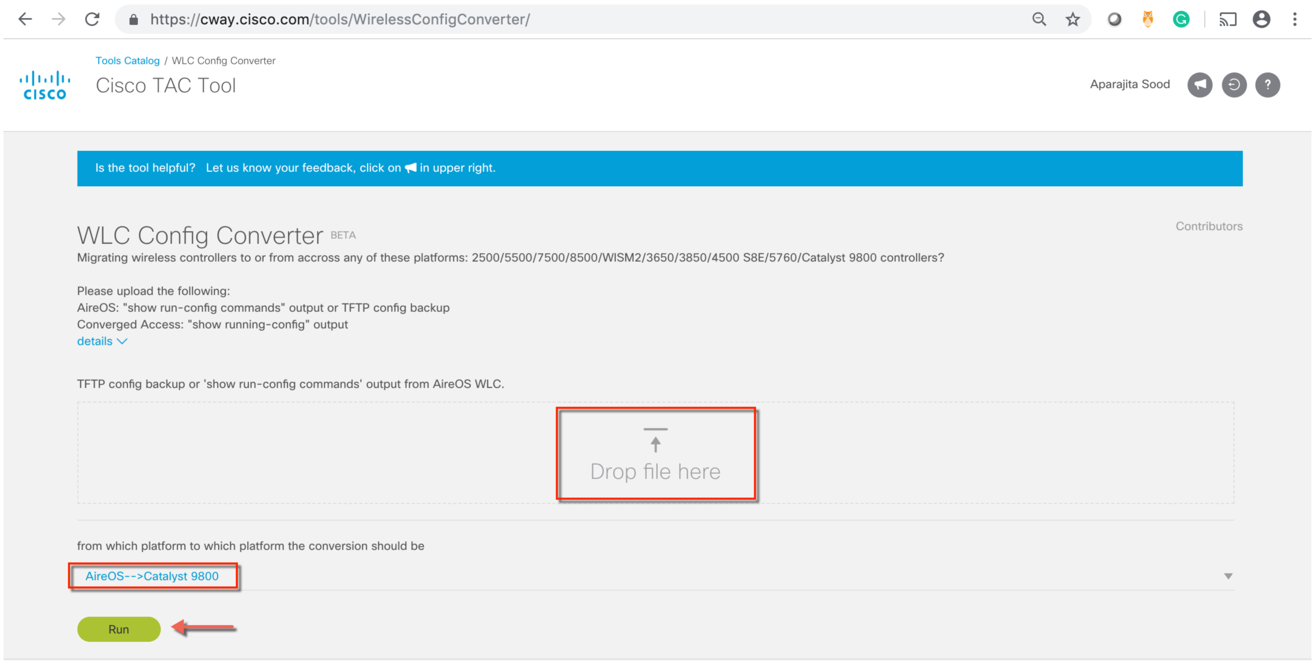
Upload file from Controller

File Type: Configuration
Configuration File Encryption: ☐
Transfer Mode: TFTP

Server Details

IP Address(Ipv4/Ipv6): 172.20.229.7
File Path: /
File Name: WLC3504ConfigurationFile

Step 2: Import the configuration into the tool as shown below, Select AireOS->9800 and click on Run



https://cway.cisco.com/tools/WirelessConfigConverter/
Tools Catalog / WLC Config Converter
Cisco TAC Tool
Aparajita Sood

Is the tool helpful? Let us know your feedback, click on in upper right.

WLC Config Converter BETA

Contributors

Migrating wireless controllers to or from accross 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.

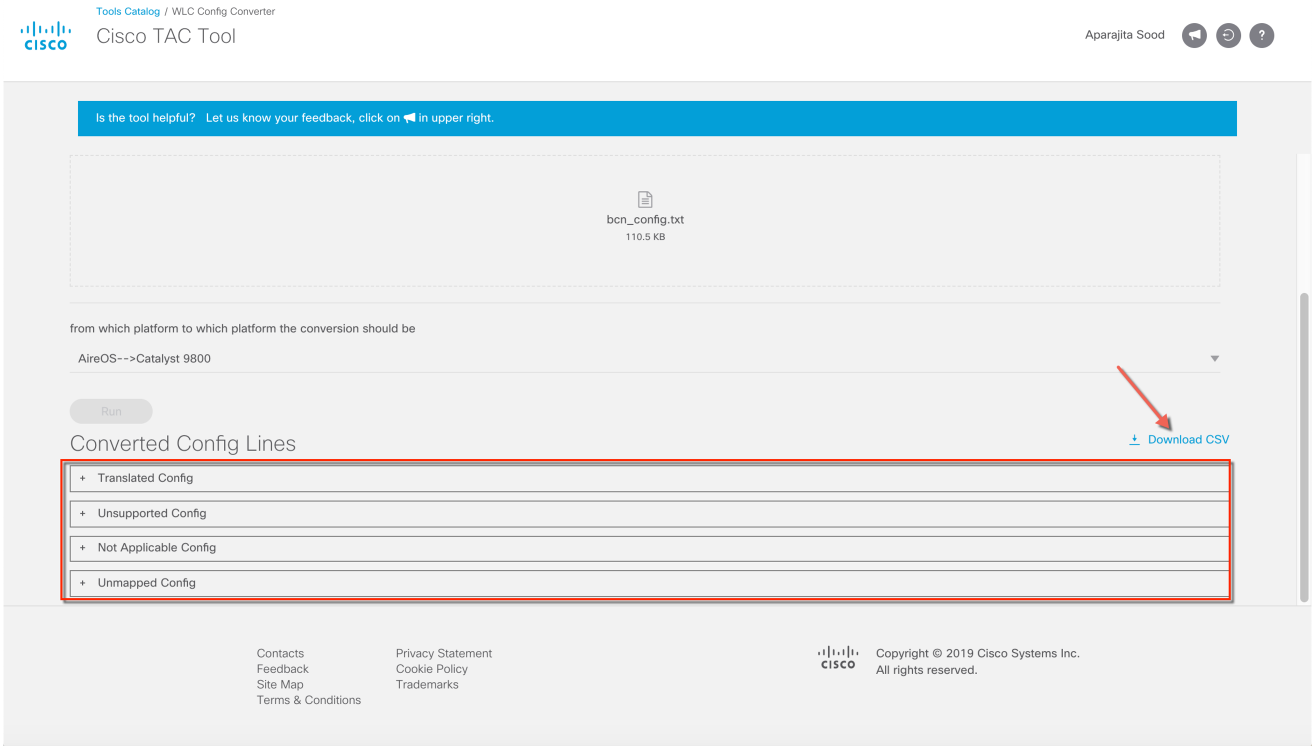
from which platform to which platform the conversion should be

AireOS-->Catalyst 9800

.

Step 3: The resultant output displays metrics on the configuration that is

a. Supported and successfully translated
b. Unsupported in the current release
c. Configuration that is either deprecated, obsolete or irrelevant in the current context of the Cisco Catalyst Wireless Controller.



