PacketFence

Network Devices Configuration Guide

PacketFence v13.1.0

Version 13.1.0 - January 2024

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1. About this Guide

This guide covers the configuration of network devices in order to integrate them with PacketFence in VLAN enforcement. Switches, wireless controllers and wireless access points are all considered network devices in PacketFence's terms.

The latest version of this guide is available at https://packetfence.org/documentation/

1.1. Other sources of information

Clustering Guide
: Covers installation in a clustered environment.

Developer's Guide
: Covers API, captive portal customization, application code customizations and instructions for supporting new equipment.

Installation Guide
: Covers installation and configuration of PacketFence.

Upgrade Guide
: Covers compatibility related changes, manual instructions and general notes about upgrading.

PacketFence News
: Covers noteworthy features, improvements and bug fixes by release.

These files are included in the package and release tarballs.

2. Note on Inline enforcement support

There is no need to follow the instructions in this guide if you plan on deploying in inline enforcement, except RADIUS inline. In this case all you need to do is to have a flat layer 2 network up to PacketFence's inline interface with no other gateway available for devices to reach out to the Internet.

This technique is usually used when your network hardware does not support VLAN enforcement.

3. Note on RADIUS accounting

Enabling RADIUS accounting on your network devices will significantly increase the database size and may cause performance issues. You should be aware of this and only use RADIUS accounting if it is really needed.

4. List of supported Network Devices

PacketFence supports a whole lot of different wireless and wired network equipment from various vendors running different versions. Since we want to provide the most accurate information and avoid duplication of that same information, please refer to our website https://packetfence.org/about.html#/material

You’ll find on this page the enforcement modes supported by each and every single piece of equipment we tested and worked with.

5. Switch configuration

5.1. Assumptions

Throughout this configuration example we use the following assumptions for our network infrastructure:

- PacketFence is fully configured with FreeRADIUS running (if you want 802.1X or MAC Auth)
- PacketFence IP address: 192.168.1.5
- Normal VLAN: 1
- Registration VLAN: 2
- Isolation VLAN: 3
- MAC Detection VLAN: 4
- Guest VLAN: 5
- VoIP, Voice VLAN: 100
- use SNMP v2c
- SNMP Read community: public
- SNMP Write community: private
- SNMP Trap community: public
- RADIUS Secret: useStrongerSecret

5.2. 3COM

5.2.1. SuperStack 3 Switch 4200 and 4500

PacketFence supports these 3Com switches *without VoIP* using one trap type:

- linkUp===linkDown
- Port Security (with static MACs)

Don’t forget to update the startup config!

linkUp === linkDown only

Global config settings:

```
snmp-agent
snmp-agent target-host trap address udp-domain 192.168.1.5 params securityname
public
snmp-agent trap enable standard linkup linkdown
```

On each interface:

```
port access vlan 4
```

In Port Security

Global config settings:

```
snmp-agent
snmp-agent target-host trap address udp-domain 192.168.1.5 params securityname
public
snmp-agent trap enable
port-security enable
port-security trap addresslearned
port-security trap intrusion
```

On each interface:

```
port access vlan 4
port-security max-mac-count 1
port-security port-mode secure
port-security intrusion-mode blockmac
undo enable snmp trap updown
```

In MAC Auth

```
Voice vlan : 6
Normal vlan : 1
Registration vlan : 2
Isolation vlan : 3
```

Global config settings:

```
lldp enable
lldp timer tx-interval 5
lldp compliance cdp
lldp compliance cdp
```

```
port-security enable
MAC-authentication domain packetfence
```

```
radius scheme system
radius scheme packetfence
 server-type extended
 primary authentication 192.168.1.5
 primary accounting 192.168.1.5
 key authentication P@cketfence
 key accounting cipher P@cketfence
 user-name-format without-domain
```

```
domain packetfence
 authentication radius-scheme packetfence
 accounting radius-scheme packetfence
 vlan-assignment-mode string
 accounting optional
domain system
```

```
voice vlan mac-address f4ea-6700-0000 mask ffff-ff00-0000 description Cisco IP Phone
undo voice vlan security enable
voice vlan 6 enable
```

On each interface with VoIP:

```
interface Ethernet1/0/1
 stp edged-port enable
 lldp compliance admin-status cdp txrx
 port link-type hybrid
 port hybrid vlan 6 tagged
 port hybrid vlan 1 2 3 untagged
 undo voice vlan mode auto
 voice vlan enable
 port-security max-mac-count 3
 port-security port-mode mac-authentication
 port-security intrusion-mode blockmac
 undo enable snmp trap updown
```

5.2.2. E4800G

PacketFence supports these 3Com switches with the following techniques:

- 802.1X with MAC Authentication fallback
- linkUp/linkDown (not recommended)

Voice over IP support was not explicitly tested during implementation however it does not mean that it won't work.

Don't forget to update the startup config!

linkUp / linkDown only

Global config settings:

```
snmp-agent
snmp-agent target-host trap address udp-domain 192.168.1.5 params securityname public
snmp-agent trap enable standard linkup linkdown
```

On each interface:

```
port access vlan 4
```

802.1X with MAC Authentication fallback

Global config settings:

```
system-view
   radius scheme PacketFence
     primary authentication 192.168.1.5 1812
     primary accounting 192.168.1.5 1812
     key authentication useStrongerSecret
     user-name-format without-domain
     quit
   domain packetfence.local
     authentication default radius-scheme PacketFence
     authorization default radius-scheme PacketFence
     quit
   domain default enable packetfence.local
   dot1x authentication-method eap
   port-security enable
quit
```

If your management authentication on your switch is default, applying the configuration above will have your authentication switch to a RADIUS based one with PacketFence as the authentication server. **It is almost certain that you do not want that!**

Below, we will just create a local password for `vty` accesses (telnet) and nothing on the console. **In order to avoid locking yourself out, make sure to verify your configuration!**

```
system-view
   user-interface aux 0
     authentication-mode none
```

```
  user-interface vty 0 4
    user privilege level 3
    set authentication password simple useStrongerPassword
  quit
quit
```

On each interface:

```
system-view
  interface gigabitEthernet 1/0/xx
    port-security port-mode mac-else-userlogin-secure-ext
    # userlogin-secure-or-mac-ext could be used below instead
    # see the Switch_4200G's documentation for a discussion about it
    undo enable snmp trap updown
    quit
quit
```

where `xx` stands for the interface index.

5.2.3. E5500G and Switch 4200G

PacketFence supports these 3Com switches with the following techniques:

- 802.1X with MAC Authentication fallback
- linkUp/linkDown (not recommended)

Voice over IP support was not explicitly tested during implementation however it does not mean that it won't work.

Don't forget to update the startup config !

linkUp / linkDown only

Global config settings:

```
snmp-agent
snmp-agent target-host trap address udp-domain 192.168.1.5 params
securityname public
snmp-agent trap enable standard linkup linkdown
```

On each interface:

```
port access vlan 4
```

802.1X with MAC Authentication fallback

Global config settings:

```
system-view
   radius scheme PacketFence
     server-type standard
     primary authentication 192.168.1.5 1812
     primary accounting 192.168.1.5 1812
     accounting optional
     key authentication useStrongerSecret
     user-name-format without-domain
     quit
   domain packetfence.local
     radius-scheme PacketFence
     vlan-assignment-mode string
     quit
   domain default enable packetfence.local
   dot1x authentication-method eap
   port-security enable
quit
```

If your management authentication on your switch is default, applying the configuration above will have your authentication switch to a RADIUS based one with PacketFence as the authentication server. **It is almost certain that you do not want that!**

Below, we will just create a local password for `vty` accesses (telnet) and nothing on the console. **In order to avoid locking yourself out, make sure to verify your configuration!**

```
system-view
   user-interface aux 0
     authentication-mode none
  user-interface vty 0 4
    user privilege level 3
    set authentication password simple useStrongerPassword
  quit
quit
```

On each interface:

```
system-view
  interface gigabitEthernet 1/0/xx
    port-security port-mode mac-else-userlogin-secure-ext
    # userlogin-secure-or-mac-ext could be used below instead
    # see the Switch_4200G's documentation for a discussion about it
    undo enable snmp trap updown
    quit
```

```
quit
```

where xx stands for the interface index

5.2.4. NJ220

This switch does not support port-security.

