

# Wireless Mesh

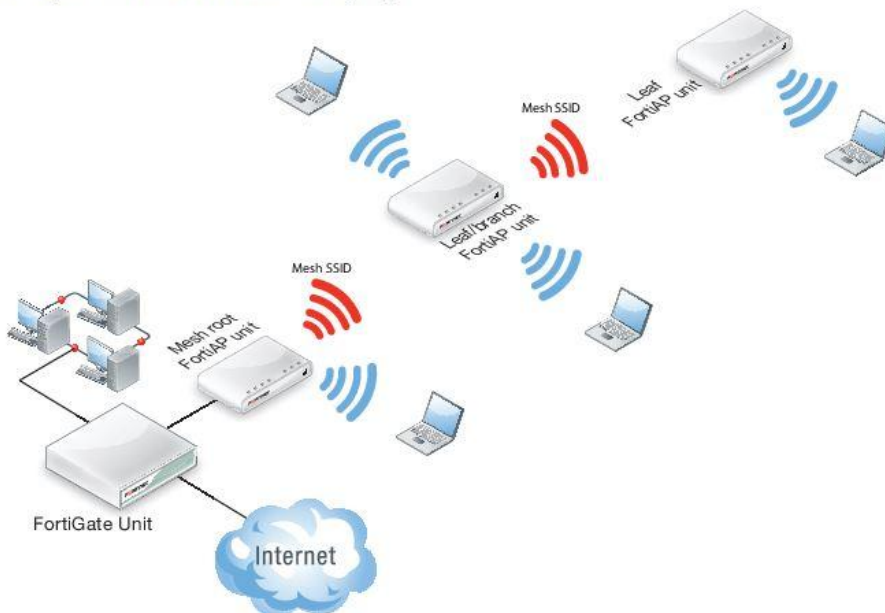
## Why Wireless mesh?

The access point of a WiFi network is usually connected to the WiFi Controller through Ethernet wiring. A wireless mesh eliminates the need for Ethernet wiring by connecting WiFi access points to the controller by radio. This is useful where installation of Ethernet wiring is impractical.

Below shows a wireless mesh topology.

### Overview of Wireless Mesh

The figure below shows a wireless mesh topology.



- The FortiAP-221B is connected to the network by Ethernet is called the Mesh Root node.
- The root node can be a FortiAP unit or built-in AP of a FortiWiFi unit.
- AP that serve only regular WiFi clients are called Leaf nodes, in this its FortiAP-220B
- Leaf AP's carry mesh SSID to other Leaf AP in the topology using a dedicated radio for eg, the 5GHz radio could carry only the mesh SSID (backhaul SSID) while the 2.4GHz radio carries one or more SSIDs that serve users.

## Network:

- Network between FortiGate/FortiWiFi is 10.10.2.0/24 with dhcp enabled.
- Network for internet users is 10.0.0.0/24 with dhcp enabled configured on WiFi controller.

## Firmware requirements:

All FortiAP units that will be part of the wireless mesh network must be running FAP firmware version 5.0 build 003. FortiWiFi or FortiGate unit used as the WiFi controller must be running FortiOS 5.0.

## Configuration of meshed WiFi network:

Setting up Full Mesh Wireless on FortiGate Unit using two FortiAP Units.

- Configure the mesh SSID, go to WiFi Controller > WiFi Network > SSID.
- Edit the default mesh SSID fmesh.root and change the SSID from the default to something unique. Note that the traffic mode is set to **mesh downlink**. Enter a new pre-shared key.
- Create another SSID for clients access and use tunnel

Name	Mesh_Link
Type	WiFi SSID
Traffic Mode	Mesh Downlink
WiFi Settings	
SSID	fmesh.root
Security Mode	WPA/WPA2-Personal
Data Encryption	<input checked="" type="radio"/> AES <input type="radio"/> TKIP <input type="radio"/> TKIP-AES
Pre-shared Key	..... (8 - 63 characters)
Comments	Write a comment... 0/255
Administrative Status	<input checked="" type="radio"/> Up <input type="radio"/> Down
<input type="button" value="OK"/> <input type="button" value="Cancel"/>	

- Go to WiFi Controller > WiFi Network > Custom AP Profile and create a new AP profile, or edit the profile created earlier, and enter the follow settings: Select the correct platform, in this example we are using the FAP 221B.
- Select Radio 1 and set mode Access Point and use default Band and Channel settings. Enable your SSID and the mesh SSID from the list of available SSIDs.
- Select Radio 2 and set mode Access Point and use default Band and Channel settings.
- Enable your SSID and the mesh SSID from the list of available SSIDs. Click OK.

