在带有C9124接入点的嵌入式无线控制器上配置带有以太网桥接的点对点网状链路

目录

简介

本文档介绍如何在带有C9124接入点的嵌入式无线控制器(eWC)上配置带有以太网桥接的P2P网状链路。

先决条件

要求

Cisco 建议您了解以下主题：

- 思科无线局域网控制器(WLC) 9800。
- Cisco Catalyst接入点(AP)。
- Catalyst接入点上的嵌入式无线控制器。
- 网状技术。

使用的组件

本文档中的信息基于以下软件和硬件版本：

- EWC IOS® XE 17.12.2。
- 2个AP C9124。
- 2个馈电器AIR-PWRINJ-60RGD1。
- 2台交换机；
- 2台笔记本电脑；
- 1个AP C9115。

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

背景信息

以太网桥接

网状网络解决方案是思科统一无线网络解决方案的一部分，可让两个或多个思科网状无线接入点（以下称为网状无线接入点）通过一个或多个无线跳点相互通信，以加入多个LAN或扩展WiFi覆盖。

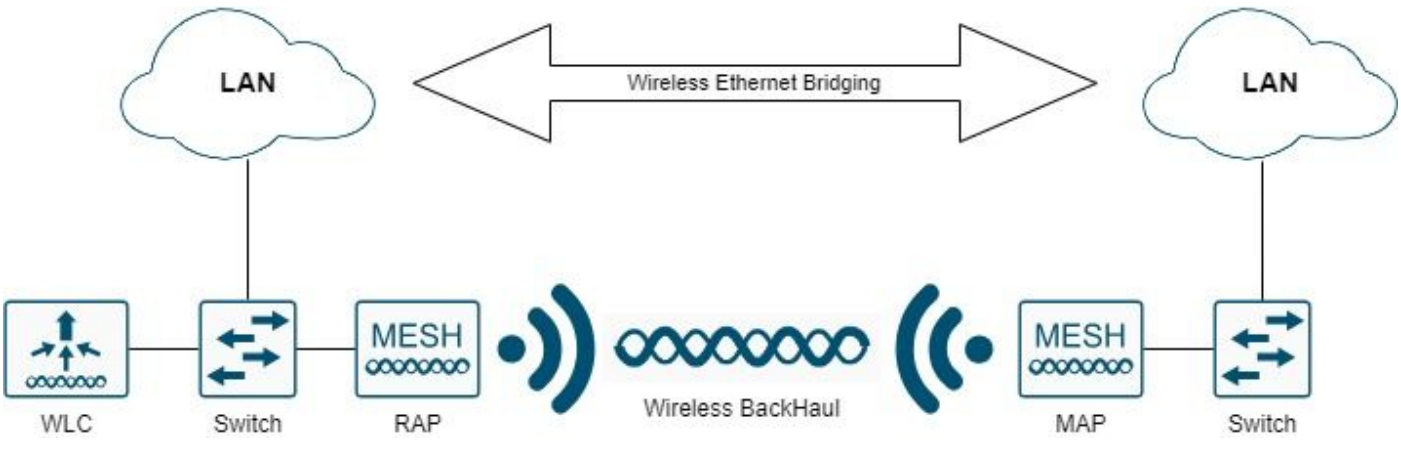
Cisco MAP通过网状网络解决方案中部署的任何思科无线LAN控制器进行配置、监控和操作。

支持的网状网络解决方案部署为以下三种常见类型之一：

- 点对点部署
- 点对多点部署
- 网状部署

本文档重点介绍如何在同一交换机上配置点对点网状网部署和以太网桥接。

在点对点网状网部署中，网状无线接入点为无线客户端提供无线接入和回传，并可同时支持一个LAN和终端到远程以太网设备或其他以太网LAN的桥接。



有关每种部署类型的详细信息，请参阅Cisco Catalyst 9800系列无线控制器的网状网部署指南。

Cisco Catalyst 9124系列室外网状AP是一种无线设备，专用于无线客户端访问和点对点桥接、点对多点桥接和点对多点网状无线连接。

室外接入点是一种可以安装在墙壁或突出物、屋顶桅杆或者路灯桅杆上的独立单元。

您可以在以下网状网角色之一中运行C9124：

- 屋顶接入点 (RAP)
- 网状无线接入点(MAP)

RAP通过有线方式连接到思科无线局域网控制器。它们使用回传无线接口与附近的MAP通信。RAP是任何桥接或网状网络的父节点，并将网桥或网状网络连接到有线网络，因此任何桥接或网状网段只能有一个RAP。

MAP没有到思科无线局域网控制器的有线连接。它们可以是完全无线的并且支持与其他MAP或RAP通信的客户端，或者可用于连接外围设备或有线网络。

Catalyst接入点上的嵌入式无线控制器

Catalyst接入点上的思科嵌入式无线控制器(EWC)是集成到Cisco Catalyst 9100接入点的基于软件的控制器。

在Cisco EWC网络中，运行无线控制器功能的接入点(AP)被指定为活动AP。

由此活动AP管理的其它接入点称为从属AP。

活动EWC有两个角色：

- 充当无线LAN控制器(WLC)并对其进行管理和控制。从属AP作为轻型接入点运行，为客户端提供服务。
- 它充当接入点以便为客户端提供服务。

有关AP上EWC的产品概述，请访问Catalyst接入点上的思科嵌入式无线控制器数据表。

要了解如何在网络上部署EWC，请访问Catalyst接入点上的思科嵌入式无线控制器(EWC)白皮书。

本文档重点介绍C9124作为EWC，并假设EWC模式下已有AP 9124。

配置

网络图

此网络中的所有设备都位于192.168.100.0/24子网内，但位于VLAN 101且子网为192.168.101.0/25的笔记本电脑除外。

EWC AP (WLC)的管理接口未标记，并且交换机端口上的本地VLAN设置为VLAN 100。

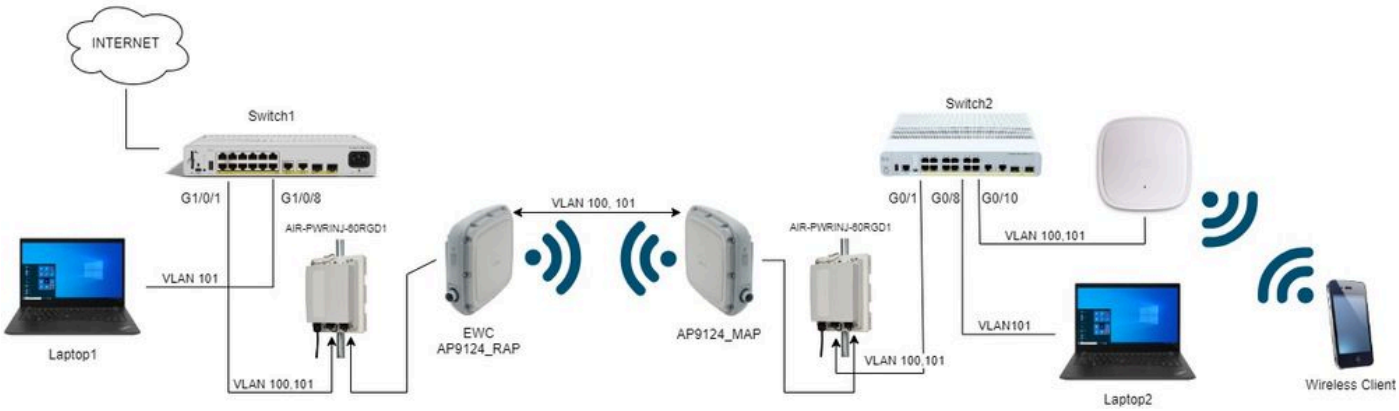
AP9124_RAP具有eWC和根接入点(RAP)角色，而AP9124_MAP则具有MAP角色。

在本实验中，AP C9115也放置在MAP的后面，以展示我们可以让AP通过网状链路加入WLC。

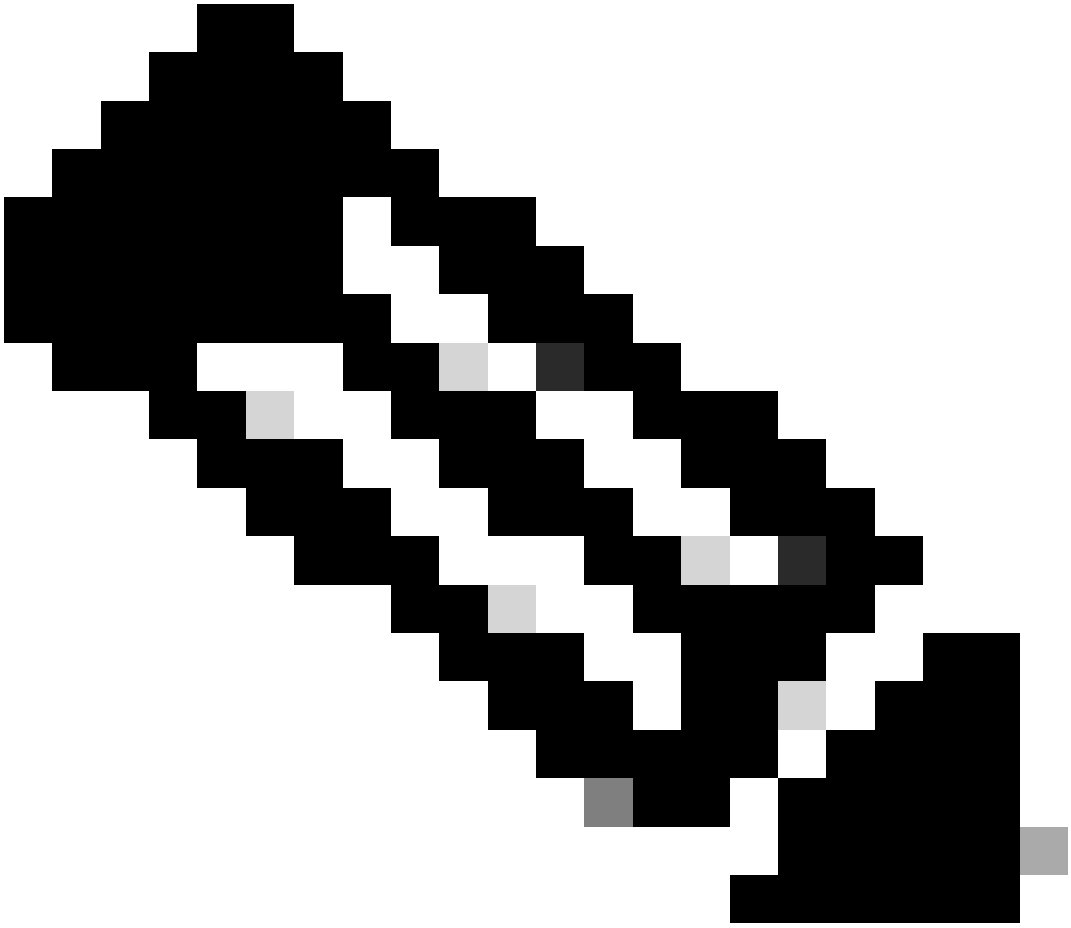
此表包含网络中所有设备的IP地址：

> 注意：标记管理接口可能会导致AP加入内部WLC进程出现问题。如果您决定标记管理接口，请确保相应地配置有线基础设施部分。

设备	IP Address
默认网关	VLAN 100上的静态地址：192.168.100.1
笔记本电脑1	VLAN 101上的DHCP
笔记本电脑2	VLAN 101上的DHCP
Switch1（DHCP服务器）	VLAN 100 SVI：静态VLAN 100:192.168.100.1（DHCP服务器）
Switch1（DHCP服务器）	VLAN 101 SVI：VLAN 101上的静态：192.168.101.1（DHCP服务器）
交换机2	VLAN 100 SVI：VLAN 100上的DHCP
交换机2	VLAN 101 SVI：VLAN 101上的DHCP
9124EWC	VLAN 100上的静态：192.168.100.40
AP9124_RAP	VLAN 100上的DHCP
AP9124_MAP	VLAN 100上的DHCP
AP9115	VLAN 100上的DHCP



网络图



注意：C9124 AP使用AIR-PWRINJ-60RGD1以及Cisco Catalyst 9124AX系列室外接入点硬件安装指南中的准则供电。

配置

本文档假设已经存在运行EWC的AP 9124，根据Catalyst接入点(EWC)上的思科嵌入式无线控制器完成了初始部署。

有关转换过程的其他提示和诀窍，请查看将Catalyst 9100接入点转换为嵌入式无线控制器文档。

交换机配置

以下是交换机的相关配置。

连接AP的交换机端口处于中继模式，本地VLAN设置为100并允许VLAN 101。

在暂存AP期间，您需要将MAP配置为MAP，因此您需要使AP通过以太网加入eWC。此处我们使用

Switch1端口G1/0/2暂存MAP。试运行后，MAP将移动到Switch2。

连接笔记本电脑的交换机端口配置为VLAN 101的接入端口。

交换机1：

```
ip dhcp excluded-address 192.168.101.1 192.168.101.10
ip dhcp excluded-address 192.168.100.1 192.168.100.10
!
ip dhcp pool AP_VLAN100
network 192.168.100.0 255.255.255.0
default-router 192.168.100.1
dns-server 192.168.1.254
!
ip dhcp pool VLAN101
network 192.168.101.0 255.255.255.0
default-router 192.168.101.1
dns-server 192.168.1.254
!
interface GigabitEthernet1/0/1
 description AP9124_RAP (EWC)
 switchport trunk native vlan 100
 switchport trunk allowed vlan 100,101
 switchport mode trunk
 end
interface GigabitEthernet1/0/2
 description AP9124_MAP_Staging
 switchport trunk native vlan 100
 switchport trunk allowed vlan 100,101
 switchport mode trunk
 end
interface GigabitEthernet1/0/8
 description laptop1
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
 end
```

