Configure OEAP and RLAN on Catalyst 9800 WLC

Contents

Introduction

This document explains how to configure the Cisco OfficeExtend access point (OEAP) and the Remote Local Area Network (RLAN) on 9800 WLC.

A Cisco OfficeExtend access point (OEAP) provides secure communications from a controller to a Cisco AP at a remote location, seamlessly extending the corporate WLAN over the Internet to an employee's residence. A user's experience at the home office is exactly the same as it would be at the corporate office. Datagram Transport Layer Security (DTLS) encryption between an access point and the controller ensures that all communications have the highest level of security.

A Remote LAN (RLAN) is used for authenticating wired clients using the controller. Once the wired client successfully joins the controller, the LAN ports switch the traffic between central or local switching modes. The traffic from the wired clients is treated as wireless client traffic. The RLAN in Access Point (AP) sends the authentication request to authenticate the wired client. The authentication of the wired clients in RLAN is similar to the central authenticated wireless client.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- 9800 WLC
- Command-line Interface (CLI) access to the wireless controllers and Access Points

Components Used

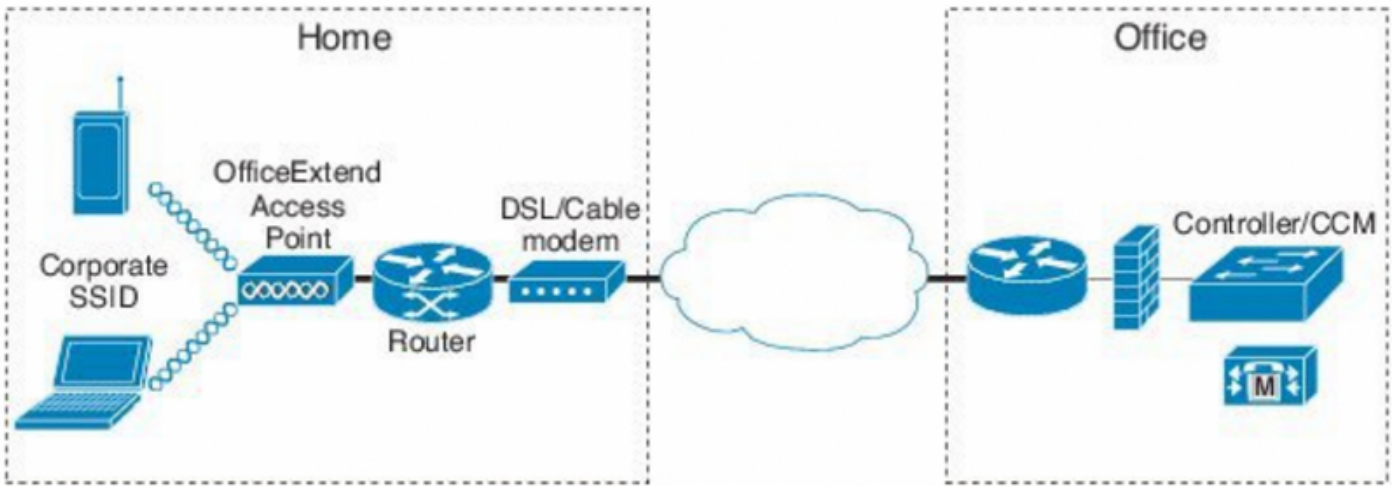
The information in this document is based on these software and hardware versions:

- Catalyst 9800 WLC version 17.02.01
- 1815/1810 Series AP

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Configure

Network Diagram

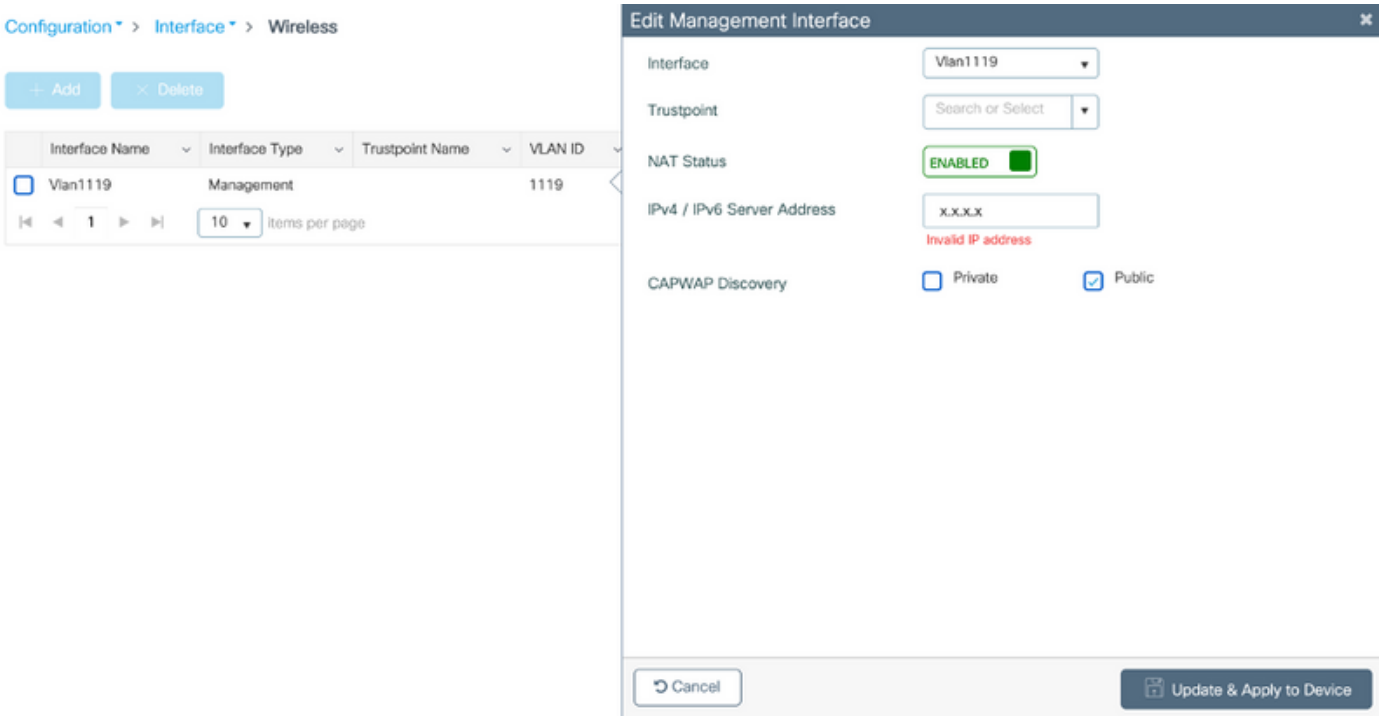


AP Join behind the NAT

In 16.12.x codes, you need to configure NAT IP address from the CLI. There is no GUI option available. You can also select CAPWAP discovery through public or private IP.

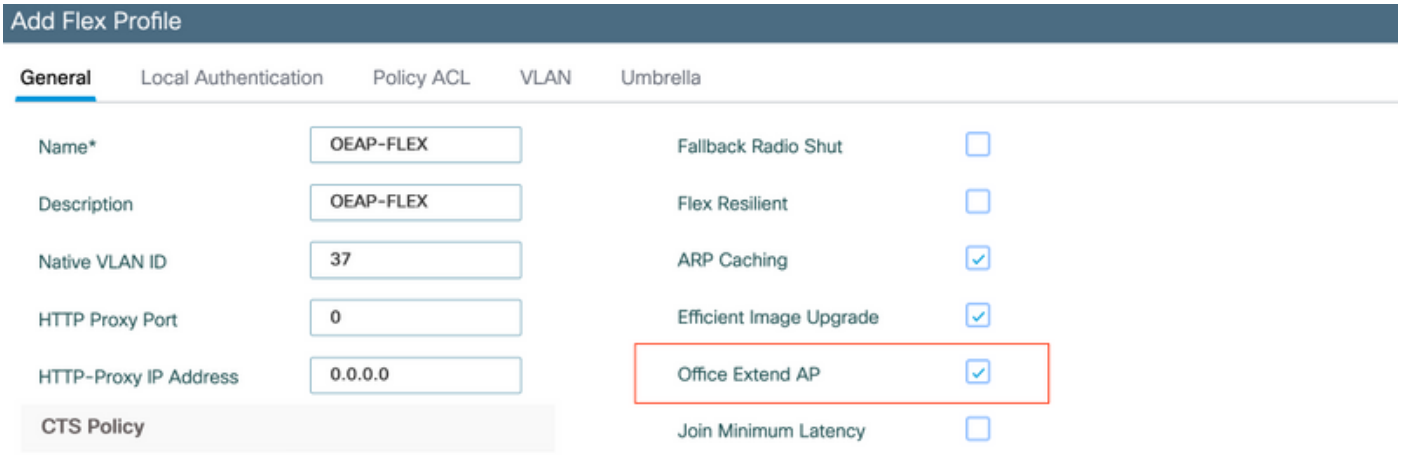
```
(config)#wireless management interface vlan 1114 nat public-ip x.x.x.x
(config-nat-interface)#capwap-discovery ?
  private  Include private IP in CAPWAP Discovery Response

  public   Include public IP in CAPWAP Discovery Response
```

In 17.x codes, navigate to **Configuration > Interface > Wireless** and then click **Wireless Management Interface**, to configure NAT IP and CAPWAP-discovery type from the GUI.