**Radio 1**

Mode  Disable  Access Point  Dedicated Monitor

Background Scan  Disable  Enable

WIDS Profile

Radio Resource Provision


Client Load Balancing  Frequency Handoff  AP Handoff

Band

20/40 MHz Channel Width

Channel  36  40  44  48  149  153  157  161  165

Auto TX Power Control  Disable  Enable

TX Power 

SSID

---

**Radio 2**

Mode  Disable  Access Point  Dedicated Monitor

Background Scan  Disable  Enable

WIDS Profile

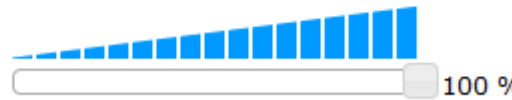
Radio Resource Provision

Client Load Balancing  Frequency Handoff  AP Handoff

Band

Channel  1  2  3  4  5  6  7  8  9  10  11

Auto TX Power Control  Disable  Enable

TX Power 

SSID

- If this is a new profile you will need to apply this to your custom AP profile in your managed AP. Go to WiFi Controller > Managed Access Points > Managed FortiAP and select your device and select edit. In the wireless settings change the AP profile from automatic to your new profile and select apply and ok to save your changes.
- This change will cause the access point daemons on the AP to restart.

Serial Number   
Name   
Comments  3/35

**Managed AP Status**

Status Online  
Connected Via Ethernet (10.10.2.4)  
Base MAC Address 00:09:0f:7c:6c:30  
Join Time 11/25/14 11:00  
Clients 1  
FortiAP OS Version FP221B-v5.0-build032 [A recommended update is available]  
State Authorized

**Wireless Settings**

AP Profile **myap** [Change]  
Radio 1  
  Mode Access Point  
  Band 802.11an\_5G  
  Channel 36, 40, 44, 48, 149, 153, 157, 161, 165  
Radio 2  
  Mode Access Point  
  Band 802.11bgn\_2.4G  
  Channel 1, 6, 11

---

**The FortiAP units that will serve as branch/leaf nodes must be preconfigured as follows.**

- Connect to the FortiAP unit web-based manager on its default Ethernet interface IP address 192.168.1.2
- In the connectivity section enter the IP address of your AP network as follows

Address Mode	<input checked="" type="radio"/> Static <input type="radio"/> DHCP
Management VLAN ID	<input type="text" value="0"/>
Local IP Address	<input type="text" value="10.10.2.4"/>
Local Network Mask	<input type="text" value="255.255.255.0"/>
Gateway IP	<input type="text" value="10.10.2.10"/>
Administrative Access	<input checked="" type="checkbox"/> HTTP <input type="checkbox"/> TELNET

---

Uplink	<input checked="" type="radio"/> Ethernet <input type="radio"/> Mesh <input type="radio"/> Ethernet with mesh backup support
--------	--

---

AC Discovery Type	<input checked="" type="radio"/> Auto <input type="radio"/> Static <input type="radio"/> DHCP <input type="radio"/> DNS <input type="radio"/> Broadcast <input type="radio"/> Multicast
AC Control Port	<input type="text" value="5246"/>
AC IP Address 1	<input type="text" value="10.10.2.10"/>
AC IP Address 2	<input type="text"/>
AC IP Address 3	<input type="text"/>
AC Host Name 1	<input type="text" value="_capwap-control._udp.example"/>
AC Host Name 2	<input type="text"/>
AC Host Name 3	<input type="text"/>
AC Discovery Multicast Address	<input type="text" value="224.0.1.140"/>
AC Discovery DHCP Option Code	<input type="text" value="138"/>

- Start your second AP. You may need to work in pairs for this lab, in that case you have to de-authorizes one AP and then you have to authorizes the second AP The second AP will use the automatic profile which is fine for this lab.
- Configure the second AP to use the wireless mesh as an uplink. From the FortiAP GUI, go to Connectivity and select mesh and enter the mesh SSID and pre-shared key. This change will cause the access point daemons on the AP to restart.