To configure: use web interface to send the linkUp/linkDown traps to the PacketFence server.

5.3. Alcatel

5.3.1. OS6250, OS6450

PacketFence supports this switch using 802.1X, Mac authentication and also supports VoIP.

Global configuration

First define any VLAN that you want to use on the switch.

```
vlan 2
vlan 5
vlan 20
vlan 100
```

Next, configure the RADIUS server to be PacketFence

```
aaa radius-server "packetfence" host 192.168.1.5 key useStrongerSecret
aaa authentication mac packetfence
aaa authentication 802.1X packetfence
```

You now need to configure a user profile (equivalent of a role) that will determine which VLAN is assigned to the device. In this case the profile names are 'unreg', 'employee' and 'guest'.

```
aaa user-network-profile name unreg vlan 2
aaa user-network-profile name guest vlan 5
aaa user-network-profile name employee vlan 20
```

Next, configure the switch in PacketFence. In the case of this example, the uplink is port 1/1.

```
[192.168.1.10]
mode=production
description=alcatel
type=Alcatel
radiusSecret=useStrongerSecret
```

```
uplink_dynamic=0
uplink=1001
RoleMap=Y
VlanMap=N
registrationRole=unreg
isolationRole=unreg
defaultRole=employee
guestRole=guest
```

802.1X

First, make sure you followed the steps above in 'Global configuration'

You will need to configure the ports you want to do authentication on.

```
vlan port mobile 1/2
vlan port 1/2 802.1X enable
802.1X 1/2 supplicant policy authentication pass group-mobility block fail block
802.1X 1/2 non-supplicant policy authentication pass group-mobility block fail block
```

MAC Authentication

First, make sure you followed the steps above in 'Global configuration' and '802.1X'

Next configure the interface to bypass 802.1X authentication

```
802.1X 1/2 supplicant bypass enable
```

VoIP

PacketFence supports VoIP on Alcatel by having multiple devices using multiple untagged VLANs on the same port.

First configure the user profile for voice. In this example it is only isolating it on another VLAN but any user profile attributes can be added to the profile.

```
aaa user-network-profile name voice vlan 3
```

Next, make sure you enable VoIP in the switch configuration in PacketFence and configure the voiceRole.

```
[192.168.1.10]
VoIPEnabled=Y
```

```
voiceRole=voice
```

5.3.2. OS6860

PacketFence supports this switch using 802.1X, Mac authentication and also supports VoIP.

NOTE

This documentation is made for Alcatel OS 8.1+. Lower versions do not support this configuration.

Global configuration

First define any VLAN that you want to use on the switch.

```
vlan 2 admin-state enable
vlan 5 admin-state enable
vlan 20 admin-state enable
vlan 100 admin-state enable
```

Next, configure the RADIUS server to be PacketFence

```
aaa radius-server "packetfence" host 192.168.1.5 key useStrongerSecret
aaa device-authentication mac packetfence
aaa device-authentication 802.1X packetfence
```

You now need to configure an edge profile (equivalent of a role) that will determine which VLAN is assigned to the device. In this case the profile names are 'unreg', 'employee' and 'guest'.

```
unp edge-profile unreg
unp edge-profile unreg redirect enable
unp edge-profile unreg authentication-flag enable
unp vlan-mapping edge-profile unreg vlan 2
```

```
unp edge-profile guest
unp edge-profile guest redirect enable
unp edge-profile guest authentication-flag enable
unp vlan-mapping edge-profile guest vlan 5
```

```
unp edge-profile employee
unp edge-profile employee redirect enable
unp edge-profile employee authentication-flag enable
unp vlan-mapping edge-profile employee vlan 20
```

CAUTION

Make sure you enable the redirect on **all** your roles as the access reevaluation will not work without it.

Next, configure the switch in PacketFence. In the case of this example, the uplink is port 1/1/1.

```
[192.168.1.10]
mode=production
description=alcatel
type=Alcatel
radiusSecret=useStrongerSecret
uplink_dynamic=0
uplink=1001
RoleMap=Y
VlanMap=N
registrationRole=unreg
isolationRole=unreg
defaultRole=employee
guestRole=guest
```

MAC Authentication

First, make sure you followed the steps above in 'Global configuration'

You will need to create an edge template and apply it on the ports you want to do authentication on.

```
unp edge-template pf_mab
unp edge-template pf_mab mac-authentication enable
unp edge-template pf_mab classification enable
unp port 1/1/2 port-type edge
unp port 1/1/2 edge-template pf_mab
```

802.1X

First, make sure you followed the steps above in 'Global configuration'

You will need to create an edge template and apply it on the ports you want to do authentication on.

```
unp edge-template pf_dot1x
unp edge-template pf_dot1x 802.1X-authentication enable
unp edge-template pf_dot1x mac-authentication enable
unp edge-template pf_dot1x 802.1X-authentication failure-policy mac-
authentication
unp port 1/1/2 port-type edge
unp port 1/1/2 edge-template pf_dot1x
```

VoIP

PacketFence supports VoIP on Alcatel by having multiple devices using multiple untagged VLANs on the same port.

First configure the edge profile for voice. In this example it is only isolating it on another VLAN but any edge profile attributes can be added to the profile.

```
unp edge-profile voice
unp edge-profile voice redirect enable
unp edge-profile voice authentication-flag enable
unp vlan-mapping edge-profile voice vlan 100
```

Next, make sure you enable VoIP in the switch configuration in PacketFence and configure the voiceRole.

```
[192.168.1.10]
VoIPEnabled=Y
voiceRole=voice
```

5.4. AlliedTelesis

5.4.1. AT8000GS

PacketFence supports the AT8000GS switch using :

- MAC Authentication
- 802.1X
- 802.1X + VOIP

Assumptions

```
PacketFence management IP: 192.168.1.5
Switch management IP: 10.0.0.14
Guest VLAN (Internet): VLAN 1
```

MAC Authentication

First, enable 802.1X globally:

```
dot1x system-auth-control
```

Next, configure the RADIUS server and AAA settings:

```
radius-server host 192.168.1.5
```

```
radius-server key useStrongerSecret
radius-server source-ip 10.0.0.14
aaa authentication dot1x default radius
aaa accounting dot1x radius
```

In order to get mac authentication, you need to enable the guest VLAN globally:

```
interface vlan 1
name ”Guest Vlan”
dot1x guest-vlan
exit
```

Finally, enable the necessary 802.1X settings for mac-only authentication:

```
interface ethernet g1
dot1x mac-authentication mac-only
dot1x radius-attributes vlan
dot1x port-control auto
dot1x guest-vlan enable
```

802.1X

The settings are almost the same as the MAC Authentication with some small differences.