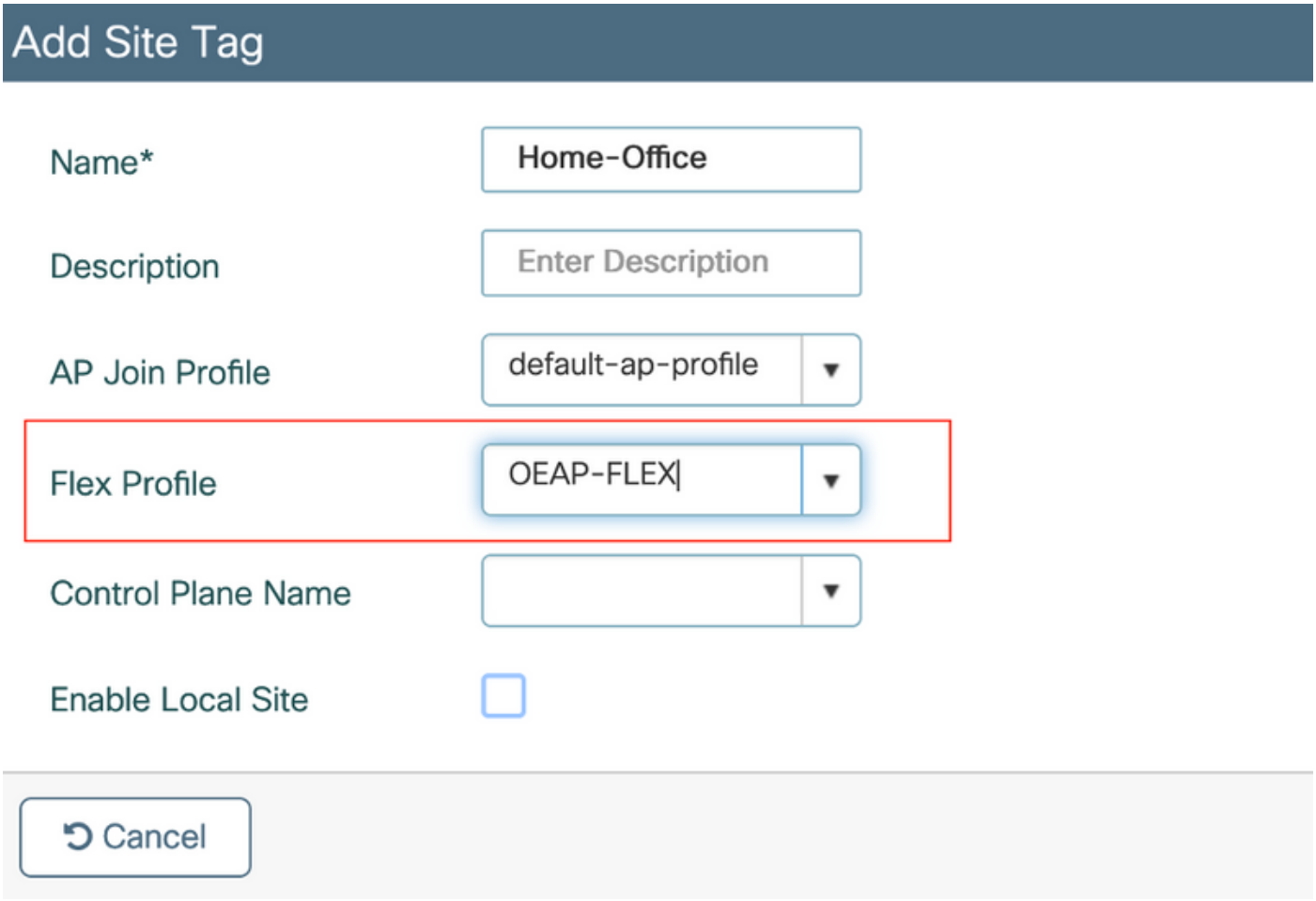


Configuration

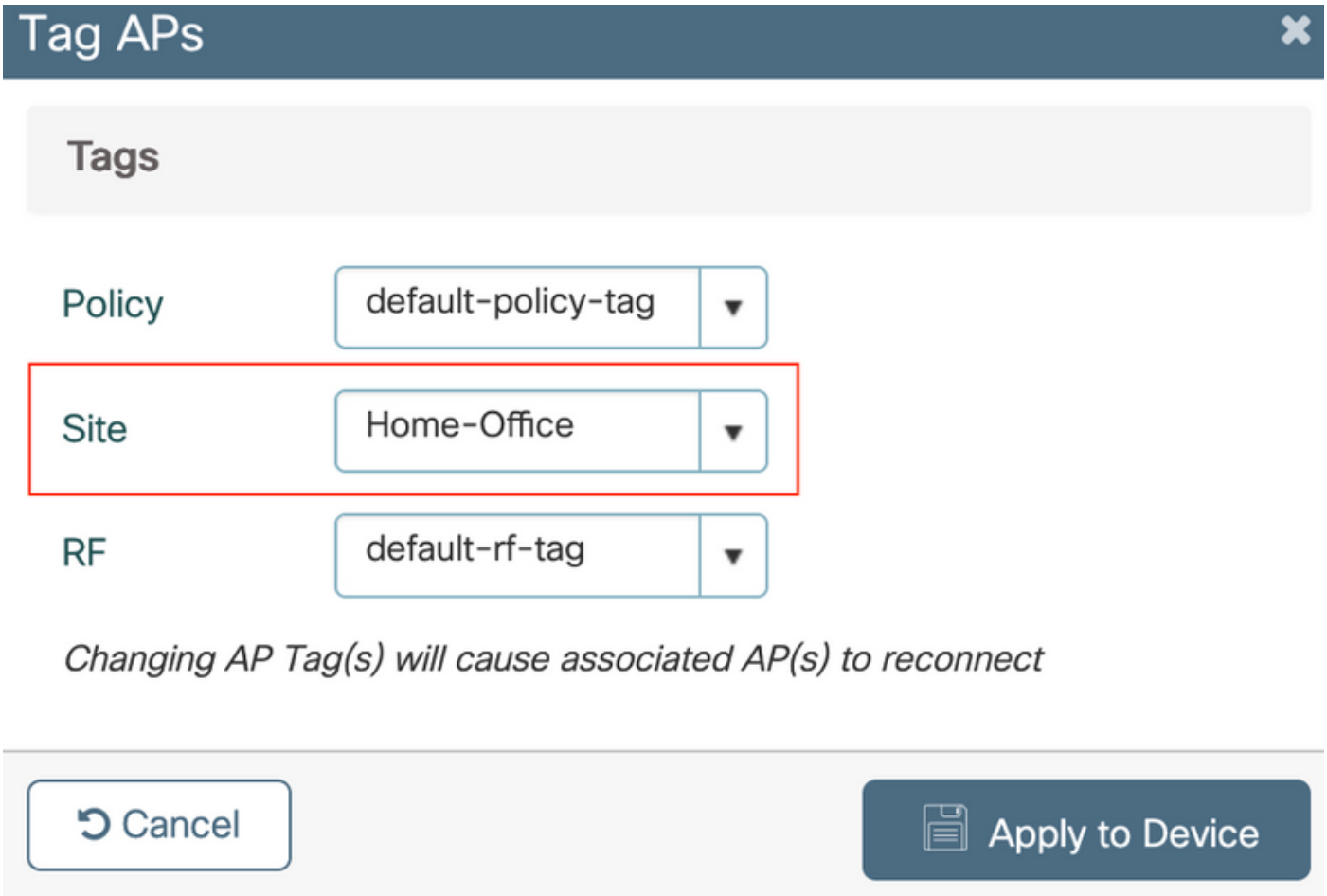
1. In order to create a Flex profile, enable **Office Extend AP** and navigate to **Configuration > Tags & Profiles > Flex.**