交换机2：

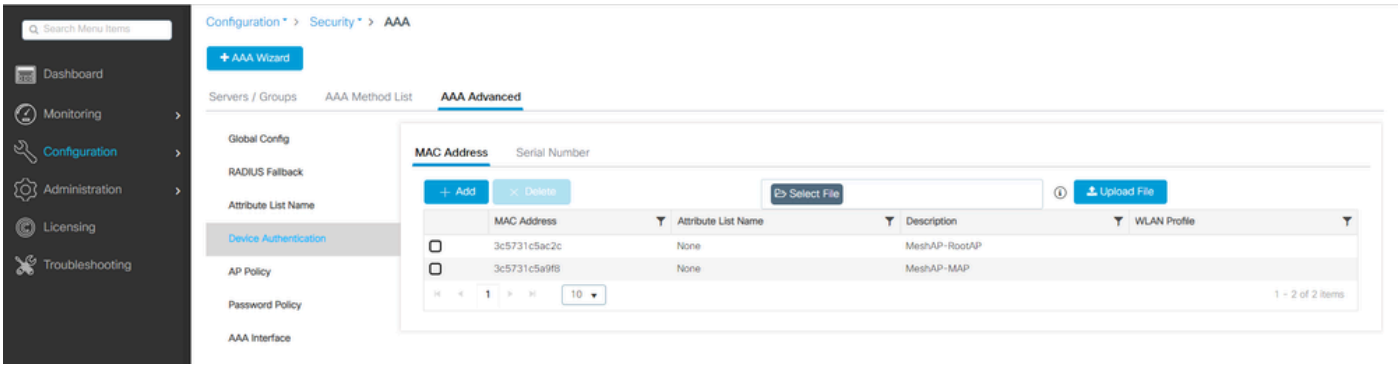
```
interface GigabitEthernet0/1
 description AP9124_MAP
 switchport trunk native vlan 100
 switchport trunk allowed vlan 100,101
 switchport mode trunk
 end
interface GigabitEthernet0/8
 description laptop2
 switchport access vlan 101
 switchport mode access
 spanning-tree portfast edge
 end
interface GigabitEthernet0/1
 description AP9115
```

```
 switchport trunk native vlan 100
 switchport trunk allowed vlan 100,101
 switchport mode trunk
 end
```

EWC和RAP配置

配置EWC AP的Day0后，嵌入式AP需要加入自身。

1. 将根AP和网状AP的以太网MAC地址添加到设备身份验证。转至Configuration > Security > AAA > AAA Advanced > Device Authentication，单击+Add：



设备身份验证中的MAC地址

CLI命令

```
9124EWC(config)#username 3c5731c5ac2c mac description MeshAP-RootAP
9124EWC(config)#username 3c5731c5a9f8 mac description MeshAP-MAP
```

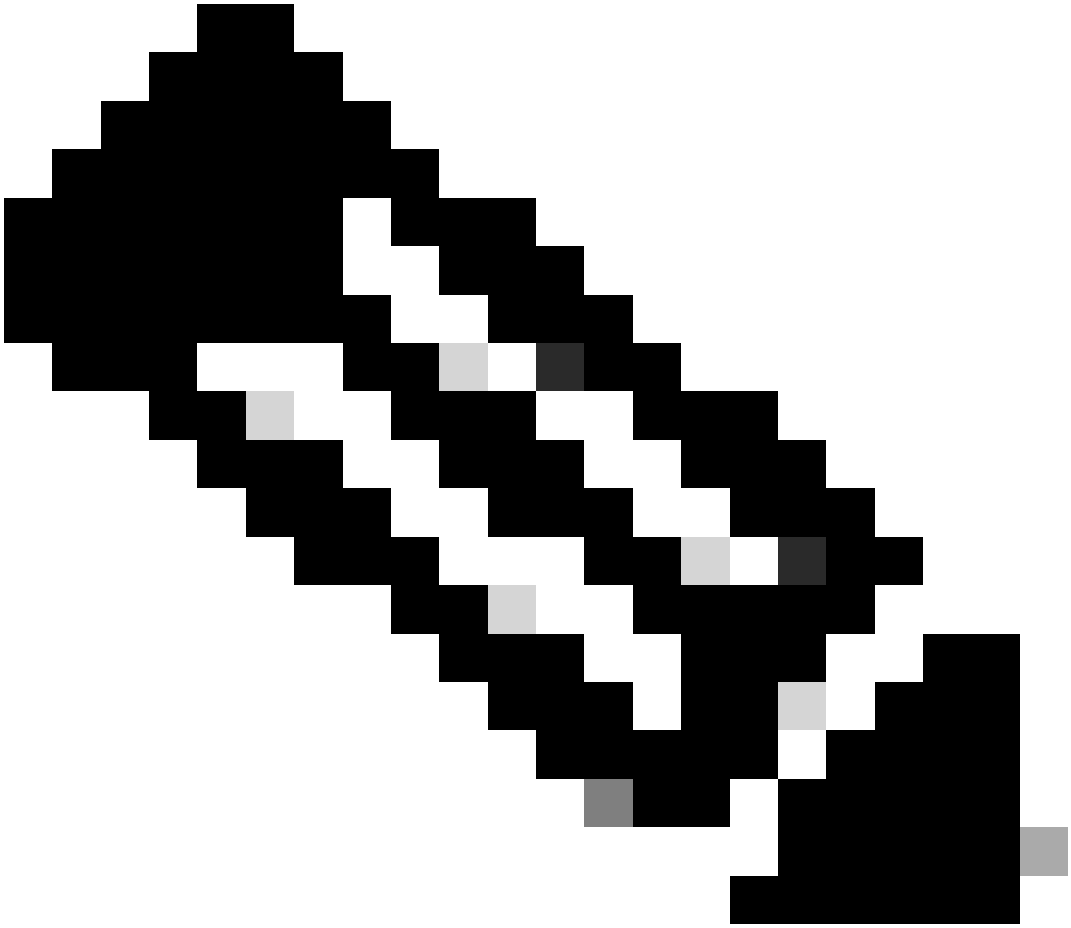
从AP CLI运行“show controllers wired 0”命令可确认以太网MAC地址。根AP示例：

```
AP3C57.31C5.AC2C#show controllers wired 0
wired0 Link encap:Ethernet HWaddr 3C:57:31:C5:AC:2C
```

使用命令wireless ewc-ap ap shell username x可以完成基础AP shell的访问，如下所示：

```
9124EWC#wireless ewc-ap ap shell username admin
[...]
admin@192.168.255.253's password:
AP3C57.31C5.AC2C>en
Password:
AP3C57.31C5.AC2C#
```

```
AP3C57.31C5.AC2C#logout
Connection to 192.168.255.253 closed.
9124EWC#
```



注意：此命令相当于之前在 Mobility Express 控制器中可用的 apciscoshell。

如果在AP配置文件中未指定AP管理用户名和口令，请使用默认用户名Cisco和口令Cisco。

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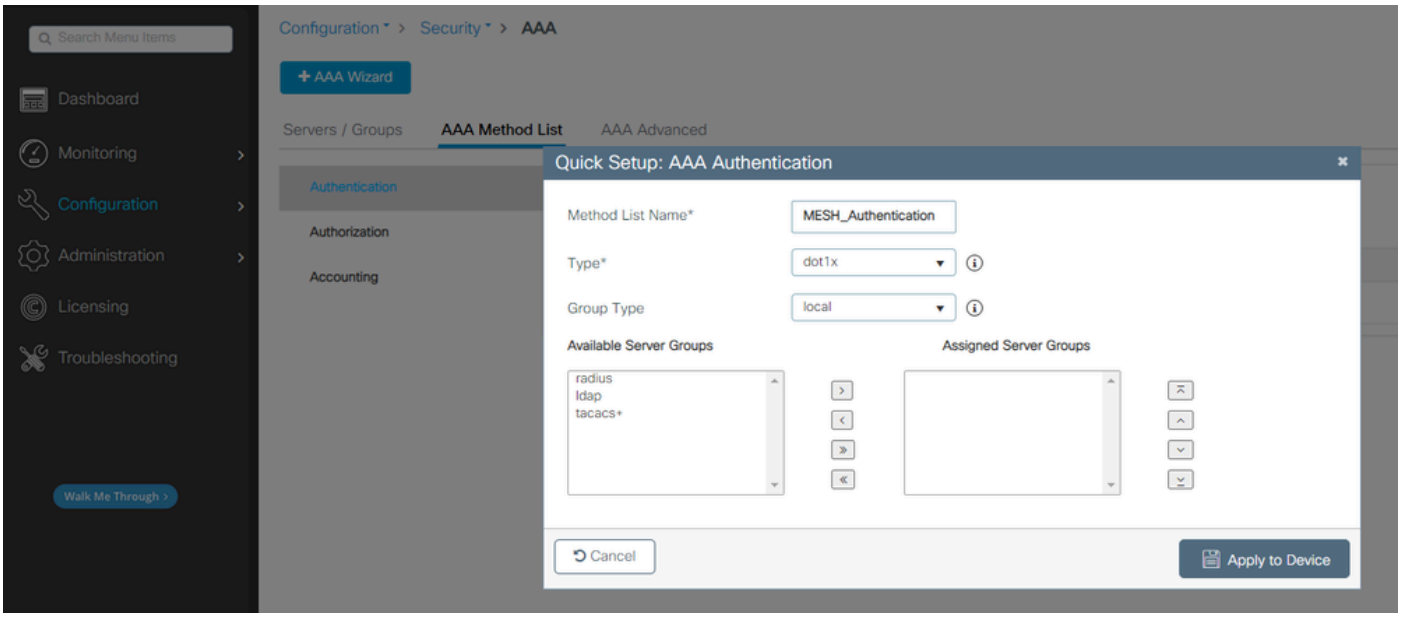
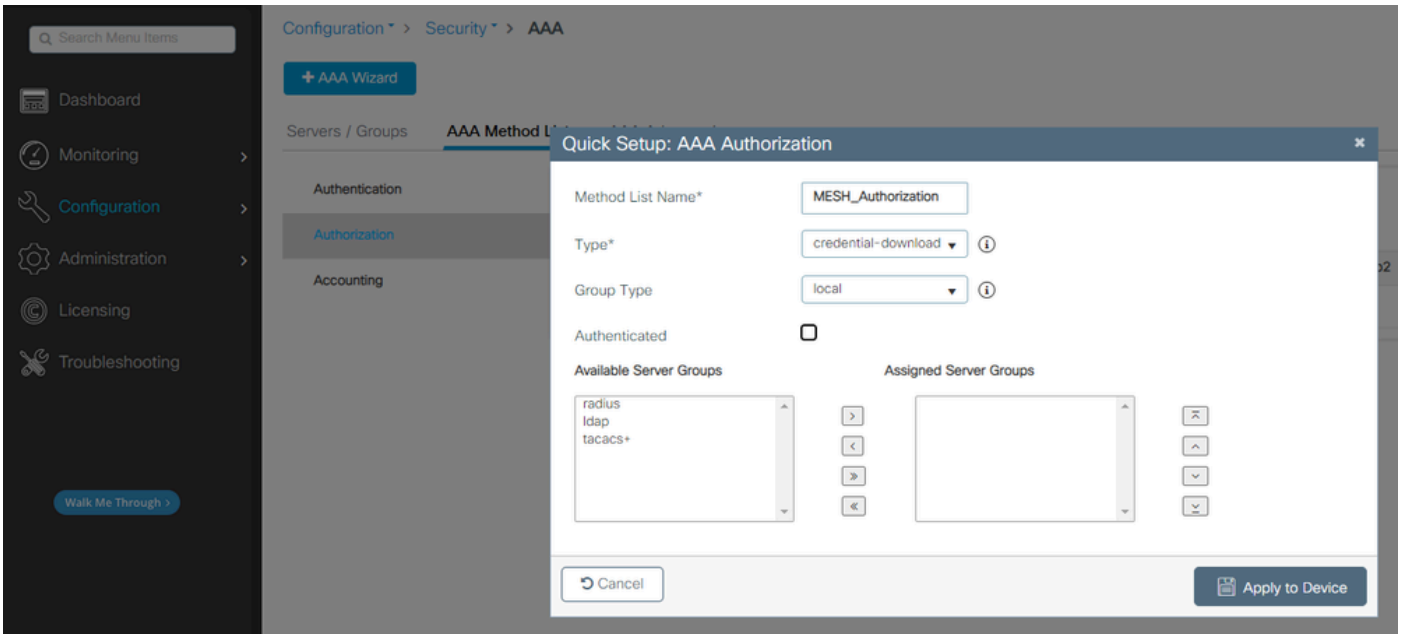
2. 添加身份验证和授权方法：



身份验证方法列表

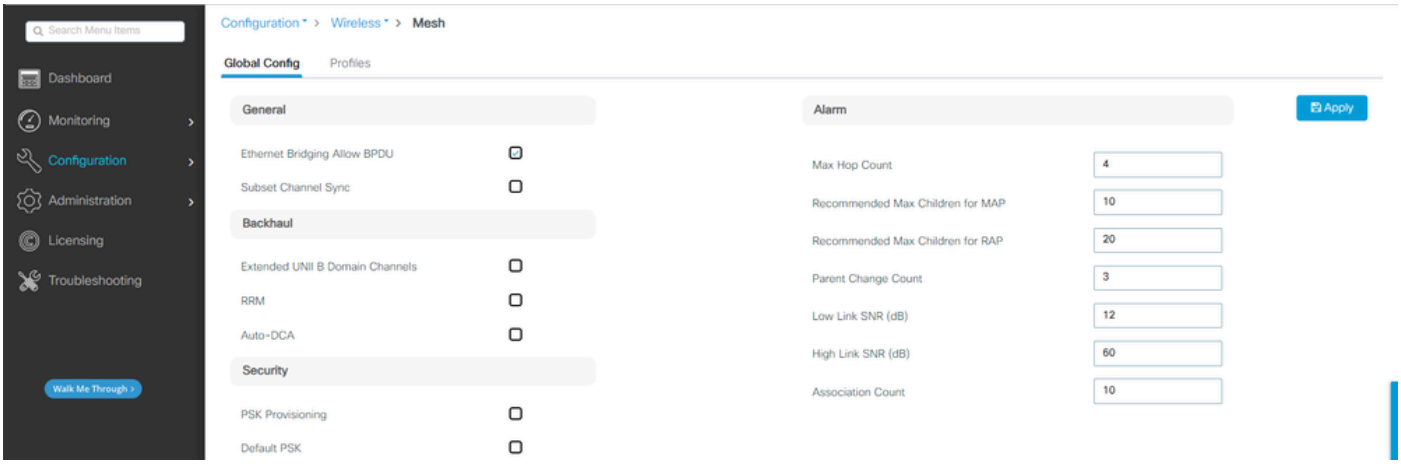


授权方法列表

CLI命令

```
9124EWC(config)#aaa authentication dot1x MESH_Authentication local
9124EWC(config)#aaa authorization credential-download MESH_Authorization local
```

