

在Catalyst 9800无线LAN控制器上配置网状

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简介

本文档介绍如何将网状无线接入点(AP)连接到Catalyst 9800无线LAN控制器(WLC)的基本配置示例

先决条件

要求

Cisco 建议您了解以下主题：

- Catalyst无线9800配置型号
- LAP的配置
- 无线接入点的控制和提供(CAPWAP)
- 配置外部DHCP服务器
- 思科交换机的配置

使用的组件

本示例使用轻量接入点（1572AP和1542），可以将其配置为根AP(RAP)或网状AP(MAP)以加入Catalyst 9800 WLC。1542或1562接入点的操作步骤相同。RAP通过Cisco Catalyst交换机连接到Catalyst 9800 WLC。

本文档中的信息基于以下软件和硬件版本：

- C9800-CL v16.12.1
- Cisco 第2层交换机
- Cisco Aironet 1572系列轻型室外网桥接入点部分

- 适用于Flex+Bridge部分的Cisco Aironet 1542

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。

配置

案例研究1：网桥模式

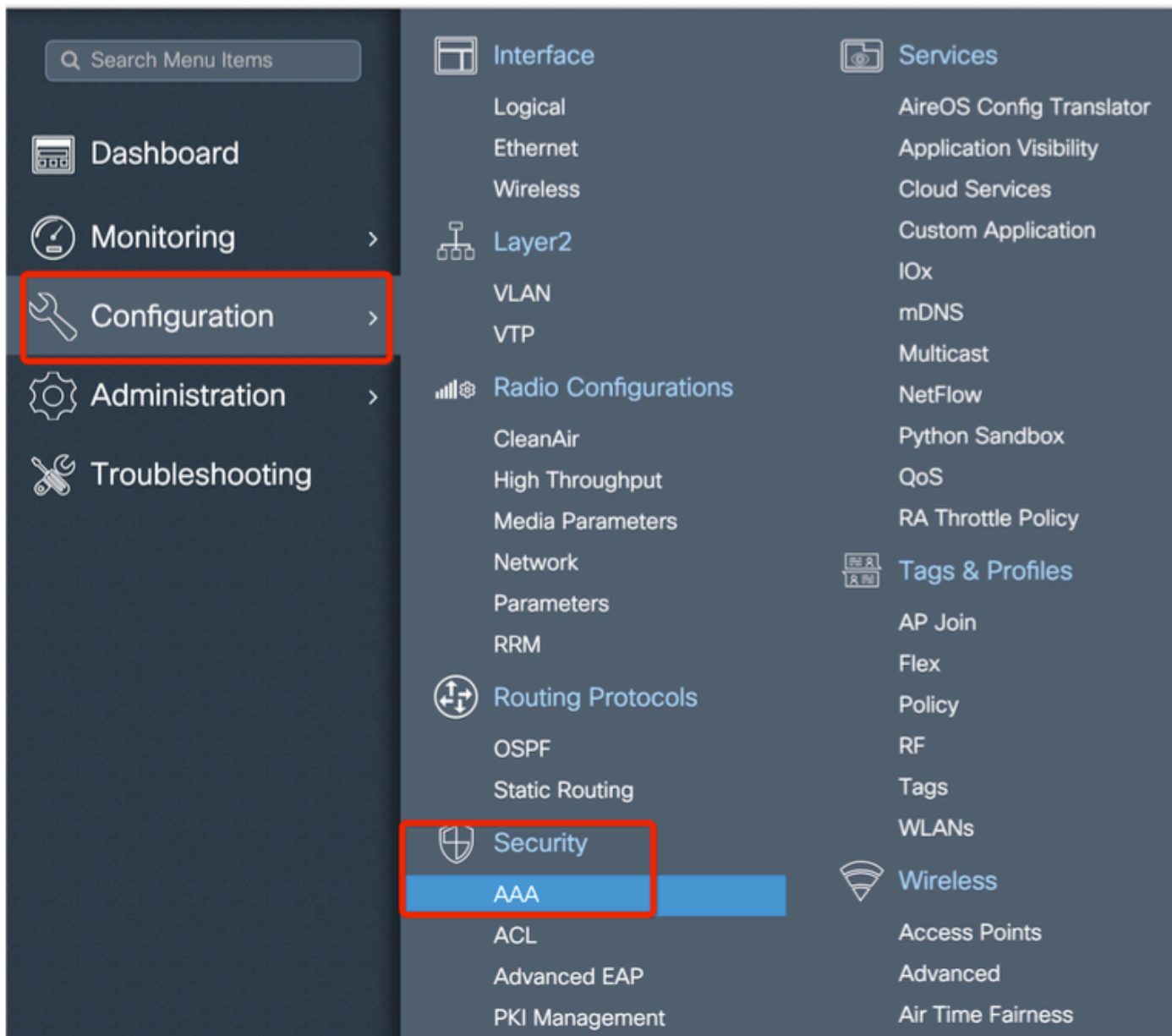
配置

网状无线接入点需要经过身份验证才能加入9800控制器。本案例研究认为，您首先以本地模式将AP连接到WLC，然后将其转换为网桥(a.k.a)网状模式。


要避免分配AP加入配置文件，请使用此示例，但配置默认aaa authorization credential-download方法，以便允许任何网状AP加入控制器。

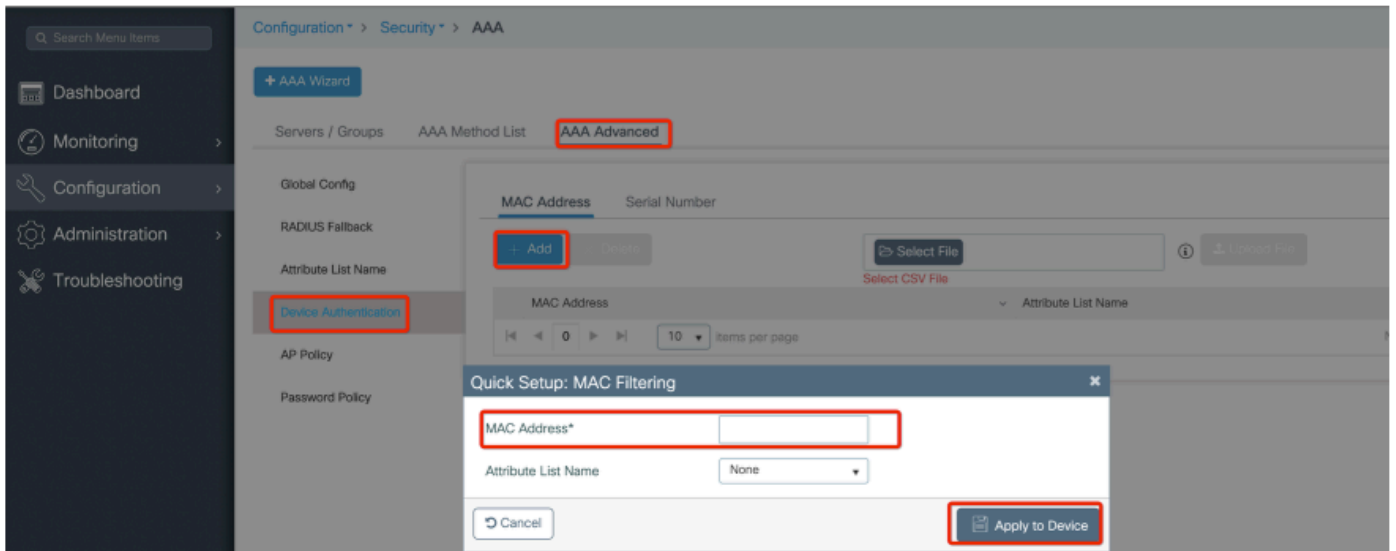
第1步：在Device Authentication下配置RAP/MAP mac地址。