2. In order to create a Site Tag and map Flex Profile, navigate to **Configuration > Tags & Profiles > Tags.**



3. Navigate to tag the 1815 AP with the Site Tag created by **Configuration > Wireless Setup >Advanced > Tag APs.**



Verify

Once the 1815 AP re-joins the WLC, verify this output:

```
vk-9800-1#show ap name AP1815 config general

Cisco AP Name   : AP1815
================================================

Cisco AP Identifier                             : 002c.c8de.3460

Country Code                                    : Multiple Countries : IN,US

Regulatory Domain Allowed by Country            : 802.11bg:-A   802.11a:-ABDN

AP Country Code                                 : US  - United States

Site Tag Name                                   : Home-Office

RF Tag Name                                     : default-rf-tag

Policy Tag Name                                 : default-policy-tag

AP join Profile                                 : default-ap-profile

Flex Profile                                    : OEAP-FLEX

Administrative State                            : Enabled

Operation State                                 : Registered

AP Mode                                         : FlexConnect

AP VLAN tagging state                           : Disabled

AP VLAN tag                                     : 0

CAPWAP Preferred mode                           : IPv4

CAPWAP UDP-Lite                                 : Not Configured

AP Submode                                      : Not Configured

Office Extend Mode                              : Enabled

Dhcp Server                                     : Disabled

Remote AP Debug                                 : Disabled


vk-9800-1#show ap link-encryption

                           Encryption      Dnstream    Upstream     Last

AP Name                    State           Count       Count        Update

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

N2                          Disabled        0           0           06/08/20 00:47:33
```

```
AP1815                      Enabled        43          865         06/08/20 00:46:56
```

when you enable the OfficeExtend mode for an access point DTLS data encryption is enabled automatically.

```
AP1815#show capwap client config

AdminState                          : ADMIN_ENABLED(1)

Name                                : AP1815

Location                            : default location

Primary controller name             : vk-9800-1

ssh status                          : Enabled

ApMode                              : FlexConnect

ApSubMode                           : Not Configured

Link-Encryption                     : Enabled

OfficeExtend AP                     : Enabled

Discovery Timer                     : 10

Heartbeat Timer                     : 30

Syslog server                       : 255.255.255.255

Syslog Facility                     : 0

Syslog level                        : informational
```

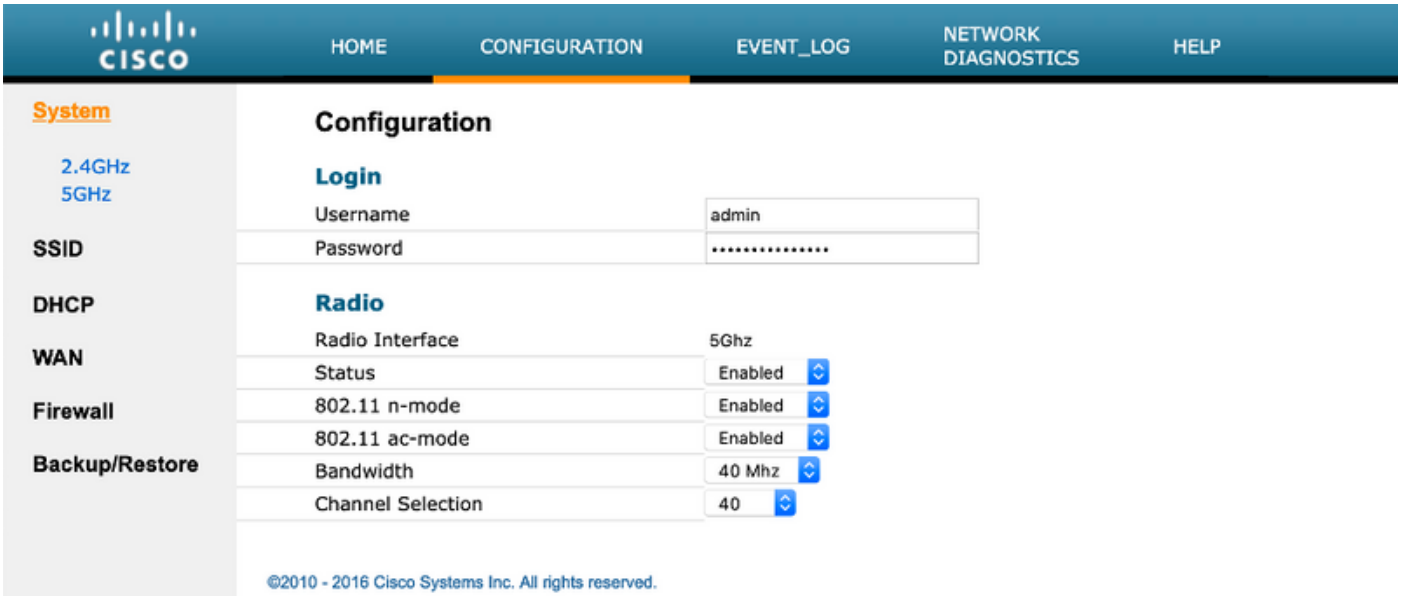
Note: You can enable or disable DTLS data encryption for a specific access point or for all access points using the ap link-encryption command

```
vk-9800-1(config)#ap profile default-ap-profile

vk-9800-1(config-ap-profile)#no link-encryption

Disabling link-encryption globally will reboot the APs with link-encryption.

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

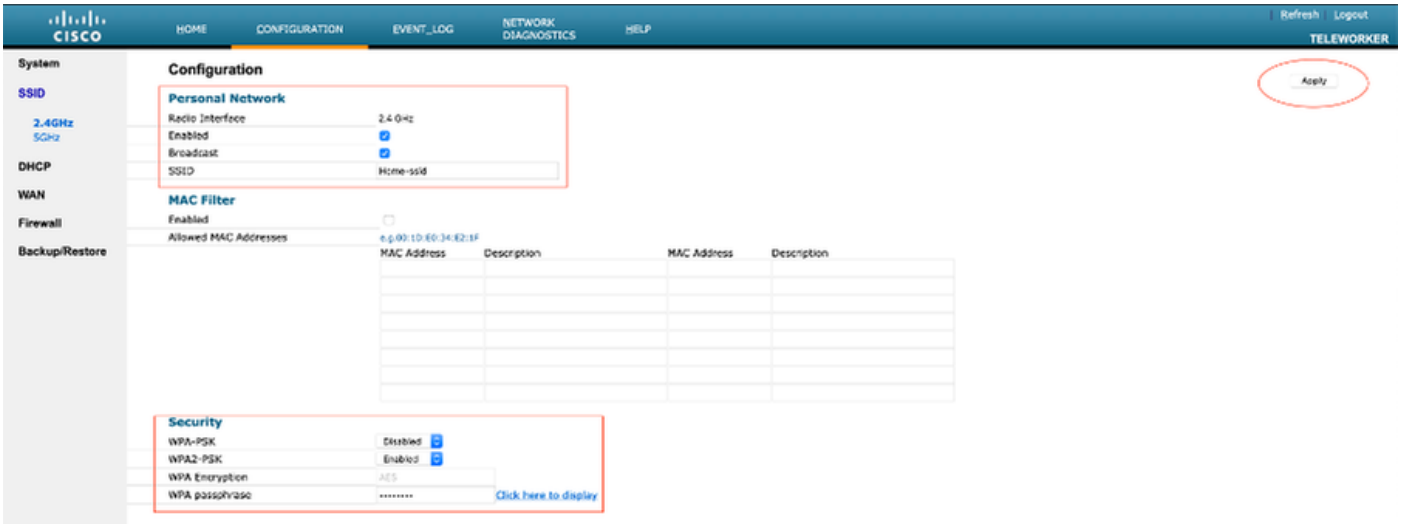
Log into OEAP and Configure the Personal SSID

1. You can access the web interface of the OEAP with its IP address. The default credentials to log in are **admin** and **admin**.

2. It is recommended to change the default credentials for security reasons.



3. Navigate to **Configuration> SSID> 2.4GHz/5GHz** to configure the personal SSID.



4. Enable Radio interface.

5. Enter the SSID and enable Broadcast

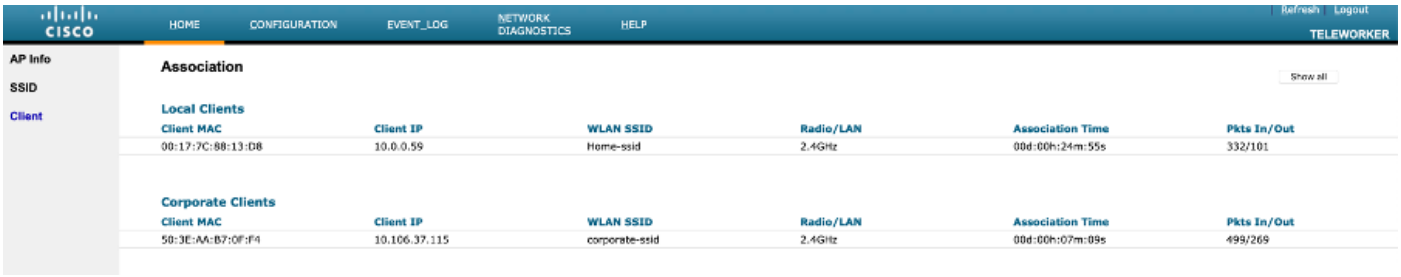
6. For encryption, choose **WPA-PSK** or **WPA2-PSK** and enter the passphrase for corresponding security type.

7. Click Apply for settings to take effect.

8. Clients that connect to the personal SSID gets the IP address from 10.0.0.1/24 network by default.

9. Home users can use the same AP to connect for their home use & that traffic is not passed via the DTLS tunnel.

10. In order to check client associations on the OEAP, navigate to **Home > Client**. You are able to see the local clients and Corporate clients associated with the OEAP.