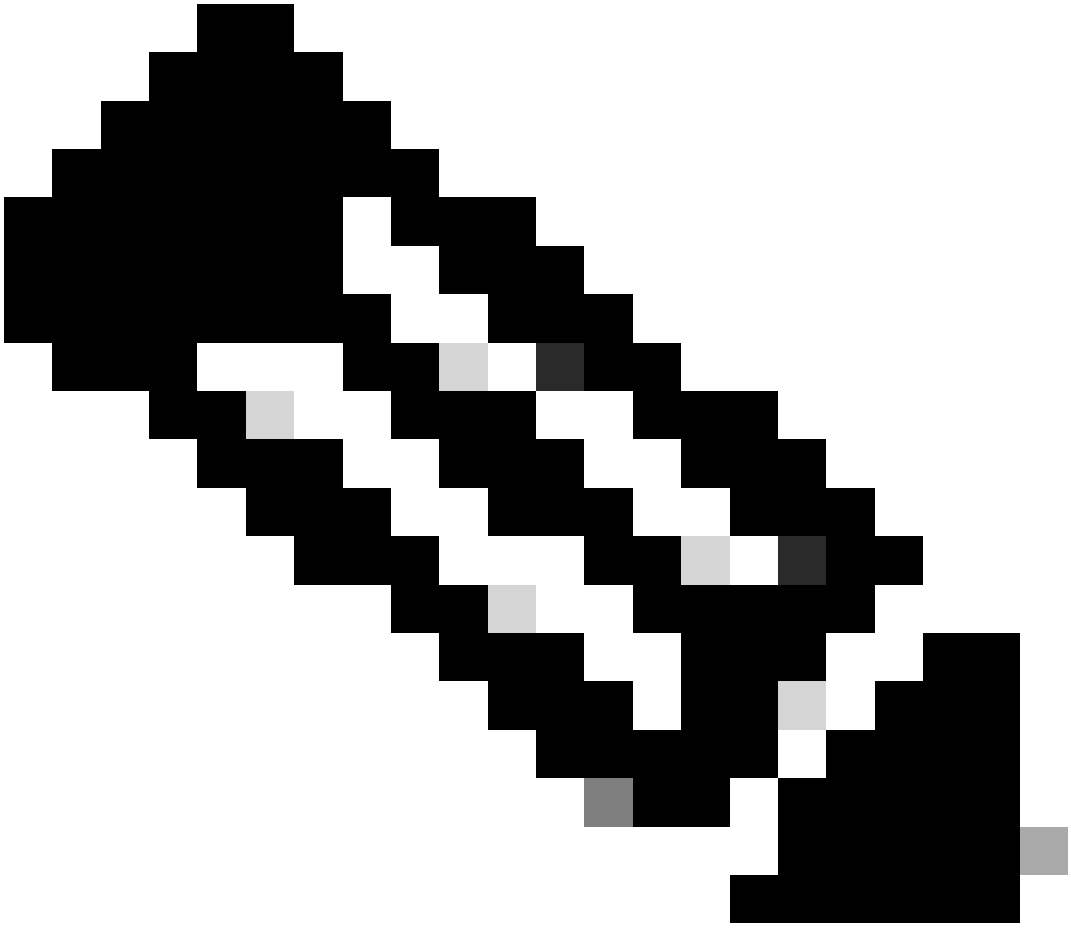
3. 转至配置 > 无线 > 网状。由于本文档中的设置需要以太网桥接，请启用以太网桥接允许BPDU：



以太网桥接允许BPDU

CLI命令

```
9124EWC(config)#wireless mesh ethernet-bridging allow-bdpu
```



注意：默认情况下，网状AP不通过网状链路转发BPDU。

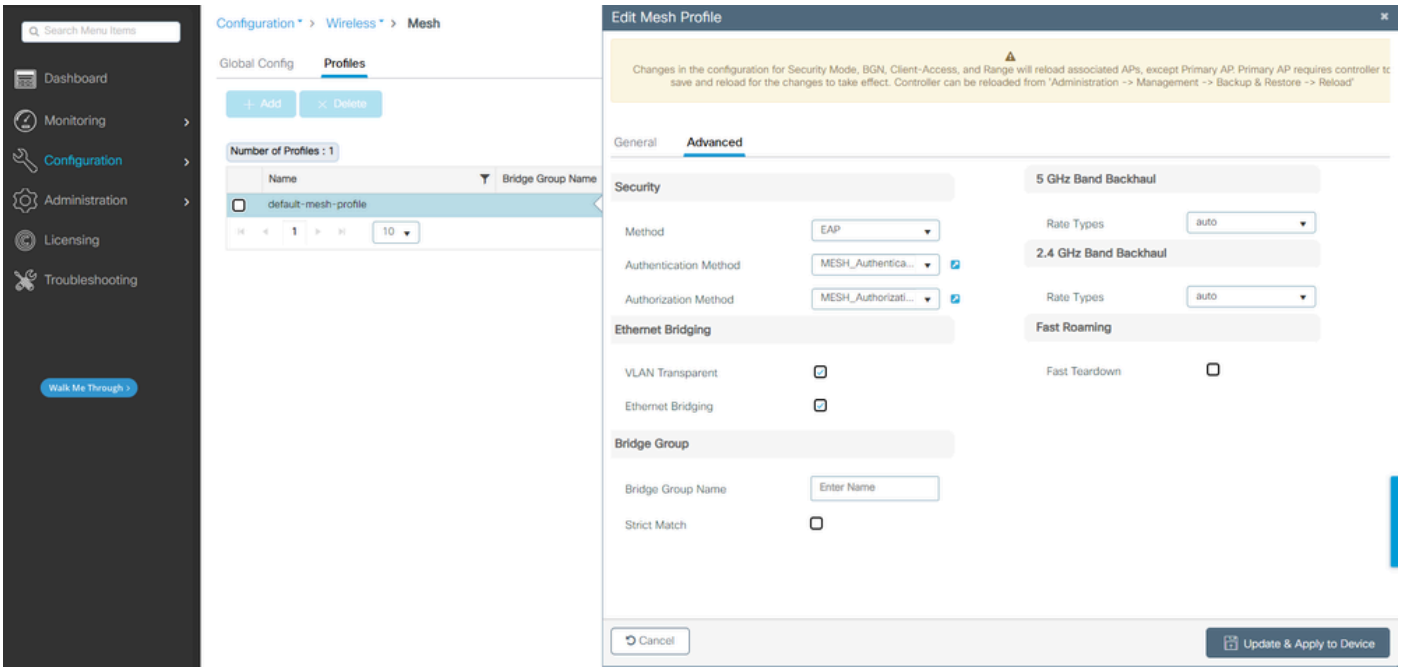
如果两个站点之间没有任何冗余链路，则不需要此链路。

如果有冗余链路，则需要允许BPDU。如果不这样做，就有可能在网络中形成STP环路。

---

4. 配置default-mesh-profile，在其中选择先前配置的AAA身份验证和授权方法。单击并编辑default-mesh-profile。

转到高级选项卡并选择身份验证和授权方法。启用选项Ethernet Briding。



编辑default-map-profile

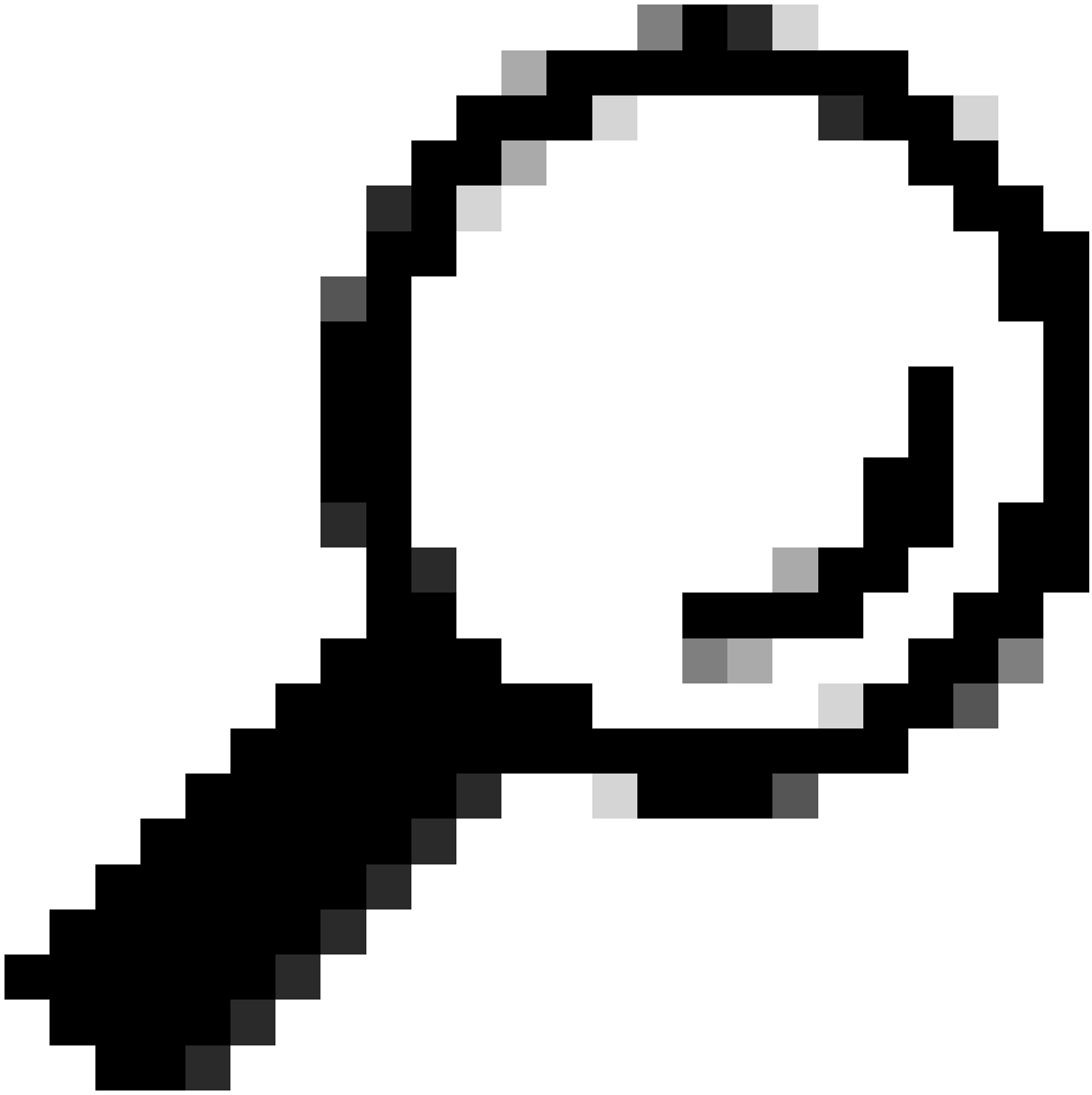
CLI命令

```
9124EWC(config)#wireless profile mesh default-mesh-profile
9124EWC(config-wireless-mesh-profile)#description "default mesh profile"
9124EWC(config-wireless-mesh-profile)#ethernet-bridging
9124EWC(config-wireless-mesh-profile)#ethernet-vlan-transparent
9124EWC(config-wireless-mesh-profile)#method authentication MESH_Authentication
9124EWC(config-wireless-mesh-profile)#method authorization MESH_Authorization
```

选项VLAN Transparent的特殊标注：

此功能确定网状无线接入点如何处理以太网桥接流量的VLAN标记：

- 如果启用了VLAN Transparent，则不会处理VLAN标记，并且数据包会桥接为无标记数据包。
  - 启用VLAN透明模式时，不需要配置以太网端口。以太网端口传递有标记帧和无标记帧，而不解释这些帧。
- 如果VLAN透明模式已禁用，则根据端口上的VLAN配置（中继、接入或正常模式）处理所有数据包。
  - 如果以太网端口设置为中继模式，则必须配置以太网VLAN标记。



提示：要使用AP VLAN标记，必须取消选中VLAN Transparent复选框。

如果不使用VLAN标记，则表示RAP和MAP位于在Trunk端口上配置的本地VLAN上。在这种情况下，如果希望MAP后的其他设备位于本地VLAN（此处为VLAN 100）上，则需要启用VLAN透明。

5. 内部AP加入EWC，您可以使用“show ap summary”命令验证AP加入状态：

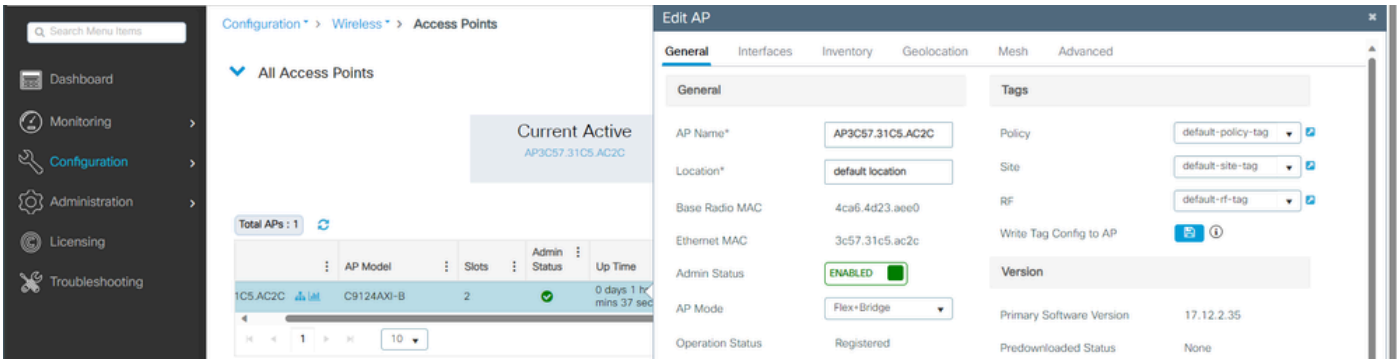
```
9124EWC#show ap summary
Number of APs: 1

CC = Country Code
RD = Regulatory Domain

AP Name                        Slots AP Model           Ethernet MAC   Radio MAC      CC   RD   IP Address                                State       Location
-------------------------------------------------------------------------------------------------------------------------------------------------------------
AP3C57.31C5.AC2C               2     C9124AXI-B         3c57.31c5.ac2c 4ca6.4d23.aee0 US   -B   192.168.100.11                            Registered  default location
```

