Embedded Wireless Controller Conversion on Catalyst 9100 Access Points

Contents

Introduction

This article demonstrates how to convert a lightweight Cisco Catalyst 9000 series Access Point (9115, 9117, 9120, 9130) to Embedded Wireless Controller (EWC) and gain access to its web interface. Other guides are available regarding the smartphone app or the web UI wizard to easily deploy Cisco EWC on Catalyst AP but this document focuses mainly on the CLI approach as well as conversion tips and tricks.

About Embedded Wireless Controller on Catalyst AP

The Cisco [®] Embedded Wireless Controller on Catalyst [®] Access Points provides an option for your Wi-Fi 6 network that is easy to deploy and manage. The control function is built into the Cisco Catalyst access point, so no added physical appliance is required.

This means you get enterprise-class capabilities, including robust security, Cisco reliability, and Wi-Fi 6 capacity and performance right out of the box. The deployment and management of your new wireless network requires little network knowledge or IT support, making it ideal for single-site or multisite deployments for organizations with minimal IT resources. Just set it and forget it.

The Cisco Embedded Wireless Controller on Catalyst Access Points runs a similar Cisco IOS®XE code as the Cisco Catalyst 9800 Series Wireless Controllers, making it resilient, secure, and intelligent. With the embedded wireless controller, you get the benefit of enterprise features without having to invest in a controller appliance.

Additionally, your investment in Cisco Catalyst access points is protected as your needs evolve. The embedded wireless controller can be migrated to cloud- or physical controller-based deployments as needed.

Requirements

Prerequisites

Components Used

- 9120 AP
- EWC image version 17.1.1s
- TFTP server
- Console cable

Steps outlined in this article assume that the AP is running a lightweight capwap image and that a functional TFTP server is reachable.

Deploy

Switch Configuration

The port where the EWC AP is connected to must be a trunk port with the native VLAN that of the management VLAN.

Example switch configuration:

```
configure terminal
  interface gigabitEthernet 0/1
  switchport mode trunk
  switchport trunk native vlan 10
```

Factory Reset

Before converting the Access Point, it is best practice to perform a factory reset, even if it is brand new:

1. Unplug the AP from its power source
2. Plug the console cable in and open a serial session on your PC
3. Press and hold the Mode/Reset button on the AP
4. Plug the AP back to its power source while still holding the Mode/Reset button
5. Continue holding the button until prompt on your serial session shows up

The console session will write out how long the button has been pressed for. At least 20 seconds

are required for a full restart. The AP will boot up and default credentials Cisco/Cisco can be used to log in.

Network Topology

Embedded Wireless Controller images are provided in the form of a zip file. The zip file contains:

- EWC .bin image (example: C9800-AP-iosxe-wlc.bin)
- AP image for all APs that can join EWC (example: ap1g4, ap1g7)
- Readme.txt file that specifies which image corresponds to which AP model

  Note: Please make sure to extract the contents of the zip archive to your TFTP server. The AP will need access to these files directly, it will not be able to get them if they are still in an archive.

Table below lists all the images and corresponding AP models:

AP Model	Image File Name
AP1815, AP154x	ap1g5
AP180x, AP183x, AP185x	ap1g4
C9115, C9120	ap1g7
C9117	ap1g6
C9130	ap1g6a
AP380x, AP280x, AP156x	ap3g3

  Note: Only Cisco Catalyst 9000 series APs are capable of running EWC code. All other APs in the table above are capable of only joining EWC.

Contents of the extracted zip file should be copied to a TFTP server.

Before upgrading the image, we will rename the AP and assign it a static IP address, netmask and default gateway:

```
Username: Cisco
Password: Cisco
AP2CF8.9B5F.8628>enable
Password: Cisco
AP2CF8.9B5F.8628#capwap ap hostname AP1
Please note that if AP is already associated to WLC,
the new hostname will only reflect on WLC after AP
 dis-associates and rejoins.
AP1#capwap ap ip 192.168.1.14 255.255.255.0 192.168.1.1
```

TFTP server is located on an IP address **192.168.1.25**. Unlike Mobility Express, it is required to specify 2 different images: one for the AP and one for the EWC. Conversion of the image will be done using the following command:

```
AP1#ap-type ewc-ap tftp://192.168.1.25/ap1g7 tftp://192.168.1.25/C9800-AP-iosxe-wlc.bin
Starting download eWLC image tftp://192.168.1.25/C9800-AP-iosxe-wlc.bin ...
It may take a few minutes. If longer, please abort command, check network and try again.
It may take a few minutes. If longer, please abort command, check network and try again.
################################################################## 100.0%
```

```
Upgrading ...
```

Note: If the AP is running 8.9 code version, the command `ap-type mobility-express` should be used instead.