First, enable 802.1X globally:

```
dot1x system-auth-control
```

Next, configure the RADIUS server and AAA settings:

```
radius-server host 192.168.1.5
radius-server key useStrongerSecret
radius-server source-ip 10.0.0.14
aaa authentication dot1x default radius
aaa accounting dot1x radius
```

Finally, enable the necessary 802.1X settings:

```
interface ethernet g1
dot1x radius-attributes vlan
dot1x port-control auto
```

802.1X + VOIP

First, enable 802.1X globally:

```
dot1x system-auth-control
```

Next, configure the RADIUS server configuration and AAA settings:

```
radius-server host 192.168.1.5
radius-server key useStrongerSecret
radius-server source-ip 10.0.0.14
aaa authentication dot1x default radius
aaa accounting dot1x radius
```

Then, LLDP configuration:

```
hostname switch-name
ip domain-name domain.local
lldp med network-policy 1 voice vlan 100 vlan-type tagged dscp 34
lldp med network-policy 2 voice-signaling vlan 100 vlan-type tagged dscp 34
```

Finally, enable the necessary 802.1X and VOIP settings on each interface:

```
interface ethernet g1
 dot1x port-control force-authorized
 no dot1x guest-vlan enable
 no dot1x mac-authentication
 no dot1x radius-attributes vlan
 no dot1x re-authentication
 switchport mode trunk
 switchport trunk native vlan 5
 switchport trunk allowed vlan add 100
 lldp med enable network-policy
 lldp med network-policy add 1
 lldp med network-policy add 2
```

802.1X commands

```
show dot1x supplicant brief
```

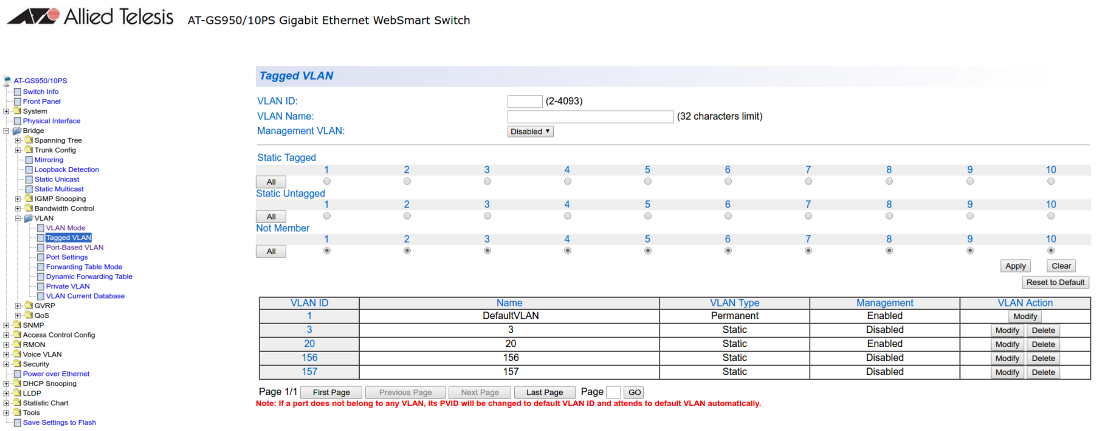
5.4.2. GS950

PacketFence supports the GS950 switch using :

- MAC Authentication
- 802.1X (without fallback to MAC authentication)

Global configuration

First, ensure that the VLANs you want to assign are part of the VLAN database via the following page:



Tagged VLAN

VLAN ID: (2-4093)
VLAN Name: (32 characters limit)
Management VLAN: Disabled ▾

	1	2	3	4	5	6	7	8	9	10
Static Tagged (All)	○	○	○	○	○	○	○	○	○	○
Static Untagged (All)	○	○	○	○	○	○	○	○	○	○
Not Member (All)	●	●	●	●	●	●	●	●	●	●

Apply Clear
Reset to Default

VLAN ID	Name	VLAN Type	Management	VLAN Action
1	DefaultVLAN	Permanent	Enabled	Modify
3	3	Static	Disabled	Modify Delete
20	20	Static	Enabled	Modify Delete
156	156	Static	Disabled	Modify Delete
157	157	Static	Disabled	Modify Delete

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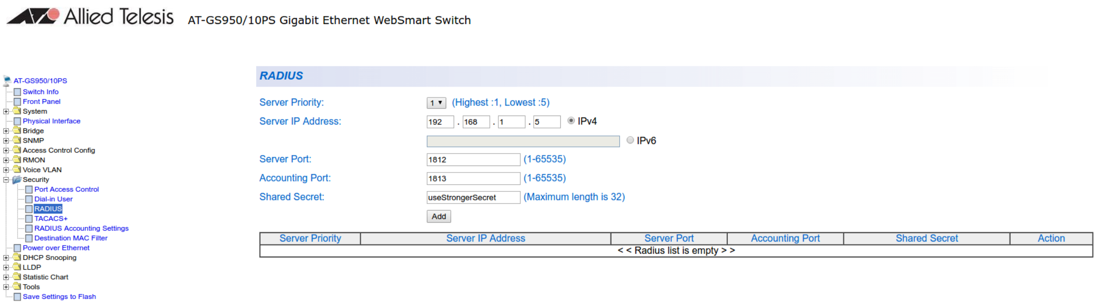
Note: If a port does not belong to any VLAN, its PVID will be changed to default VLAN ID and attends to default VLAN automatically.

Note that they only need to be tagged on the trunk and don't need any specific configuration for the dynamic VLAN assignment here.

Next, configure the RADIUS server (*Security → RADIUS*):

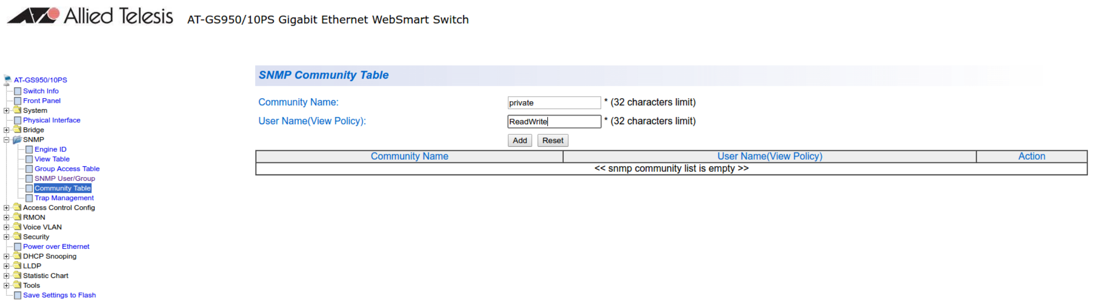


RADIUS

Server Priority: 1 ▾ (Highest :1, Lowest :5)
Server IP Address: 192 . 168 . 1 . 5 ● IPv4
○ IPv6
Server Port: 1812 (1-65535)
Accounting Port: 1813 (1-65535)
Shared Secret: useStrongerSecret (Maximum length is 32)
Add

Server Priority	Server IP Address	Server Port	Accounting Port	Shared Secret	Action
< < Radius list is empty > >					

Next, configure an SNMP community (*SNMP → Community Table*)



SNMP Community Table

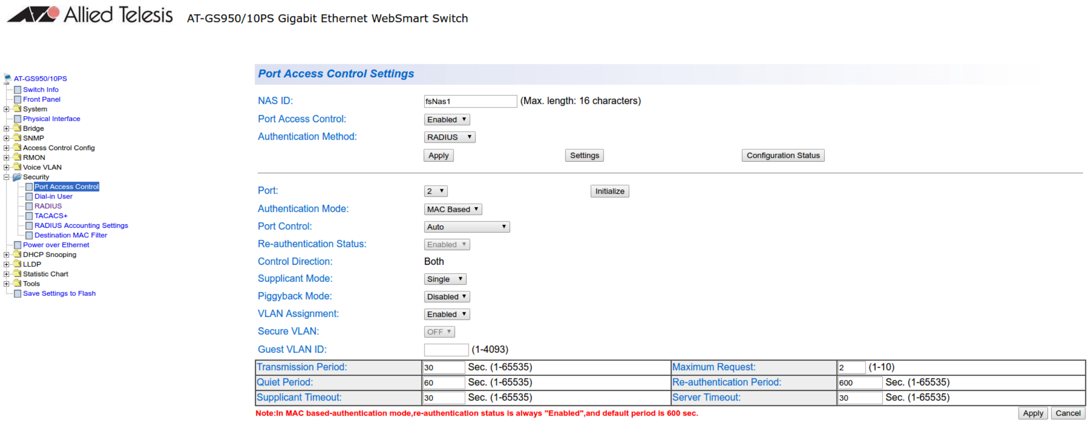
Community Name: private * (32 characters limit)
User Name(View Policy): ReadWrite * (32 characters limit)
Add Reset

Community Name	User Name(View Policy)	Action
<< snmp community list is empty >>		

MAC authentication

Go in *Security* → *Port Access Control*, select the port you want to enable MAB on, and ensure you set:

- Authentication Mode: MAC Based
- Port Control: Auto
- Supplicant Mode: Single
- VLAN Assignment: Enabled