Address Mode	<input checked="" type="radio"/> Static <input type="radio"/> DHCP
Local IP Address	<input type="text" value="10.10.2.6"/>
Local Network Mask	<input type="text" value="255.255.255.0"/>
Gateway IP	<input type="text" value="10.10.2.10"/>
Administrative Access	<input checked="" type="checkbox"/> HTTP <input type="checkbox"/> TELNET
<hr/>	
Uplink	<input type="radio"/> Ethernet <input checked="" type="radio"/> Mesh <input type="radio"/> Ethernet with mesh backup support
Mesh AP SSID	<input type="text" value="fmesh.root"/>
Mesh AP Password	<input type="password" value="*****"/>
Ethernet Bridge	<input type="checkbox"/>
<hr/>	
AC Discovery Type	<input checked="" type="radio"/> Auto <input type="radio"/> Static <input type="radio"/> DHCP <input type="radio"/> DNS <input type="radio"/> Broadcast <input type="radio"/> Multicast
AC Control Port	<input type="text" value="5246"/>
AC IP Address 1	<input type="text" value="10.10.2.10"/>
AC IP Address 2	<input type="text"/>
AC IP Address 3	<input type="text"/>
AC Host Name 1	<input type="text" value="_capwap-control._udp.exa"/>

- You should observe that the second AP connects as a leaf device.

**Note:** It might take some time for the state icon to become green however if you feel it is taking to long can you can reboot the AP to expedite the process.

Mesh	Access Point	State	Connected Via	SSIDs	Channel	Clients
	FP221B3X12008432		10.10.2.4	Radio 1: fmesh.root, Client_SSID Radio 2: fmesh.root, Client_SSID	Radio 1: 36 Radio 2: 1	Radio 1: 0 Radio 2: 1
	FAP22B3U12009906		10.10.2.6	Radio 1: All Radio 2: All	Radio 1: 149 Radio 2: 1	Radio 1: 0 Radio 2: 0

- You have now created the full mesh. If you would like to test that clients on the leaf AP can reach the wireless controller modify the AP profile associated with your root AP and remove your wireless client SSID so that it is only being announced on the leaf AP.

## Debug commands:

Using the wireless controller debug of the FortiGate, try the following commands.

Use the following command to see the status of the FortiAPs:

```
diagnose wireless-controller wlac -c wtp
```

```
FWF60C3G12006306 # diagnose wireless-controller wlac -c wtp
```

```
-----WTP 1-----
WTP vd      : root
vfid       : 0
id         : FAP22B3U12009906
mgmt_vlanid : 0
region code : C
regcode status : invalid
refcnt     : 3 own(1) wtpprof(1) ws(1)
plain_ctl  : disabled
deleted    : no
admin      : enable
wtp-mode   : normal
wtp-profile : resv-dflt-FAP22B3U12009906
name       :
location   :
ip-frag-prevent : TCP_MSS
tun-mtu    : 0,0
active sw ver : FAP22B-v5.0-build032
local IPv4 addr : 10.10.2.6
board mac   : 00:09:0f:a1:94:3e
join_time   : Tue Nov 25 11:01:38 2014
mesh-uplink : mesh
mesh hop count : 1
parent wtp id : FP221B3X12008432
connection state : Connected
image download progress: 0
last failure : 0 -- N/A
last failure param:
last failure time: N/A
station info : 0/0
geo         : World (0)
Radio 1     : AP
country name : CN
country code : 156
radio_type  : 11N_5G
channel list : 36 40 44 48 149 153 157 161 165
darrp      : disabled
txpower     : 100% (23 dBm)
beacon_intv : 100
rts_threshold : 2346
frag_threshold : 2346
```

ap scan : disable  
ap scan passive : disabled  
sta scan : disabled  
WIDS profile : ---  
 wlan 0 : Mesh\_WiFi  
 wlan 1 : leaf\_SSID  
max vaps : 8  
base bssid : 00:09:0f:a1:94:40  
oper chan : 149  
station info : 0/0

Radio 2 : AP  
country name : CN  
country code : 156  
radio\_type : 11N  
channel list : 1 6 11  
darrp : disabled  
txpower : 100% (27 dBm)  
beacon\_intv : 100  
rts\_threshold : 2346  
frag\_threshold : 2346  
ap scan : disable  
ap scan passive : disabled  
sta scan : disabled  
WIDS profile : ---  
 wlan 0 : Mesh\_WiFi  
 wlan 1 : leaf\_SSID  
max vaps : 8  
base bssid : 00:09:0f:a1:94:47  
oper chan : 1  
station info : 0/0  
Radio 3 : Not Exist