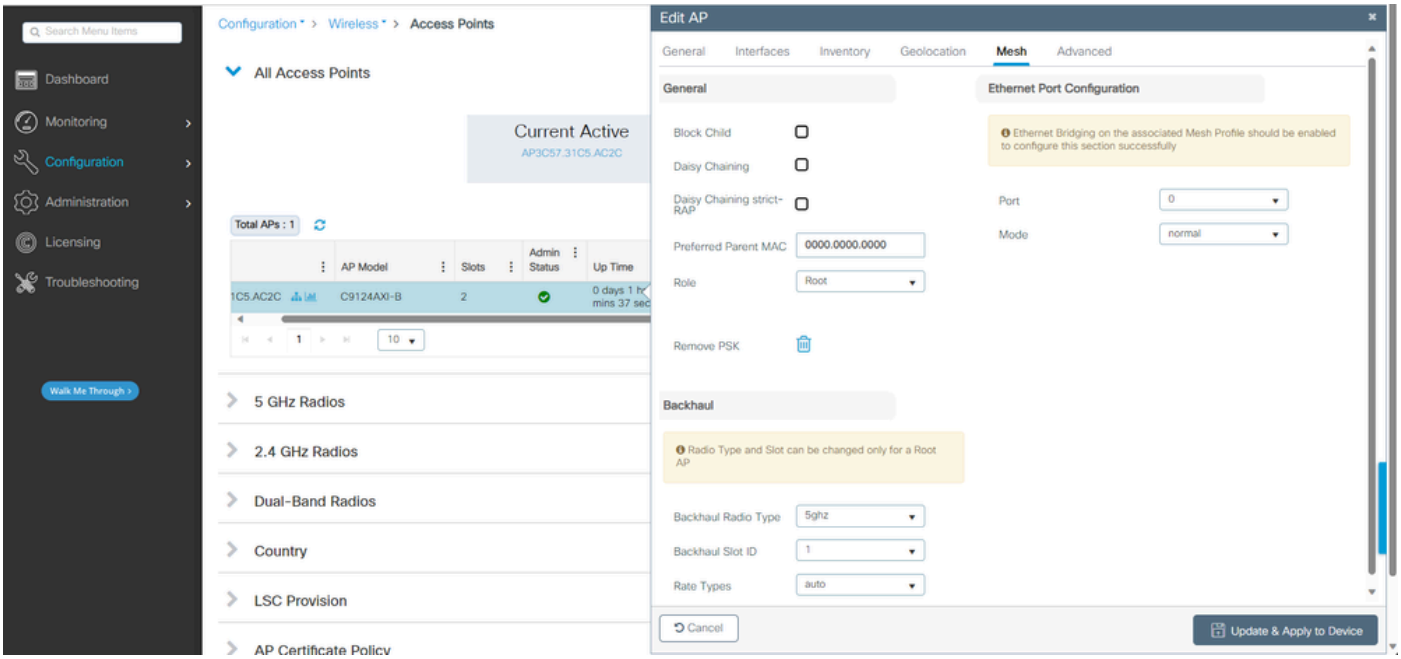
show ap summary

您还可以看到通过GUI加入的AP，其中AP显示为Flex+Bridge模式。为方便起见，您可以立即更改AP的名称。在此设置中，使用的名称是AP9124_RAP：

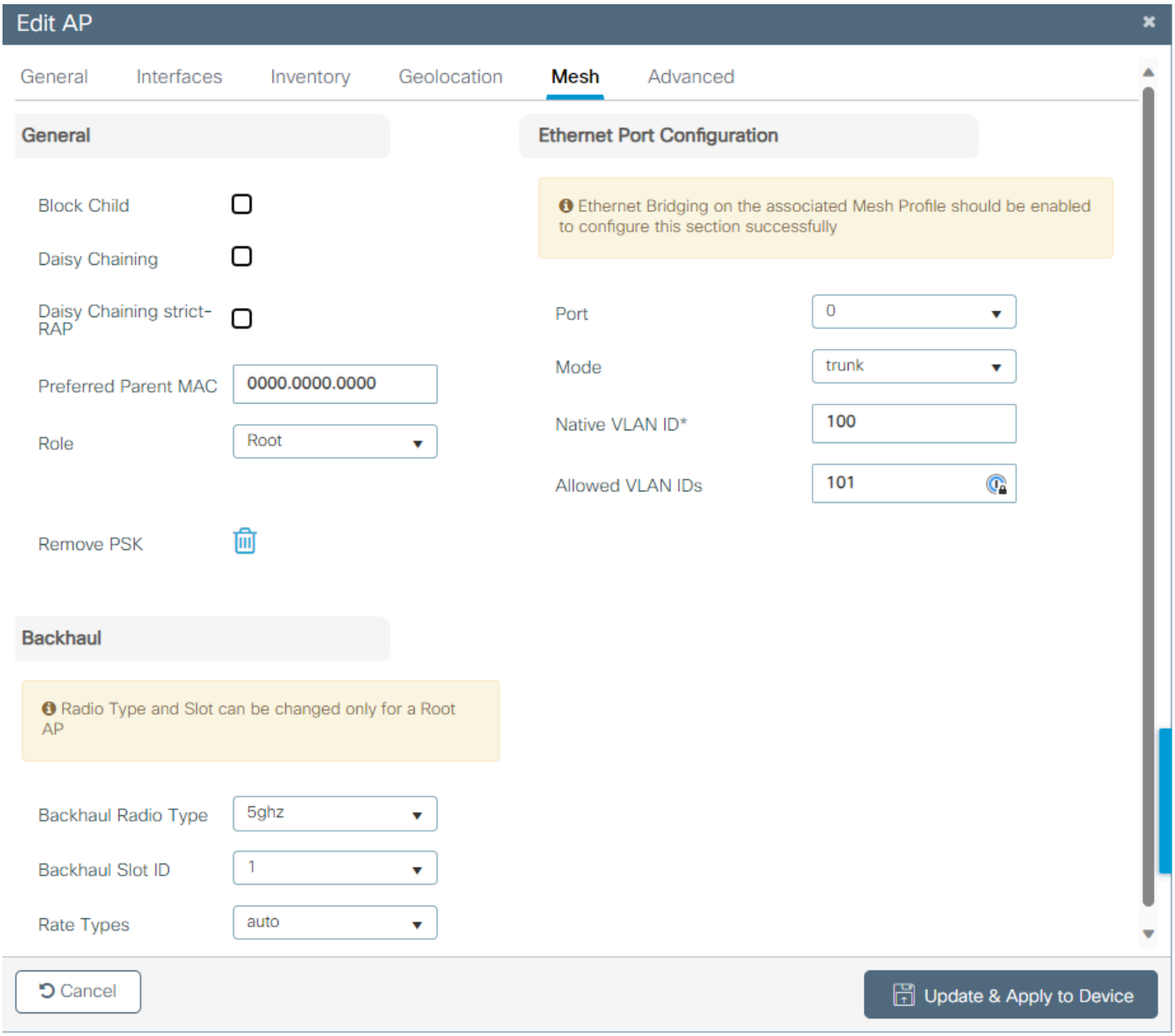


AP一般详细信息

您可以编辑地理位置，然后在Mesh选项卡中，确保其Role配置为Root AP，并且Ethernet Port Configuration设置为trunk并配置相应的VLAN ID：



网状角色根

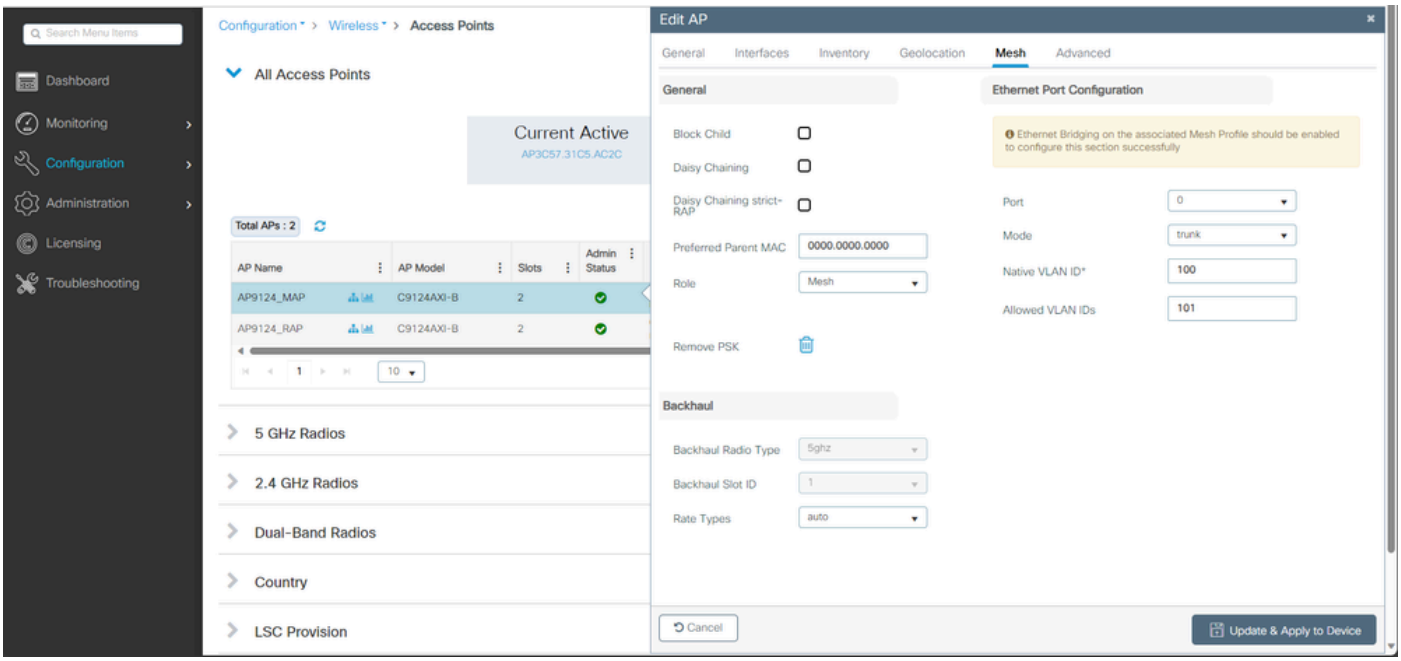


以太网端口配置

配置MAP

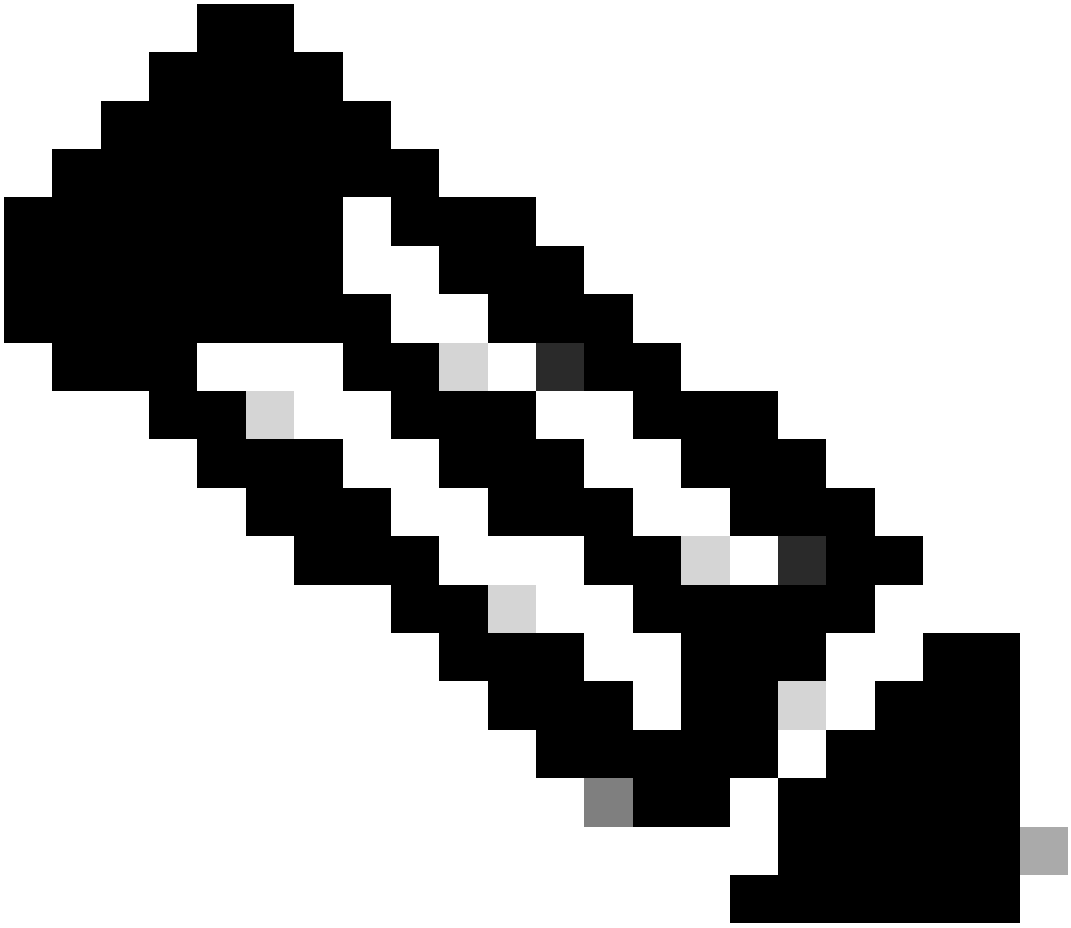
现在是加入9124 MAP的时候了。

1. 将MAP AP连接到Switch1进行试运行。AP加入EWC并在AP列表中显示。将其名称更改为类似于AP9124_MAP的名称，并在Mesh选项卡中将其配置为Mesh Role。点击Update & Apply to Device：