转至Configuration > AAA > AAA Advanced > Device Authentication。



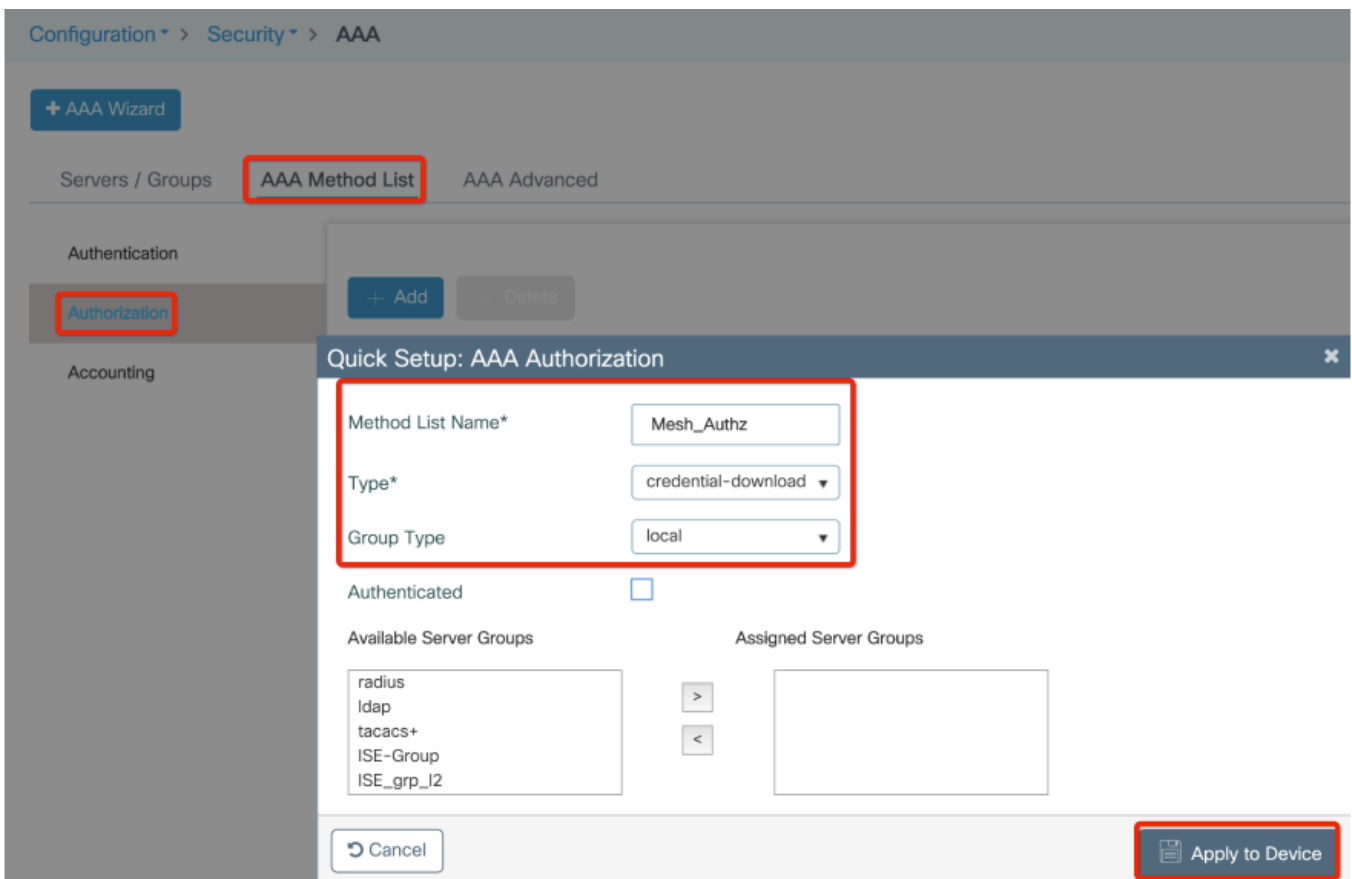
添加MAP的基本以太网MAC地址，添加时不带任何特殊字符，不带“。”或“：”

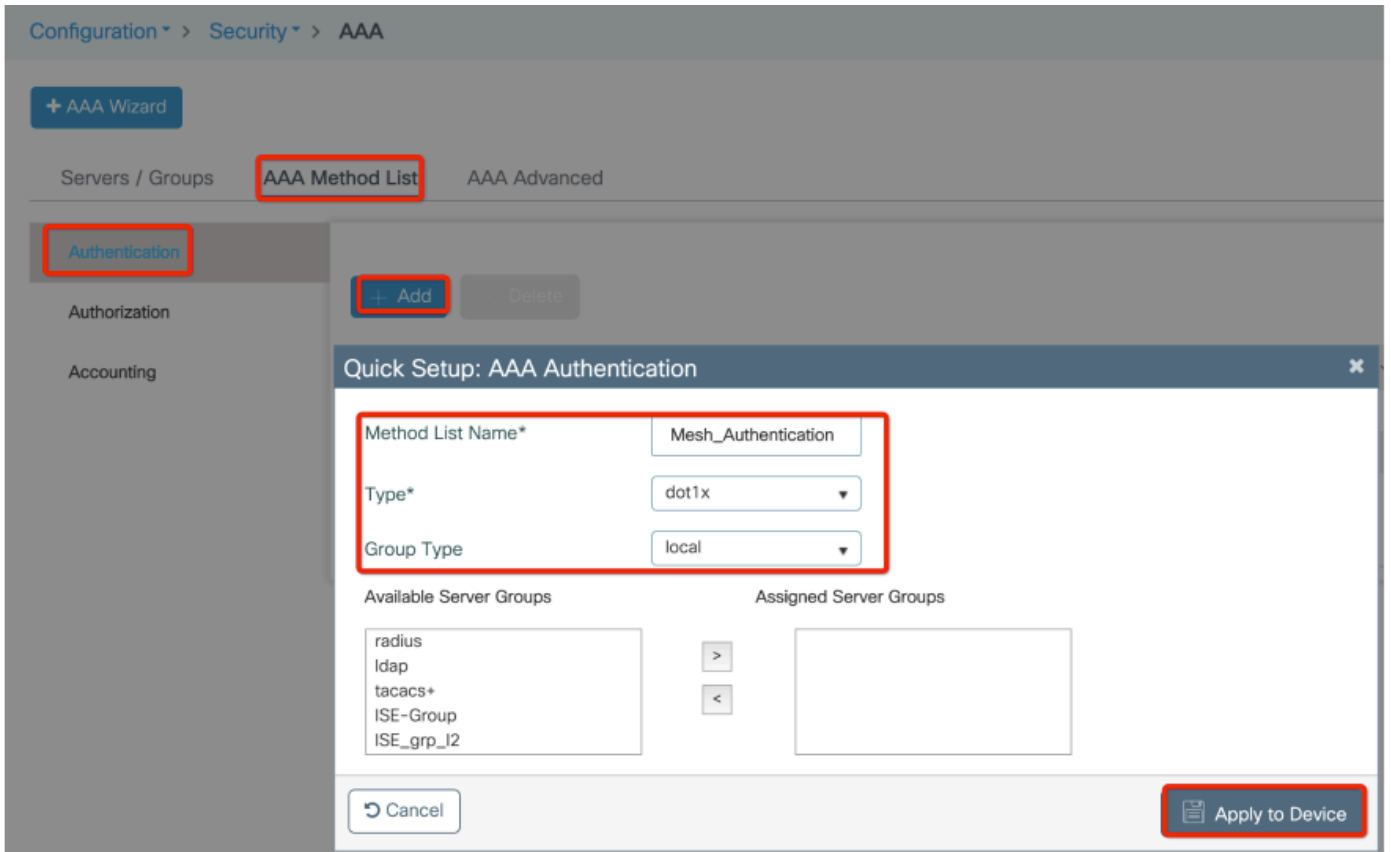
 **重要信息：**自17.3.1版本起，如果添加任何mac地址分隔符（如“。”、“：”或“ — ”），则AP无法加入。目前为此打开了2个增强功能：[Cisco Bug ID CSCvv43870](#)和[Cisco Bug ID CSCvr07920](#)。将来，9800会接受所有mac地址格式。