Tools Catalog / WLC Config Converter

Cisco TAC Tool

Aparajita Sood

Is the tool helpful? Let us know your feedback, click on in upper right.

bcn_config.txt
110.5 KB

from which platform to which platform the conversion should be

AireOS-->Catalyst 9800

Converted Config Lines

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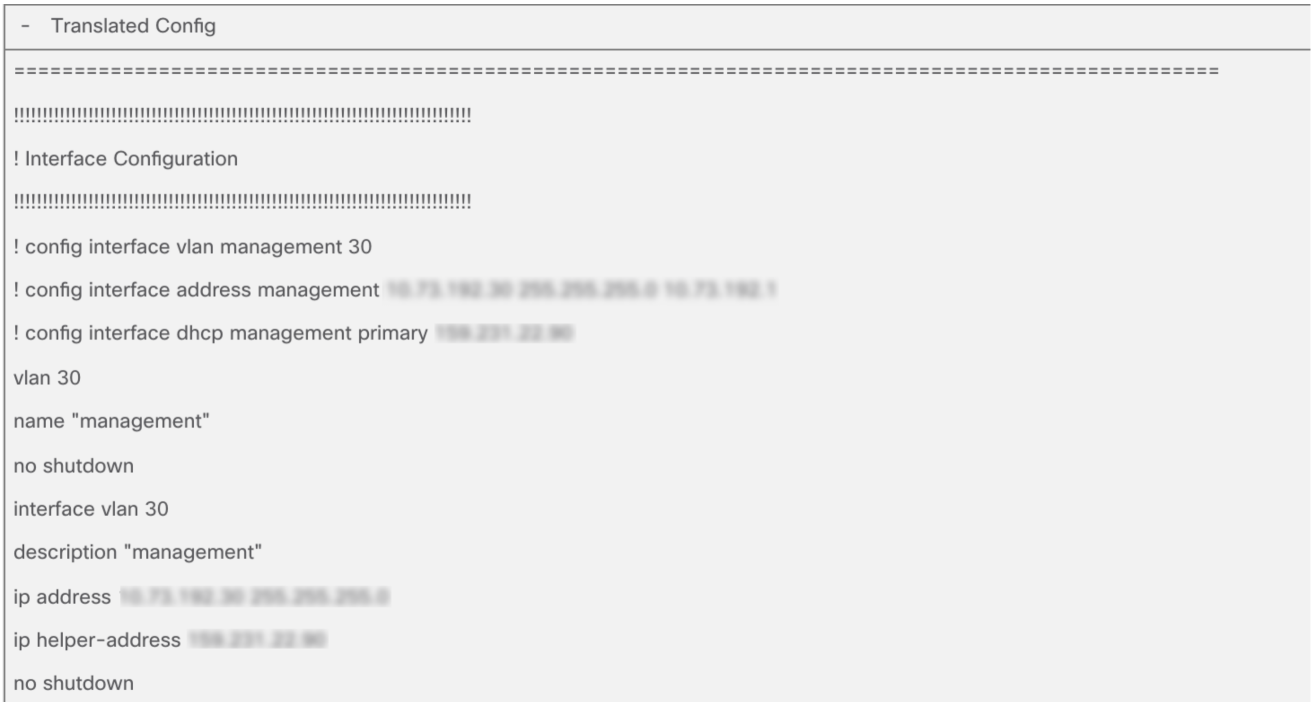
This configuration can also be exported for further analysis by clicking on ‘Download CSV’. A detailed list of CLIs can be obtained by expanding the sections.

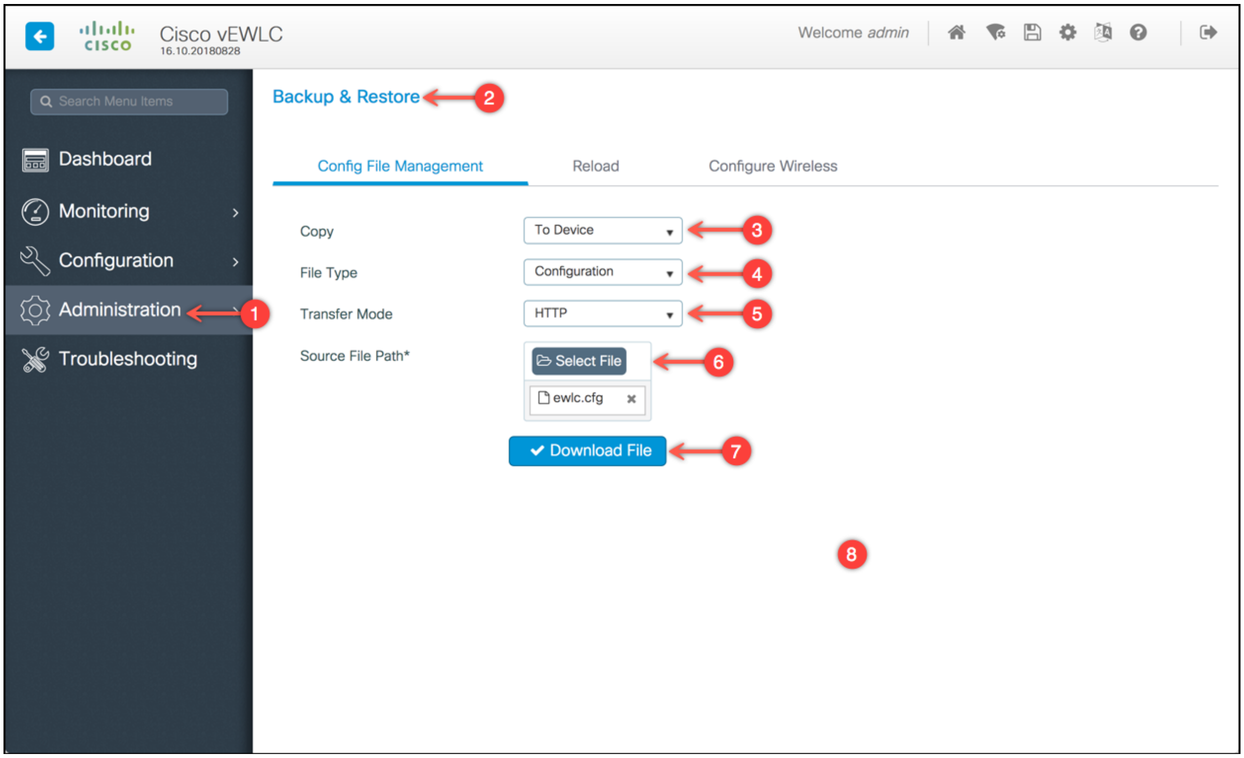
Step 4: The tool displays the translated configuration in the form of a CLI output with the translated configuration and the corresponding AireOS configuration (preceded by a ‘!’ sign). Download the translated configuration, update shared secrets, passwords, IP and port information and prepare the file to be uploaded on the target C9800 controller