```
To clear personal ssidfrom office-extend ap

ewlc#ap name cisco-ap clear-personalssid-config

clear-personalssid-config Clears the Personal SSID config on an OfficeExtend AP
```

Configure RLAN on 9800 WLC

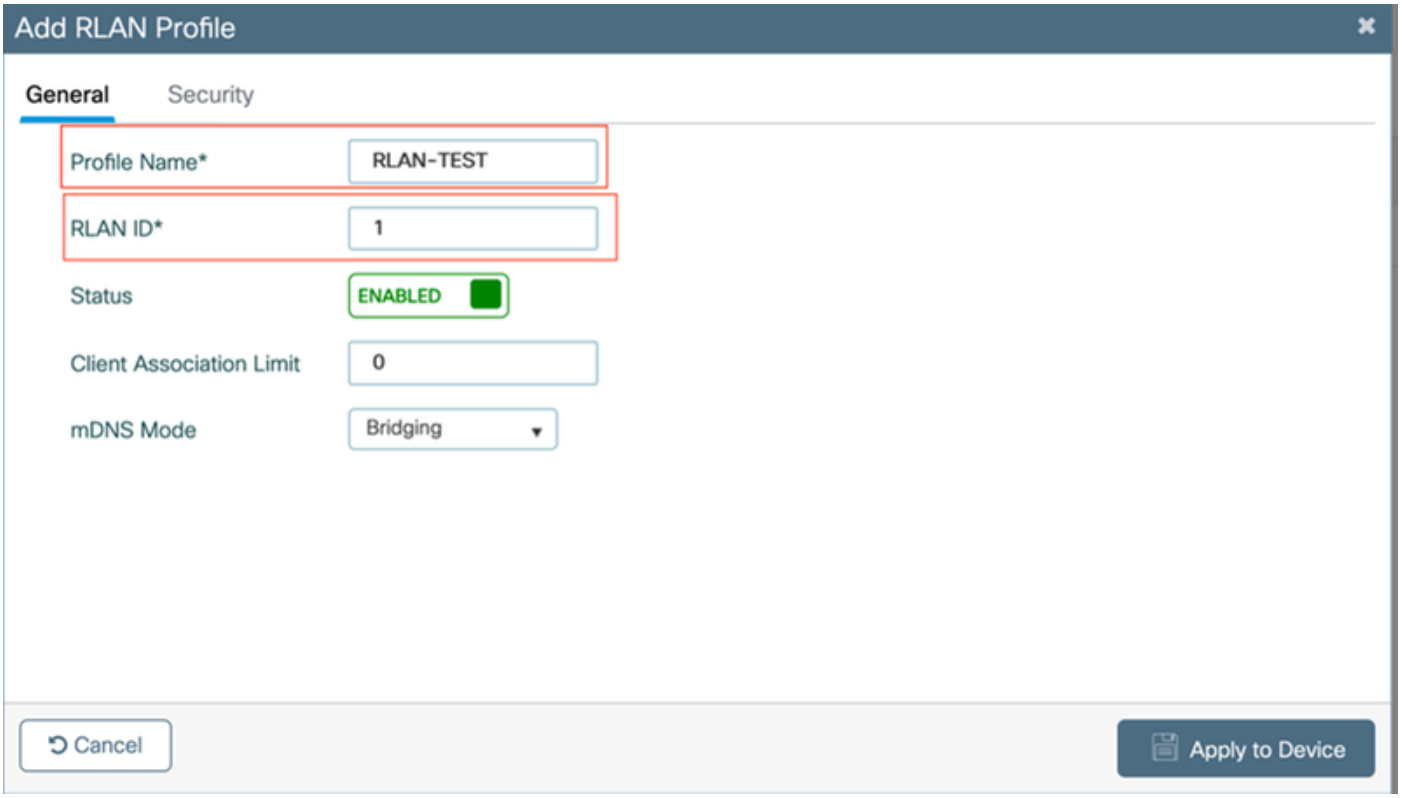
A Remote LAN (RLAN) is used for authenticating wired clients using the controller. Once the wired client successfully joins the controller, the LAN ports switch the traffic between central or local switching modes. The traffic from the wired clients is treated as wireless client traffic. The RLAN in Access Point (AP) sends the authentication request to authenticate the wired client. The

The authentication of the wired clients in RLAN is similar to the central authenticated wireless client.

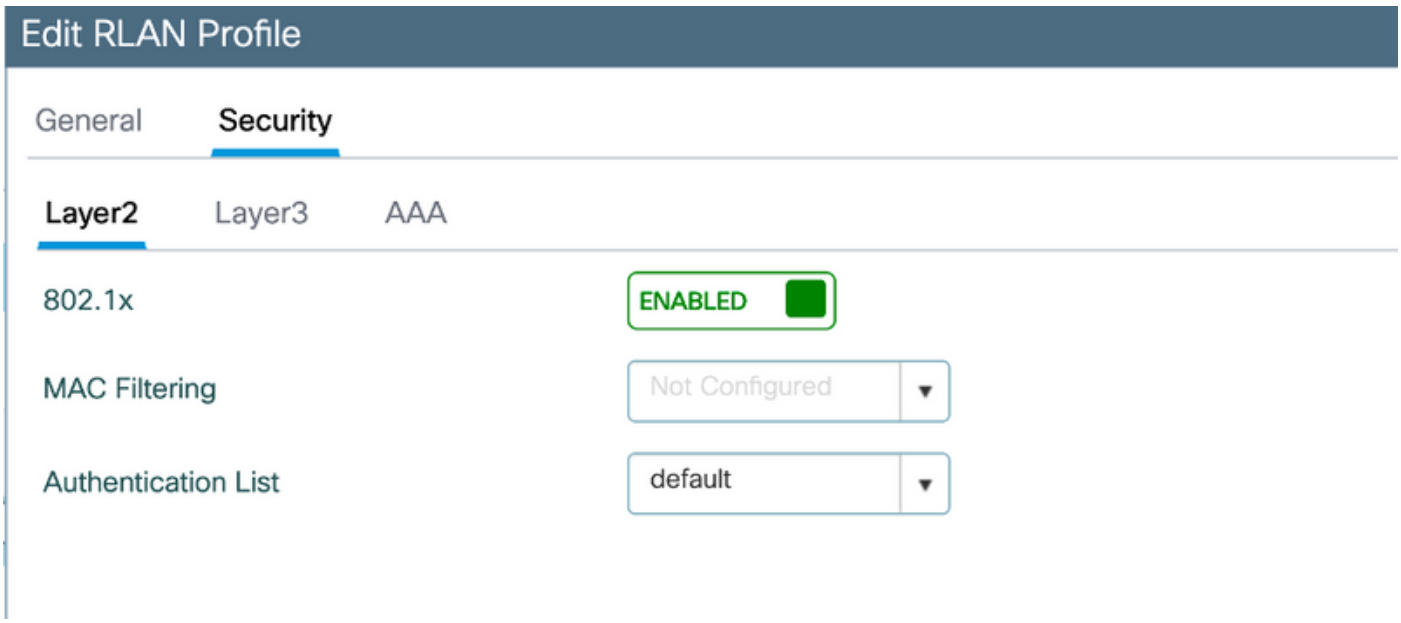