-----WTP 2-----  
WTP vd : root  
vfid : 0  
id : FP221B3X12008432  
mgmt\_vlanid : 0  
region code : A  
regcode status : valid  
refcnt : 3 own(1) wtpprof(1) ws(1)  
plain\_ctl : disabled  
deleted : no  
admin : enable  
wtp-mode : normal  
wtp-profile : myap  
name :  
location : N/A  
ip-frag-prevent : TCP\_MSS  
tun-mtu : 0,0  
active sw ver : FP221B-v5.0-build032  
local IPv4 addr : 10.10.2.4  
board mac : 00:09:0f:7c:6c:30  
join\_time : Tue Nov 25 11:00:15 2014  
mesh-uplink : ethernet



mesh hop count : 0  
parent wtp id :  
connection state : Connected  
image download progress: 0  
last failure : 10 -- JOIN REQ from unmanaged WTP is denied  
last failure param: N/A  
last failure time: Tue Nov 25 10:30:07 2014

station info : 1/0  
geo : World (0)  
Radio 1 : AP  
country name : US  
country code : 841  
radio\_type : 11N\_5G  
channel list : 36 40 44 48 149 153 157 161 165  
darrp : disabled  
txpower : 100% (23 dBm)  
beacon\_intv : 100  
rts\_threshold : 2346  
frag\_threshold : 2346  
ap scan : disable  
ap scan passive : disabled  
sta scan : disabled  
WIDS profile : ---  
wlan 0 : Mesh\_Link  
wlan 1 : leaf\_SSID  
max vaps : 8  
base bssid : 00:09:0f:7c:6c:31  
oper chan : 36  
station info : 0/0

Radio 2 : AP  
country name : US  
country code : 841  
radio\_type : 11N  
channel list : 1 6 11  
darrp : disabled  
txpower : 100% (27 dBm)  
beacon\_intv : 100  
rts\_threshold : 2346  
frag\_threshold : 2346  
ap scan : disable  
ap scan passive : disabled  
sta scan : disabled  
WIDS profile : ---  
wlan 0 : Mesh\_Link  
wlan 1 : leaf\_SSID  
max vaps : 8  
base bssid : 00:09:0f:7c:6c:38  
oper chan : 1  
station info : 1/0

Radio 3 : Not Exist

-----WTP 3-----  
WTP vd : root  
vfid : 0

id : FWF60C-WIFI0  
mgmt\_vlanid : 0  
region code : ALL  
regcode status : valid  
refcnt : 3 own(1) wtpprof(1) ws(1)  
plain\_ctl : disabled  
deleted : no  
admin : enable  
wtp-mode : normal  
wtp-profile : resv-dflt-FWF60C-WIFI0  
name :  
location :  
ip-frag-prevent : TCP\_MSS  
tun-mtu : 0,0  
active sw ver : FWF60C-v5.0-build292  
local IPv4 addr : 127.0.0.1  
board mac : 00:09:0f:00:00:01  
join\_time : Mon Nov 24 12:37:52 2014  
mesh-uplink : ethernet  
mesh hop count : 0  
parent wtp id :  
connection state : Connected  
image download progress: 0  
last failure : 0 -- N/A  
last failure param:  
last failure time: N/A  
station info : 0/0  
geo : World (0)  
Radio 1 : AP  
country name : US  
country code : N/A  
radio\_type : 11N  
channel list : 1 6 11  
darrp : disabled  
txpower : 100% (27 dBm)  
beacon\_intv : 100  
rts\_threshold : 2346  
frag\_threshold : 2346  
ap scan : disable  
ap scan passive : disabled  
sta scan : disabled  
WIDS profile : ---  
max vaps : 8  
base bssid : 00:0e:8e:41:2e:69  
oper chan : 1  
station info : 0/0  
Radio 2 : Not Exist  
Radio 3 : Not Exist  
-----Total 3 WTPs-----

Use the following command to list the configured wireless LANs:

*diagnose wireless-controller wlac -c wlan*

**FWF60C3G12006306 # diagnose wireless-controller wlac -c wlan**

```
WLAN (001/003) vdom,name: root, Mesh_Link
  vlanid      : 0 (auto vlan intf disabled)
  sw name     :
  ip, mac     : 0.0.0.0, 00:ff:b1:aa:12:39
  status      : up
  refcnt, deleted : 3 own(1) wtpprof(2)
  mesh backhaul : enabled
  local bridging : disabled
  local switching : disabled
  dynamic vlan  : disabled
  auth type     : 0
  mac type      : 0xffffffff
  tunnel type   : 0xffffffff
  fast roaming  : 0x1
  bc suppression : dhcp arp
  suppress ssid : 0
  ssid         : fmesh.root
  security      : 7
  radius mac auth : disabled
  radius mac auth svr:
  auth         : 0
  key          :
  keyindex     : 1
password      : fmeshroot
  radius_server :
  usergroup    : 0
  intra privacy : disabled
  station info : 1/0
  kern sock    : 23
  mf acl cfg   : disabled, allow, 0 entries
  sta list 0000 72:09:0f:a1:94:47 ws (0-10.10.2.4:5246) 1 0
WTP 0001      : 0, FP221B3X12008432
  ---- 0-10.10.2.4:5246 (12 - CWAS_RUN)
```

```
WLAN (002/003) vdom,name: root, Mesh_WiFi
  vlanid      : 0 (auto vlan intf disabled)
  sw name     :
  ip, mac     : 10.0.0.1, 00:ff:d7:12:eb:8f
  status      : down
  refcnt, deleted : 3 own(1) wtpprof(2)
  mesh backhaul : disabled
  local bridging : disabled
  local switching : enabled
  dynamic vlan  : disabled
  auth type     : 0
  mac type      : 0xffffffff
  tunnel type   : 0xffffffff
```

fast roaming : 0x1  
bc suppression : dhcp arp  
suppress ssid : 0  
ssid : fortinet.mesh.root  
security : 7  
radius mac auth : disabled  
radius mac auth svr:  
auth : 0  
key :  
keyindex : 1  
password : fortinet  
radius\_server :  
usergroup : 0  
intra privacy : disabled  
station info : 0/0  
kern sock : 8  
mf acl cfg : disabled, allow, 0 entries  
WTP 0002 : 0, FAP22B3U12009906  
---- 0-10.10.2.6:5246 (12 - CWAS\_RUN)

WLAN (003/003) vdom,name: root, leaf\_SSID  
vlanid : 0 (auto vlan intf disabled)  
sw name :  
ip, mac : 10.0.0.1, 00:ff:50:2f:de:4e  
status : up  
refcnt, deleted : 5 own(1) wtpprof(4)  
mesh backhaul : disabled  
local bridging : disabled  
local switching : enabled  
dynamic vlan : disabled  
auth type : 0  
mac type : 0xffffffff  
tunnel type : 0xffffffff  
fast roaming : 0x1  
bc suppression : dhcp arp  
suppress ssid : 0  
ssid : Client\_SSID  
security : 7  
radius mac auth : disabled  
radius mac auth svr:  
auth : 0  
key :  
keyindex : 1  
password : fmeshroot  
radius\_server :  
usergroup : 0  
intra privacy : disabled  
station info : 0/0  
kern sock : 24  
mf acl cfg : disabled, allow, 0 entries  
WTP 0003 : 0, FAP22B3U12009906  
---- 0-10.10.2.6:5246 (12 - CWAS\_RUN)  
WTP 0004 : 0, FP221B3X12008432

---- 0-10.10.2.4:5246 (12 - CWAS\_RUN)

Use the following command to list the connected wireless stations:

*diagnose wireless-controller wlac -d sta*

**FWF60C3G12006306 # diagnose wireless-controller wlac -d sta**

\* vf=0 wtp=15 rld=1 wlan=leaf\_SSID ip=0.0.0.0 mac=12:09:0f:7c:6c:31 vci= host= user= group= signal=0 noise=0 idle=23145 bw=0 use=3 chan=36 radio\_type=11N\_5G security=wpa\_wpa2\_personal encrypt=aes online=yes

\* vf=0 wtp=15 rld=2 wlan=leaf\_SSID ip=0.0.0.0 mac=12:09:0f:7c:6c:38 vci= host= user= group= signal=0 noise=0 idle=23145 bw=0 use=3 chan=1 radio\_type=11N security=wpa\_wpa2\_personal encrypt=aes online=yes

vf=0 wtp=15 rld=2 wlan=leaf\_SSID ip=10.0.0.3 mac=00:26:c7:99:33:86 vci=MSFT 5.0 host=Yogesh-PC user= group= signal=-43 noise=-95 idle=1 bw=0 use=3 chan=1 radio\_type=11N security=wpa2\_only\_personal encrypt=aes online=yes

\* vf=0 wtp=16 rld=2 wlan=leaf\_SSID ip=0.0.0.0 mac=12:09:0f:a1:94:47 vci= host= user= group= signal=0 noise=0 idle=23061 bw=0 use=3 chan=1 radio\_type=11N security=wpa\_wpa2\_personal encrypt=aes online=yes