Port Access Control Settings

NAS ID: fsNas1 (Max. length: 16 characters)
Port Access Control: Enabled
Authentication Method: RADIUS

Port: 2
Authentication Mode: MAC Based
Port Control: Auto
Re-authentication Status: Enabled
Control Direction: Both
Supplicant Mode: Single
Piggyback Mode: Disabled
VLAN Assignment: Enabled
Secure VLAN: OFF
Guest VLAN ID: (1-4093)

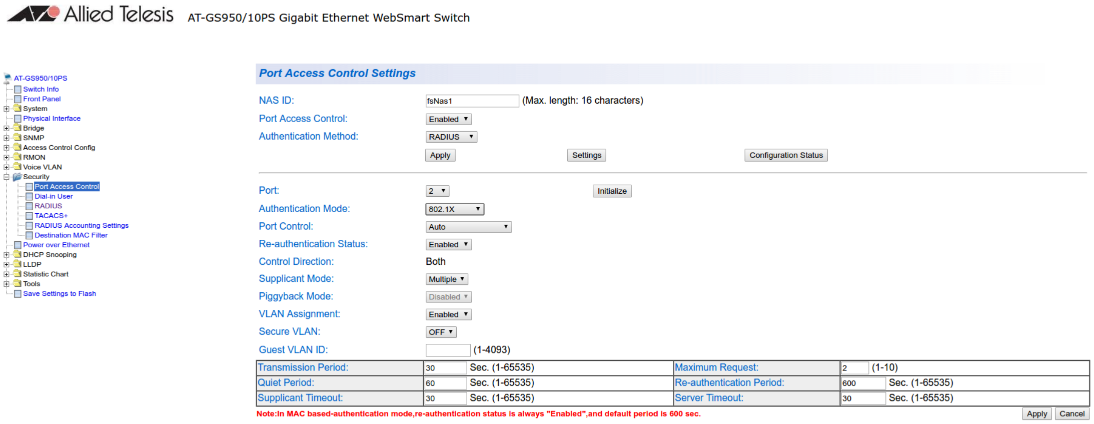
Transmission Period:	30 Sec. (1-65535)	Maximum Request:	2 (1-10)
Quiet Period:	60 Sec. (1-65535)	Re-authentication Period:	600 Sec. (1-65535)
Supplicant Timeout:	30 Sec. (1-65535)	Server Timeout:	30 Sec. (1-65535)

Note:In MAC based-authentication mode,re-authentication status is always "Enabled",and default period is 600 sec.

802.1x

Go in *Security* → *Port Access Control*, select the port you want to enable MAB on, and ensure you set:

- Authentication Mode: 802.1X
- Port Control: Auto
- Supplicant Mode: Multiple
- VLAN Assignment: Enabled



Port Access Control Settings

NAS ID: fsNas1 (Max. length: 16 characters)
Port Access Control: Enabled
Authentication Method: RADIUS

Port: 2
Authentication Mode: 802.1X
Port Control: Auto
Re-authentication Status: Enabled
Control Direction: Both
Supplicant Mode: Multiple
Piggyback Mode: Disabled
VLAN Assignment: Enabled
Secure VLAN: OFF
Guest VLAN ID: (1-4093)

Transmission Period:	30 Sec. (1-65535)	Maximum Request:	2 (1-10)
Quiet Period:	60 Sec. (1-65535)	Re-authentication Period:	600 Sec. (1-65535)
Supplicant Timeout:	30 Sec. (1-65535)	Server Timeout:	30 Sec. (1-65535)

Note:In MAC based-authentication mode,re-authentication status is always "Enabled",and default period is 600 sec.

PacketFence configuration

Ensure you configure at least:

- Type: Allied Telesis GS950
- RADIUS secret: useStrongerSecret
- SNMP Version: v2c
- SNMP Community Read: private
- SNMP Community Write: private

If you are using MAC authentication on this switch, you must adjust the FreeRADIUS configuration so it transforms the EAP requests this switch sends into requests that PacketFence will interpret as MAC authentication. This configuration will also set missing attributes in the RADIUS requests since this switch doesn't follow the standard attributes that are usually sent during RADIUS authentication.

To adjust it, go in `/usr/local/pf/conf/radiusd/packetfence` and add the following below the line that contains `packetfence-eap-mac-policy`:

```
packetfence-allied-gs950-mab
```

And then restart FreeRADIUS:

```
# /usr/local/pf/bin/pfcmd service radiusd restart
```

5.5. Amer

PacketFence supports Amer switches *without VoIP* using one trap type:

- linkUp/linkDown

Don't forget to update the startup config!

5.5.1. L2 Switch SS2R24i

Global config settings:

```
create snmp host 192.168.1.5 v2c public
create snmp user public ReadGroup
enable snmp traps
```

On each interface:

```
config vlan default delete xx
config vlan mac-detection add untagged xx
```

where `xx` stands for the interface index

5.6. Aruba

5.6.1. ArubaOS_CX_10.x and ArubaOS_Switch_16.x

The ArubaOS_CX_10.x and ArubaOS_Switch_16.x are supported by PacketFence and it supports MAC Authentication, 802.1X, Dynamic ACLS and Web Authentication.

Global Radius Configuration

```
radius-server host 192.168.1.5 key ”useStrongerSecret”
radius-server host 192.168.1.5 dyn-authorization
radius-server host 192.168.1.5 time-window 0
ip source-interface radius vlan 1
aaa server-group radius ”PacketFence” host 10.5.6.100
aaa accounting network start-stop radius server-group ”PacketFence”
```

MAC Authentication

```
aaa authentication mac-based chap-radius server-group ”PacketFence”
aaa port-access mac-based 1
aaa port-access mac-based 1 addr-moves
aaa port-access mac-based 1 reauth-period 14400
```

802.1x

```
aaa authentication port-access eap-radius server-group ”PacketFence”
aaa port-access authenticator 1
aaa port-access authenticator 1 tx-period 10
aaa port-access authenticator 1 client-limit 2
aaa port-access authenticator active
```

MAC Authentication Bypass

```
aaa authentication mac-based chap-radius server-group ”PacketFence”
aaa authentication port-access eap-radius server-group ”PacketFence”
aaa port-access 1 auth-order authenticator mac-based
aaa port-access mac-based 1
aaa port-access mac-based 1 addr-moves
aaa port-access mac-based 1 reauth-period 14400
aaa port-access authenticator 1
aaa port-access authenticator 1 tx-period 10
aaa port-access authenticator 1 client-limit 2
aaa port-access authenticator active
```

Web Authentication

```
aaa authentication captive-portal enable
```

On the PacketFence side you will need to fill the "Role by Access List" for the registration role:

```
permit in tcp from any to 192.168.1.5 80
permit in tcp from any to 192.168.1.5 443
deny in tcp from any to any 80 cpy
deny in tcp from any to any 443 cpy
permit in udp from any to any 53
permit in udp from any to any 67
```

And the "Role by Web Auth URL" for the registration role depending of your switch template:

```
http://192.168.1.5/Aruba::ArubaOS_Switch_16_x
```

or

```
http://192.168.1.5/Aruba::ArubaOS_CX_10.x
```

Dynamic ACL

The switch needs to be configure to do MAC Authentication and or 802.1x. Then on the PacketFence side in the switch roles, enable "Role by Access List" and fill the appropriate role with the acl you want.

5.7. Avaya

Avaya bought Nortel's wired networks assets. So Avaya switches are, in effect, re-branded Nortels. See Nortel section of this document for configuration instructions.