> **Note**: Local EAP is being used for RLAN client authentication in this example. Local EAP configuration has to be present on the WLC to configure the below steps. It includes aaa authentication & authorization methods, Local EAP profile, and Local credentials.

Local EAP authentication on Catalyst 9800 WLC configuration example

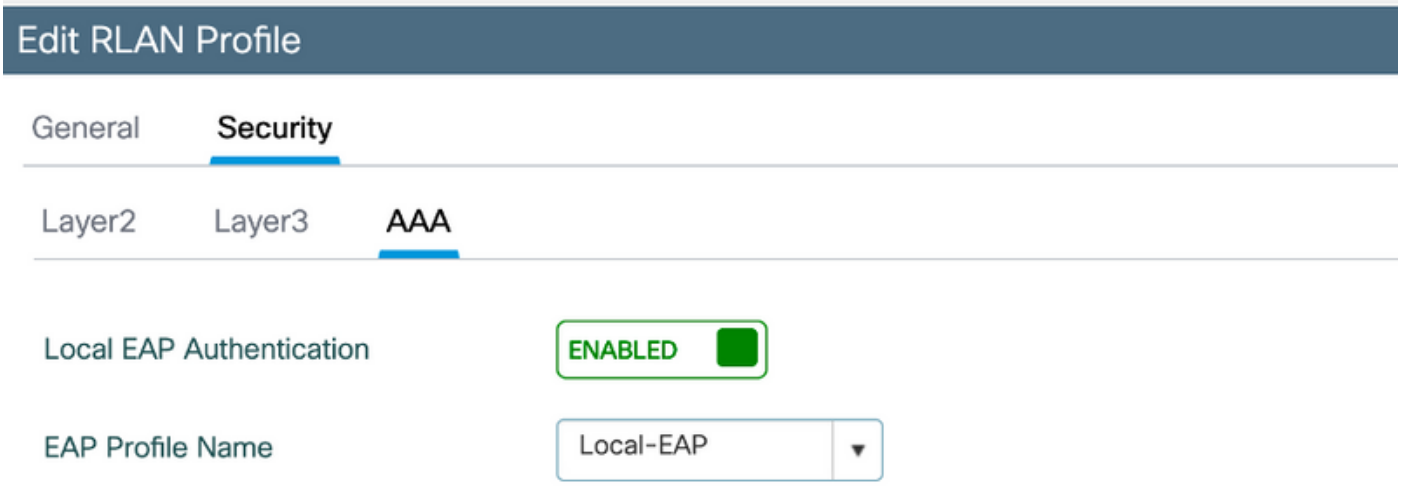
1. In order to create RLAN profile, navigate to **Configuration > Wireless > Remote LAN** and enter a Name and RLAN ID for the RLAN profile, as shown in this image.



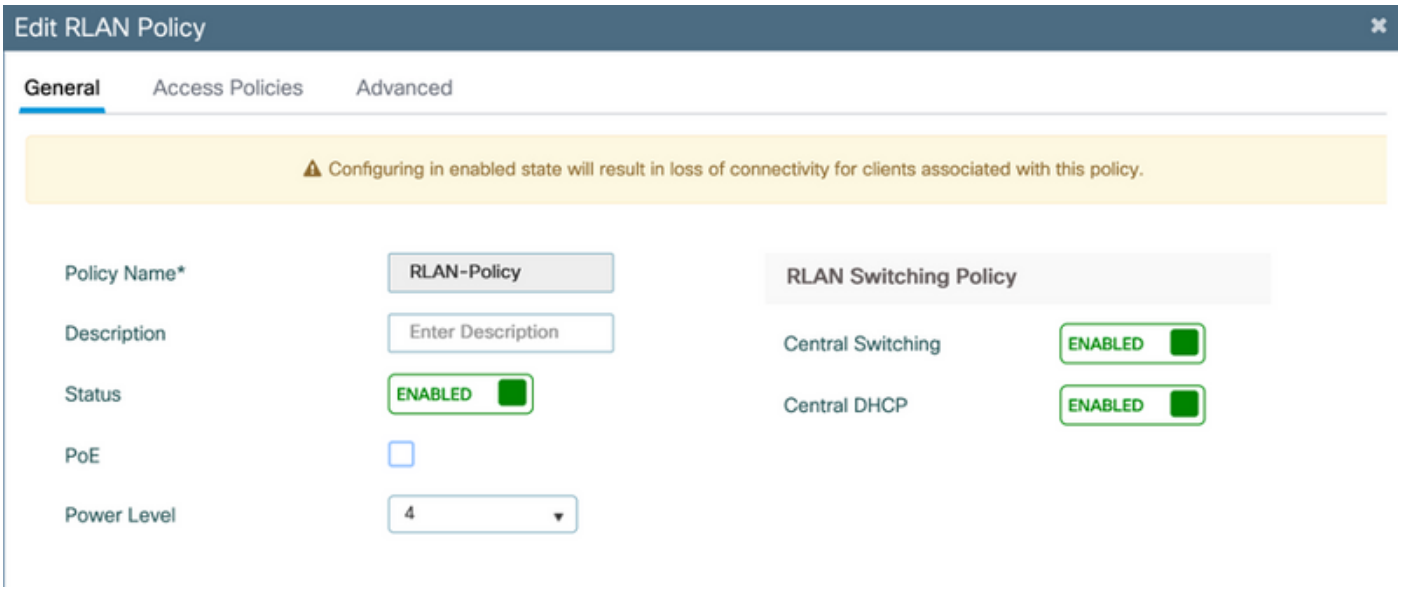
2. Navigate to **Security > Layer2**, in order to enable 802.1x for an RLAN, set the 802.1x status as Enabled, as shown in this image.



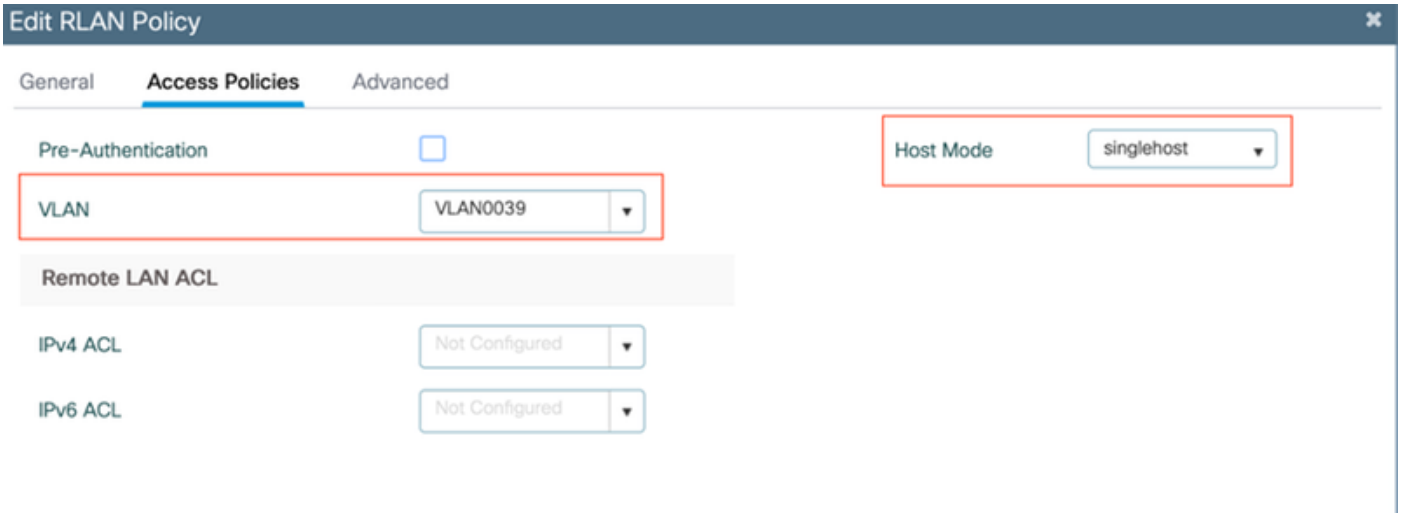