- Translated Config

```
==================================================================================================
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Interface Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! config interface vlan management 30
! config interface address management [redacted]
! config interface dhcp management primary [redacted]
vlan 30
name "management"
no shutdown
interface vlan 30
description "management"
ip address [redacted]
ip helper-address [redacted]
no shutdown
```

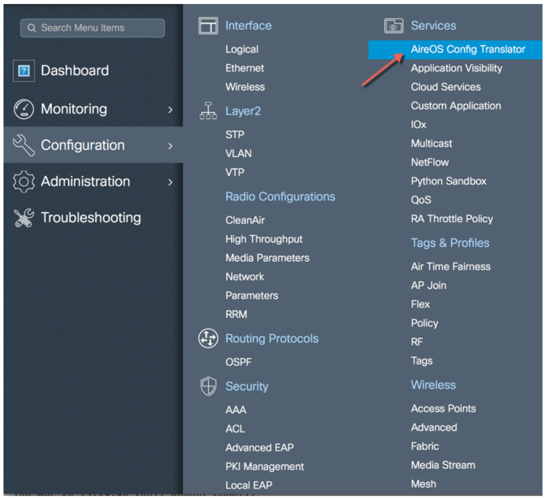
Step 5: Import Downloaded file to the C9800 controller to complete configuration migration



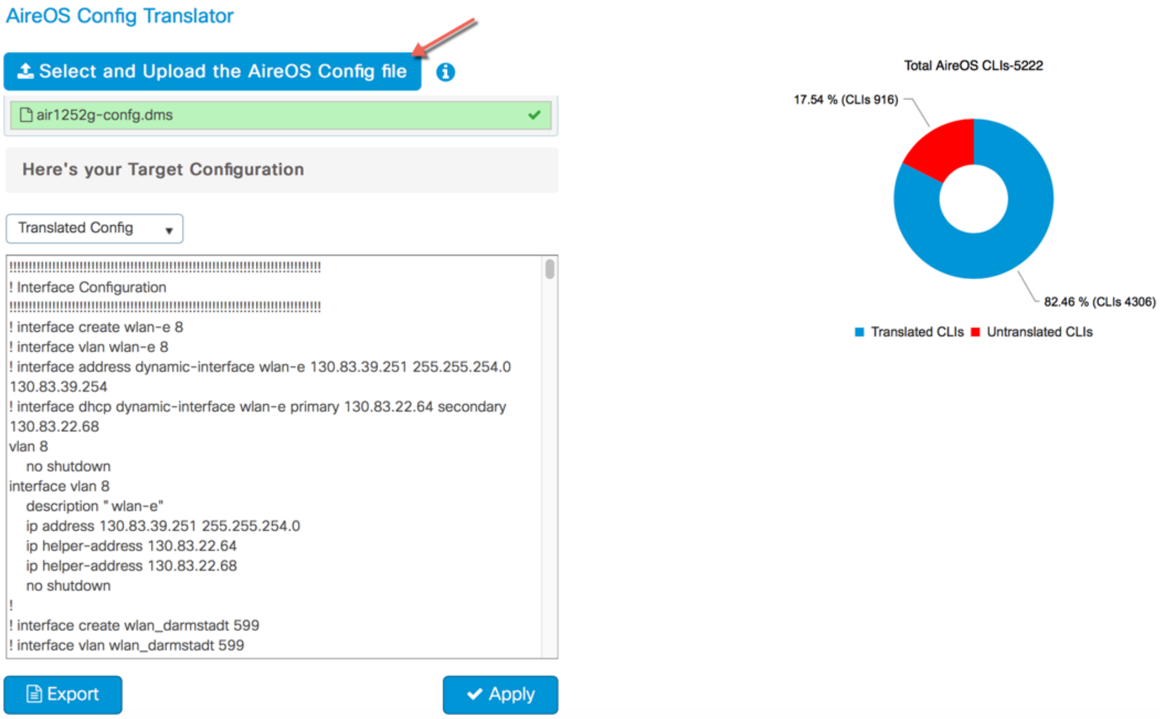
Copy: To Device
File Type: Configuration
Transfer Mode: HTTP
Source File Path*: ewlc.cfg

AireOS Config Translator

The AireOS config translator tool is natively built into the controller software and allows an AireOS configuration to be migrated to the Cisco Catalyst Wireless Controller configuration. To access the tool, go under Configuration > Services > AireOS Config Translator



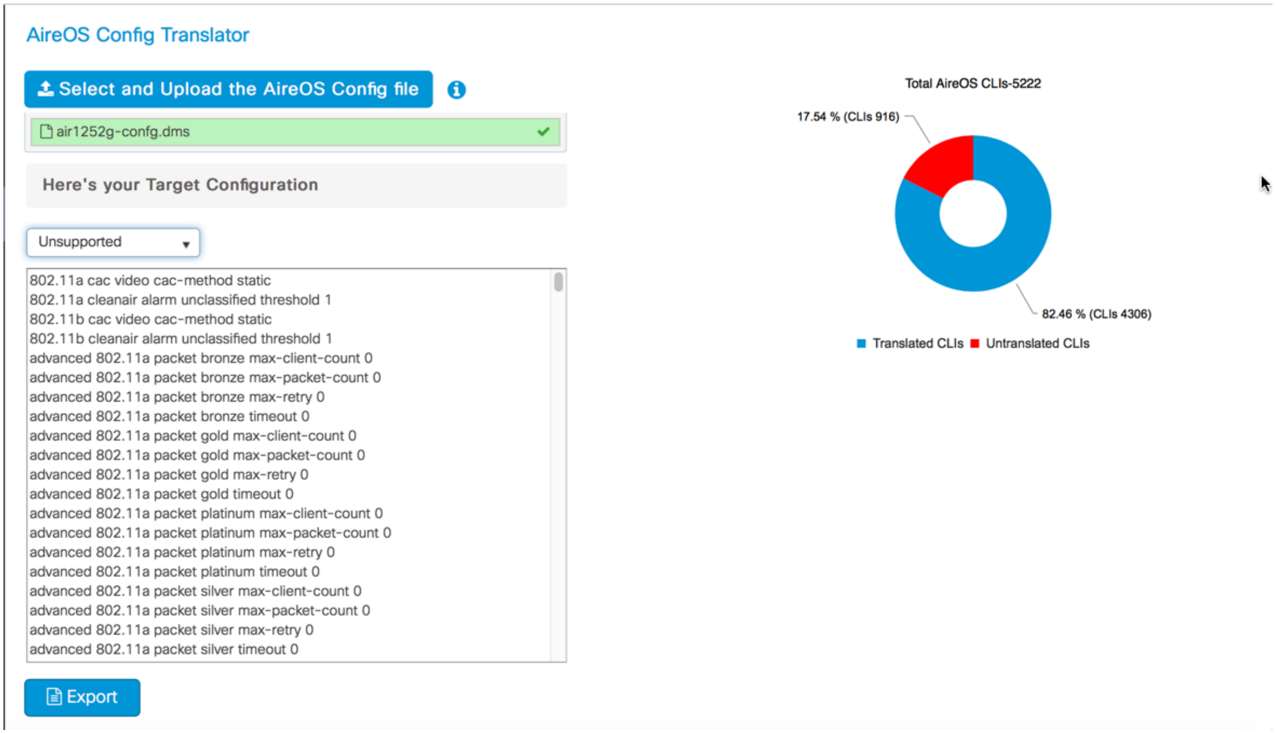
From an AireOS controller, export the configuration to a TFTP server and upload the file on the tool as shown below. The tool displays the translated configuration in the form of a CLI output with the translated configuration and the corresponding AireOS configuration (preceded by a '!' sign)



```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Interface Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! interface create wlan-e 8
! interface vlan wlan-e 8
! interface address dynamic-interface wlan-e 130.83.39.251 255.255.254.0
130.83.39.254
! interface dhcp dynamic-interface wlan-e primary 130.83.22.64 secondary
130.83.22.68
vlan 8
   no shutdown
interface vlan 8
   description " wlan-e"
   ip address 130.83.39.251 255.255.254.0
   ip helper-address 130.83.22.64
   ip helper-address 130.83.22.68
   no shutdown
!
! interface create wlan_darmstadt 599
! interface vlan wlan_darmstadt 599
```