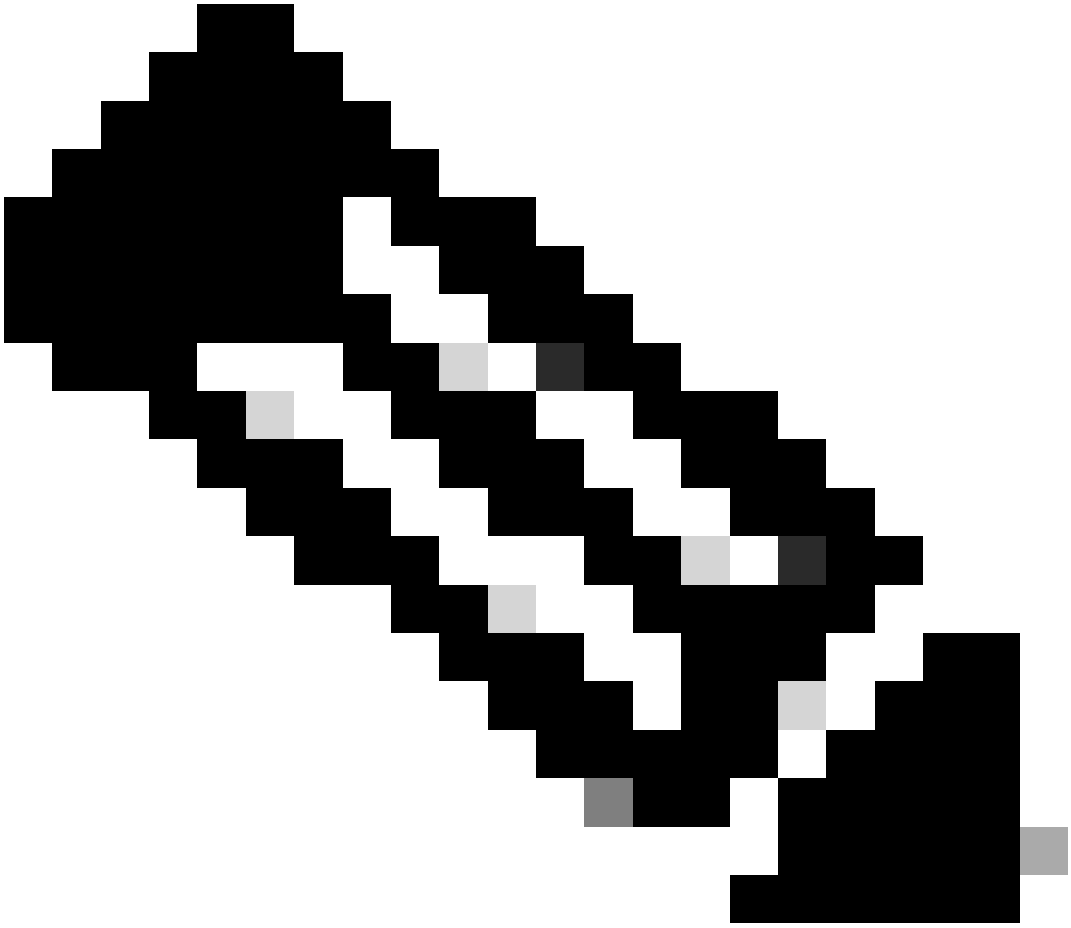
映射配置

2. 从Switch1断开AP连接并根据网络图连接到Switch2。MAP通过无线接口通过RAP加入EWC。



注意：由于AP通过馈电器供电，AP不会关闭，并且由于设置是在受控环境中，因此交换机2在物理上非常接近，我们只需将电缆从一台交换机移到另一台交换机即可。

您可以将控制台电缆连接到AP，并通过控制台查看结果。下面是看到的一些重要消息。



注意：从版本17.12.1开始，802.11AX AP的默认控制台波特率从9600 bps更改为115200 bps。

MAP失去与EWC的连接：

```
AP9124_MAP#
[*01/11/2024 14:08:23.0214] chatter: Device wired0 notify state change link DO
[*01/11/2024 14:08:28.1474] Re-Tx Count=1, Max Re-Tx Value=5, SendSeqNum=83, M
[*01/11/2024 14:08:28.1474]
[*01/11/2024 14:08:31.1485] Re-Tx Count=2, Max Re-Tx Value=5, SendSeqNum=83, M
[*01/11/2024 14:08:31.1486]
[*01/11/2024 14:08:33.4214] chatter: Device wired0 notify state change link UP
[*01/11/2024 14:08:34.1495] Re-Tx Count=3, Max Re-Tx Value=5, SendSeqNum=83, M
[*01/11/2024 14:08:34.1495]
[*01/11/2024 14:08:37.1505] Re-Tx Count=4, Max Re-Tx Value=5, SendSeqNum=84, M
[*01/11/2024 14:08:37.1505]
[*01/11/2024 14:08:40.1515] Re-Tx Count=5, Max Re-Tx Value=5, SendSeqNum=84, M
[*01/11/2024 14:08:40.1515]
```

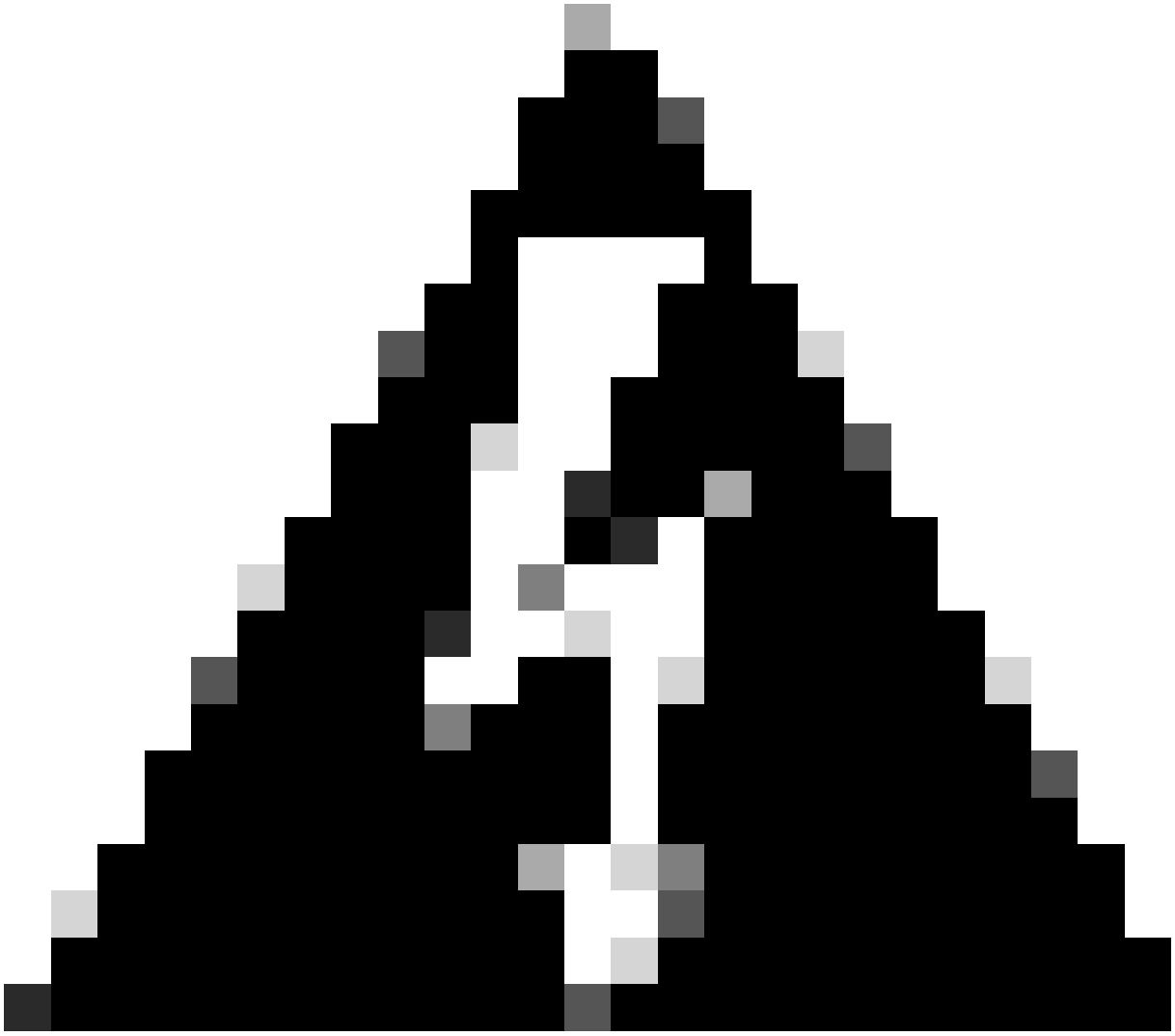
```
[*01/11/2024 14:08:43.1524] Max retransmission count exceeded, going back to D
[...]
[*01/11/2024 14:08:48.1537] CRIT-MeshWiredAdj[0][3C:57:31:C5:A9:F8]: Blocklist
[*01/11/2024 14:08:48.1538] CRIT-MeshWiredAdj[0][3C:57:31:C5:A9:F8]: Remove as
[*01/11/2024 14:08:48.1539] CRIT-MeshLink: Link Down Block Root port Mac: 3C:5
[*01/11/2024 14:08:48.1542] CRIT-MeshWiredBackhaul[0]: Remove as uplink
```

MAP通过无线进入发现模式，并通过无线回传在信道36上找到RAP，找到EWC并加入该信道：

```
[*01/11/2024 14:08:51.3893] CRIT-MeshRadioBackhaul[1]: Set as uplink
[*01/11/2024 14:08:51.3894] CRIT-MeshAwppAdj[1][4C:A6:4D:23:AE:F1]: Set as Par
[*01/11/2024 14:08:51.3915] wlan: [0:I:CMN_MLME] mlme_ext_vap_down: VAP (mon0)
[*01/11/2024 14:08:51.3926] wlan: [0:I:CMN_MLME] mlme_ext_vap_down: VAP (apbhr
[*01/11/2024 14:08:51.4045] wlan: [0:I:CMN_MLME] mlme_ext_vap_up: VAP (apbhr0)
[*01/11/2024 14:08:51.4053] wlan: [0:I:CMN_MLME] mlme_ext_vap_up: VAP (mon0) t
[*01/11/2024 14:08:53.3898] CRIT-MeshLink: Set Root port Mac: 4C:A6:4D:23:AE:F
[*01/11/2024 14:08:53.3904] Mesh Reconfiguring DHCP.
[*01/11/2024 14:08:53.8680] DOT11_UPLINK_EV: wgb_uplink_set_port_authorized: c
[*01/11/2024 14:08:53.9232] CRIT-MeshSecurity: Mesh Security successful auther
[...]
[*01/11/2024 14:09:48.4388] Discovery Response from 192.168.100.40
[*01/11/2024 14:09:59.0000] Started wait dtls timer (60 sec)
[*01/11/2024 14:09:59.0106]
[*01/11/2024 14:09:59.0106] CAPWAP State: DTLS Setup
[*01/11/2024 14:09:59.0987] dtls_verify_server_cert: Controller certificate ve
[*01/11/2024 14:09:59.8466]
[*01/11/2024 14:09:59.8466] CAPWAP State: Join
[*01/11/2024 14:09:59.8769] Sending Join request to 192.168.100.40 through por
[*01/11/2024 14:10:04.7842] Sending Join request to 192.168.100.40 through por
[*01/11/2024 14:10:04.7953] Join Response from 192.168.100.40, packet size 139
[...]
[*01/11/2024 14:10:06.6919] CAPWAP State: Run
[*01/11/2024 14:10:06.8506] AP has joined controller 9124EWC
[*01/11/2024 14:10:06.8848] Flexconnect Switching to Connected Mode!
[...]
```

MAP现在通过RAP加入EWC。

现在，AP C9115可以获取VLAN 100上的IP地址，然后加入EWC：



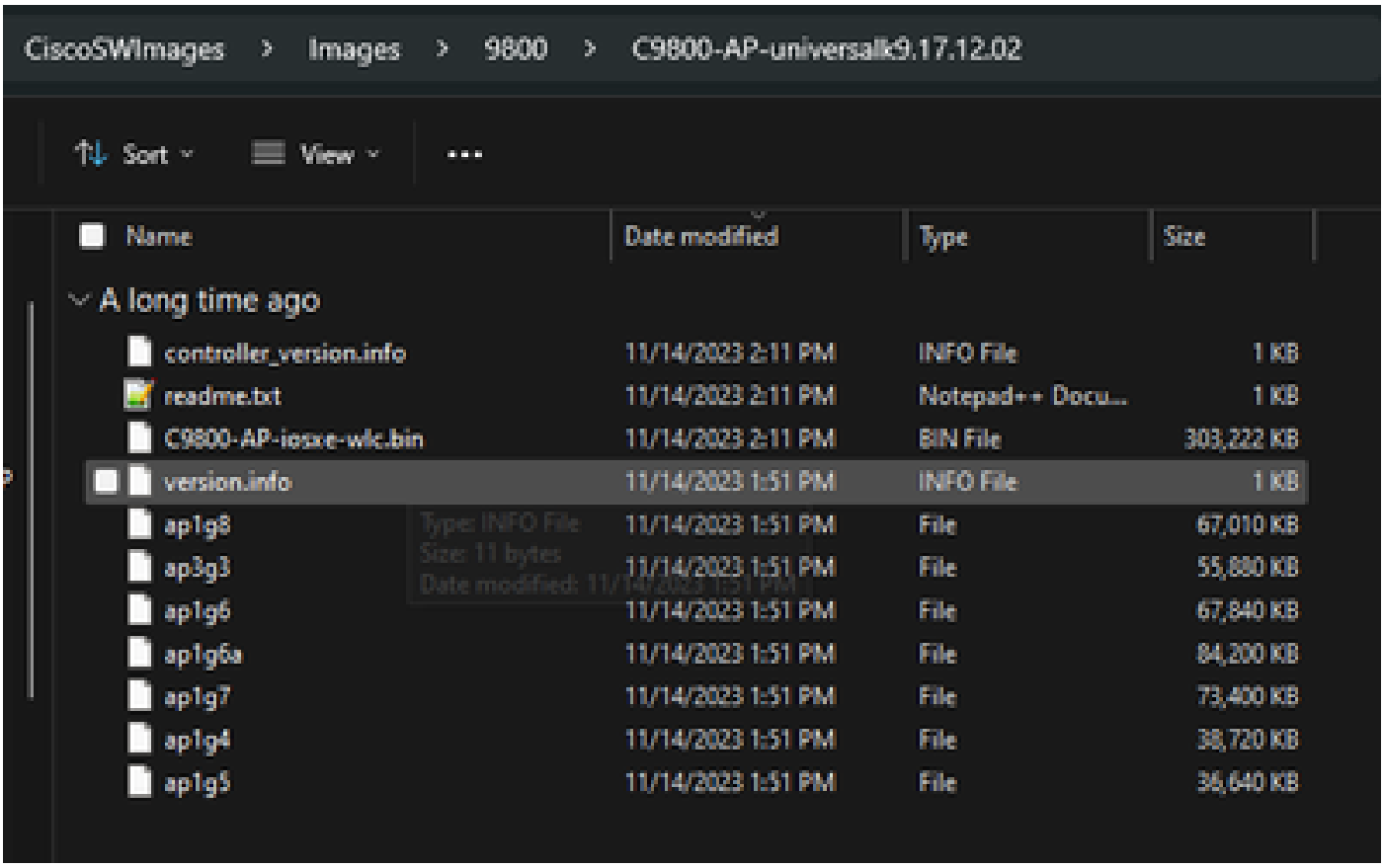
警告：请记住，VLAN 100是交换机端口中继本地VLAN。为了使来自VLAN 100中的AP的流量到达VLAN 100中的WLC，网状链路必须启用VLAN Transparent。此操作在网状配置文件以太网桥接部分完成。

```
[*01/19/2024 11:40:55.0710] ethernet_port wired0, ip 192.168.100.14, netmask 2
[*01/19/2024 11:40:58.2070]
[*01/19/2024 11:40:58.2070] CAPWAP State: Init
[*01/19/2024 11:40:58.2150]
[*01/19/2024 11:40:58.2150] CAPWAP State: Discovery
[*01/19/2024 11:40:58.2400] Discovery Request sent to 192.168.100.40, discover
[*01/19/2024 11:40:58.2530] Discovery Request sent to 255.255.255.255, discove
[*01/19/2024 11:40:58.2600]
[*01/19/2024 11:40:58.2600] CAPWAP State: Discovery
[*01/19/2024 11:40:58.2670] Discovery Response from 192.168.100.40
[*01/19/2024 11:40:58.2670] Found Configured MWAR '9124EWC' (respIdx 1).
[*01/19/2024 15:13:56.0000] Started wait dtls timer (60 sec)
[*01/19/2024 15:13:56.0070]
[*01/19/2024 15:13:56.0070] CAPWAP State: DTLS Setup
[...]
```