5.7.1. 802.1X with MAC Authentication Bypass and VoIP

NOTE

The configuration below requires an ntp server. We use the PacketFence server as the NTP server but any other one will do. If you want to use the PacketFence server for NTP, make sure you install the appropriate service and open port 123 in `/usr/local/pf/conf/iptables.conf`

Global config settings:

```
sntp server primary address 192.168.1.5
sntp enable
radius server host 192.168.1.5 acct-enable
radius server host key useStrongerSecret
radius server host key useStrongerSecret used-by eapol
radius server host key useStrongerSecret used-by non-eapol
radius dynamic-server client 192.168.1.5
radius dynamic-server client 192.168.1.5 secret useStrongerSecret
radius dynamic-server client 192.168.1.5 enable
radius dynamic-server client 192.168.1.5 process-change-of-auth-requests
radius dynamic-server client 192.168.1.5 process-disconnect-requests
```

```
vlan create 2,3,4,5 type port
vlan create 100 type port voice-vlan
vlan name 2 ”Reg”
vlan name 3 ”Isol”
vlan name 4 ”Detect”
vlan name 5 ”Guest”
vlan name 100 ”Voice”
```

```
#Uplink configuration
vlan ports 24 tagging tagAll
vlan configcontrol autopvid
```

```
eapol multihost allow-non-eap-enable
eapol multihost radius-non-eap-enable
eapol multihost non-eap-phone-enable
eapol multihost use-radius-assigned-vlan
eapol multihost non-eap-use-radius-assigned-vlan
eapol multihost eap-packet-mode unicast
eapol multihost non-eap-reauthentication-enable
eapol multihost adac-non-eap-enable
no eapol multihost non-eap-pwd-fmt ip-addr
no eapol multihost non-eap-pwd-fmt port-number
eapol multihost voip-vlan 1 enable vid 100
```

```
adac voice-vlan 100
adac uplink-port 24
adac op-mode tagged-frames
adac enable
```

```
qos if-group name TrustedLinks class trusted
qos if-assign port ALL name TrustedLinks
```

Port 1 configuration:

```
interface FastEthernet ALL
vlan ports 1 tagging tagAll
vlan members 2,3,4,5 1
vlan ports 1 pvid 2
eapol multihost port 1 enable eap-mac-max 8 allow-non-eap-enable non-eap-mac-
max 8 radius-non-eap-enable use-radius-assigned-vlan non-eap-use-radius-
assigned-vlan eap-packet-mode unicast adac-non-eap-enable
eapol port 1 status auto traffic-control in re-authentication enable
eapol port 1 radius-dynamic-server enable
lldp port 1 vendor-specific avaya dot1q-framing tagged
no adac detection port 1 mac
adac port 1 tagged-frames-tagging tag-all
adac port 1 enable
spanning-tree port 1 learning fast
```

5.8. Brocade

NOTE | By default, all deconnections will be done using SNMP.

5.8.1. ICX 6400 Series

Those switches are supported using 802.1X for networks with or without VoIP.

- Global config settings:

```
aaa authentication dot1x default radius
radius-server host 192.168.1.5 auth-port 1812 acct-port 1813 default
radius-server key useStrongerSecret
```

```
vlan 1 name DEFAULT-VLAN by port
!
vlan 100 by port
 tagged ethe 1/1/xx ethe 1/1/yy
```

Where `xx` and `yy` represent the range of ports where you want PacketFence enforcement.

MAC-Authentication without VoIP

- Enable MAC-Authentication globally

```
mac-authentication enable
mac-authentication mac-vlan-dyn-activation
```

- Enable MAC-Authentication on each interface you want PacketFence active

```
mac-authentication enable
mac-authentication enable-dynamic-vlan
```

MAC-Authentication with VoIP

- Enable cdp globally

```
cdp run
```

- Apply the following configuration on each interface you want PacketFence active

```
dual-mode
mac-authentication enable
mac-authentication enable-dynamic-vlan
voice-vlan 100
cdp enable
```

802.1X/MAC-Auth

- Enable 802.1X globally

```
dot1x-enable
 re-authentication
 enable ethe 1/1/xx
```

Where `xx` is the switch port number

- Apply the following configuration on each interface you want PacketFence active

```
dot1x port-control auto
dual-mode
mac-authentication enable
mac-authentication enable-dynamic-vlan
voice-vlan 100
```

5.8.2. Firmware 08.0.80 and above

802.1x/MAC-Auth

Those switches are supported using 802.1X for networks with or without VoIP.

- RADIUS server configuration

```
radius-server host 192.168.1.5 auth-port 1812 acct-port 1813 default key
```

```
useStrongerSecret dot1x mac-auth no-login
```

- Authentication configuration

```
aaa authentication dot1x default radius
authentication
  auth-default-vlan 2
  re-authentication
  auth-fail-action restricted-vlan
  dot1x enable
  dot1x enable ethe 1/1/1
  dot1x port-control auto ethe 1/1/1
  dot1x macauth-override
  dot1x timeout tx-period 3
  dot1x timeout quiet-period 2
  mac-authentication enable
  mac-authentication enable ethe 1/1/1
```

The configuration above enables authentication on port 1/1/1 - make sure you change this to the ports where you want to perform enforcement.

- SNMP configuration

```
snmpserver community public ro
snmpserver community private rw
```

- PacketFence configuration

While configuring the switch in PacketFence, ensure you set at least the following values: * Definition, Type: Brocade Switches * RADIUS, Secret Passphrase: useStrongerSecret * SNMP, Version: v2c * SNMP, Community Read: public * SNMP, Community Write: private

VoIP

In order to enable VoIP, you first need to enable LLDP then define the network policy for tagging VoIP traffic on the ports where PacketFence is enabled.

```
lldp run
lldp med network-policy application voice tagged vlan 5 priority 5 dscp 46
ports ethe 1/1/1
```

NOTE Make sure you change VLAN 5 to the VLAN you use for VoIP

- PacketFence configuration

While configuring the switch in PacketFence, ensure you set at least the following values: * Roles, voice VLAN: 5 * Definition, VoIP: enabled

5.8.3. Radius CLI Login

If you want to use the server PacketFence to authenticate users on the Brocade switch.

- Configure the radius server to send user authentication request to PacketFence

```
aaa authentication login default radius local
```

NOTE Make sure to have a local account in case the switch can not reach the PacketFence server

5.9. Cisco

PacketFence supports Cisco switches with VoIP using three different trap types:

- linkUp/linkDown
- MAC Notification
- Port Security (with static MACs)

You also need to make sure that lldp or cdp notification is configured on all ports that will handle VoIP.

On some recent models, we can also use more secure and robust features like:

- MAC Authentication (Cisco's MAC Authentication Bypass or MAB)
- 802.1X (Multi-Host or Multi-Domain)

Depending of the switch model, we recommend the use of the most secure and reliable feature first. In other words, you should consider the following order:

1. 802.1X/MAB
2. Port-Security
3. linkUp/linkDown

5.9.1. 2900XL / 3500XL Series

SNMP | linkUP/linkDown

Global config settings:

```
snmp-server community public RO
snmp-server community private RW
snmp-server enable traps snmp linkdown linkup
snmp-server enable traps mac-notification
snmp-server host 192.168.1.5 trap version 2c public snmp mac-notification
mac-address-table notification interval 0
mac-address-table notification
mac-address-table aging-time 3600
```

On each interface *without VoIP*:

```
switchport mode access
switchport access vlan 4
snmp trap mac-notification added
```

On each interface *with VoIP*:

```
switchport trunk encapsulation dot1q
switchport trunk native vlan 4
switchport mode trunk
switchport voice vlan 100
snmp trap mac-notification added
snmp trap mac-notification removed
```

5.9.2. Cisco IOS

This switch module is built for switches using Cisco IOS versions earlier than 12.2(46)SE. This provides support for PortSecurity for networks with or without VoIP.