3. Navigate to **Security > AAA**, set the Local EAP Authentication to enabled, and choose the required EAP Profile Name from the drop-down list, as shown in this image.



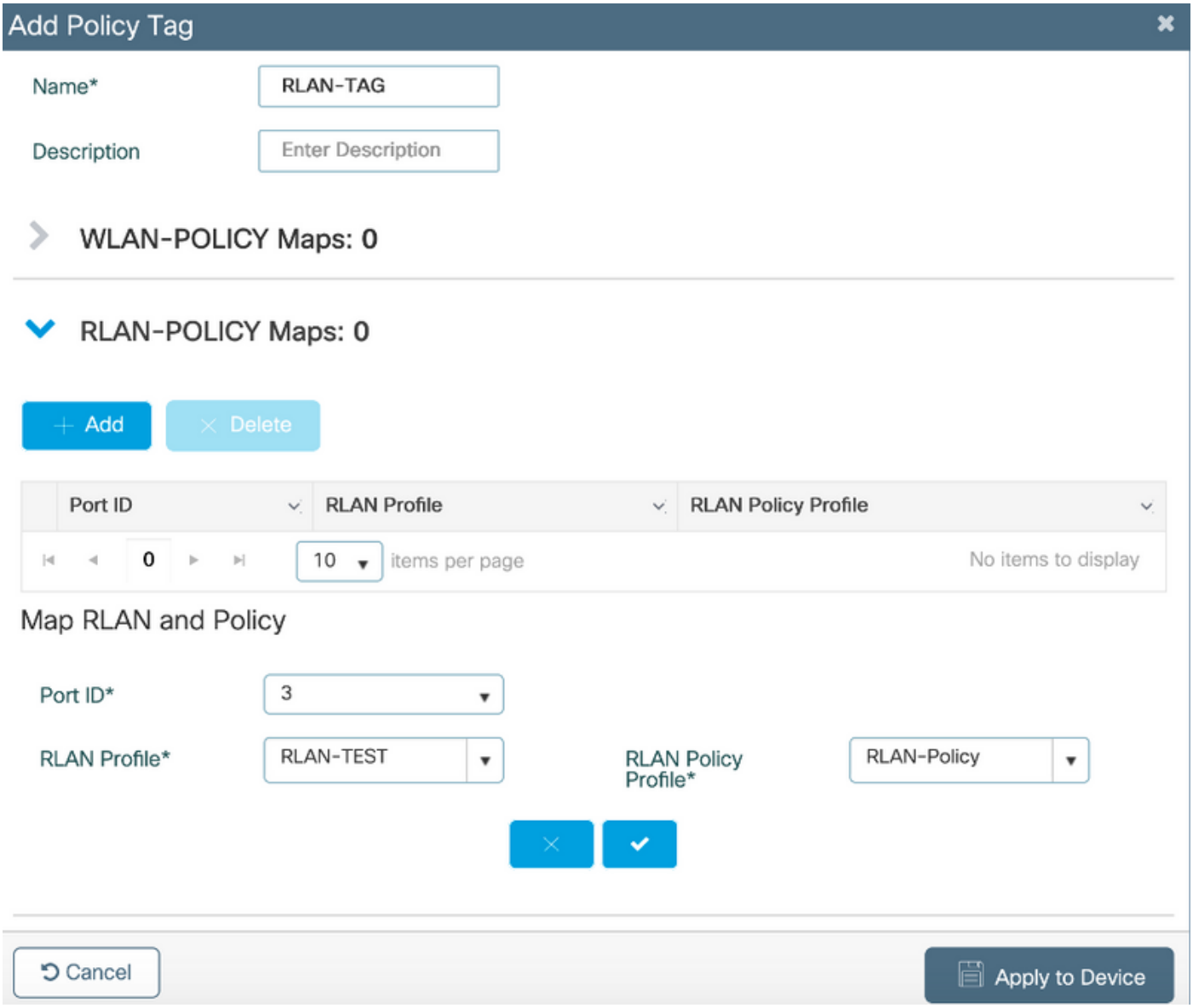
4. In order to Create RLAN policy, navigate to **Configuration > Wireless > Remote LAN** and on the Remote LAN page, click **RLAN Policy** tab, as shown in this image.

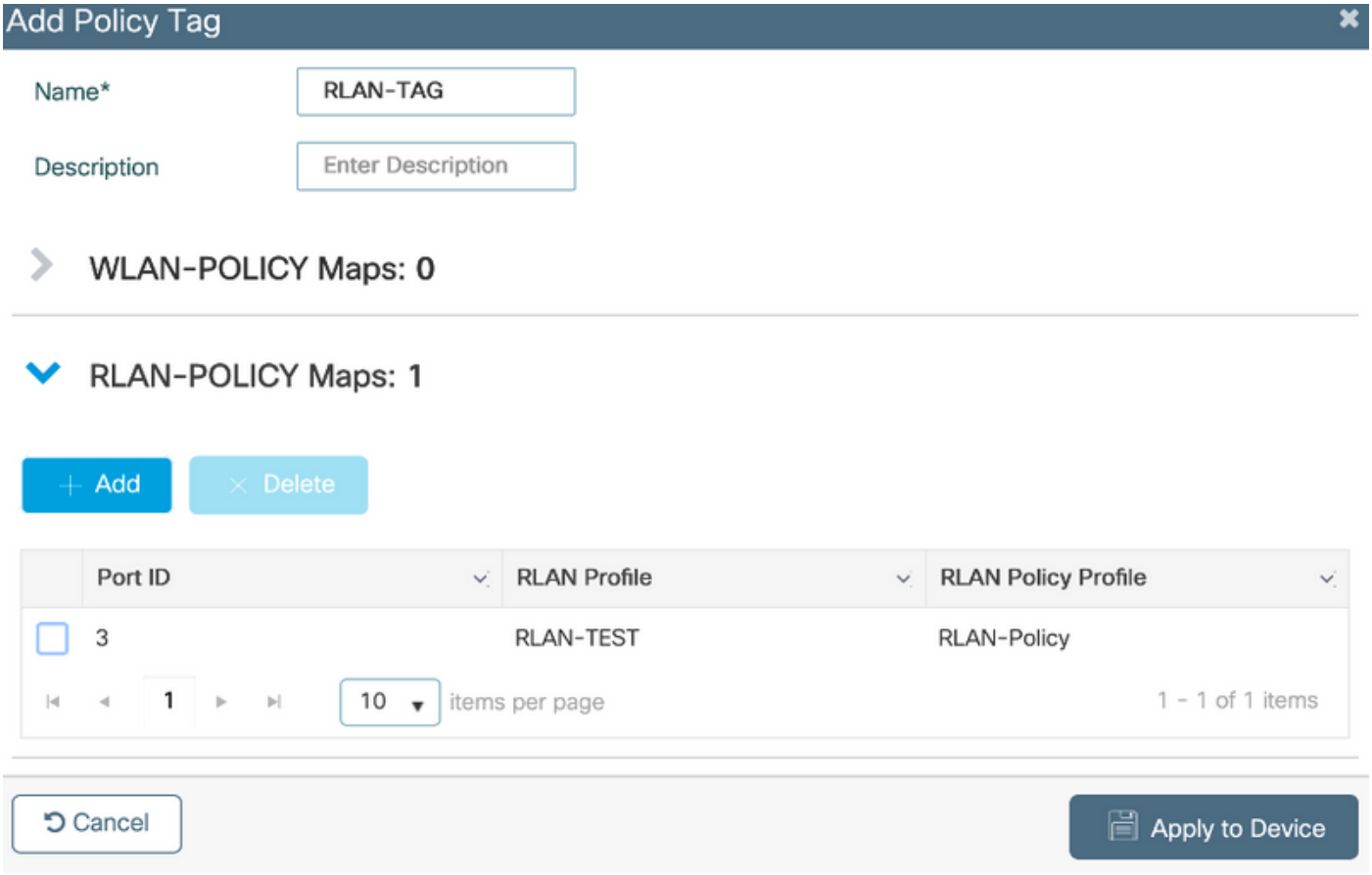


Navigate to Access Policies and configure the VLAN and Host Mode and apply the settings.

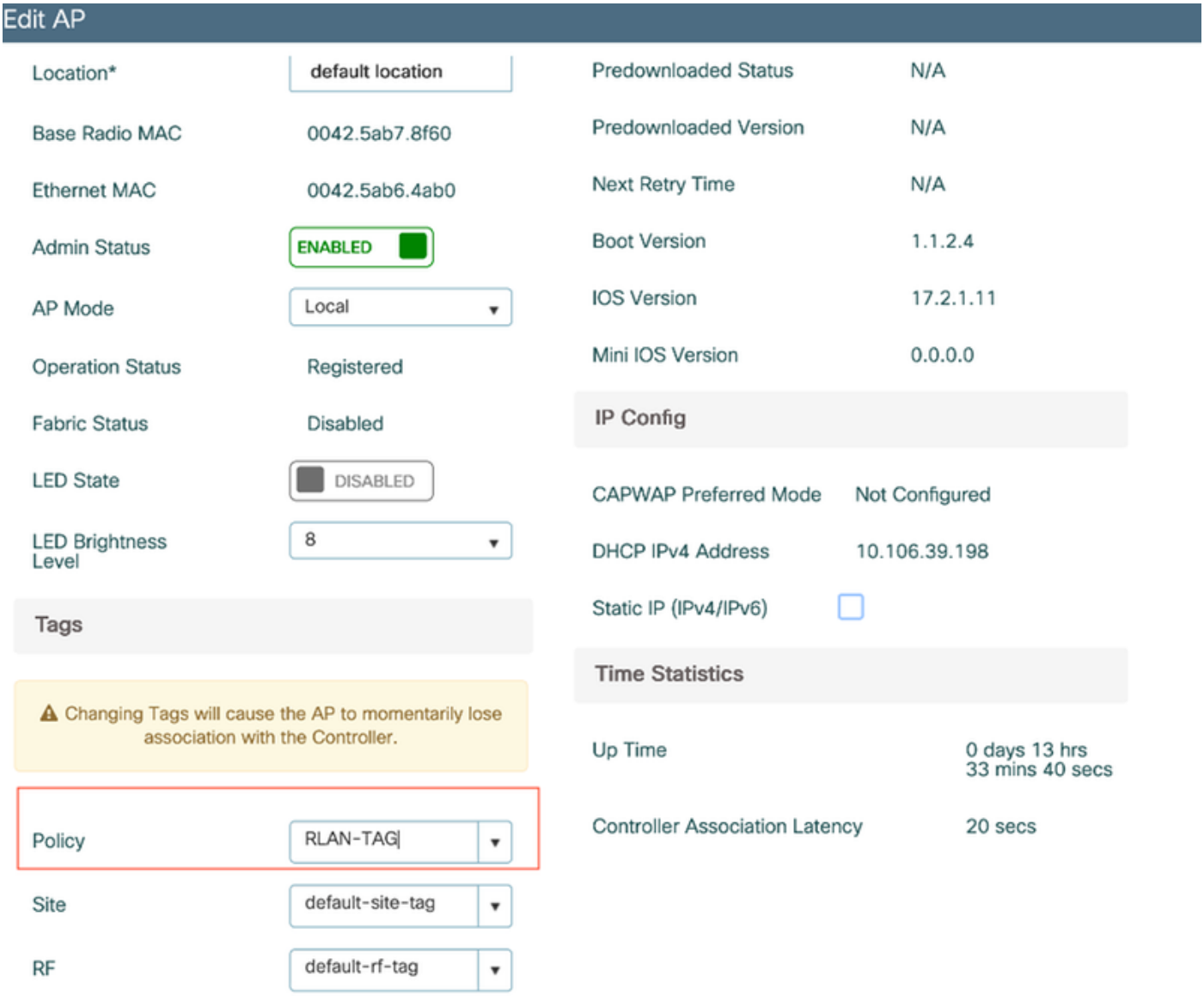


5. In order to create Policy tag and Map RLAN profile to RLAN policy, navigate to **Configuration > Tags & Profiles > Tags.**

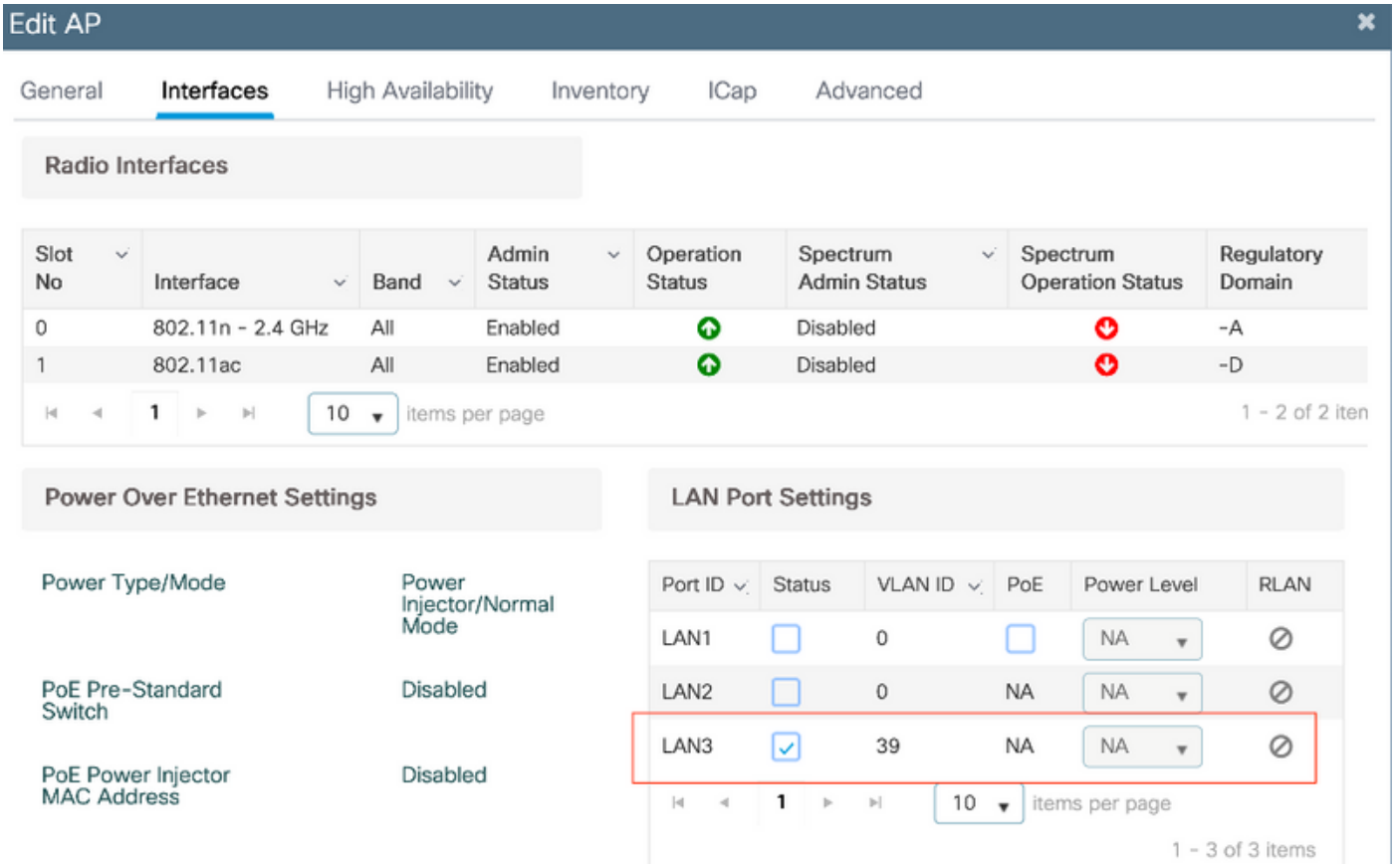

Add Policy Tag
Name*
RLAN-TAG
Description
Enter Description
WLAN-POLICY Maps: 0
RLAN-POLICY Maps: 0
Add
Delete
Port ID
RLAN Profile
RLAN Policy Profile