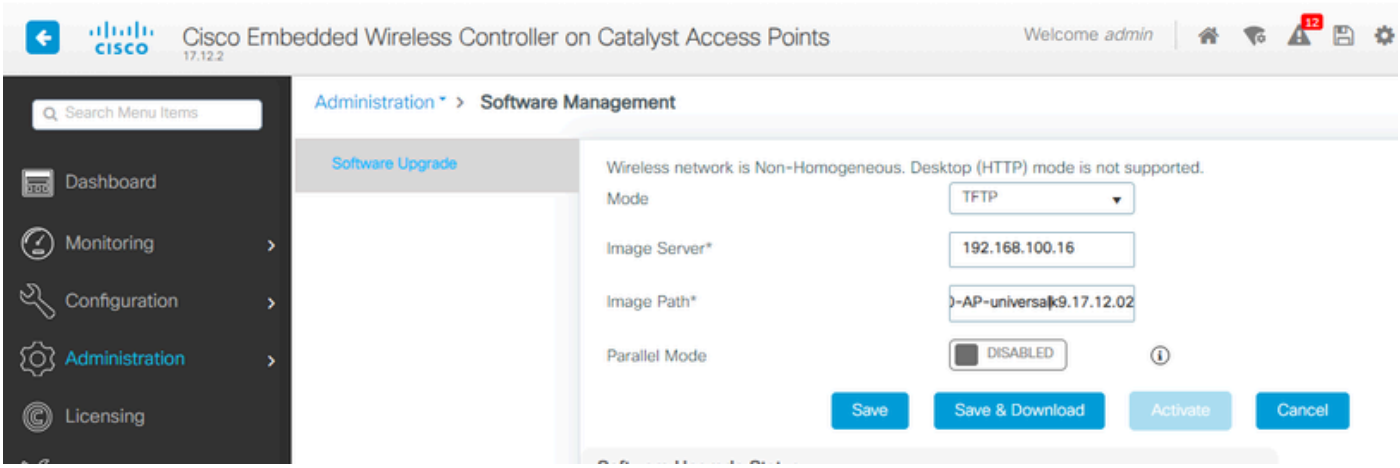
```
[*01/19/2024 15:13:56.1660] dtls_verify_server_cert: Controller certificate ve
[*01/19/2024 15:13:56.9000] sudi99_request_check_and_load: Use HARSA SUDI cert
[*01/19/2024 15:13:57.2980]
[*01/19/2024 15:13:57.2980] CAPWAP State: Join
[*01/19/2024 15:13:57.3170] shared_setenv PART_BOOTCNT 0 &> /dev/null
[*01/19/2024 15:13:57.8620] Sending Join request to 192.168.100.40 through por
[*01/19/2024 15:14:02.8070] Sending Join request to 192.168.100.40 through por
[*01/19/2024 15:14:02.8200] Join Response from 192.168.100.40, packet size 139
[*01/19/2024 15:14:02.8200] AC accepted previous sent request with result code
[*01/19/2024 15:14:03.3700] Received wlcType 2, timer 30
[*01/19/2024 15:14:03.4440]
[*01/19/2024 15:14:03.4440] CAPWAP State: Image Data
[*01/19/2024 15:14:03.4440] AP image version 17.12.2.35 backup 17.9.4.27, Cont
[*01/19/2024 15:14:03.4440] Version is the same, do not need update.
[*01/19/2024 15:14:03.4880] status 'upgrade.sh: Script called with args:[NO_UP
[*01/19/2024 15:14:03.5330] do NO_UPGRADE, part2 is active part
[*01/19/2024 15:14:03.5520]
[*01/19/2024 15:14:03.5520] CAPWAP State: Configure
[*01/19/2024 15:14:03.5600] Telnet is not supported by AP, should not encode t
[*01/19/2024 15:14:03.6880] Radio [1] Administrative state DISABLED change to
[*01/19/2024 15:14:03.6890] Radio [0] Administrative state DISABLED change to
[*01/19/2024 15:14:03.8670]
[*01/19/2024 15:14:03.8670] CAPWAP State: Run
[*01/19/2024 15:14:03.9290] AP has joined controller 9124EWC
[*01/19/2024 15:14:03.9310] Flexconnect Switching to Connected Mode!
```

由于这是EWC AP，因此它只包含与其自己的型号对应的AP映像（此处的C9124运行ap1g6a）。当您加入不同的AP型号时，就会出现非同构网络。

在这些情况下，如果AP的版本不同，则它需要下载相同的版本，因此，请确保您具有有效的TFTP/SFTP服务器和位置，以及已在EWC > Administration > Software Management中配置的AP映像：

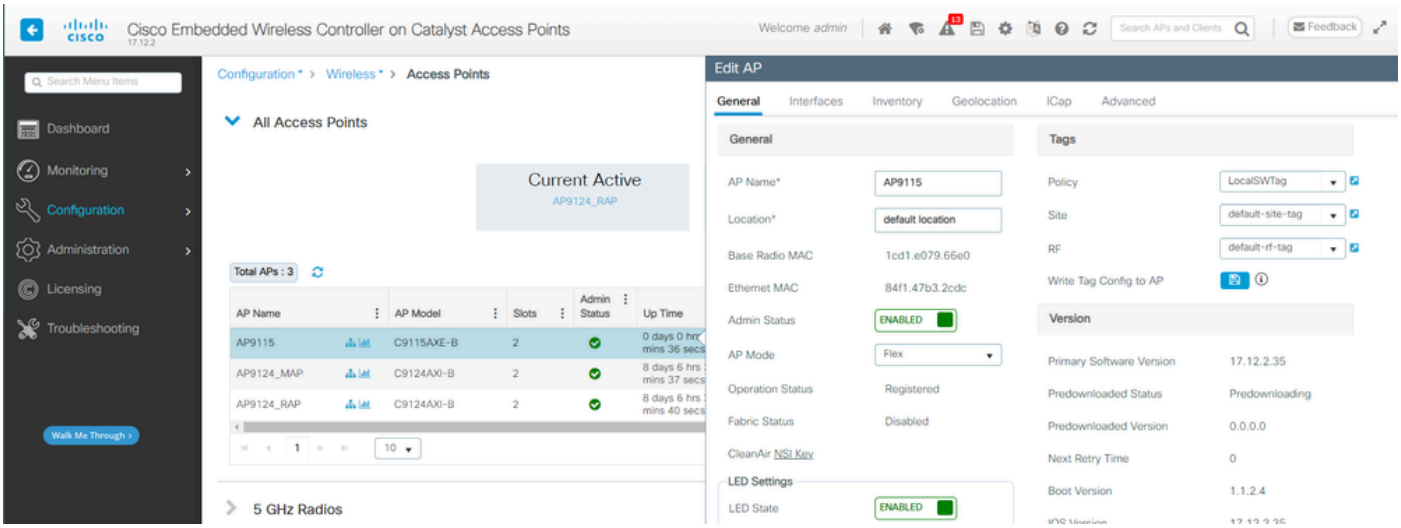


TFTP服务器及AP镜像文件夹

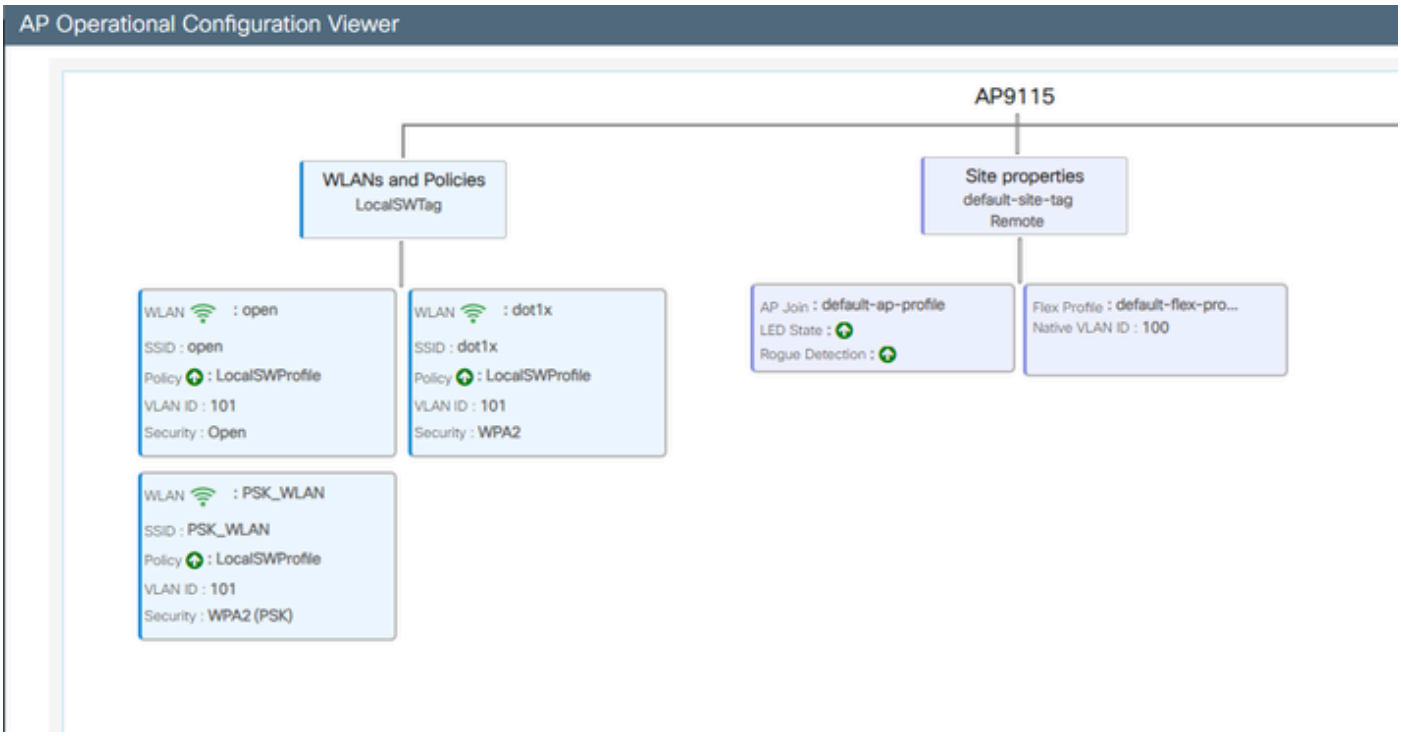


AP映像

AP显示在AP列表中，您可以分配PolicyTag：



包含9115详细信息的AP列表



AP操作视图

验证

您能通过GUI看到网状树，如果使用命令“show wireless mesh ap tree”，该网状树也会提供CLI的输出。在GUI中，转到Monitoring > Wireless > Mesh：

网状AP树

在RAP和MAP上，您可以使用命令“show mesh backhaul”验证网状回程：

```
AP9124_RAP#show mesh backhaul
Wired Backhaul: 0 [3C:57:31:C5:AC:2C]
idx Cost Uplink InterfaceType
0   16   TRUE   WIRED
Mesh Wired Adjacency Info
Flags: Parent(P), Child(C), Reachable(R), CapwapUp(W), BlockListed(B) Authenticated(A)
Address           Cost RawCost BlistCount Flags: P C R W B A  Reject reason
3C:57:31:C5:AC:2C 16   16      0           T/F: T F T T F T  Filtered


----------------------------------------------------------------
Wired Backhaul: 1 [3C:57:31:C5:AC:2C]
idx Cost    Uplink InterfaceType
1   Invalid FALSE  WIRED
Mesh Wired Adjacency Info
Flags: Parent(P), Child(C), Reachable(R), CapwapUp(W), BlockListed(B) Authenticated(A)
Address           Cost RawCost BlistCount Flags: P C R W B A  Reject reason
3C:57:31:C5:AC:2C 16   16      0           T/F: F F F F F F  Filtered


----------------------------------------------------------------
Radio Backhaul: 0 [4C:A6:4D:23:AE:F1]
idx State   Role   RadioState Cost    Uplink Downlink Access ShutDown ChildrenAllowed BlockChildState InterfaceType
2   INITIAL ACCESS UP         Invalid FALSE  FALSE    TRUE   FALSE    FALSE           ALLOWED         RADIO

No Radio Adjacency Exists


----------------------------------------------------------------------------
Radio Backhaul: 1 [4C:A6:4D:23:AE:F1]
idx State Role     RadioState Cost    Uplink Downlink Access ShutDown ChildrenAllowed BlockChildState InterfaceType
3   MAINT DOWNLINK UP         Invalid FALSE  TRUE     FALSE  FALSE    TRUE            ALLOWED         RADIO
Mesh AWPP Radio adjacency info
Flags: Parent(P), Child(C), Neighbor(N), Reachable(R), CapwapUp(W),
       BlockListed(B), Authenticated(A), HTCapable(H), VHTCapable(V)
       OldParent(O), BGScan(S)
Address           Cost    RawCost LinkCost ReportedCost Snr BCount Ch Width  Bgn Flags: P O C N R W B A H V S Reject reason
4C:A6:4D:23:9D:51 Invalid Invalid 0        0            76  0      36 20 MHz -   (T/F): F F T F T F F T T T F -


----------------------------------------------------------------------------
```