第2步：配置身份验证和授权方法列表。

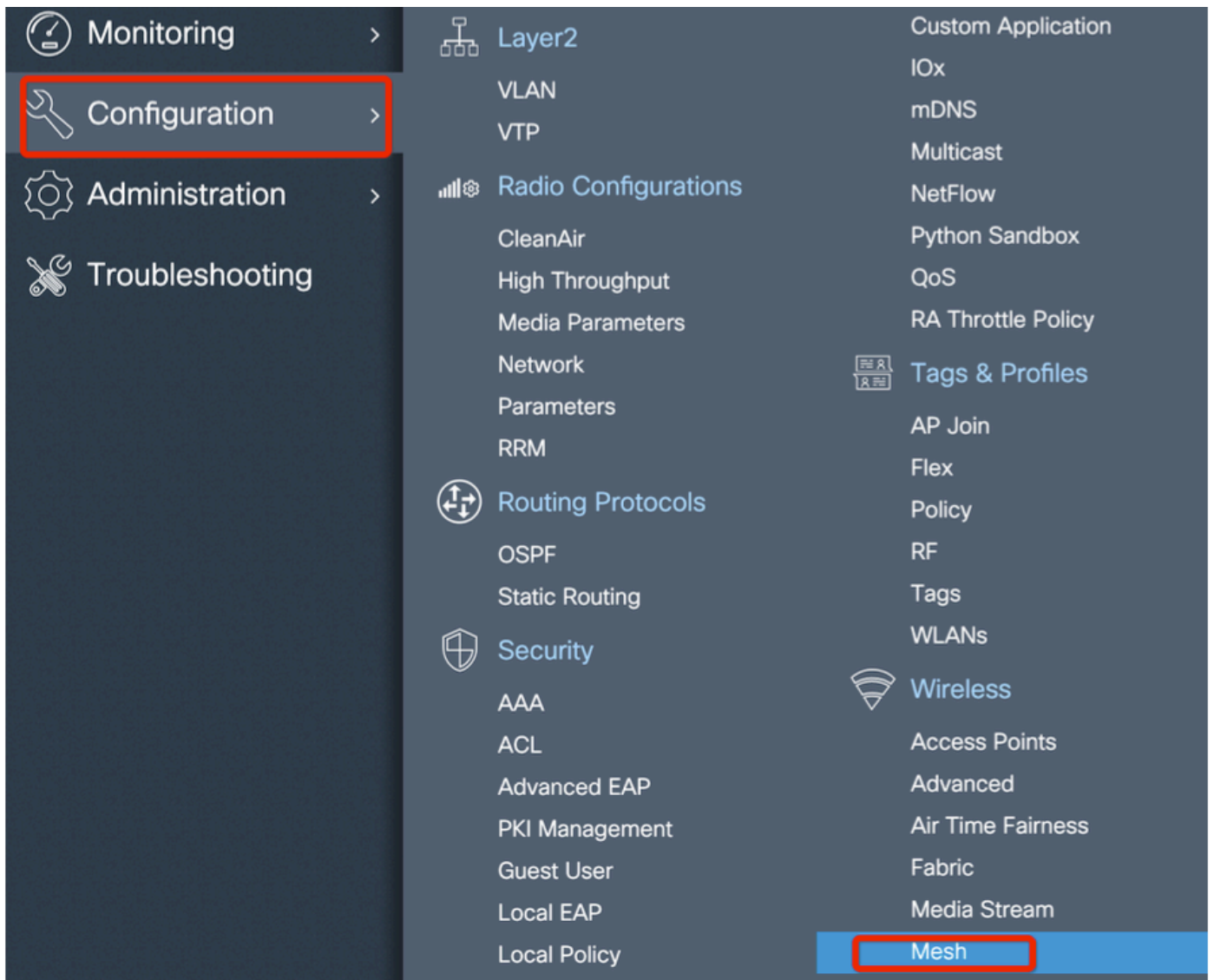
转至Configuration > Security > AAA > AAA Method list > Authentication，然后创建身份验证方法列表和授权方法列表。