The configuration can then be exported as a file to make modifications such as re-entering passwords, IP addresses if changed and port details or, applied directly to the running configuration of the device. The pie chart on the right shows the breakdown of translated vs. untranslated configs

Unsupported configuration is configuration that is currently unsupported on the controller and will be addressed in the upcoming releases



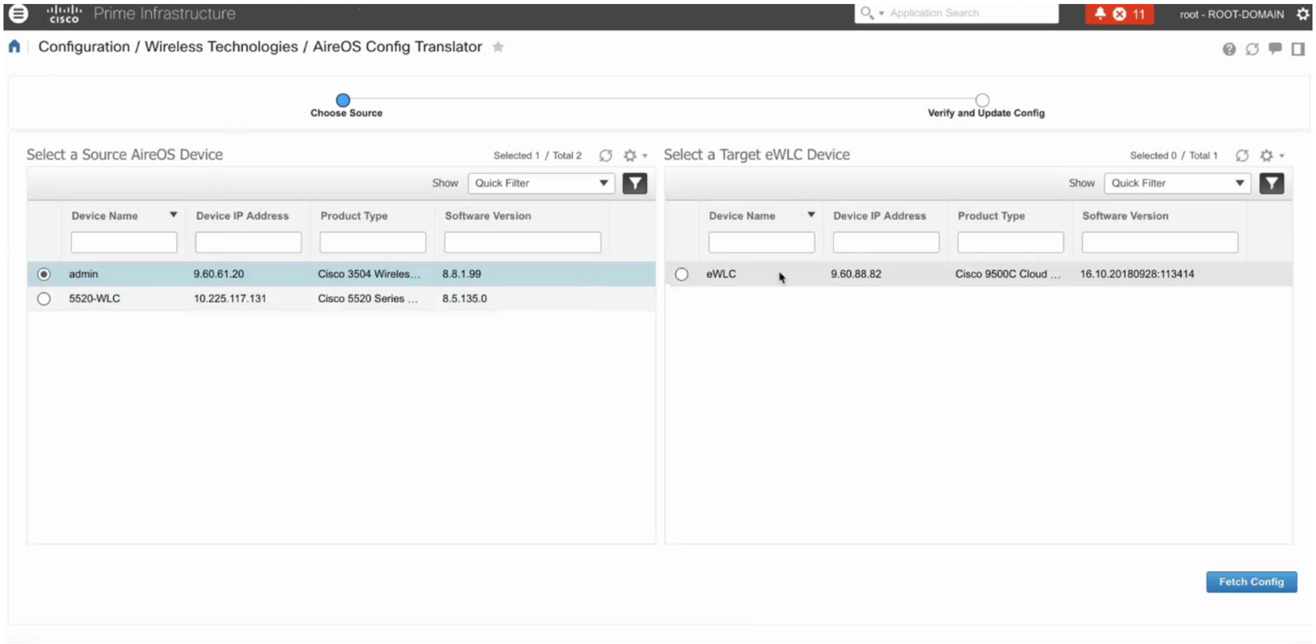
```
802.11a cac video cac-method static
802.11a cleanair alarm unclassified threshold 1
802.11b cac video cac-method static
802.11b cleanair alarm unclassified threshold 1
advanced 802.11a packet bronze max-client-count 0
advanced 802.11a packet bronze max-packet-count 0
advanced 802.11a packet bronze max-retry 0
advanced 802.11a packet bronze timeout 0
advanced 802.11a packet gold max-client-count 0
advanced 802.11a packet gold max-packet-count 0
advanced 802.11a packet gold max-retry 0
advanced 802.11a packet gold timeout 0
advanced 802.11a packet platinum max-client-count 0
advanced 802.11a packet platinum max-packet-count 0
advanced 802.11a packet platinum max-retry 0
advanced 802.11a packet platinum timeout 0
advanced 802.11a packet silver max-client-count 0
advanced 802.11a packet silver max-packet-count 0
advanced 802.11a packet silver max-retry 0
advanced 802.11a packet silver timeout 0
```

Migration using Prime Infrastructure 3.5

Prime Infrastructure 3.5 can be used to migrate existing AireOS controllers to the new cisco catalyst 9800 wireless controllers. Once these devices, both AireOS and Catalyst Wireless Controllers, have been discovered and added into the network devices database of Prime, specific source AireOS controllers can be selected and their configuration migrated to the target controllers in a simple process as detailed below.

Select Source and Target Wireless Controllers

From the left hand menu, select the Source AireOS Wireless LAN Controller that needs to be migrated. On the right hand menu, choose the Wireless Controller that the translated configuration will be applied to. Click on Fetch Config to pull in the latest running configuration from the AireOS controller.