0
10
items per page
No items to display
Map RLAN and Policy
Port ID*
3
RLAN Profile*
RLAN-TEST
RLAN Policy Profile*
RLAN-Policy
Cancel
Apply to Device



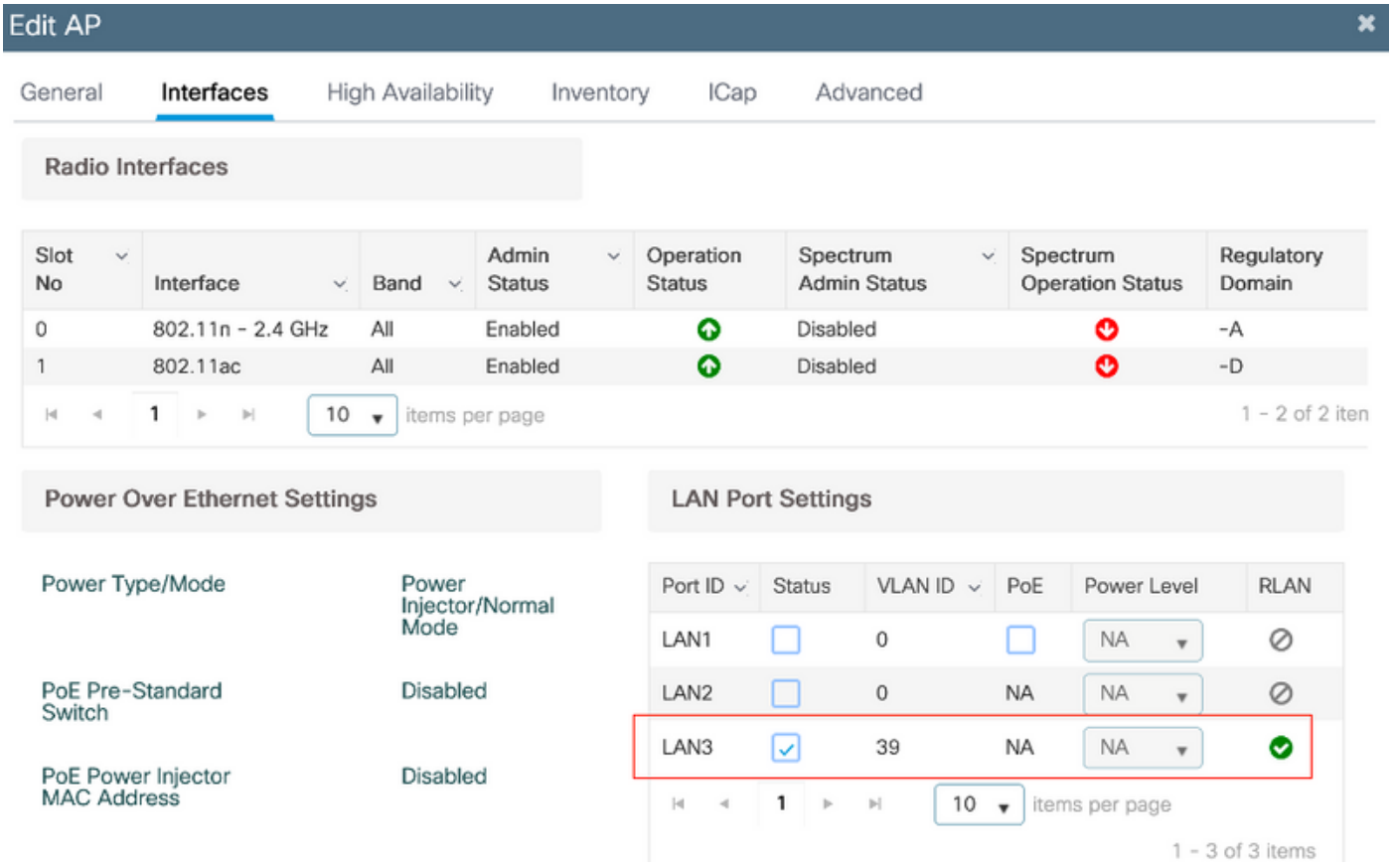
6. Enable the LAN port and apply the Policy TAG on the AP. Navigate to **Configuration > Wireless > Access Points** and click on the **AP**.



Apply the setting and the AP re-joins the WLC. Click on the **AP**, then select **Interfaces** and enable the LAN port.

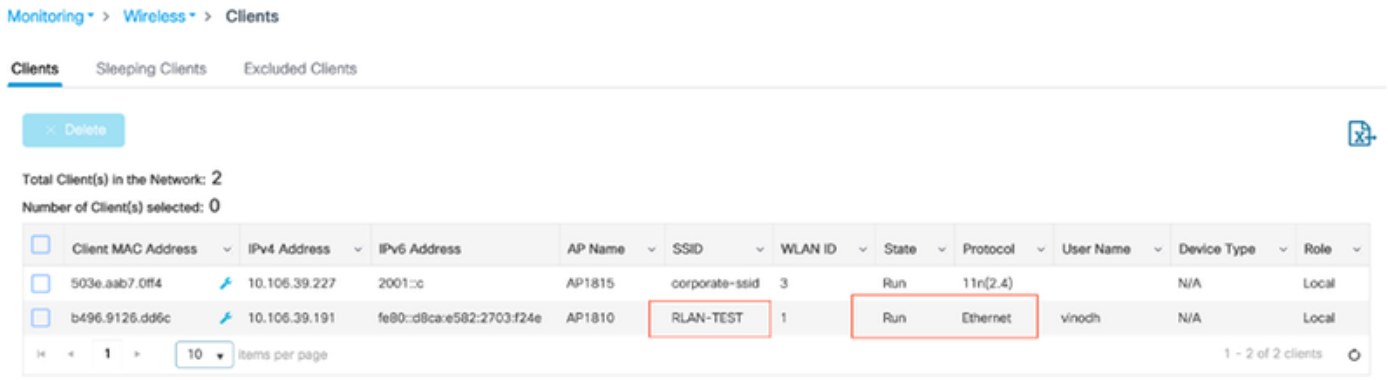


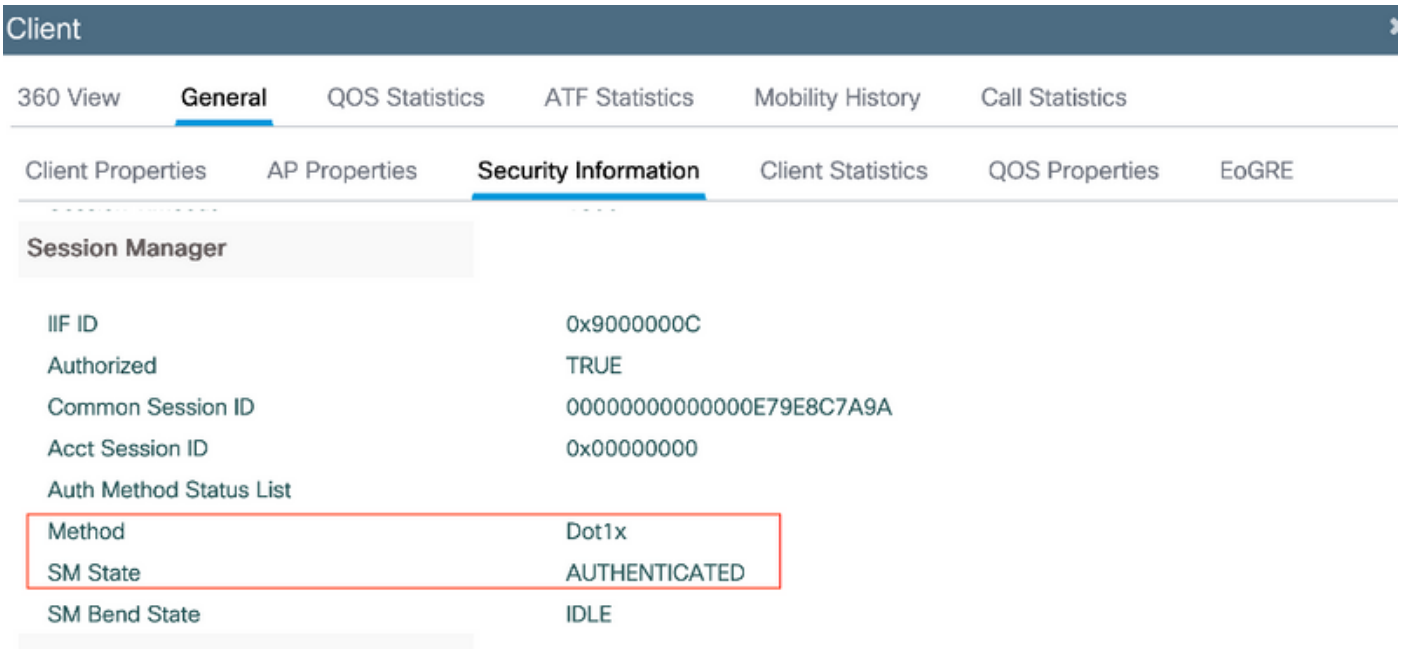
Apply the settings and verify the status.



7. Connect a PC in the LAN3 port of the AP. PC will be authenticated via 802.1x and get an IP address from the configured VLAN.

Navigate to **Monitoring >Wireless > Clients** to check the client status.