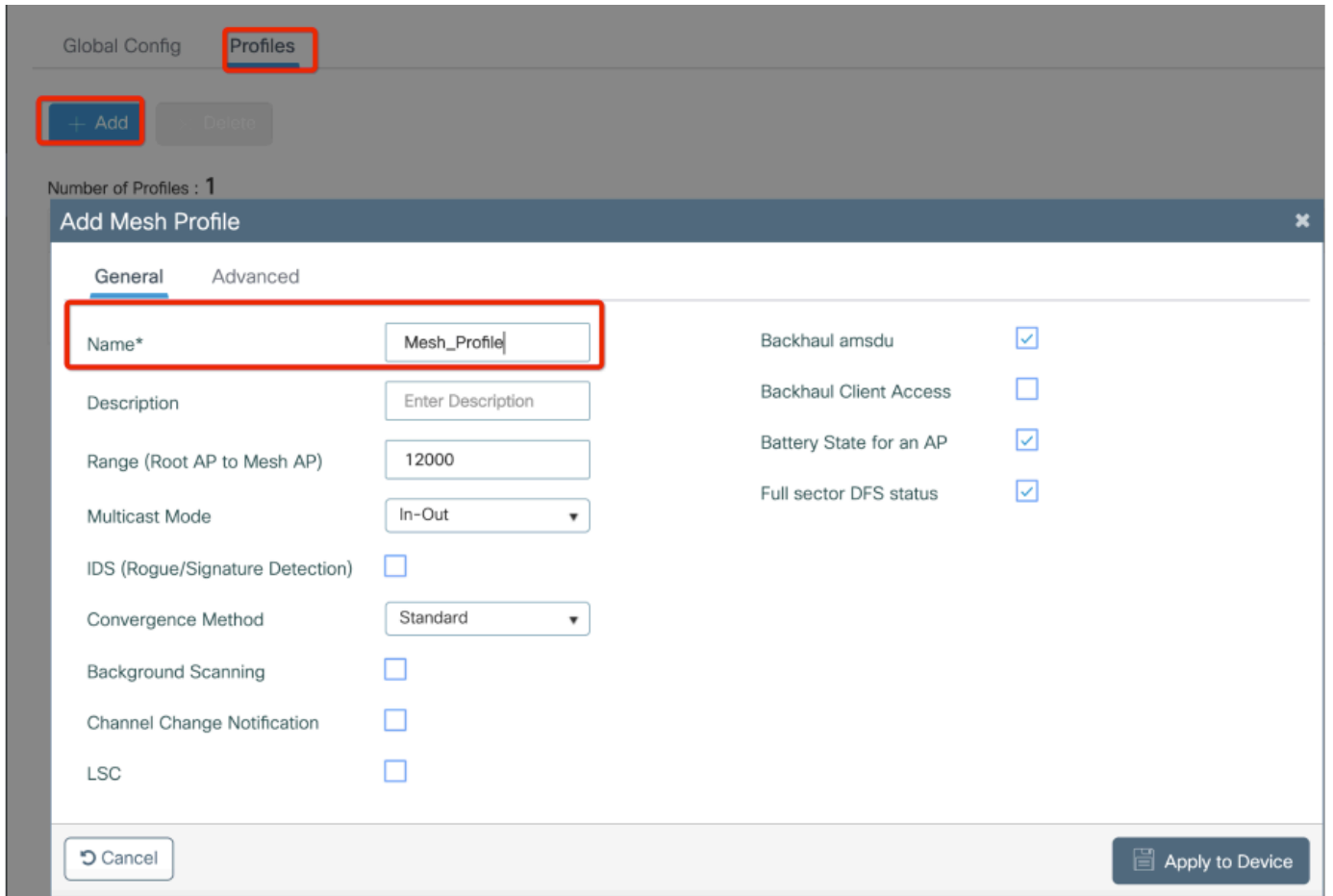


第3步：配置全局网状网参数。

转到Configuration> Mesh> Global参数。最初，我们可以将这些值保留为默认值。

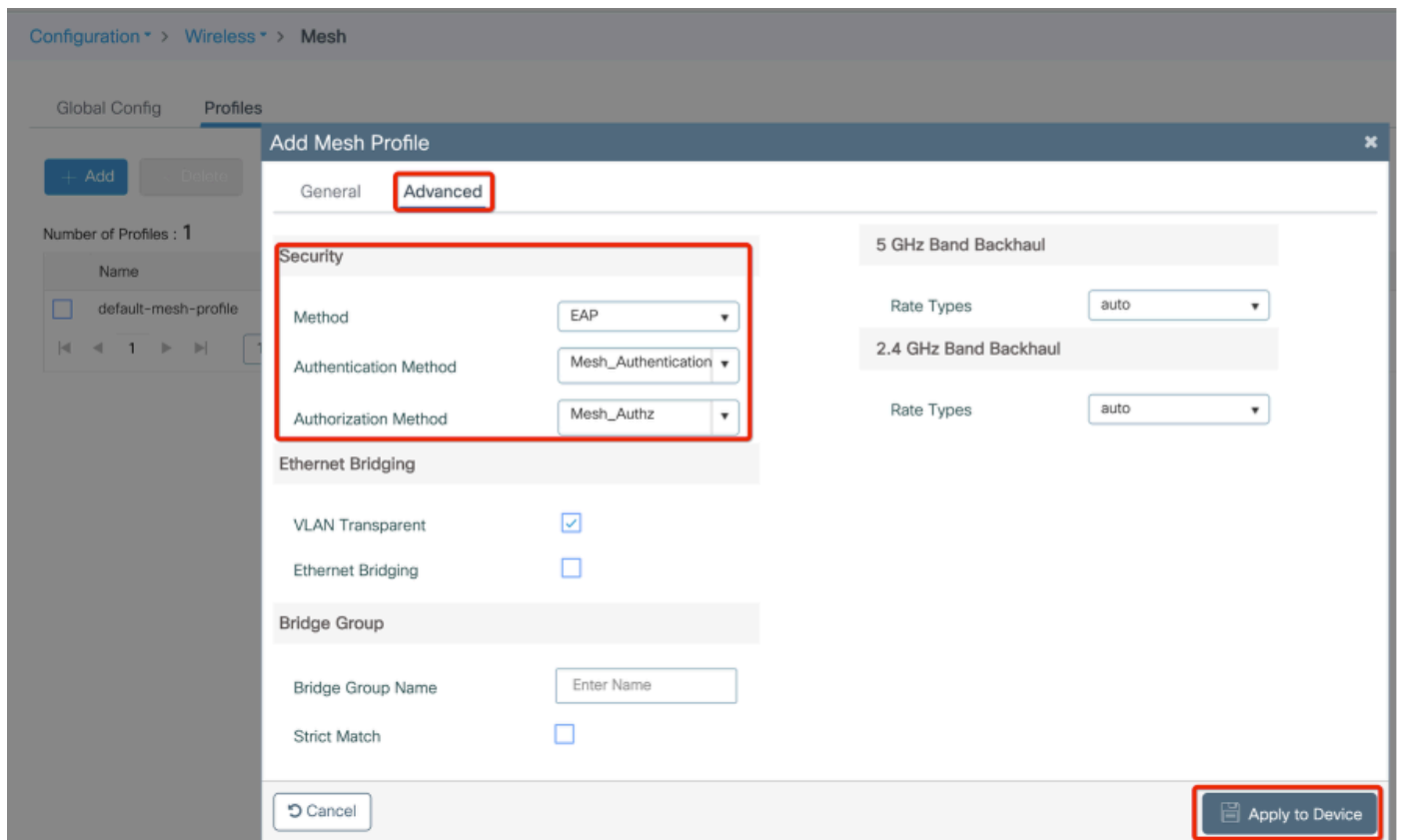


第4步：在Configuration > Mesh > Profile > +Add下创建新的网状配置文件

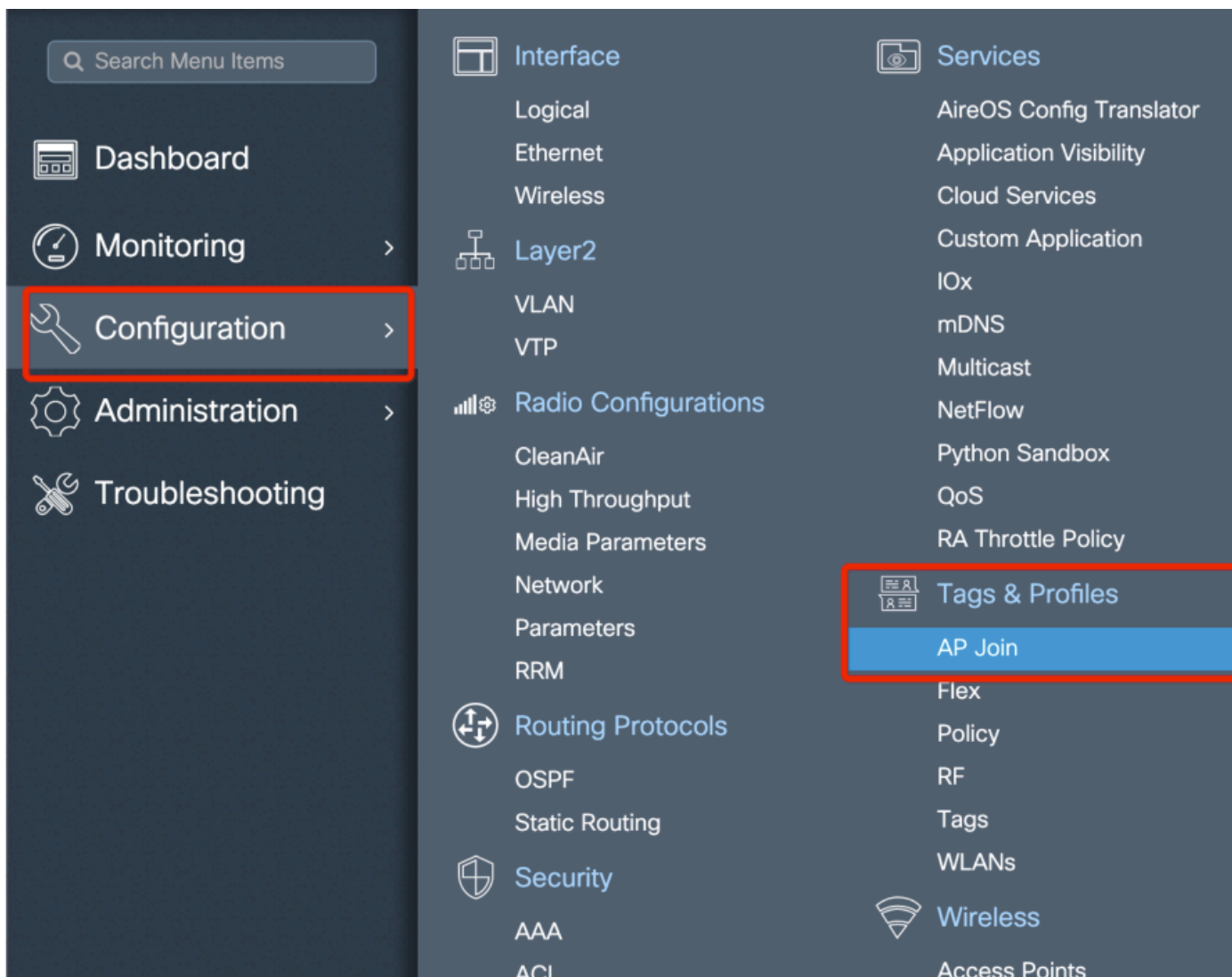


单击已创建的网格剖面，编辑网格剖面的常规和高级设置。

如图所示，我们需要将之前创建的身份验证和授权配置文件映射到Mesh配置文件



第5步：创建新的AP加入配置文件。转至Configure > Tags and Profiles: AP Join。



Configuration > Tags & Profiles > AP Join

+ Add - Delete

AP Join Profile Name	Description
<input type="checkbox"/> default-ap-profile	default ap profile

Add AP Join Profile

General Client CAPWAP AP Management Rogue AP ICap

Name* Mesh_AP_Join_Profile

Description Enter Description

LED State

LAG Mode

NTP Server 0.0.0.0

Cancel Apply to Device

应用之前配置的网状配置文件并配置AP EAP身份验证：

AP Join Profile Name	Description
<input type="checkbox"/> default-ap-profile	default ap profile