PortSecurity for IOS earlier than 12.2(46)SE

Global config settings:

```
snmp-server community public RO
snmp-server community private RW
snmp-server enable traps port-security
snmp-server enable traps port-security trap-rate 1
snmp-server host 192.168.1.5 version 2c public port-security
```

On each interface *without VoIP*:

```
switchport access vlan 4
switchport port-security
switchport port-security maximum 1 vlan access
switchport port-security violation restrict
switchport port-security mac-address 0200.000x.xxxx
```

where `xxxxx` stands for the interface `ifIndex`

On each interface with VoIP:

```
switchport voice vlan 100
switchport access vlan 4
switchport port-security
switchport port-security maximum 2
switchport port-security maximum 1 vlan access
switchport port-security violation restrict
switchport port-security mac-address 0200.000x.xxxx
```

where `xxxxx` stands for the interface `ifIndex`

NOTE

ifIndex mapping

Use the following templates for interface `IfIndex` in bogus MAC addresses (0200.000x.xxxx):

- Fa0/1…Fa0/48 → 10001…10048
- Gi0/1…Gi0/48 → 10101…10148

5.9.3. Cisco IOS 12.x

Those versions are now supported using 802.1X for networks with or without VoIP. You can also use port-security with static MAC address but we can not secure a MAC on the data VLAN specifically so enable it if there is no VoIP, use linkUp/linkDown and MAC notification otherwise.So on setup that needs to handle VoIP with this switch, go with a 802.1X configuration. Note: This module is renamed from the old 2950 module and therefore inherits all its capabilities.

802.1X

WARNING

Make sure that you have a local account, because enabling 802.1X or MAB will ask for a username and password on the next login.

Global config settings:

```
dot1x system-auth-control
```

AAA configuration:

```
aaa new-model
aaa group server radius packetfence
 server 192.168.1.5 auth-port 1812 acct-port 1813
aaa authentication login default local
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
```

AAA configuration (accounting):

```
aaa accounting dot1x default start-stop group packetfence
```

RADIUS server configuration:

```
radius-server host 192.168.1.5 auth-port 1812 acct-port 1813 timeout 2
key useStrongerSecret
radius-server vsa send authentication
```

On each interface *without VoIP*:

```
switchport access vlan 4
switchport mode access
dot1x port-control auto
dot1x host-mode multi-host
dot1x reauthentication
```

On each interface *with VoIP*:

```
switchport access vlan 4
switchport mode access
switchport voice vlan 100
dot1x port-control auto
dot1x host-mode multi-host
dot1x reauthentication
```

Port-Security

CAUTION

With port-security, if no MAC is connected on ports when activating port-security, we need to secure bogus MAC addresses on ports in order for the switch to send a trap when a new MAC appears on a port. On the other hand, if a MAC is actually connected when you enable port security, you must secure this MAC rather than the bogus one. Otherwise this MAC will lose its connectivity instantly.

Global config settings *without VoIP*:

```
snmp-server enable traps port-security
snmp-server enable traps port-security trap-rate 1
snmp-server host 192.168.1.5 version 2c public port-security
```

On each interface *without VoIP*:

```
switchport mode access
switchport access vlan 4
switchport port-security
switchport port-security violation restrict
switchport port-security mac-address 0200.0000.00xx
```

where `xx` stands for the interface `ifIndex`.

NOTE

ifIndex mapping

Use the following templates for interface `IfIndex` in bogus MAC addresses (0200.0000.00xx):

- Fa0/1, ..., Fa0/48 ⍰ 1, ..., 48
- Gi0/1, Gi0/2 ⍰ 49, 50

Global config settings *with VoIP*:

```
snmp-server community public RO
snmp-server community private RW
snmp-server enable traps snmp linkdown linkup
snmp-server enable traps mac-notification
snmp-server host 192.168.1.5 trap version 2c public snmp mac-notification
mac-address-table notification interval 0
mac-address-table notification
mac-address-table aging-time 3600
```

On each interface *with VoIP*:

```
switchport voice vlan 100
switchport access vlan 4
switchport mode access
snmp trap mac-notification added
snmp trap mac-notification removed
```

5.9.4. 3550 (802.1X with MAB)

CAUTION

The Catalyst 3550 does **not** support 802.1X with Multi-Domain, it can only support 802.1X with MAB using Multi-Host, MAB, and port security.

CAUTION

The Catalyst 3550 does **not** support CoA. Minimal IOS required for CoA is 12.2(52)SE. Latest available IOS for 3550 is 12.2(46)SE. Set "Deauthentication Method" to "SNMP" in PacketFence Administration GUI under *Configuration* → *Policies and Access Control* → *Network Devices* → *Switches* for the switch IP configured below.

Global settings:

```
dot1x system-auth-control
aaa new-model
aaa group server radius packetfence
 server 192.168.1.5 auth-port 1812 acct-port 1813
aaa authentication login default local
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
```

RADIUS server configuration:

```
radius-server host 192.168.1.5 auth-port 1812 acct-port 1813 timeout 2 key
useStrongerSecret
radius-server vsa send authentication
```

Enable SNMP on the switch:

```
snmp-server community public RO
snmp-server community private RW
```

On each interface:

```
switchport mode access
dot1x mac-auth-bypass
dot1x pae authenticator
dot1x port-control auto
dot1x violation-mode protect
dot1x timeout quiet-period 2
dot1x timeout reauth-period 7200
dot1x timeout tx-period 3
dot1x reauthentication
```

5.9.5. Cisco IOS 15.0

This switch module is built for switches using Cisco IOS versions 15.0 or greater. Note: This module is renamed from the old 2960 module and therefore inherits all its capabilities.

CAUTION For 802.1X and MAB configurations, refer to this section below.

PortSecurity for IOS 12.2(46)SE or greater

Since version PacketFence 2.2.1, the way to handle VoIP when using port-security dramatically changed. Ensure that you follow the instructions below. To make the story short, instead on relying on the dynamic MAC learning for VoIP, we use a static entry on the voice VLAN so we can trigger a new security violation, and then authorize the phone MAC address on the network.

Global config settings:

```
snmp-server community public RO
snmp-server community private RW
snmp-server enable traps port-security
snmp-server enable traps port-security trap-rate 1
```

```
snmp-server host 192.168.1.5 version 2c public port-security
```

On each interface *without VoIP*:

```
switchport access vlan 4
switchport port-security
switchport port-security maximum 1 vlan access
switchport port-security violation restrict
switchport port-security mac-address 0200.000x.xxxx
```

where `xxxxx` stands for the interface `ifIndex`

On each interface *with VoIP*:

```
switchport voice vlan 100
switchport access vlan 4
switchport port-security
switchport port-security maximum 2
switchport port-security maximum 1 vlan access
switchport port-security maximum 1 vlan voice
switchport port-security violation restrict
switchport port-security mac-address 0200.010x.xxxx vlan voice
switchport port-security mac-address 0200.000x.xxxx vlan access
```

where `xxxxx` stands for the interface `ifIndex`

NOTE

ifIndex mapping

Use the following templates for interface `IfIndex` in bogus MAC addresses (0200.000x.xxxx):

- Fa0/1...Fa0/48 → 10001...10048
- Gi0/1...Gi0/48 → 10101...10148

2960, 2970, 3560, 3750

NOTE

You shouldn't use any port-security features when doing 802.1X and/or MAC Authentication. This can cause unexpected behavior.

WARNING

Make sure that you have a local account, because enabling 802.1X or MAB will ask for a username and password on the next login.

WARNING

When doing 802.1X and network interface teaming on the same switch or stack, you might consider using the mac-move feature of the Cisco switches. When you authenticate the primary link of the team, the virtual MAC address will be published and authorized on the switchport. When something breaks on that link (ie. cable disconnected), the teaming driver will publish the MAC address on the secondary link, and the switch will try to authorize it. However, since the switch already has the MAC address in a session on another switchport, the switch will put the secondary link into err-disabled mode.