```
vk-9800-1#show wireless client summary
Number of Clients: 2
MAC Address    AP Name                                          Type ID   State
Protocol Method     Role
-------------------------------------------------------------------------------------------------
-------------------------
503e.aab7.0ff4 AP1815                                           WLAN 3    Run
11n(2.4) None       Local
b496.9126.dd6c AP1810                                           RLAN 1    Run
Ethernet Dot1x      Local
Number of Excluded Clients: 0
```

Troubleshoot

Common issues:

- Only local SSID's work, SSID's configured on WLC not being broadcasted: Check if AP has joined the Controller properly.
- Not able to access the OEAP GUI: Check if ap has IP address and verify reachability (firewall, ACL, etc in-network)
- Centrally Switched Wireless or wired clients not able to authenticate or get the IP address: Take RA traces, always on traces, etc.

Sample of Always on traces for Wired 802.1x client:

[client-orch-sm] [18950]: (note): MAC: <client-mac> Association received. BSSID 00b0.e187.cfc0, old BSSID 0000.0000.0000, WLAN test_rlan, Slot 2 AP 00b0.e187.cfc0, Ap_1810

[client-orch-state] [18950]: (note): MAC: <client-mac> Client state transition: S_CO_INIT -> S_CO_ASSOCIATING

[dot11-validate] [18950]: (ERR): MAC: <client-mac> Failed to dot11 determine ms physical radio type. Invalid radio type :0 of the client.

[dot11] [18950]: (ERR): MAC: <client-mac> Failed to dot11 send association response. Encoding of assoc response failed for client reason code: 14.

[dot11] [18950]: (note): MAC: <client-mac> Association success. AID 1, Roaming = False, WGB = False, 11r = False, 11w = False AID list: 0x1| 0x0| 0x0| 0x0

[client-orch-state] [18950]: (note): MAC: <client-mac> Client state transition: S_CO_ASSOCIATING -> S_CO_L2_AUTH_IN_PROGRESS

[client-auth] [18950]: (note): MAC: <client-mac> ADD MOBILE sent. Client state flags: 0x71 BSSID: MAC: 00b0.e187.cfc0 capwap IFID: 0x90000012

[client-auth] [18950]: (note): MAC: <client-mac> L2 Authentication initiated. method DOT1X, Policy VLAN 1119,AAA override = 0 , NAC = 0

[ewlc-infra-evq] [18950]: (note): Authentication Success. Resolved Policy bitmap:11 for client <client-mac>

[client-orch-sm] [18950]: (note): MAC: <client-mac> Mobility discovery triggered. Client mode: Local

[client-orch-state] [18950]: (note): MAC: <client-mac> Client state transition: S_CO_L2_AUTH_IN_PROGRESS -> S_CO_MOBILITY_DISCOVERY_IN_PROGRESS

[mm-client] [18950]: (note): MAC: <client-mac> Mobility Successful. Roam Type None, Sub Roam Type MM_SUB_ROAM_TYPE_NONE, Previous BSSID MAC: 0000.0000.0000   Client IFID: 0xa0000003, Client Role: Local PoA: 0x90000012 PoP: 0x0

[client-auth] [18950]: (note): MAC: <client-mac> ADD MOBILE sent. Client state flags: 0x72 BSSID: MAC: 00b0.e187.cfc0 capwap IFID: 0x90000012

[client-orch-state] [18950]: (note): MAC: <client-mac> Client state transition: S_CO_MOBILITY_DISCOVERY_IN_PROGRESS -> S_CO_DPATH_PLUMB_IN_PROGRESS

[dot11] [18950]: (note): MAC: <client-mac> Client datapath entry params - ssid:test_rlan,slot_id:2 bssid ifid: 0x0, radio_ifid: 0x90000006, wlan_ifid: 0xf0404001

[dpath_svc] [18950]: (note): MAC: <client-mac> Client datapath entry created for ifid 0xa0000003

[client-orch-state] [18950]: (note): MAC: <client-mac> Client state transition: S_CO_DPATH_PLUMB_IN_PROGRESS -> S_CO_IP_LEARN_IN_PROGRESS

[client-iplearn] [18950]: (note): MAC: <client-mac> Client IP learn successful. Method: DHCP IP: <Cliet-IP>

[apmgr-db] [18950]: (ERR): 00b0.e187.cfc0 Get ATF policy name from WLAN profile:: Failed to get wlan profile. Searched wlan profile test_rlan

[apmgr-db] [18950]: (ERR): 00b0.e187.cfc0 Failed to get ATF policy name

[apmgr-bssid] [18950]: (ERR): 00b0.e187.cfc0 Failed to get ATF policy name from WLAN profile name: No such file or directory

```
[client-orch-sm] [18950]: (ERR): Failed to get client ATF policy name: No such file or directory

[client-orch-state] [18950]: (note): MAC: <client-mac>  Client state transition:
S_CO_IP_LEARN_IN_PROGRESS -> S_CO_RUN
```