Add AP Join Profile ✕

General Client CAPWAP **AP** Management Rogue AP ICap

General Hyperlocation BLE Packet Capture

Power Over Ethernet

Switch Flag

Power Injector State

Power Injector Type

Injector Switch MAC

Code

Client Statistics Reporting Interval

5 GHz (sec)

2.4 GHz (sec)

Extended Module

Enable

AP EAP Auth Configuration

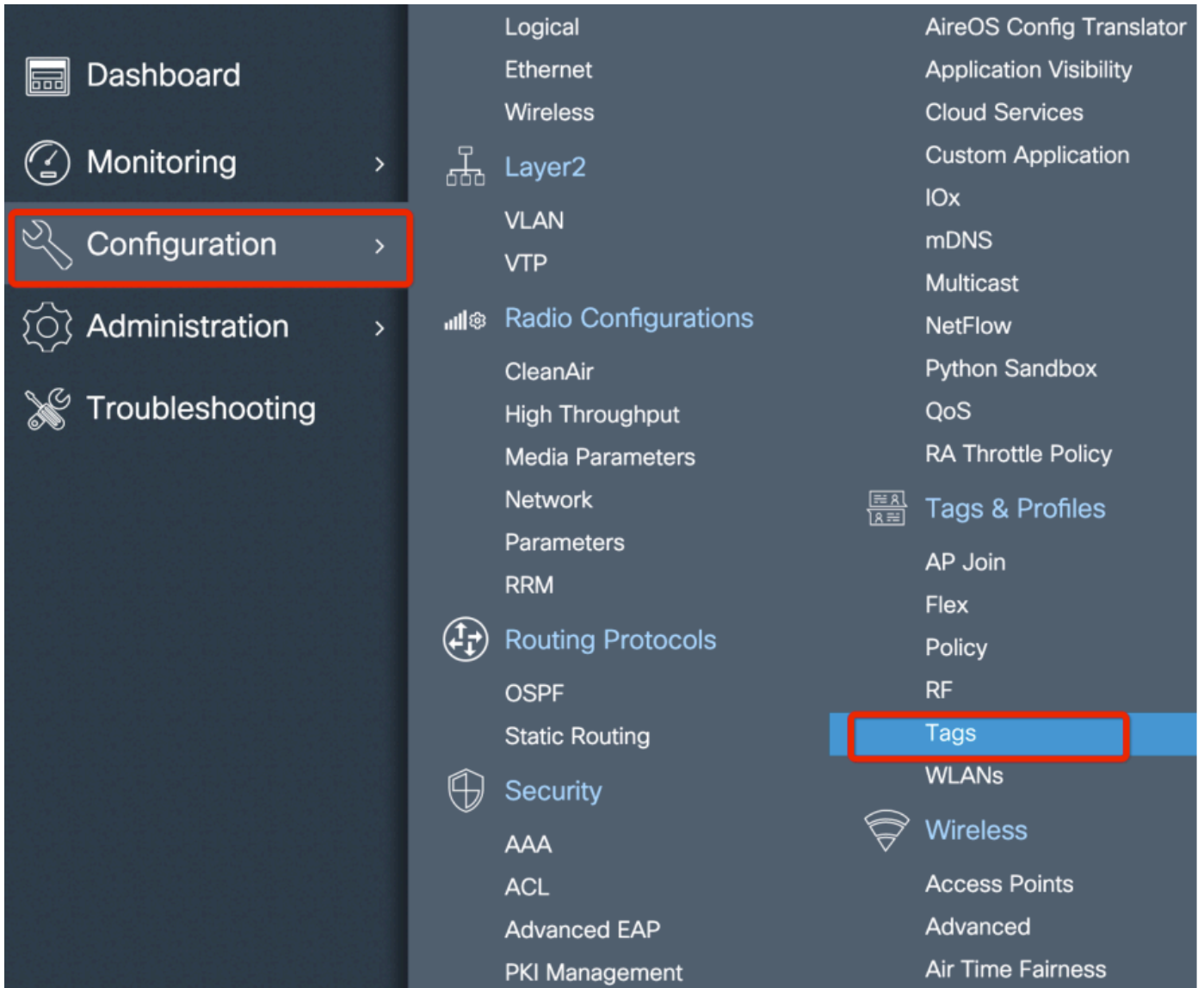
EAP Type

AP Authorization Type

Mesh

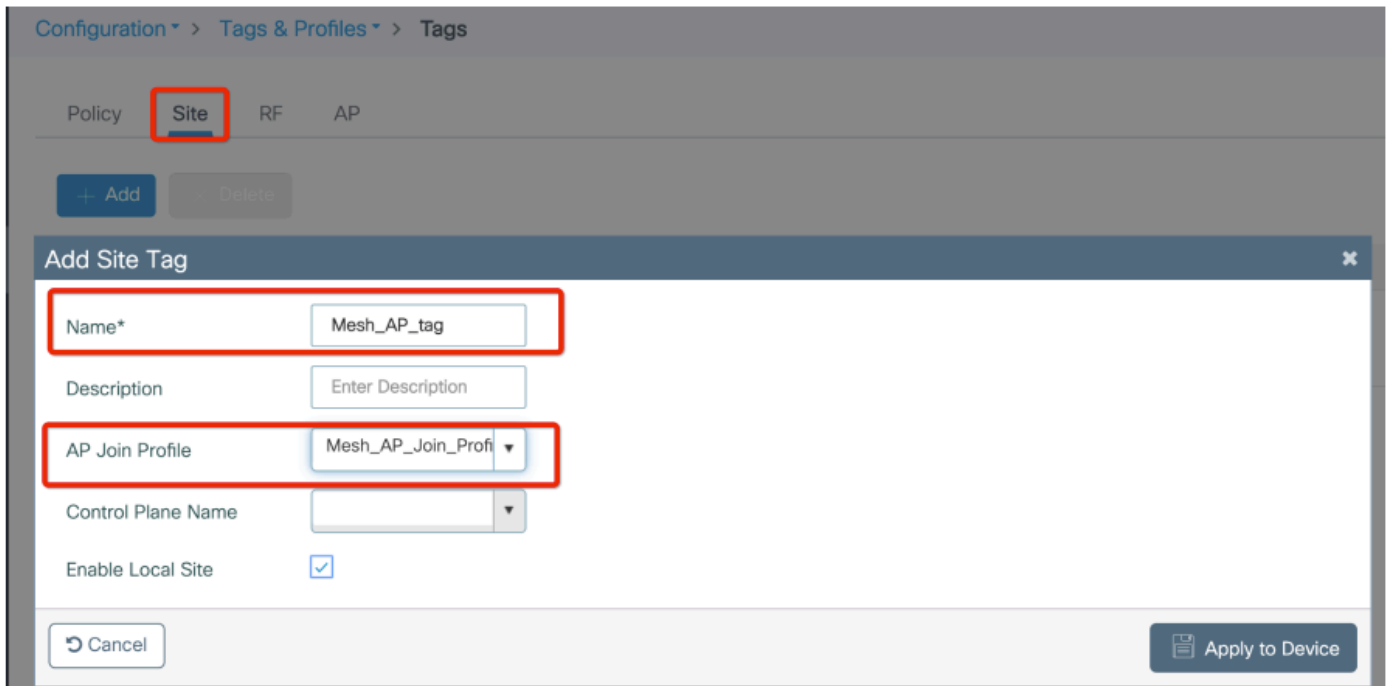
Profile Name [Clear](#)

第6步：如图所示创建网格位置标签。

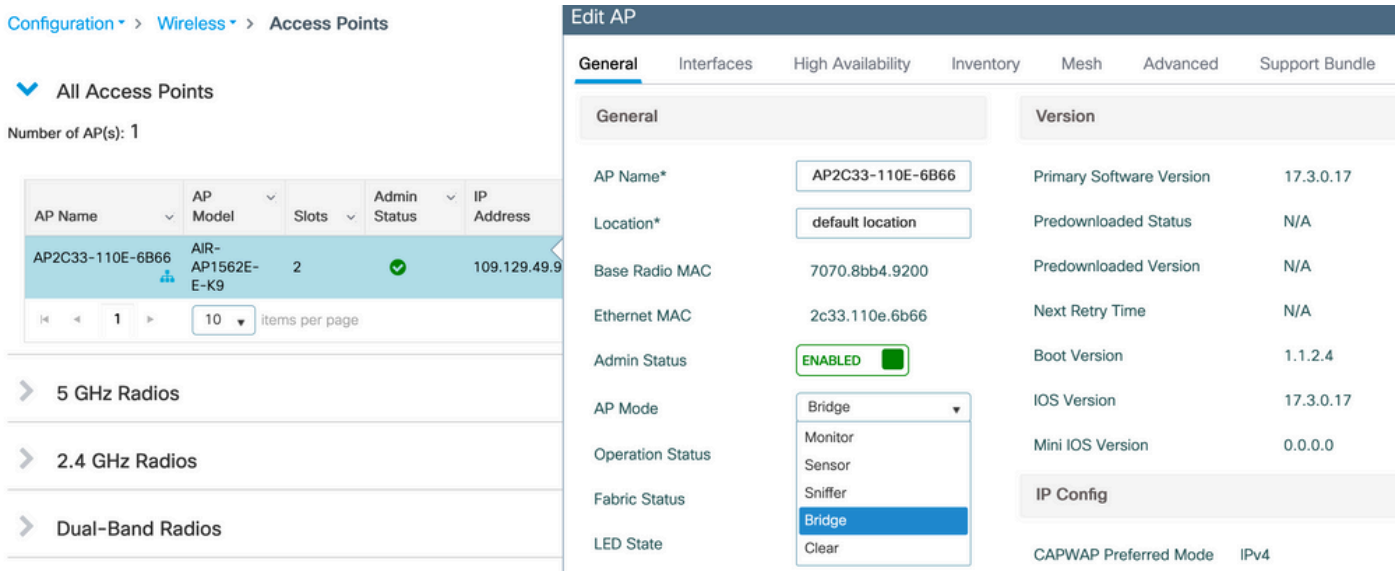


配置单击第6步中创建的Mesh location TAG对其进行配置。

转至Site选项卡，并将之前配置的Mesh AP加入配置文件应用到Site选项卡：



步骤 7.将AP转换为网桥模式。



通过CLI，您可以在AP上发出此命令：

```
capwap ap mode bridge
```

AP重新启动后作为网桥模式重新加入。

步骤 8现在您可以定义AP的角色：根AP或网状AP。

当网状AP通过其尝试连接到根AP的无线电加入WLC时，根AP是与WLC具有有线连接的网络。

当网状AP无法通过其无线电找到根AP以进行调配时，可以通过其有线接口加入WLC。

▼ All Access Points

Number of AP(s): 1

AP Name	AP Model	Slots	Admin Status	IP Address
AP2C33-110E-6B66	AIR-AP1562E-E-K9	2	✓	109.129.49.9

> 5 GHz Radios

> 2.4 GHz Radios

> Dual-Band Radios

> Country

> LSC Provision

Edit AP

General
Interfaces
High Availability
Inventory
Mesh
Advanced
Support Bundle

General

Block Child

Daisy Chaining

Daisy Chaining strict-RAP

Preferred Parent MAC

VLAN Trunking Native

Role

Mesh
 Root
Mesh

Remove PSK

Ethernet Port Configuration

⚠ Ethernet Bridging on the associated Mesh Profile should be enabled to configure this section successfully