\* vf=0 wtp=16 rld=1 wlan=leaf\_SSID ip=0.0.0.0 mac=12:09:0f:a1:94:40 vci= host= user= group= signal=0 noise=0 idle=23062 bw=0 use=3 chan=149 radio\_type=11N\_5G security=wpa\_wpa2\_personal encrypt=aes online=yes

vf=0 wtp=15 rld=2 wlan=leaf\_SSID ip=10.0.0.2 mac=90:21:55:eb:bf:25 vci= host= user= group= signal=-44 noise=-95 idle=27 bw=0 use=3 chan=1 radio\_type=11N security=wpa2\_only\_personal encrypt=aes online=yes

\* vf=0 wtp=15 rld=1 wlan=Mesh\_Link ip=0.0.0.0 mac=00:09:0f:7c:6c:31 vci= host= user= group= signal=0 noise=0 idle=22187 bw=0 use=3 chan=36 radio\_type=11N\_5G security=wpa\_wpa2\_personal encrypt=aes online=yes

\* vf=0 wtp=15 rld=2 wlan=Mesh\_Link ip=0.0.0.0 mac=00:09:0f:7c:6c:38 vci= host= user= group= signal=0 noise=0 idle=22187 bw=0 use=3 chan=1 radio\_type=11N security=wpa\_wpa2\_personal encrypt=aes online=yes

m vf=0 wtp=15 rld=2 wlan=Mesh\_Link ip=10.10.2.6 mac=72:09:0f:a1:94:47 vci= host= user= group= signal=-28 noise=-95 idle=3 bw=0 use=3 chan=1 radio\_type=11N security=wpa2\_only\_personal encrypt=aes online=yes

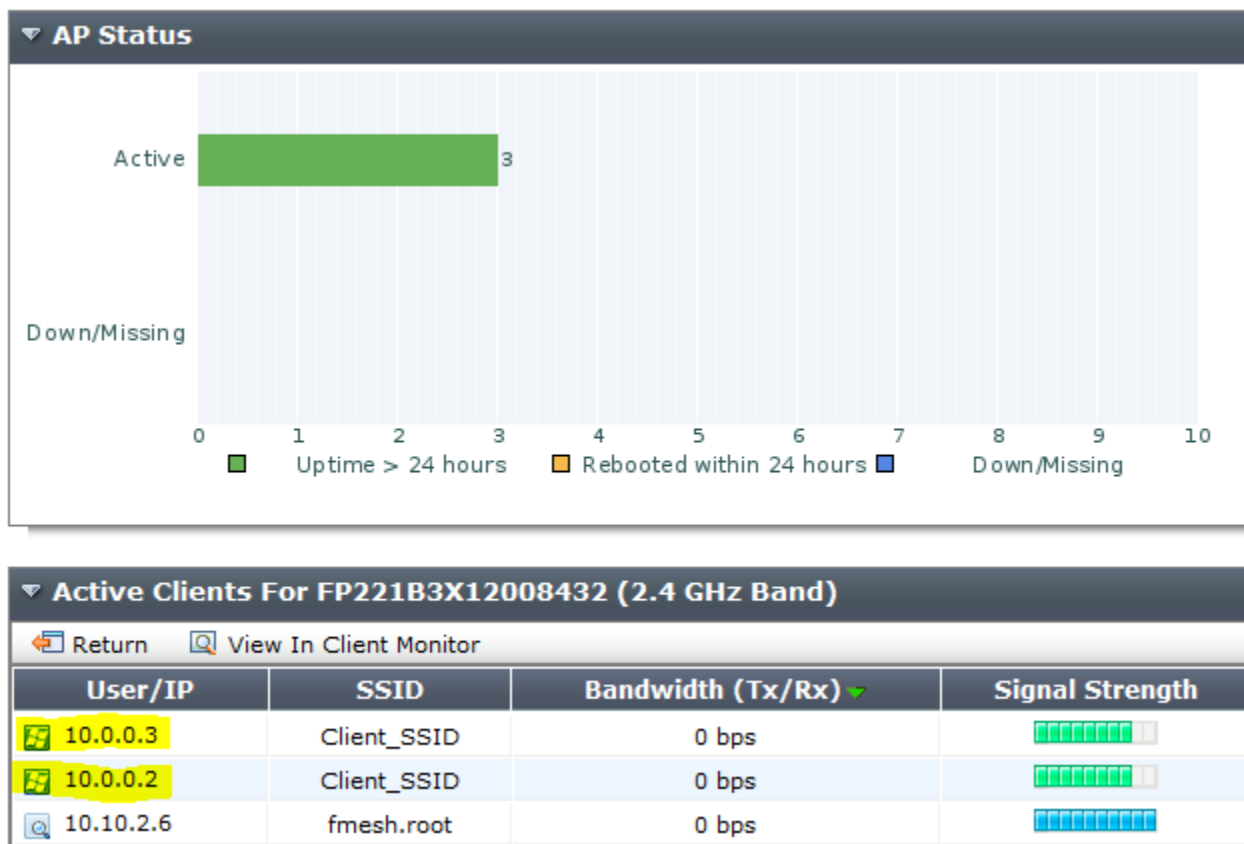
\* vf=0 wtp=16 rld=2 wlan=Mesh\_WiFi ip=0.0.0.0 mac=00:09:0f:a1:94:47 vci= host= user= group= signal=0 noise=0 idle=23062 bw=0 use=3 chan=1 radio\_type=11N security=wpa\_wpa2\_personal encrypt=aes online=yes