To prevent this behavior, you need to tell the switch to allow MAC address movements between ports. The global command is the following:

```
authentication mac-move permit
```

Global settings:

```
dot1x system-auth-control
aaa new-model
aaa group server radius packetfence
 server name pfnac
aaa authentication login default local
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
```

RADIUS server configuration:

```
radius server pfnac
  address ipv4 192.168.1.5 auth-port 1812 acct-port 1813
  automate-tester username dummy ignore-acct-port idle-time 3
  key 0 useStrongerSecret
```

```
radius-server vsa send authentication
```

CoA configuration

```
aaa server radius dynamic-author
 client 192.168.1.5 server-key useStrongerSecret
 port 3799
```

Activate SNMP v1 on the switch:

```
snmp-server community public RO
```

802.1X with MAC Authentication bypass (MultiDomain)

On each interface:

```
switchport mode access
switchport voice vlan 100
```

```
authentication host-mode multi-domain
authentication order dot1x mab
authentication priority dot1x mab
authentication port-control auto
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 10800
authentication violation replace
mab
no snmp trap link-status
dot1x pae authenticator
dot1x timeout quiet-period 2
dot1x timeout tx-period 3
```

802.1X with MAC Authentication bypass (MultiHost)

On each interface:

```
switchport mode access
authentication order dot1x mab
authentication priority dot1x mab
authentication port-control auto
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 7200
authentication violation replace
mab
no snmp trap link-status
dot1x pae authenticator
dot1x timeout quiet-period 2
dot1x timeout tx-period 3
```

MAC Authentication bypass only

On each interface:

```
switchport mode access
switchport voice vlan 100
dot1x mac-auth-bypass
dot1x pae authenticator
dot1x port-control auto
dot1x timeout tx-period 5
dot1x reauthentication
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 7200
authentication violation replace
mab
no snmp trap link-status
```

NOTE

802.1X on various models of 2960

There's a lot of different versions of the Catalyst 2960. Some of them may not accept the command stated in this guide for 802.1X.

We have found a couple of commands that are working great or MAB:

On each interface

```
switchport mode access
authentication order mab
authentication port-control auto
mab
dot1x pae authenticator
```

But, as it is difficult for us to maintain the whole list of commands to configure each and every different model of 2960 with different IOS, please refer to Cisco documentation for very specific cases.

Web auth

The Catalyst 2960 supports web authentication from IOS 12.2.55SE3. This procedure has been tested on IOS 15.0.2SE5.

In this example, the ACL that triggers the redirection to the portal for registration is 'registration'.

Configure the global configuration of the switch using the section *MAC Authentication bypass only* of Cisco IOS 15.0 in this document.

Then add this additional configuration on the global level

```
ip device tracking
ip http server
ip http secure-server
snmp-server community public RO
snmp-server community private RW
```

Add the required access lists

```
ip access-list extended registration
 deny ip any host <your captive portal ip>
 permit tcp any any eq www
 permit tcp any any eq 443
```

Then on each controlled interface

```
switchport access vlan <vlan>
switchport mode access
authentication priority mab
authentication port-control auto
authentication periodic
authentication violation replace
mab
spanning-tree portfast
```

PacketFence switch configuration

- Select the type to 'Cisco IOS 15.0'
- Set the 'Registration' role to 'registration' (If left empty then it will use the role name)
- Set Role by Web Auth URL for registration to 'http://<your_captive_portal_ip>/Cisco::Cisco_IOS_15_0'
- The URL can contain dynamic parameters, like the MAC address ($mac), the switch IP ($switch_ip), the username ($user_name).
- Screenshots of this configuration are available in the Cisco WLC section of this guide.

Dynamic ACLs

The Cisco IOS 15.5 supports RADIUS pushed ACLs which means that you can define the ACLs centrally in PacketFence without configuring them in your switches and their rules will be applied to the switch during the authentication.

These ACLs are defined by role like the VLANs which means you can define different ACLs for your registration VLAN, production VLAN, guest VLAN, etc.

Add the following configuration setting on the global level

```
ip device tracking
```

For IOS 12.2, you need to create this acl and assign it to the switch port interface:

```
ip access-list extended Auth-Default-ACL
 permit udp any range bootps 65347 any range bootpc 65348
 permit udp any any range bootps 65347
 permit udp any any eq domain
 deny   ip any any
```

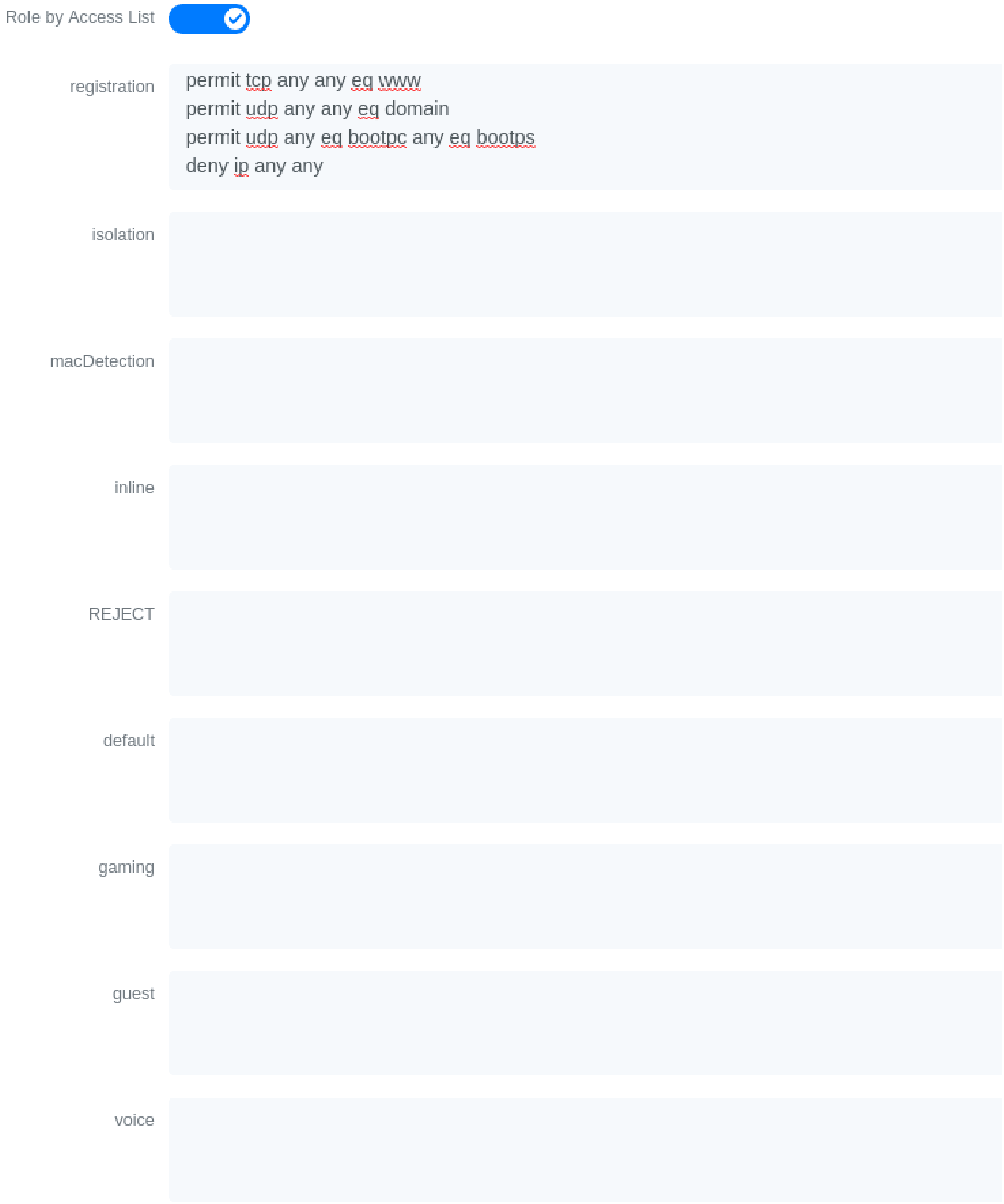
```
interface GigabitEthernetx/y/z
 ...
 ip access-group Auth-Default-ACL in
 ...
```

Before continuing, configure your switch to be in MAC authentication bypass or 802.1X.

Now in the PacketFence interface go in the switch configuration and in the Roles tab.

Check 'Role by access list' and you should now be able to configure the access lists as below.

For example if you want the users that are in the registration VLAN to only use HTTP, HTTPS, DNS and DHCP you can configure this ACL in the registration category.