Port

Mode

Backhaul

Backhaul Radio Type

Backhaul Slot ID

Rate Types

↶ Cancel
↷ Update & Apply to Device

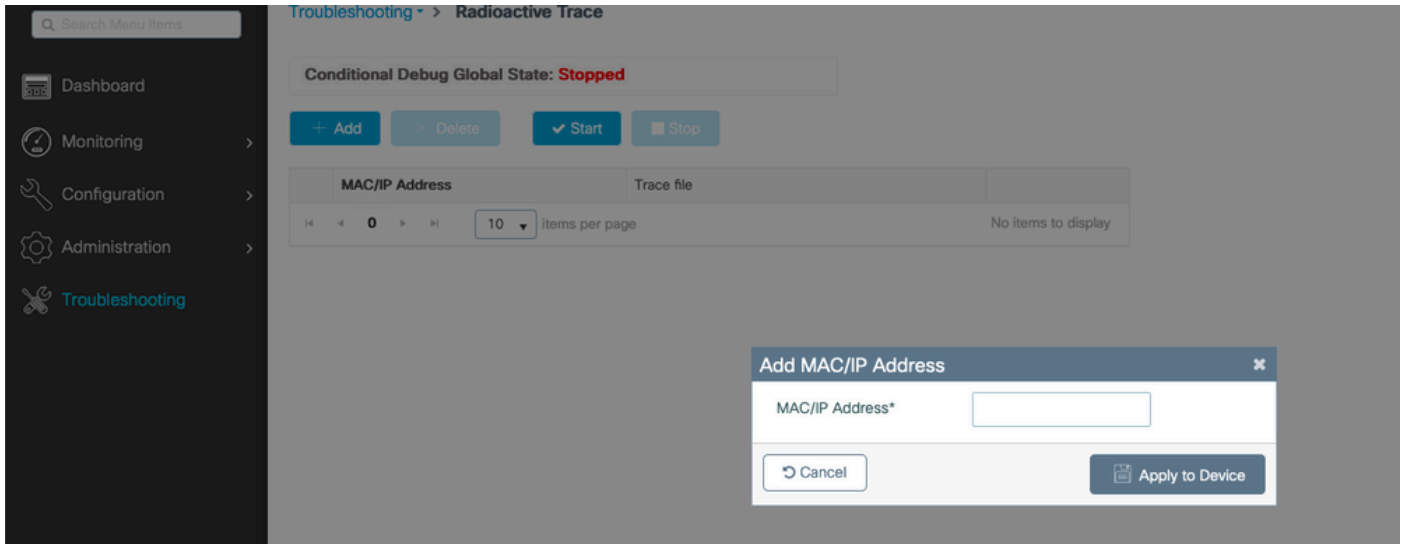
验证

```

aaa new-model
aaa local authentication default authorization default
!
!
aaa authentication dot1x default local
aaa authentication dot1x Mesh_Authentication local
aaa authorization network default local
aaa authorization credential-download default local
aaa authorization credential-download Mesh_Authz local
username 111122223333 mac
wireless profile mesh Mesh_Profile
  method authentication Mesh_Authentication
  method authorization Mesh_Authz
wireless profile mesh default-mesh-profile
  description "default mesh profile"
wireless tag site Mesh_AP_Tag
  ap-profile Mesh_AP_Join_Profile
ap profile Mesh_AP_Join_Profile
  hyperlocation ble-beacon 0
  hyperlocation ble-beacon 1
  hyperlocation ble-beacon 2
  hyperlocation ble-beacon 3
  hyperlocation ble-beacon 4
  mesh-profile Mesh_Profile
    
```

故障排除

在Troubleshoot > Radiative Trace Web UI页中，单击add，然后输入AP mac地址。



单击Start并等待AP再次尝试加入控制器。

完成后，单击Generate并选择收集日志的时间段（例如最近10或30分钟）。

单击Trace file name（跟踪文件名）从浏览器下载。

以下是AP未加入的示例，因为定义的aaa授权方法名称错误：

```
2019/11/28 13:08:38.269 {wncd_x_R0-0}{1}: [capwapac-smgr-srvr] [23388]: (info): Session-IP: 192.168.88.4
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [ewlc-infra-evq] [23388]: (info): DTLS record type: 23, appli
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [capwapac-smgr-sess] [23388]: (info): Session-IP: 192.168.88.
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [capwapac-smgr-sess] [23388]: (info): Session-IP: 192.168.88.
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [mesh-config] [23388]: (ERR): Failed to get ap PMK cache rec
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [mesh-config] [23388]: (ERR): Failed to get ap PMK cache rec
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [mesh-config] [23388]: (ERR): Failed to get ap PMK cache rec
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [apmgr-capwap-join] [23388]: (info): 00a3.8e95.6c40 Ap auth p
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [apmgr-capwap-join] [23388]: (ERR): Failed to initialize auth
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [apmgr-capwap-join] [23388]: (ERR): 00a3.8e95.6c40 Auth requ
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [apmgr-db] [23388]: (ERR): 00a3.8e95.6c40 Failed to get wtp r
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [apmgr-db] [23388]: (ERR): 00a3.8e95.6c40 Failed to get ap ta
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [capwapac-smgr-sess-fsm] [23388]: (ERR): Session-IP: 192.168.
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [capwapac-smgr-sess-fsm] [23388]: (info): Session-IP: 192.168
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [capwapac-smgr-sess-fsm] [23388]: (note): Session-IP: 192.168
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [capwapac-smgr-sess-fsm] [23388]: (note): Session-IP: 192.168
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [ewlc-dtls-sessmgr] [23388]: (info): Remote Host: 192.168.88.
2019/11/28 13:08:38.288 {wncd_x_R0-0}{1}: [ewlc-dtls-sessmgr] [23388]: (info): Remote Host: 192.168.88.
2019/11/28 13:08:38.289 {wncmgrd_R0-0}{1}: [ewlc-infra-evq] [23038]: (debug): instance :0 port:38932MAC
```

点击未加入的AP时，在Web UI控制面板中更容易看到相同内容。“Ap auth pending”是指向AP自身身份验证的提示：

Monitoring > Wireless > AP Statistics

General **Join Statistics**

Clear ClearAll

Number of AP(s): 2

Status "Is equal to" NOT JOINED x

AP Name	AP Mod
<input type="checkbox"/> AP2CF8-9B5F-7D70	C9120A
<input checked="" type="checkbox"/> NA	

10 items per page

Join Statistics

General **Statistics**

DTLS Session request received	1	Configuration requests received	0
Established DTLS session	1	Successful configuration responses sent	0
Unsuccessful DTLS session	0	Unsuccessful configuration request processing	0
Reason for last unsuccessful DTLS session	DTLS Handshake Success	Reason for last unsuccessful configuration attempt	NA
Time at last successful DTLS session	Mon, 17 Feb 2020 09:15:41 GMT	Time at last successful configuration attempt	NA
Time at last unsuccessful DTLS session	NA	Time at last unsuccessful configuration attempt	NA

Join phase statistics

Join requests received	1
Successful join responses sent	0
Unsuccessful join request processing	0
Reason for last unsuccessful join attempt	Ap auth pending
Time at last successful join attempt	NA
Time at last unsuccessful join attempt	NA

Data DTLS Statistics

DTLS Session request received	0
Established DTLS session	0
Unsuccessful DTLS session	0
Reason for last unsuccessful DTLS session	DTLS Handshake Success
Time at last successful DTLS session	NA
Time at last unsuccessful DTLS session	NA

OK

案例研究2:Flex +网桥

本部分重点介绍1542 AP在Flex+网桥模式下与EAP身份验证在WLC上本地完成的加入过程。

配置

- 步骤1:导航到配置 > 安全 > AAA > AAA高级 > 设备身份验证

Configuration > Security > AAA

1

+ AAA Wizard

Servers / Groups

AAA Method List

AAA Advanced

2

Global Config

RADIUS Fallback

Attribute List Name

Device Authentication

3

MAC Address

Serial Number

+ Add

4

× Delete

MAC Address

002cc8de2b40

- 第二步：选择Device Authentication，然后选择Add
- 第三步：键入要加入WLC的AP的基本以太网MAC地址，将Attribute List Name留空，然后选择Apply to Device