\* vf=0 wtp=16 rld=1 wlan=Mesh\_WiFi ip=0.0.0.0 mac=00:09:0f:a1:94:40 vci= host= user= group= signal=0 noise=0 idle=23062 bw=0 use=3 chan=149 radio\_type=11N\_5G security=wpa\_wpa2\_personal encrypt=aes online=yes

Using the debug of the FortiAP, try the following commands.

**View the status of the Wireless clients:**

Go to WiFi Controller > Monitors > Wireless Health to view the list of all connected internet users.



In the FortiAP CLI, you can check the main ip field in the output from the commands

```
cw_diag -c mesh
```

**FAP22B3U12009906 # cw\_diag -c mesh**

```
Sys Cfg AP addr mode: static
stp mode : 0
dflt ip : 10.10.2.6
dflt mask: 255.255.255.0
dflt gw : 10.10.2.10

Mesh Cfg Uplink : Mesh Uplink
AP SSID : fmesh.root
AP BSSID : 00:00:00:00:00:00
```

*AP PASSWD : fmeshroot*  
*local eth bridge : 2*

*Mesh Oper AP Type : Mesh Uplink*  
*wbh status : running*  
*wbh rld : 1*  
*wbh mac : 72:09:0f:a1:94:47*  
*wbh bssid : 00:09:0f:7c:6c:38*  
*wbh Chan : 1*  
*vap mhc : 1*  
*eth type : 0x2233*

*main dhcp ip : 0.0.0.0*  
*main dhcp mask : 0.0.0.0*  
*main dhcp gw : 0.0.0.0*

*bh dhcp ip : 0.0.0.0*  
*bh dhcp mask : 0.0.0.0*  
*bh dhcp gw : 0.0.0.0*

*main ip : 10.10.2.6*  
*main mask : 255.255.255.0*  
*main gw : 10.10.2.10*

*bh ip : 0.0.0.0*  
*bh mask : 0.0.0.0*  
*bh gw : 0.0.0.0*  
*bh mac : 00:00:00:00:00:00*

*eth bridge : 2*

## **Troubleshooting Guide of Wireless Mesh:**

Use the following command to list the Authentication process and client connection:

diagnose debug application wpa2 4  
diagnose debug enable

```

2E 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
00 D4 C3 87 7E EF 0D 1A A1 12 4C 39 2B 5D 63 47 ....~.....L9+]cG
7B 00 16 30 14 01 00 00 0F AC 04 01 00 00 0F AC {...0.....
04 01 00 00 0F AC 02 0C 00 .....
46580.212 90:21:55:eb:bf:25 <eh> IEEE 802.1X (EAPOL 121B) <== 90:21:55:eb:bf:25 w
s (0-10.10.2.4:5246) rId 1 wId 1 12:09:0f:7c:6c:38
85120.213 IEEE 802.1X: 121 bytes from 90:21:55:eb:bf:25
85120.216 IEEE 802.1X: version=1 type=3 length=117
46580.219 90:21:55:eb:bf:25 <eh> recv IEEE 802.1X ver=1 type=3 (EAPOL_KEY) da
ta len=117
46580.221 90:21:55:eb:bf:25 <eh> recv EAPOL-Key 2/4 Pairwise replay cnt 1
85120.223 : STA 90:21:55:eb:bf:25 WPA: received EAPOL-Key frame (2/4 Pairwise)
85120.225 WPA: 90:21:55:eb:bf:25 WPA_PTK entering state PTKCALCNEGOTIATING
85120.226 PMK - hexdump (len=32):
A0 E4 AA 7B 42 D7 AA 71 0A 15 63 00 1D 8E 5B 17 ...{B..q..c...[.
E7 52 AB 1F E3 B4 51 CF ED DB 8A E5 BC 24 34 99 .R....Q.....$4.
85120.228 PTK - hexdump (len=64):
82 A7 A2 8C 6B 2C 6A E9 F7 06 E4 3B F2 FF 60 12 ....k,j.....;..`.
CA F3 E2 4D A9 CF BF 04 49 7B 86 F1 D7 E3 E1 7B ...M....I{.....{
32 A6 E5 44 8F B0 D4 F0 50 B3 18 EA F1 8D 5A 7A 2..D....P.....Zz
79 39 9C 6A C0 33 17 C9 74 9B 7F EB 74 95 2E 4D y9.j.3..t...t..M
85120.231 WPA: 90:21:55:eb:bf:25 WPA_PTK entering state PTKCALCNEGOTIATING2
85120.232 WPA: 90:21:55:eb:bf:25 WPA_PTK entering state PTKGETRSC
85120.233 WPA: 90:21:55:eb:bf:25 WPA_PTK entering state PTKINITNEGOTIATING
85120.235 : STA 90:21:55:eb:bf:25 WPA: sending 3/4 msg of 4-Way Handshake
46580.239 90:21:55:eb:bf:25 <eh> send 3/4 msg of 4-Way Handshake
85120.241 Plaintext EAPOL-Key Key Data - hexdump (len=80):
30 14 01 00 00 0F AC 04 01 00 00 0F AC 04 01 00 0.....
00 0F AC 02 01 00 DD 16 00 50 F2 01 01 00 00 50 .....P.....P
F2 04 01 00 00 50 F2 04 01 00 00 50 F2 02 DD 16 .....P.....P....
00 0F AC 01 02 00 EC 94 88 1E 02 4F F7 E7 A8 9F .....O....
99 F2 43 A2 4A 2F DD 00 00 00 00 00 00 00 00 00 ..C.J/.....
46580.246 90:21:55:eb:bf:25 <eh> send IEEE 802.1X ver=1 type=3 (EAPOL_KEY) da
ta len=175 replay cnt 2
46580.247 90:21:55:eb:bf:25 <eh> IEEE 802.1X (EAPOL 179B) ==> 90:21:55:eb:bf:25 w
s (0-10.10.2.4:5246) rId 1 wId 1 12:09:0f:7c:6c:38

```

Use the following command to list specific client process by filtering it with mac-address:

```

diagnose wireless-controller wlac sta_filter <client-mac> 1
diagnose debug enable

```

To turn it off use following commands:

```

diagnose wireless-controller wlac sta_filter <client-mac> 0
diagnose debug reset

```



```

FWF60C3G12006306 # diagnose wireless-controller wlac sta_filter 00:26:c7:99:33:
1
STA Filter Index 0/1      sta 00:26:c7:99:33:86      log-enabled 1
FWF60C3G12006306 # diagnose debug en
FWF60C3G12006306 # 05177.312 hostapd_query_capwap_pid cw_acd pid 94 unacked que
count:1
05177.314 Sending data - hexdump(len=102):
 0A 03 00 00 01 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 .....
 00 00 5F 00 00 00 .....
05177.318 HOSTAPD: 0.0.0.0:0<0-0> sent E2C_QUERY_PID (102 bytes)
05177.319 HOSTAPD: 0.0.0.0:0<0-0> Received C2E_SEND_PID (4 bytes)
05177.320 Received data - hexdump(len=102):
 11 02 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 .....
 00 00 5E 00 00 00 .....
05177.325 Get AC daemon pid 94
05187.332 hostapd_query_capwap_pid cw_acd pid 94 unacked query count:1
05187.334 Sending data - hexdump(len=102):
 0A 03 00 00 01 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 .....
 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 04 .....
 00 00 5F 00 00 00 .....
05187.338 HOSTAPD: 0.0.0.0:0<0-0> sent E2C_QUERY_PID (102 bytes)

```

**IMP:** For specific mac-address filtering you have to use the same debug commands with grep and the name of the mac-address