Configuration / Wireless Technologies / AireOS Config Translator

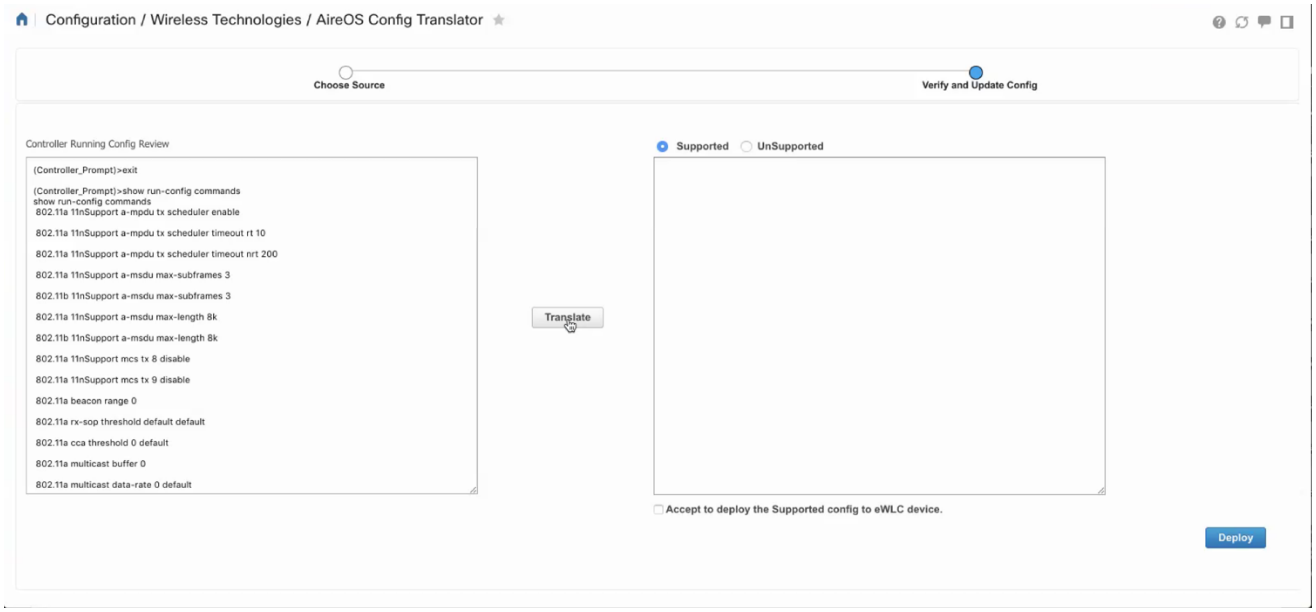
Select a Source AireOS Device — Selected 1 / Total 2

	Device Name	Device IP Address	Product Type	Software Version
●	admin	9.60.61.20	Cisco 3504 Wireles...	8.8.1.99
○	5520-WLC	10.225.117.131	Cisco 5520 Series ...	8.5.135.0

Select a Target eWLC Device — Selected 0 / Total 1

	Device Name	Device IP Address	Product Type	Software Version
○	eWLC	9.60.88.82	Cisco 9500C Cloud ...	16.10.20180928:113414

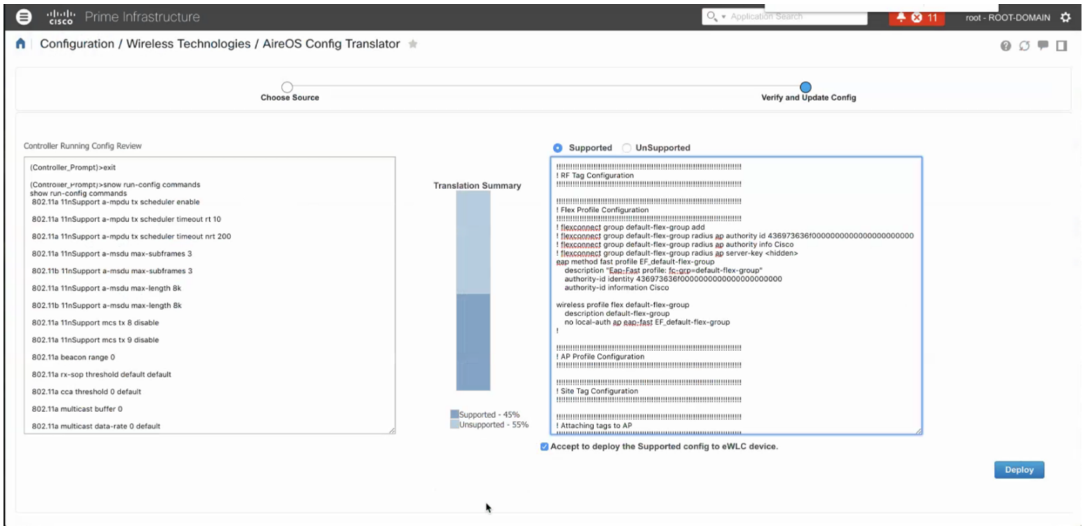
Once the configuration has been fetched, click on the translate button to start the translation of AireOS to Catalyst 9800 configuration.


Configuration / Wireless Technologies / AireOS Config Translator
Choose Source
Verify and Update Config
Controller Running Config Review
Translate
● Supported ○ UnSupported
□ Accept to deploy the Supported config to eWLC device.
Deploy

```
(Controller_Prompt)>exit

(Controller_Prompt)>show run-config commands
show run-config commands
 802.11a 11nSupport a-mpdu tx scheduler enable

 802.11a 11nSupport a-mpdu tx scheduler timeout rt 10

 802.11a 11nSupport a-mpdu tx scheduler timeout nrt 200

 802.11a 11nSupport a-msdu max-subframes 3

 802.11b 11nSupport a-msdu max-subframes 3

 802.11a 11nSupport a-msdu max-length 8k

 802.11b 11nSupport a-msdu max-length 8k

 802.11a 11nSupport mcs tx 8 disable

 802.11a 11nSupport mcs tx 9 disable

 802.11a beacon range 0

 802.11a rx-sop threshold default default

 802.11a cca threshold 0 default

 802.11a multicast buffer 0

 802.11a multicast data-rate 0 default
```

Translate and Verify/Update Passwords, Shared Secrets, IP and ports

The translation summary represents the percentage of supported/ translated vs. unsupported configuration. The translated configuration is displayed in the text box on the right hand side.