Quick Setup: MAC Filtering

MAC Address*

ffffffffffff

1

Attribute List Name

None

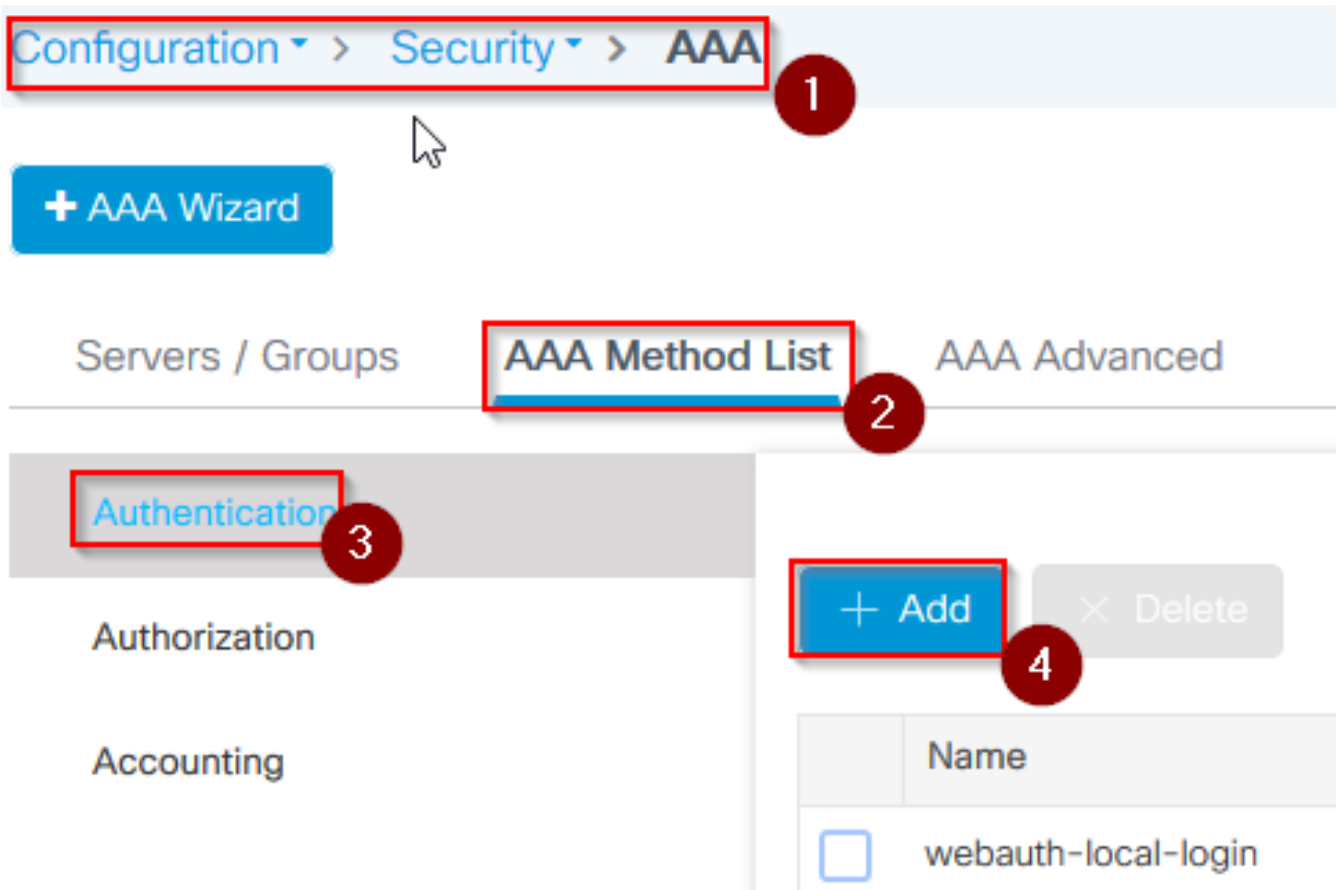
2

Cancel

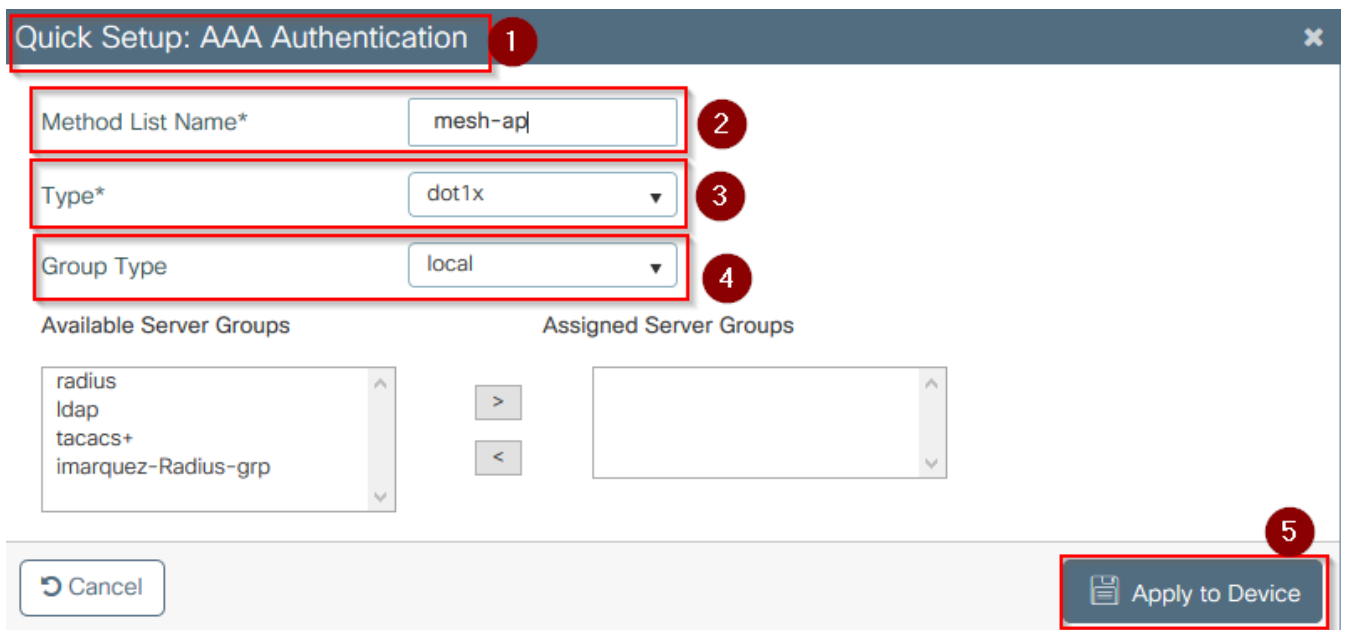
Apply to Device

3

- 第四步：导航到配置 > 安全 > AAA > AAA方法列表 > 身份验证
- 第五步：选择Add，系统将显示AAA Authentication弹出窗口



- 第六步：在Method List Name中键入名称，从Type*下拉列表中选择802.1x，并为Group Type选择local，最后选择Apply to Device



- 步骤6b.如果您的AP直接以网桥模式加入，并且之前没有分配站点和策略标签，请重复步骤6，但使用默认方法。
- 配置指向本地的dot1x aaa身份验证方法(CLI aaa authentication dot1x default local)
- 步骤7.导航到配置 > 安全 > AAA > AAA方法列表 > 授权
- 步骤8选择Add，系统将显示AAA Authorization弹出窗口

Configuration > Security > AAA 1

+ AAA Wizard

Servers / Groups

AAA Method List 2

AAA Advanced

Authentication

Authorization 3

Accounting

+ Add 4

× Delete

Name
<input type="checkbox"/> default

- 步骤 9在Method List Name中键入名称，从Type*下拉菜单中选择credential download，并为Group Type选择local，最后选择Apply to Device

Quick Setup: AAA Authorization x

Method List Name* mesh-ap 1

Type* credential-download 2

Group Type local 3

Authenticated

Available Server Groups

radius
ldap
tacacs+
imarquez-Radius-grp

Assigned Server Groups

> <

Cancel

Apply to Device 4

- 步骤9b.如果AP直接在网桥模式下加入（即它不会首先在本地模式下加入），请对默认凭证下载方法(CLI aaa authorization credential-download default local)重复步骤9
- 步骤 10导航到配置 > 无线 > 网状 > 配置文件
- 步骤 11选择Add，系统将显示Add Mesh Profile弹出窗口

Configuration ▾ > Wireless ▾ > Mesh

1

Global Config

Profiles

2

+ Add

× Delete

3

- 步骤 12在General选项卡中，设置网状配置文件的名称和说明

Add Mesh Profile

General

Advanced

Name*

mesh-profile|

Description

mesh-profile

- 步骤 13在Advanced选项卡下，为Method字段选择EAP
- 步骤 14选择Authorization和Authentication配置文件（在步骤6和9中定义），然后选择Apply to Device