Once the image is upgraded, the AP will reboot. Login using default credentials Cisco/Cisco. If the upgrade has been successful, output of the SHOW VERSION command will contain:

```
AP1#show version
.
...
AP Image type    : EWC-AP IMAGE
AP Configuration : EWC-AP CAPABLE
```

The EWC portion of the code will boot up. Booting up for the first time can take up to 15 minutes.

Important: The EWC process of the AP will never boot if there is an existing AireOS, 9800 or Mobility Express or EWC controller in the same broadcast domain (VLAN).

Option 1 : Initial CLI Configuration

Once the EWC partition boots up, a prompt will offer to start up an initial configuration wizard. This article will cover manual configuration from scratch, without the use of Catalyst Wireless app or web browser wizard:

```
--- System Configuration Dialog ---

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

Would you like to terminate autoinstall? [yes]: no

WLC2CF8.9B5F.8628#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
WLC2CF8.9B5F.8628(config)#hostname EWC

######## Cteates local user admin ######## EWC(config)#user-name admin
EWC(config-user-name)#privilege 15
EWC(config-user-name)#password 0 Cisco123
EWC(config-user-name)#exit

######## Specifies credentials used to log into APs joined to this EWC ######## EWC(config)#ap
profile default-ap-profile
EWC(config-ap-profile)#mgmtuser username admin password 0 Cisco123 secret 0 Cisco123
EWC(config-ap-profile)#exit

######## Configures management interface IP address and subnet######## EWC(config)#interface
gigabitEthernet 0
EWC(config-if)#ip address 192.168.1.15 255.255.255.0
EWC(config-if)#exit

######## Default gateway IP address ######## EWC(config)#ip default-gateway 192.168.1.1

######## Enables web interface of EWC ######## EWC(config)#ip http server
EWC(config)#ip http secure-server
```

```
######## Write to memory ########
EWC(config)#end
EWC#write memory
```

> **Note**: You must do "**write memory**" in order to save the configuration and also to clear the preinstalled day-zero configuration. If this is not done the access to the GUI of the EWC will be not be possible like it is explained later in this guide.

Unlike a 9800 controller, EWC flash memory does not have enough space to store all AP images. All the AP images need to be hosted on an external TFTP or SFTP server. When a second AP tries to join, EWC will point it to the external server. Without the following commands, no other AP will be able to join it:

```
EWC(config)#wireless profile image-download default
EWC(config-wireless-image-download-profile)#image-download-mode tftp
EWC(config-wireless-image-download-profile-tftp)#tftp-image-server 192.168.1.25
EWC(config-wireless-image-download-profile-tftp)#tftp-image-path /

EWC#write memory
Building configuration...
[OK]
```

Web interface can now be accessed at **https://<EWC management IP address>**.

> **Note**: If both HTTP and HTTPs are enabled, the EWC will always serve the user with its HTTPS web interface. Having HTTP enabled is crucial for some features like web authentication and it is recommended to have it enabled.

Option 2 : Web UI Wizard

Once the AP has rebooted in EWC mode, it will broadcast a provisioning SSID ending with the last digits of its MAC address. You can connect to it using the PSK "password".

You can then open your browser and you will be redirected to mywifi.cisco.com which will take you to the AP web UI. Connect with user "webui" and password "cisco".

> **Note**: The web redirection to the EWC configuration portal only works if you are connected to the provisioning SSID. It does not work if your laptop is connected to another wifi network or on the wired network. You cannot configure the AP from the wired network even if you enter the EWC IP address when it is in day0 wizard provisioning mode

Option 3 : Smartphone app

On the Apple Store as well as Android Play Store, you will be able to find the Cisco Catalyst Wireless application. Install it, and the app will allow you to easily provision your embedded controller either through manual connection or QR code.

Tips & Tricks

Joining Other APs to EWC

Up to 100 Access Points can be joined to EWC. APs joined to EWC can only function if they are in FlexConnect mode. Like it's mentioned in previous chapter, EWC is not capable of hosting all AP images in its flash memory and it is required to have TFTP or SFTP server that needs to be specified with `wireless profile image-download default` command.

If the site where EWC is located has no infrastructure to host a permanent TFTP server, a regular laptop can be used temporarily. TFTP server with AP images only needs to be present on site during initial deployment and upgrade.

Accessing AP Console From EWC (former `apciscoshell`)

When console cable is plugged into the AP running EWC image, an EWC prompt will be shown by default. If, for any reason, access to the underlying AP shell is required, it can be done using:

```
EWC#wireless ewc-ap ap shell username admin
admin@192.168.129.1's password: Cisco123
```

To exit back to EWC shell, use:

```
AP1>logout
Connection to 192.168.129.1 closed.
EWC#
```

> **Note**: This command is equivalent to `apciscoshell` that was previously available in Mobility Express controllers.