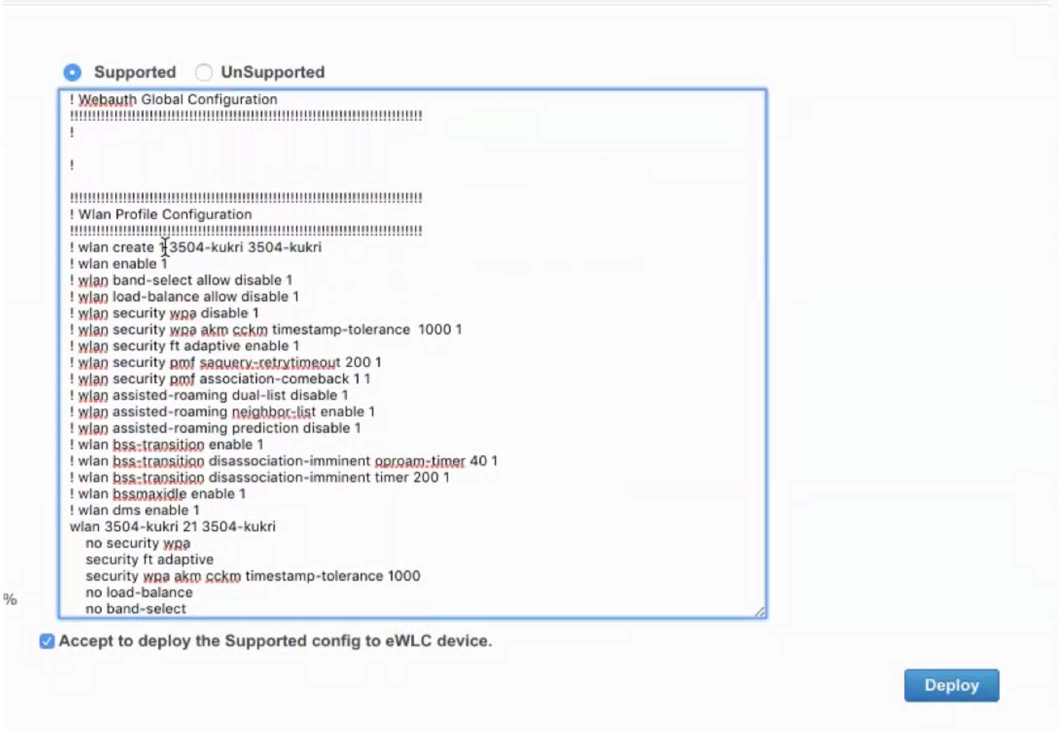

Prime Infrastructure
Application Search
11
root - ROOT-DOMAIN
Configuration / Wireless Technologies / AireOS Config Translator
Choose Source
Verify and Update Config
Controller Running Config Review
Translation Summary
Supported - 45%
Unsupported - 55%
● Supported ○ UnSupported
☑ Accept to deploy the Supported config to eWLC device.
Deploy

```
(Controller_Prompt)>exit

(Controller_Prompt)>show run-config commands
show run-config commands
 802.11a 11nSupport a-mpdu tx scheduler enable

 802.11a 11nSupport a-mpdu tx scheduler timeout rt 10

 802.11a 11nSupport a-mpdu tx scheduler timeout nrt 200

 802.11a 11nSupport a-msdu max-subframes 3

 802.11b 11nSupport a-msdu max-subframes 3

 802.11a 11nSupport a-msdu max-length 8k

 802.11b 11nSupport a-msdu max-length 8k

 802.11a 11nSupport mcs tx 8 disable

 802.11a 11nSupport mcs tx 9 disable

 802.11a beacon range 0

 802.11a rx-sop threshold default default

 802.11a cca threshold 0 default

 802.11a multicast buffer 0

 802.11a multicast data-rate 0 default
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! RF Tag Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Flex Profile Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! flexconnect group default-flex-group add
! flexconnect group default-flex-group radius ap authority id 436973636f000000000000000000000
! flexconnect group default-flex-group radius ap authority info Cisco
! flexconnect group default-flex-group radius ap server-key <hidden>
eap method fast profile EF_default-flex-group
   description "Eap-Fast profile: fc-grp=default-flex-group"
   authority-id identity 436973636f000000000000000000000
   authority-id information Cisco

wireless profile flex default-flex-group
   description default-flex-group
   no local-auth ap eap-fast EF_default-flex-group
!

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! AP Profile Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Site Tag Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Attaching tags to AP
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

DEPLOY TRANSLATED AND UPDATED CONFIGURATION

The tool does not translate shared secret and passwords, as these are stored encrypted and have to be re-entered by the user. For easy identification of such configurations, they are highlighted and required to be edited manually by the user. Once the necessary edits have been made, click on the 'Accept to deploy' checkbox and click Deploy.



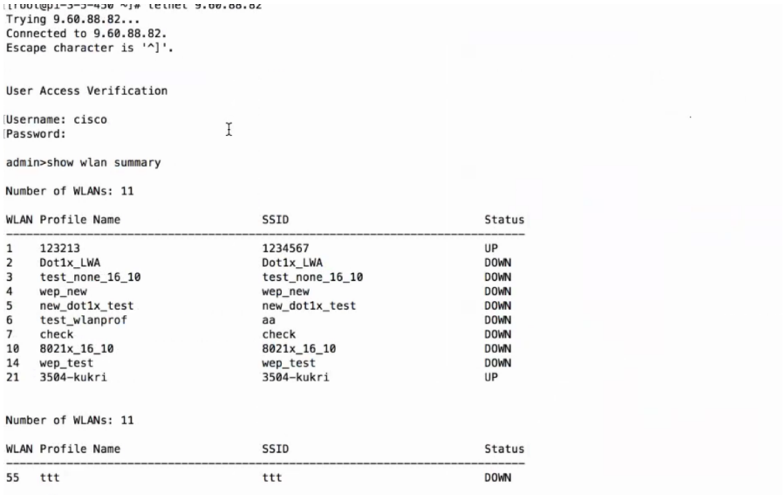
● Supported ○ UnSupported

```
! Webauth Global Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!

!

!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! Wlan Profile Configuration
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
! wlan create 1 3504-kukri 3504-kukri
! wlan enable 1
! wlan band-select allow disable 1
! wlan load-balance allow disable 1
! wlan security wpa disable 1
! wlan security wpa akm cckm timestamp-tolerance  1000 1
! wlan security ft adaptive enable 1
! wlan security pmf saquery-retrytimeout 200 1
! wlan security pmf association-comeback 1 1
! wlan assisted-roaming dual-list disable 1
! wlan assisted-roaming neighbor-list enable 1
! wlan assisted-roaming prediction disable 1
! wlan bss-transition enable 1
! wlan bss-transition disassociation-imminent oproam-timer 40 1
! wlan bss-transition disassociation-imminent timer 200 1
! wlan bssmaxidle enable 1
! wlan dms enable 1
wlan 3504-kukri 21 3504-kukri
   no security wpa
   security ft adaptive
   security wpa akm cckm timestamp-tolerance 1000
   no load-balance
   no band-select
```

%

☑ Accept to deploy the Supported config to eWLC device.

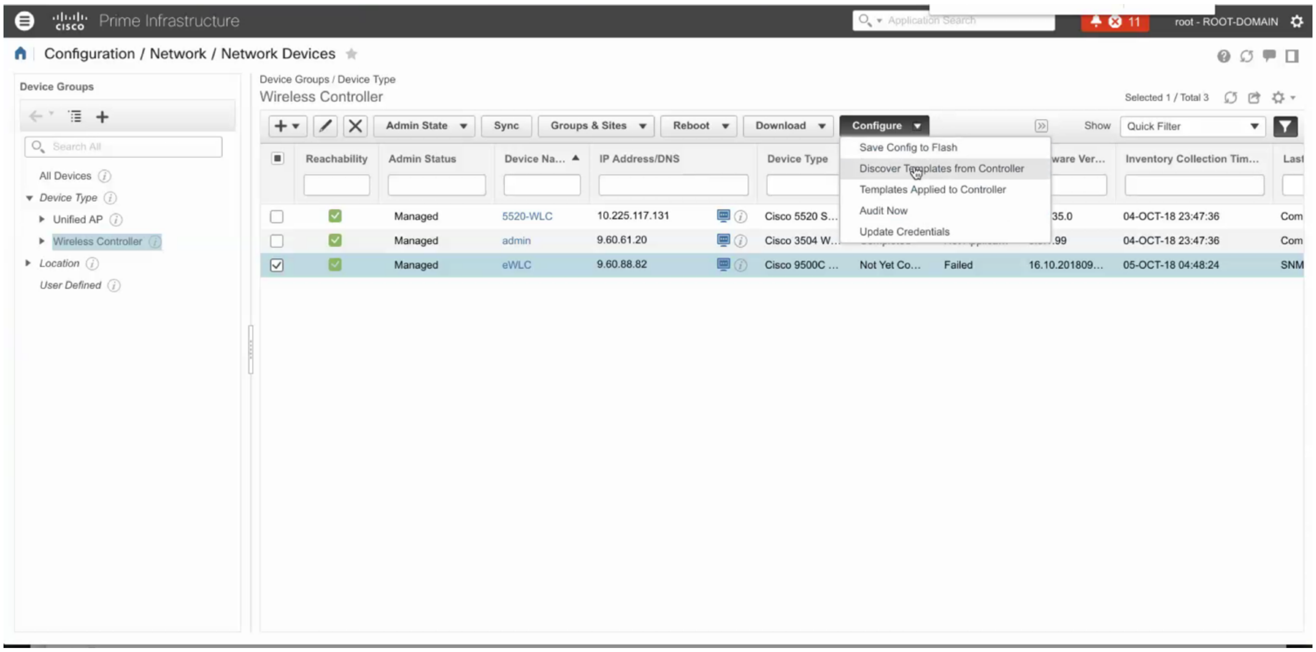
Once deployed, the configuration is pushed to the target wireless controller.