Add Mesh Profile ✕

General **Advanced** 1

Security

Method 2 EAP

Authentication Method 3 mesh-ap

Authorization Method 4 mesh-ap|

Ethernet Bridging

VLAN Transparent

Ethernet Bridging

Bridge Group

Bridge Group Name

Strict Match

5 GHz Band Backhaul

Rate Types 5 auto

2.4 GHz Band Backhaul

Rate Types 5 auto

5 Apply to Device

Cancel

- 步骤 15 导航到配置 > 标记和配置文件 > AP 加入 > 配置文件
- 步骤 16 选择 Add，系统将显示 AP Join Profile 弹出窗口，为 AP Join 配置文件设置名称和说明

Configuration ▾ > Tags & Profiles ▾ > AP Join 1

+ Add 2

× Delete

	AP Join Profile Name

Add AP Join Profile

General	Client	CAPWAP	AP	Management	Rogue AP	ICap
Name*	<input type="text" value="mes-ap-join"/>					
Description	<input type="text" value="mesh-ap-join"/>					
LED State	<input checked="" type="checkbox"/>					
LAG Mode	<input type="checkbox"/>					
NTP Server	<input type="text" value="0.0.0.0"/>					

- 步骤 17 导航到 AP 选项卡，从 Mesh Profile Name 下拉列表选择在步骤 12 中创建的 Mesh Profile
- 步骤 18. 确保分别为 EAP Type 和 AP Authorization Type 字段设置 EAP-FAST 和 CAPWAP DTLS
- 斯蒂奥 19. 选择应用到设备

Add AP Join Profile

General	Client	CAPWAP	AP	Management	Rogue AP	ICap
General	Hyperlocation	BLE	Packet Capture			
Power Over Ethernet				Client Statistics Reporting Interval		
Switch Flag	<input type="checkbox"/>			5 GHz (sec)	<input type="text" value="90"/>	
Power Injector State	<input type="checkbox"/>			2.4 GHz (sec)	<input type="text" value="90"/>	
Power Injector Type	<input type="text" value="Unknown"/>			Extended Module		
Injector Switch MAC	<input type="text" value="00:00:00:00:00:00"/>			Enable	<input type="checkbox"/>	
Code	<input type="text"/>			Mesh		
AP EAP Auth Configuration				Profile Name	<input type="text" value="mesh-profile"/>	<input type="button" value="Clear"/>
EAP Type	<input type="text" value="EAP-FAST"/>					
AP Authorization Type	<input type="text" value="CAPWAP DTLS"/>					
<input type="button" value="Cancel"/>						<input type="button" value="Apply to Device"/>

- 步骤 20. 导航到配置 > 标记和配置文件 > 标记 > 站点
- 步骤 21. 选择 Add，系统将显示 Site Tag 弹出窗口

Configuration ▾ > Tags & Profiles ▾ > Tags

1

Policy

Site

2

RF

AP

+ Add

3

× Delete

- 步骤 22. 输入站点标签的名称和说明

Add Site Tag

1

Name*

mesh-ap-site

Description

mesh-ap-site

AP Join Profile

mesh-ap-join-profile ▾

2

- 步骤 23. 从AP Join Profile下拉列表选择在步骤16中创建的AP加入配置文件
- 步骤 24. 在Site Tag弹出窗口的底部，取消选中Enable Local Site复选框以启用Flex Profile下拉列表。
- 步骤 35. 从Flex Profile下拉列表选择要用于AP的Flex Profile

Add Site Tag ✕

Name*

Description

AP Join Profile

Flex Profile 2

Control Plane Name

Enable Local Site 1

3

- 步骤 36将AP连接到网络并确保AP处于本地模式。
- 步骤 37要确保AP处于本地模式，请发出命令capwap ap ap mode local。

AP必须找到控制器，可以是L2广播、DHCP选项43、DNS解析或手动设置。

- 步骤 38AP加入WLC，确保它列在AP列表下，导航到Configuration > Wireless > Access Points > All Access Points

Configuration > Wireless > Access Points 1

▼ All Access Points

Number of AP(s): 2

AP Name	Total Slots	Admin Status	AP Model	Base Radio MAC	AP Mode	Operation Status
AP-1	2	✔	AP-10000-10000	00:00:00:00:00:00	Flex+Bridge	Registered
AP-2	2	✔	AP-10000-10000	00:00:00:00:00:00	Local	2 Registered

- 步骤 39选择AP，系统将显示AP弹出窗口。
- 步骤 40在AP弹出窗口中的General > Tags > Site选项卡下，选择Update and Apply to Device，在步骤22中创建的Site Tag

- 步骤 41 AP重新启动并且必须以Flex +网桥模式连接回WLC

请注意，此方法首先在本地模式（不执行dot1x身份验证）下加入AP，以应用带网状配置文件的站点标记，然后将AP切换到网桥模式。

要加入滞留在网桥（或Flex+Bridge）模式中的AP，请配置默认方法(`aaa authentication dot1x default local`和`aaa authorization cred default local`)。

然后，AP能够进行身份验证，您随后可以分配标签。

验证

确保AP模式显示为Flex + Bridge，如下图所示。

Configuration > Wireless > Access Points

All Access Points

Number of AP(s): 2

AP Name	Total Slots	Admin Status	AP Model	Base Radio MAC	AP Mode	Operation Status
[REDACTED]	2	✓	AIR-AP1542I-A-K9	[REDACTED]	Flex+Bridge	Registered

从WLC 9800 CLI运行这些命令并查找AP模式属性。它必须列为Flex+Bridge

```
aaa authorization credential-download mesh-ap local
aaa authentication dot1x mesh-ap local
wireless profile mesh default-mesh-profile
  description "default mesh profile"
wireless tag site meshsite
  ap-profile meshapjoin
  no local-site
ap profile meshapjoin
  hyperlocation ble-beacon 0
  hyperlocation ble-beacon 1
  hyperlocation ble-beacon 2
  hyperlocation ble-beacon 3
  hyperlocation ble-beacon 4
  mesh-profile mesh-profile
```

故障排除

确保存在aaa authentication dot1x default local和aaa authorization cred default local命令。如果您的AP未在本地模式下预先加入，则需要这些设置。

9800主控制面板有一个显示无法加入的AP的构件。点击它可获取无法加入的AP列表：

Monitoring > Wireless > AP Statistics

General | **Join Statistics**

Clear Clear All

Number of AP(s): 2

Status "Is equal to" NOT JOINED

Status	Base Radio MAC	Ethernet MAC	AP Name	IP Address
✗	10b3.c622.5d80	2cf8.9b21.18b0	AP2CF8.9B21.18B0	87.66.46.211
✗	7070.8bb4.9200	2c33.110e.6b66	AP2C33.110E.6B66	87.66.46.211

1 - 2 of 2 Join Statistics

单击特定AP以查看未加入的原因。在本例中，我们看到身份验证问题（AP身份验证挂起），因为站点标记未分配到AP。

因此，9800未选择命名身份验证/授权方法对AP进行身份验证：

Join Statistics ✕

General **Statistics**

Control DTLS Statistics		Configuration phase statistics	
DTLS Session request received	179	Configuration requests received	173
Established DTLS session	179	Successful configuration responses sent	4
Unsuccessful DTLS session	0	Unsuccessful configuration request processing	0
Reason for last unsuccessful DTLS session	DTLS Handshake Success	Reason for last unsuccessful configuration attempt	Regulatory domain check failed
Time at last successful DTLS session	Thu, 19 Dec 2019 13:03:19 GMT	Time at last successful configuration attempt	Thu, 19 Dec 2019 12:36:10 GMT
Time at last unsuccessful DTLS session	NA	Time at last unsuccessful configuration attempt	NA
Join phase statistics		Data DTLS Statistics	
Join requests received	179	DTLS Session request received	0
Successful join responses sent	173	Established DTLS session	0
Unsuccessful join request processing	0	Unsuccessful DTLS session	0
Reason for last unsuccessful join attempt	Ap auth pending	Reason for last unsuccessful DTLS session	DTLS Handshake Success
Time at last successful join attempt	Thu, 19 Dec 2019 12:36:10 GMT	Time at last successful DTLS session	NA
Time at last unsuccessful join attempt	NA	Time at last unsuccessful DTLS session	NA

有关更高级的故障排除，请转到Web UI上的Troubleshooting > Radiative Trace页。

如果输入AP MAC地址，您可以立即生成文件来获取尝试加入的AP的永远在线日志（在通知级别）。

单击Start以启用该MAC地址的高级调试。下次生成日志时，将会显示AP加入的调试级别日志。

Cisco Catalyst 9800-CL Wireless Controller 16.12.1

Troubleshooting > Radioactive Trace

← Back to Troubleshooting Menu

Conditional Debug Global State: **Stopped**

+ Add Delete Start Stop

MAC/IP Address	Trace file	
<input type="checkbox"/> 2c33.110e.6b66	debugTrace_2c33.110e.6b66.txt ↓	▶ Generate

1 items per page 1 - 1 of 1 items

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