RAP show mesh backhaul

```
AP9124_MAP#show mesh backhaul
Wired Backhaul: 0 [3C:57:31:C5:A9:F8]
idx Cost    Uplink InterfaceType
0   Invalid FALSE  WIRED
Mesh Wired Adjacency Info
Flags: Parent(P), Child(C), Reachable(R), CapwapUp(W), BlockListed(B) Authenticated(A)
Address           Cost RawCost BlistCount Flags: P C R W B A  Reject reason
3C:57:31:C5:A9:F8 16   16      32           T/F: F F T F T T  Blocklisted: GW UNREACHABLE


----------------------------------------------------------------
Wired Backhaul: 1 [3C:57:31:C5:A9:F8]
idx Cost    Uplink InterfaceType
1   Invalid FALSE  WIRED
Mesh Wired Adjacency Info
Flags: Parent(P), Child(C), Reachable(R), CapwapUp(W), BlockListed(B) Authenticated(A)
Address           Cost RawCost BlistCount Flags: P C R W B A  Reject reason
3C:57:31:C5:A9:F8 16   16      0            T/F: F F F F F F  Filtered


----------------------------------------------------------------
Radio Backhaul: 0 [4C:A6:4D:23:9D:51]
idx State   Role   RadioState Cost    Uplink Downlink Access ShutDown ChildrenAllowed BlockChildState InterfaceType
2   INITIAL ACCESS UP         Invalid FALSE  FALSE    TRUE   FALSE    FALSE           ALLOWED         RADIO

No Radio Adjacency Exists


-------------------------------------------------------------------------------
Radio Backhaul: 1 [4C:A6:4D:23:9D:51]
Hops to Root: 1
idx State Role   RadioState Cost Uplink Downlink Access ShutDown ChildrenAllowed BlockChildState InterfaceType
3   MAINT UPLINK UP         217  TRUE   TRUE     FALSE  FALSE    TRUE            ALLOWED         RADIO
Mesh AWPP Radio adjacency info
Flags: Parent(P), Child(C), Neighbor(N), Reachable(R), CapwapUp(W),
       BlockListed(B), Authenticated(A), HTCapable(H), VHTCapable(V)
       OldParent(O), BGScan(S)
Address           Cost RawCost LinkCost ReportedCost Snr BCount Ch Width  Bgn Flags: P O C N R W B A H V S Reject reason
4C:A6:4D:23:AE:F1 217  272     256      16           70  0      36 20 MHz -   (T/F): T F F T T T F T T T F -


-------------------------------------------------------------------------------

AP9124_MAP#!
```

MAP show mesh backhaul

您可以在AP端验证网状VLAN中继配置：

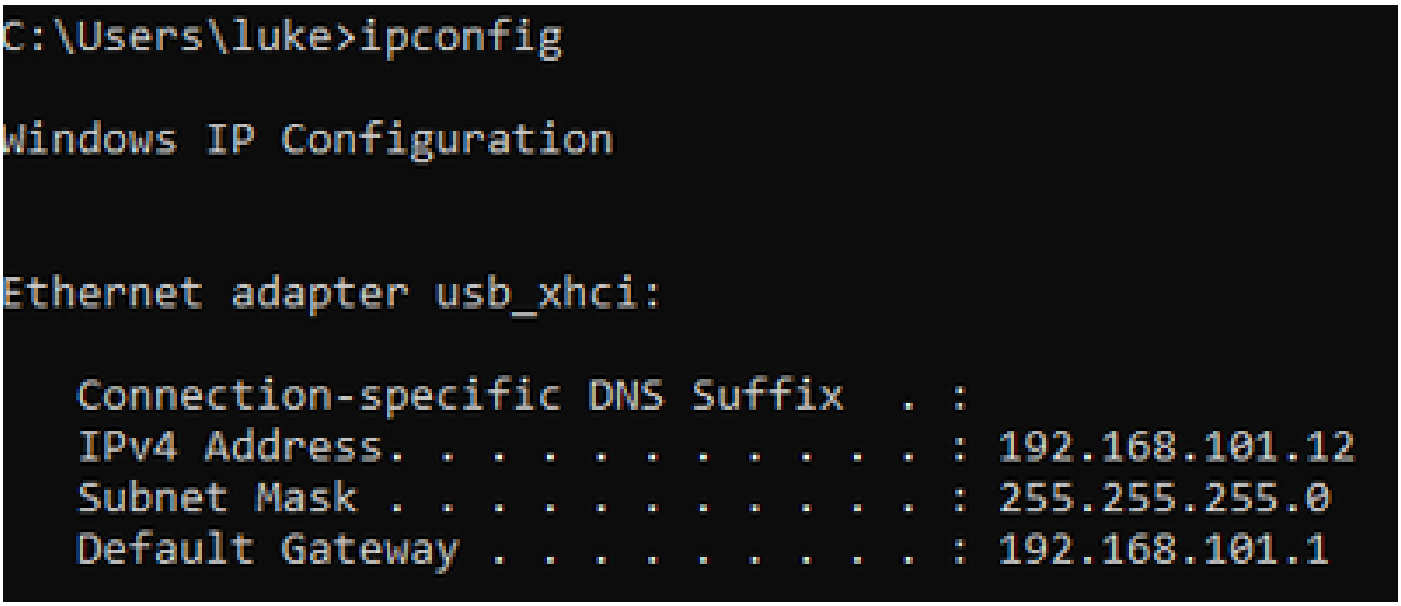
```
AP9124_RAP#show mesh ethernet vlan config static
Static (Stored) ethernet VLAN Configuration

Ethernet Interface: 0
Interface Mode: TRUNK
Native Vlan: 100
Allowed Vlan: 101,

Ethernet Interface: 1
Interface Mode: ACCESS
Native Vlan: 0
Allowed Vlan:
```

```
Ethernet Interface: 2
Interface Mode: ACCESS
Native Vlan: 0
Allowed Vlan:
```

连接到Switch2的Laptop2收到了来自VLAN 101的IP地址：



放置在Switch1上的Laptop1收到来自VLAN 101的IP地址：

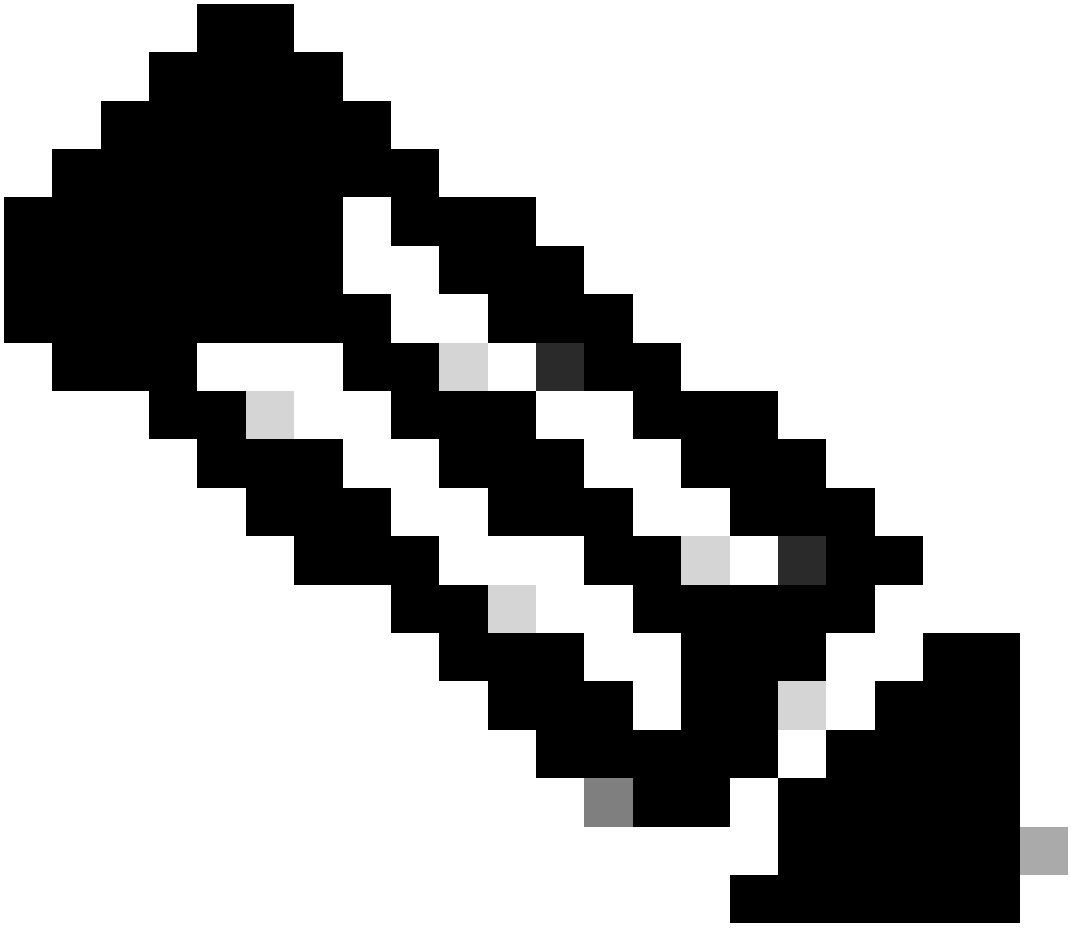
```
Ethernet adapter Ethernet 6_White:

Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::d1d6:f607:ff02:4217%18
IPv4 Address. . . . . : 192.168.101.13
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.101.1
```

```
C:\Users\tantunes>ping 192.168.101.12 -i 192.168.101.13

Pinging 192.168.101.12 with 32 bytes of data:
Reply from 192.168.101.12: bytes=32 time=5ms TTL=128
Reply from 192.168.101.12: bytes=32 time=5ms TTL=128
Reply from 192.168.101.12: bytes=32 time=7ms TTL=128
Reply from 192.168.101.12: bytes=32 time=5ms TTL=128

Ping statistics for 192.168.101.12:
Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
Minimum = 5ms, Maximum = 7ms, Average = 5ms
```



注意：请注意，要在Windows设备之间测试ICMP，您需要在系统防火墙上允许ICMP。默认情况下，Windows设备会在系统防火墙中阻止ICMP。

用于验证以太网桥接的另一个简单测试是两台交换机上都有用于VLAN 101的SVI，并且将Switch2 SVI设置为DHCP。用于VLAN 101的Switch2 SVI从VLAN 101获取IP地址，您可以对Switch 1 VLAN 101 SVI执行VLAN 101连接检查：

<#root>

```
Switch2#show ip int br
Interface IP-Address OK? Method Status Protocol
Vlan1 unassigned YES NVRAM up down
Vlan100 192.168.100.61 YES DHCP up up
```

Vlan101 192.168.101.11 YES DHCP up up

```
GigabitEthernet0/1 unassigned YES unset up up
```

```
[...]
Switch2#
Switch2#ping 192.168.101.1 source 192.168.101.11
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.101.1, timeout is 2 seconds:
Packet sent with a source address of 192.168.101.11
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 3/4/7 ms
Switch2#
```

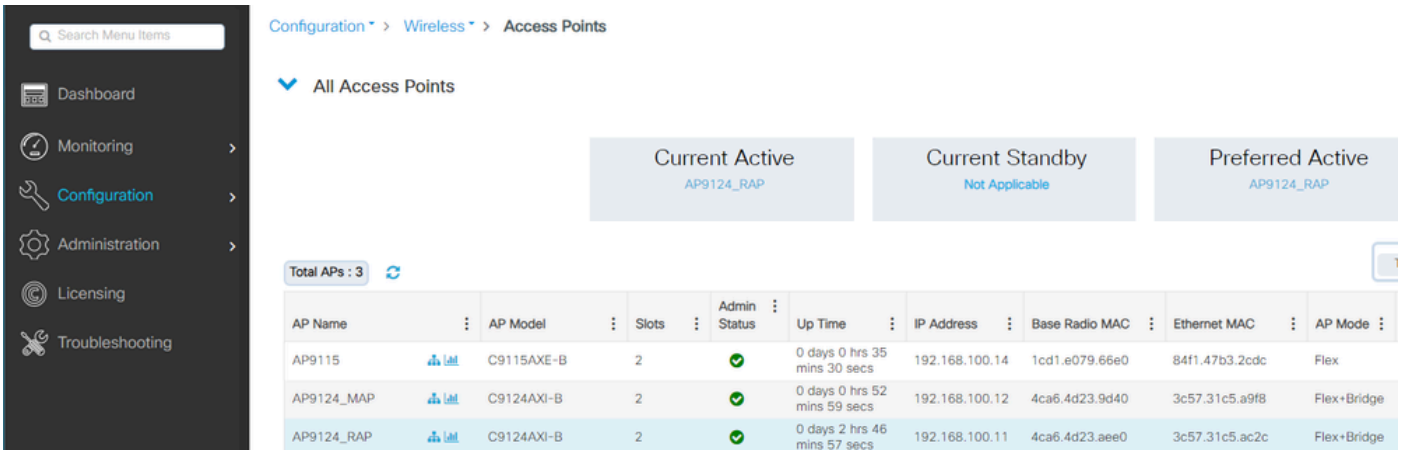
<#root>

```
Switch1#sh ip int br
Interface IP-Address OK? Method Status Protocol
Vlan1 192.168.1.11 YES NVRAM up up
Vlan100 192.168.100.1 YES NVRAM up up
```