```
[root@pi-3-5-450 ~]# telnet 9.60.88.82
Trying 9.60.88.82...
Connected to 9.60.88.82.
Escape character is '^]'.


User Access Verification

Username: cisco
Password:

admin>show wlan summary

Number of WLANs: 11

WLAN Profile Name                        SSID                            Status
-------------------------------------------------------------------------------
1    123213                              1234567                         UP
2    Dot1x_LWA                           Dot1x_LWA                       DOWN
3    test_none_16_10                     test_none_16_10                 DOWN
4    wep_new                             wep_new                         DOWN
5    new_dot1x_test                      new_dot1x_test                  DOWN
6    test_wlanprof                       aa                              DOWN
7    check                               check                           DOWN
10   8021x_16_10                         8021x_16_10                     DOWN
14   wep_test                            wep_test                        DOWN
21   3504-kukri                          3504-kukri                      UP


Number of WLANs: 11

WLAN Profile Name                        SSID                            Status
-------------------------------------------------------------------------------
55   ttt                                 ttt                             DOWN
```

Discover Templates from migrated Wireless Controller

Optionally, templates can be discovered from the Cisco 9800 Catalyst Wireless Controller and re-used to apply configuration to other Wireless Controllers.



■	Reachability	Admin Status	Device Na... ▲	IP Address/DNS	Device Type			ware Ver...	Inventory Collection Tim...	Last
☐	✓	Managed	5520-WLC	10.225.117.131	Cisco 5520 S...			35.0	04-OCT-18 23:47:36	Com
☐	✓	Managed	admin	9.60.61.20	Cisco 3504 W...			.99	04-OCT-18 23:47:36	Com
☑	✓	Managed	eWLC	9.60.88.82	Cisco 9500C ...	Not Yet Co...	Failed	16.10.201809...	05-OCT-18 04:48:24	SNM

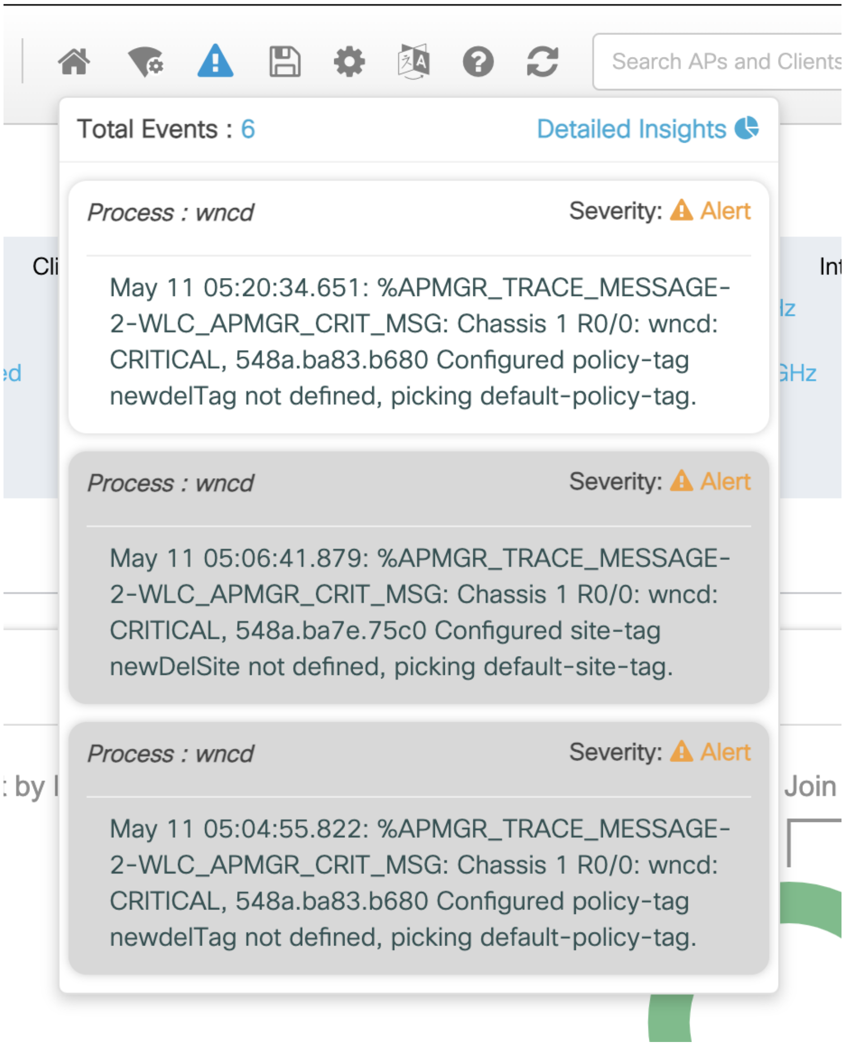
WebUI Alerts for Syslog Events

Starting IOS XE release 17.7.1, WebUI alerts will be generated when syslogs with level Emergency(0), Alert(1) or Critical(2) are generated. Examples include:

- WLAN not broadcasting
- Tags for an Access Point are misconfigured
- When device in unregistered state
- Any syslog with level < (3)

Event Banner

These alerts are generated in the events banner and can be viewed in detail in the event window. Click on the Alert Icon to see latest events. If the event is grayed out, then it is rmeans it has been read, else it is unread. Click on Detailed Insights to get all events data. The last 100 events (maximum) are stored in database and whenever there is a new event, it will get notified on the WebUI.



Process : wncd Severity: Alert