Converting EWC Back To Lightweight CAPWAP Mode

If AP running in EWC mode needs to be converted back to lightweight capwap mode, it can be done via:

```
AP1#ap-type capwap
AP is the Master AP, system will need a reboot when ap type is changed to CAPWAP
. Do you want to proceed? (y/N) y
```

> **Important**: This command will perform a complete factory reset of both AP and EWC partition. Make sure to backup existing EWC configuration before conversion.
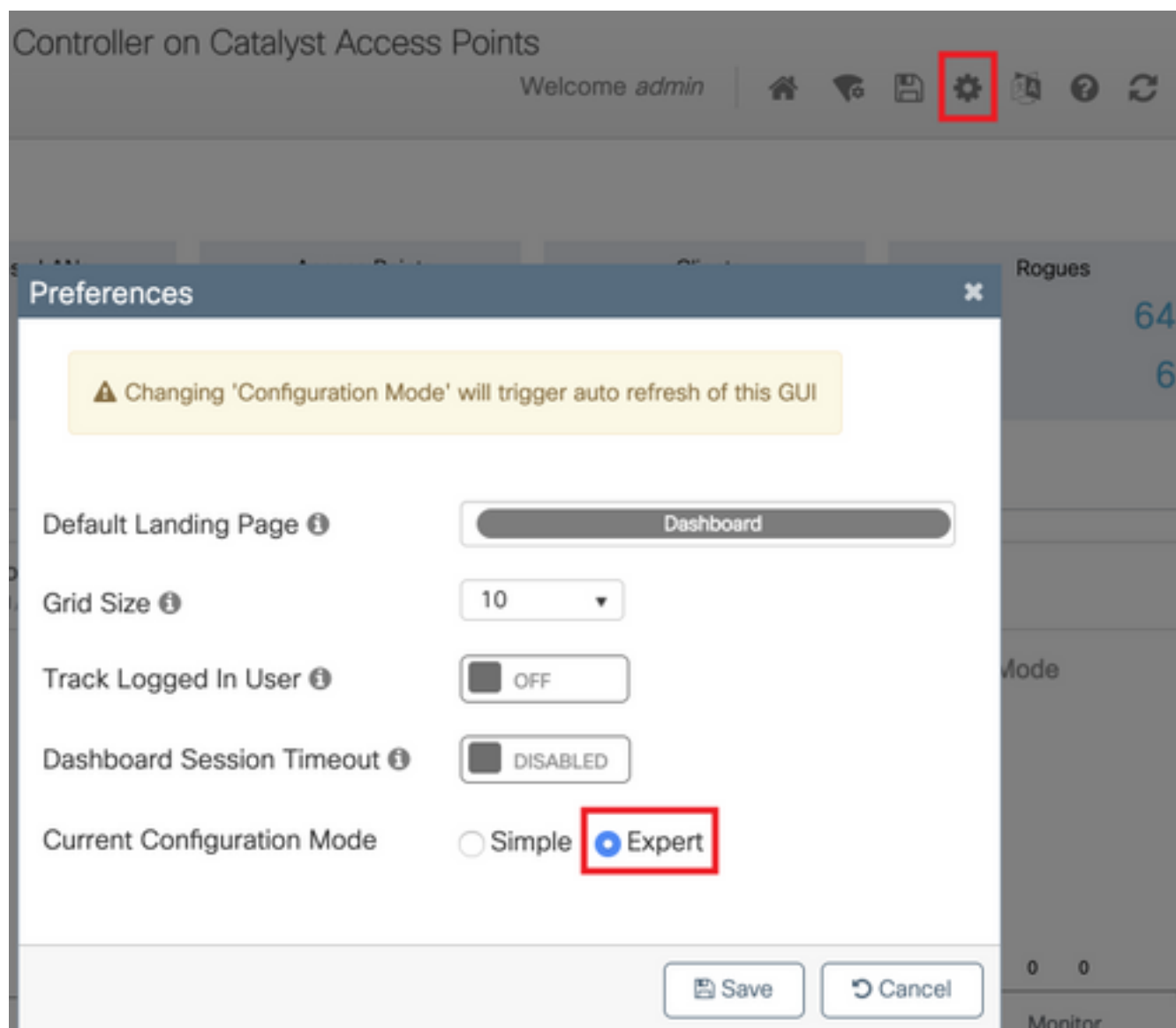
Factory Reset from the EWC CLI

In order to reset the EWC back to factory defaults you can use this command from the EWC CLI prompt:

```
EWC#wireless ewc-ap factory-reset
```

Accessing Expert Mode

By default, web interface of EWC will not show all of its advanced functions. They can be enabled by clicking on the gear icon in the top right corner and turning on the expert mode:

Generating Management Interface Certificate and Trustpoint

EWC uses Manufacturer Installed Certificate (MIC) for all of its functions. At no point should a Self Signed Certificate be generated. All the commands specified in this article are enough to have EWC up and running and have APs join to it.

References

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