Vlan101 192.168.101.1 YES NVRAM up up

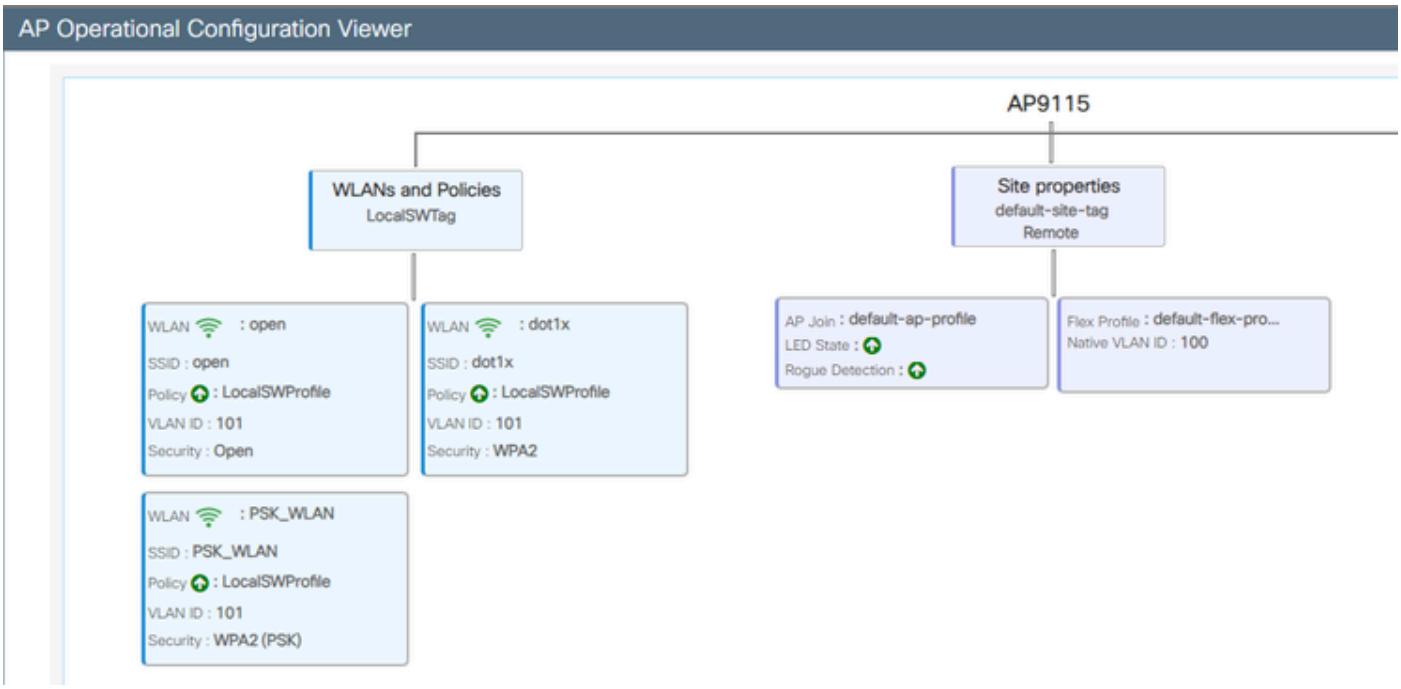
```
GigabitEthernet1/0/1 unassigned YES unset up up
[...]
Switch1#ping 192.168.101.11 source 192.168.101.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.101.11, timeout is 2 seconds:
Packet sent with a source address of 192.168.101.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 4/6/8 ms
Switch1#
```

本地模式AP C9115也加入EWC：



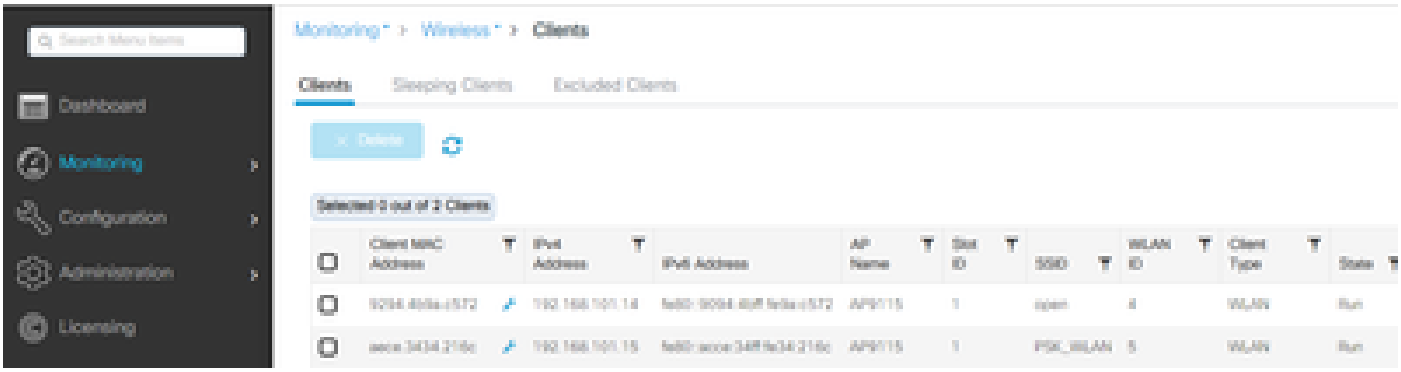
AP 9115已加入EWC

已创建3个映射到策略配置文件的WLAN（开放式、PSK和dot1x），并在访问策略中定义了VLAN 101：



AP9115运行配置

无线客户端可以连接到WLAN：



故障排除

本节提供了有用的命令和一些提示、技巧和建议。

有用的命令

在RAP/MAP上：

```
AP9124_RAP#show mesh
  adjacency              MESH Adjacency
  backhaul               MESH backhaul
  bgscan                 MESH Background Scanning
  channel                MESH channels
  client-debug-filter    MESH client debugging filter set
  config                 MESH config paramenter
  convergence            MESH convergence info
  dfs                    MESH dfs information
  dhcp                   Flex-mesh Internal DHCP Server
  ethernet               show mesh ethernet bridging
  forwarding             MESH Forwarding
  history                MESH history of events
  least-congested-scan   Mesh least congested channel scan
  linktest               MESH linktest stats
  nat                    Flex-mesh NAT/PAT
  res                    MESH RES info
  security               MESH Security Show
  stats                  MESH stats
  status                 MESH status
  stp                    MESH daisychain STP info
  timers                 MESH Adjacency timers
```

show mesh

```
AP9124_RAP#debug mesh
  adjacency        MESH adjacency debugs
  ap-link          MESH link debugs
  bg-scan          Mesh background scanning debugs
  channel          MESH channel debugs
  clear            RESET all MESH debugs
  client           Debug mesh clients
  convergence      MESH convergence debugs
  dhcp             MESH Internal DHCP debugs
  dump-pkts        Dump mesh packets
  events           MESH events
  filter           MESH debug filter
  forward-mcast    Mesh forwarding mcast debugs
  forward-table    Mesh forwarding table debugs
  history          MESH history of events
  level            Enable different mesh debug levels
  linktest         Mesh linktest debugs
  nat              Mesh NAT debugs
  path-control     MESH path-control debugs
  port-control     MESH port-control debugs
  security         MESH security debugs
  stp              MESH daisychain STP debugs
  wpa_supplicant   Mesh WPA_SUPPLICANT debugs
  wstp             MESH WSTP debugs
```

RAP/MAP调试网状选项

在WLC上：

```
9124EWC#show wireless mesh ?
  airtime-fairness           Shows Mesh AP Airtime Fairness information
  ap                         Shows mesh AP related information
  cac                        Shows Mesh AP cac related information
  config                     Show mesh configurations
  convergence                Show mesh convergence details.
  ethernet                   Show wireless mesh ethernet
  neighbor                   Show neighbors of all connected mesh Aps
  persistent-ssid-broadcast  Shows Mesh AP persistent ssid broadcast
                             information
  rrm                        Show wireless mesh rrm information
```

show wireless mesh

要在WLC上进行调试，最佳起点是将RadioActive跟踪与MAP/RAP的MAC地址配合使用。

示例1：RAP从MAP接收邻接关系并成功进行身份验证

<#root>

```
AP9124_RAP#show debug
mesh:
adjacent packet debugging is enabled
event debugging is enabled
mesh linktest debug debugging is enabled
Jan 16 14:47:01 AP9124_RAP kernel: [*01/16/2024 14:47:01.9559] EVENT-MeshRadio
Jan 16 14:47:01 AP9124_RAP kernel: [*01/16/2024 14:47:01.9559] EVENT-MeshAwppA
Jan 16 14:47:01 AP9124_RAP kernel: [*01/16/2024 14:47:01.9560] EVENT-MeshAwppA
Jan 16 14:47:01 AP9124_RAP kernel: [*01/16/2024 14:47:01.9570] CLSM[4C:A6:4D:2
Jan 16 14:47:04 AP9124_RAP kernel: [*01/16/2024 14:47:04.9588] EVENT-MeshRadio
Jan 16 14:47:04 AP9124_RAP kernel: [*01/16/2024 14:47:04.9592] EVENT-MeshLink:
Jan 16 14:47:04 AP9124_RAP kernel: [*01/16/2024 14:47:04.9600] EVENT-MeshSecur
Jan 16 14:47:05 AP9124_RAP kernel: [*01/16/2024 14:47:05.1008] EVENT-MeshSecur
Jan 16 14:47:05 AP9124_RAP kernel: [*01/16/2024 14:47:05.1011] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.1172] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.1173] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.1173] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2033] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2139] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2139] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2143] EVENT-MeshSecur
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2143] EVENT-MeshSecur

Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2143] EVENT-MeshLink:

Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2143] EVENT-MeshLink:
```

```
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2144] EVENT-MeshLink:
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2146] EVENT-MeshAwppA

Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2147] EVENT-MeshAwppA
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2151] EVENT-MeshAwppA
Jan 16 14:47:06 AP9124_RAP kernel: [*01/16/2024 14:47:06.2151] EVENT-MeshAwppA
Jan 16 14:47:19 AP9124_RAP kernel: [*01/16/2024 14:47:19.3576] EVENT-MeshRadio
Jan 16 14:47:19 AP9124_RAP kernel: [*01/16/2024 14:47:19.3577] EVENT-MeshRadio
Jan 16 14:47:19 AP9124_RAP kernel: [*01/16/2024 14:47:19.3577] EVENT-MeshRadio
```

示例2：MAP Mac地址未添加到WLC或添加不正确

<#root>

```
Jan 16 14:52:13 AP9124_RAP kernel: [*01/16/2024 14:52:13.6402] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7407] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7408] EVENT-MeshRadio
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7409] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7411] EVENT-MeshLink:
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7419] EVENT-MeshSecur
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7583] EVENT-MeshSecur
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7586] EVENT-MeshSecur
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7586] EVENT-MeshSecur

Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7620] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7620] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7621] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7621] 0x3c 0x57 0x31
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7621] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7621] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7621] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7622] 0xff 0xff 0xff
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7622] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7622] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7622] 0xaa 0xff 0x00
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7622] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7623] INFO-MeshAwppAd
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7623] 0xaa 0xff 0xaa
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7623] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7636] EVENT-MeshRadio
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7637] INFO-MeshRadioE
Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7642] EVENT-MeshLink:

Jan 16 14:52:15 AP9124_RAP kernel: [*01/16/2024 14:52:15.7642] EVENT-MeshSecur
```

示例3：RAP丢失MAP

<#root>

```
Jan 16 14:48:58 AP9124_RAP kernel: [*01/16/2024 14:48:58.9929] INFO-MeshRadioE
Jan 16 14:48:59 AP9124_RAP kernel: [*01/16/2024 14:48:59.2889] INFO-MeshAwppAc
Jan 16 14:48:59 AP9124_RAP kernel: [*01/16/2024 14:48:59.7894] INFO-MeshAwppAc
Jan 16 14:48:59 AP9124_RAP kernel: [*01/16/2024 14:48:59.9931] INFO-MeshRadioE
Jan 16 14:48:59 AP9124_RAP kernel: [*01/16/2024 14:48:59.9932] INFO-MeshRadioE
Jan 16 14:49:00 AP9124_RAP kernel: [*01/16/2024 14:49:00.2891] INFO-MeshAwppAc
Jan 16 14:49:00 AP9124_RAP kernel: [*01/16/2024 14:49:00.7891] INFO-MeshAwppAc
Jan 16 14:49:00 AP9124_RAP kernel: [*01/16/2024 14:49:00.9937] INFO-MeshRadioE
Jan 16 14:49:00 AP9124_RAP kernel: [*01/16/2024 14:49:00.9938] INFO-MeshRadioE
Jan 16 14:49:01 AP9124_RAP kernel: [*01/16/2024 14:49:01.2891] INFO-MeshAwppAc

Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5480] EVENT-MeshAwppA


Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5481] EVENT-MeshRadio

Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5481] EVENT-MeshRadio


Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5488] EVENT-MeshRadio


Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5489] INFO-MeshRadioE

Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5501] EVENT-MeshRadio


Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5501] EVENT-MeshAdj[1


Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5502] EVENT-MeshRadio
Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5511] EVENT-MeshLink
Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5512] EVENT-MeshSecur
Jan 16 14:49:25 AP9124_RAP kernel: [*01/16/2024 14:49:25.5513] EVENT-MeshLink
```

提示、技巧和建议

- 通过在线路将MAP和RAP升级到相同的映像版本，我们避免通过空中下载映像（这在“脏”RF环境中可能会出现问题）。
- 强烈建议在现场部署之前，在受控环境中测试设置。
- 如果在两端测试与windows笔记本电脑之间的以太网桥接，请注意，要在Windows设备之间测试ICMP，您需要在系统防火墙上允许ICMP。默认情况下，Windows设备会在系统防火墙中阻止ICMP。
- 如果使用带有外部天线的AP，请务必参考部署指南，检查哪些天线兼容，以及应该插入哪个端口。
- 为了通过网状链路桥接来自不同VLAN的流量，需要禁用VLAN透明功能。
- 请考虑在AP本地放置系统日志服务器，因为它可以提供调试信息，否则只能通过控制台连接使用。

参考

Catalyst接入点产品手册中的思科嵌入式无线控制器

Catalyst接入点上的思科嵌入式无线控制器(EWC)白皮书

在Mobility Express AP上配置带有以太网桥接的点对点网状链路

关于此翻译
思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

请注意：即使是最好的机器翻译，其准确度也不及专业翻译人员的水平。

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