```
May 11 05:20:34.651: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba83.b680 Configured policy-tag newdelTag not defined, picking default-policy-tag.
```

Process : wncd Severity: Alert

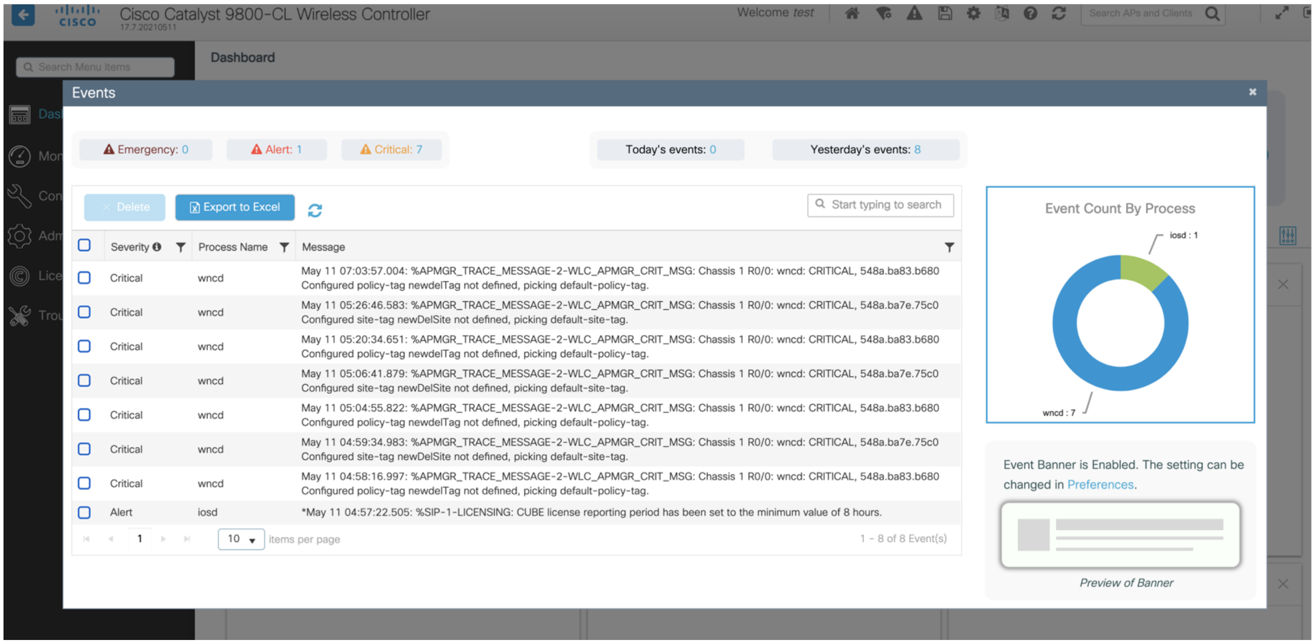
```
May 11 05:06:41.879: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba7e.75c0 Configured site-tag newDelSite not defined, picking default-site-tag.
```

Process : wncd Severity: Alert

```
May 11 05:04:55.822: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba83.b680 Configured policy-tag newdelTag not defined, picking default-policy-tag.
```

EVENT WINDOW DETAILED INSIGHTS

Events can be selected using the checkbox next to the individual event item. Events can also be filtered based on severity and day. The chart on the right hand side classified events by processes.



Emergency: 0 | Alert: 1 | Critical: 7 | Today's events: 0 | Yesterday's events: 8

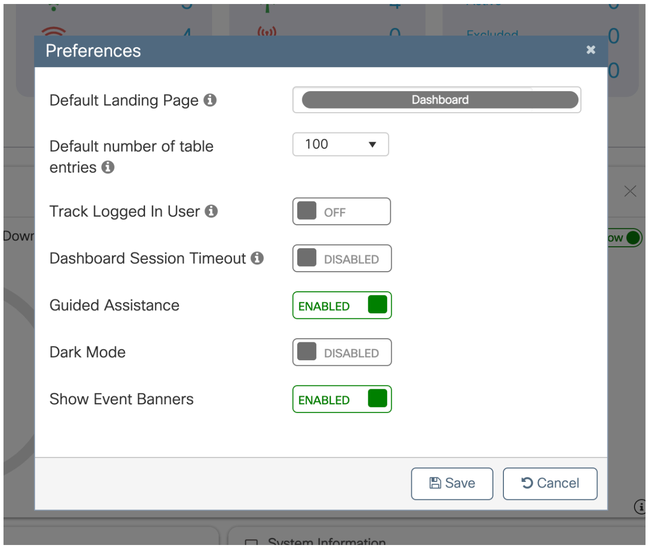
□	Severity	Process Name	Message
□	Critical	wncd	May 11 07:03:57.004: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba83.b680 Configured policy-tag newdelTag not defined, picking default-policy-tag.
□	Critical	wncd	May 11 05:26:46.583: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba7e.75c0 Configured site-tag newDelSite not defined, picking default-site-tag.
□	Critical	wncd	May 11 05:20:34.651: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba83.b680 Configured policy-tag newdelTag not defined, picking default-policy-tag.
□	Critical	wncd	May 11 05:06:41.879: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba7e.75c0 Configured site-tag newDelSite not defined, picking default-site-tag.
□	Critical	wncd	May 11 05:04:55.822: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba83.b680 Configured policy-tag newdelTag not defined, picking default-policy-tag.
□	Critical	wncd	May 11 04:59:34.983: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba7e.75c0 Configured site-tag newDelSite not defined, picking default-site-tag.
□	Critical	wncd	May 11 04:58:16.997: %APMGR_TRACE_MESSAGE-2-WLC_APMGR_CRIT_MSG: Chassis 1 R0/0: wncd: CRITICAL, 548a.ba83.b680 Configured policy-tag newdelTag not defined, picking default-policy-tag.
□	Alert	iosd	*May 11 04:57:22.505: %SIP-1-LICENSING: CUBE license reporting period has been set to the minimum value of 8 hours.

1 | 10 items per page | 1 - 8 of 8 Event(s)

Event Banner is Enabled. The setting can be changed in Preferences.

EVENT BANNER CONFIGURATION

User can choose to enable/disable the notification banner by going to Preferences settings by clicking on Gear Icon in the top right section
If the banner is disabled, the user can still see the count



Default Landing Page	Dashboard
Default number of table entries	100
Track Logged In User	OFF
Dashboard Session Timeout	DISABLED
Guided Assistance	ENABLED
Dark Mode	DISABLED
Show Event Banners	ENABLED