Role by Access List ☑

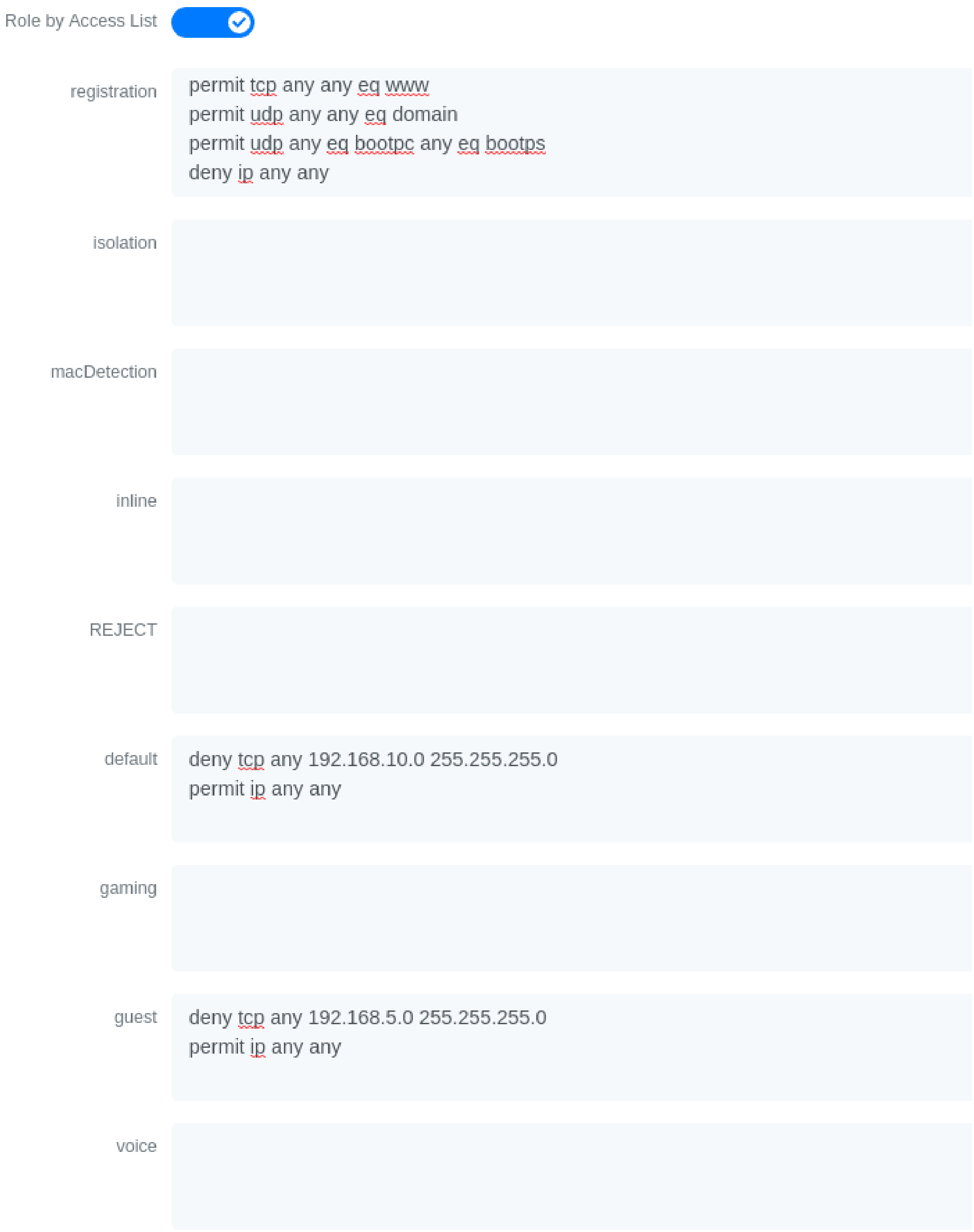
registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

Now if for example, your normal users are placed in the 'default' category and your guests in the 'guest' category.

If for example the 'default' category uses the network 192.168.5.0/24 and your guest network uses the network 192.168.10.0/24.

You can prevent communications between both networks using these access lists



Role by Access List ☑

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

```
deny tcp any 192.168.10.0 255.255.255.0
permit ip any any
```

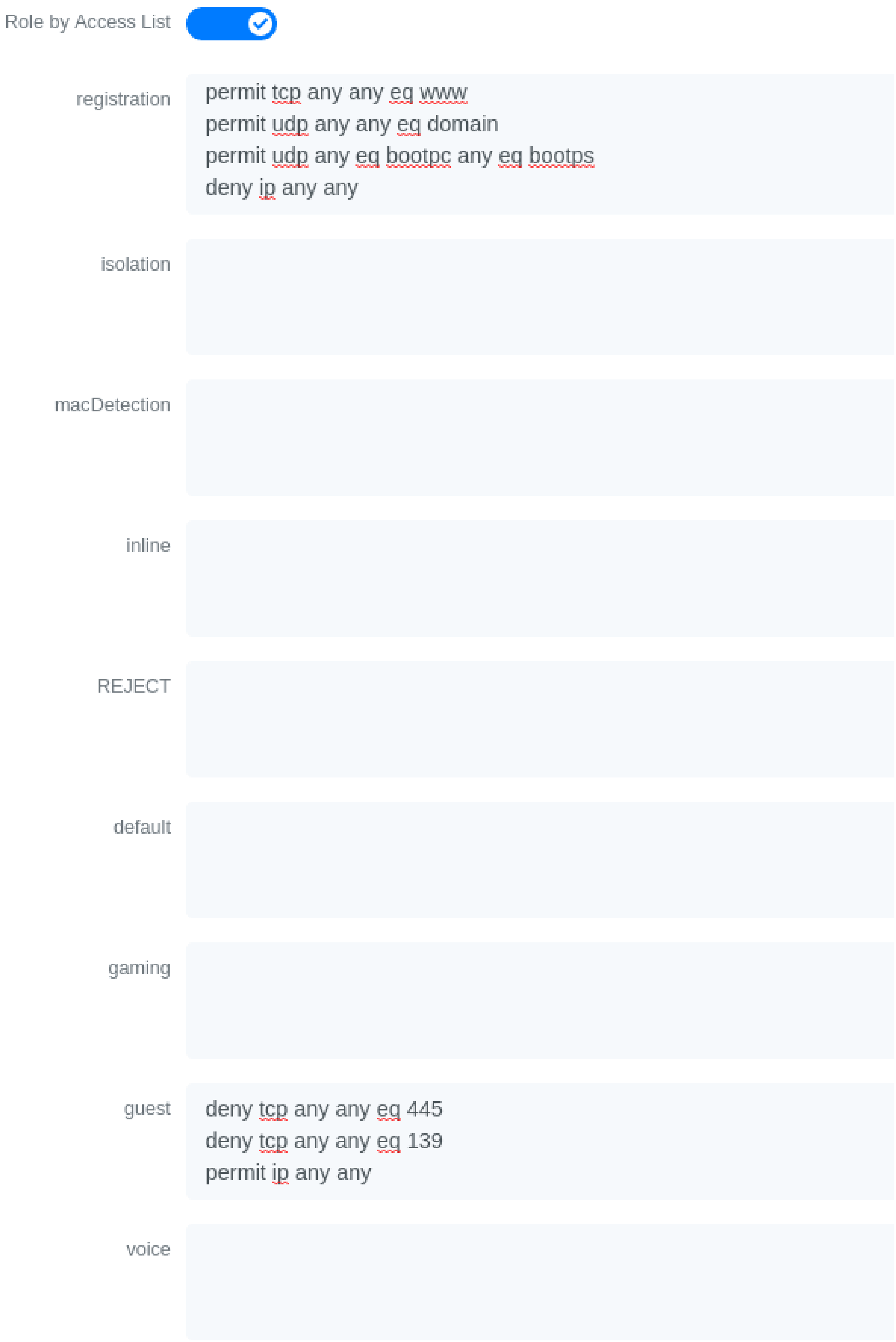
gaming

guest

```
deny tcp any 192.168.5.0 255.255.255.0
permit ip any any
```

voice

You could also only prevent your guest users from using shared directories



Role by Access List ☑

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

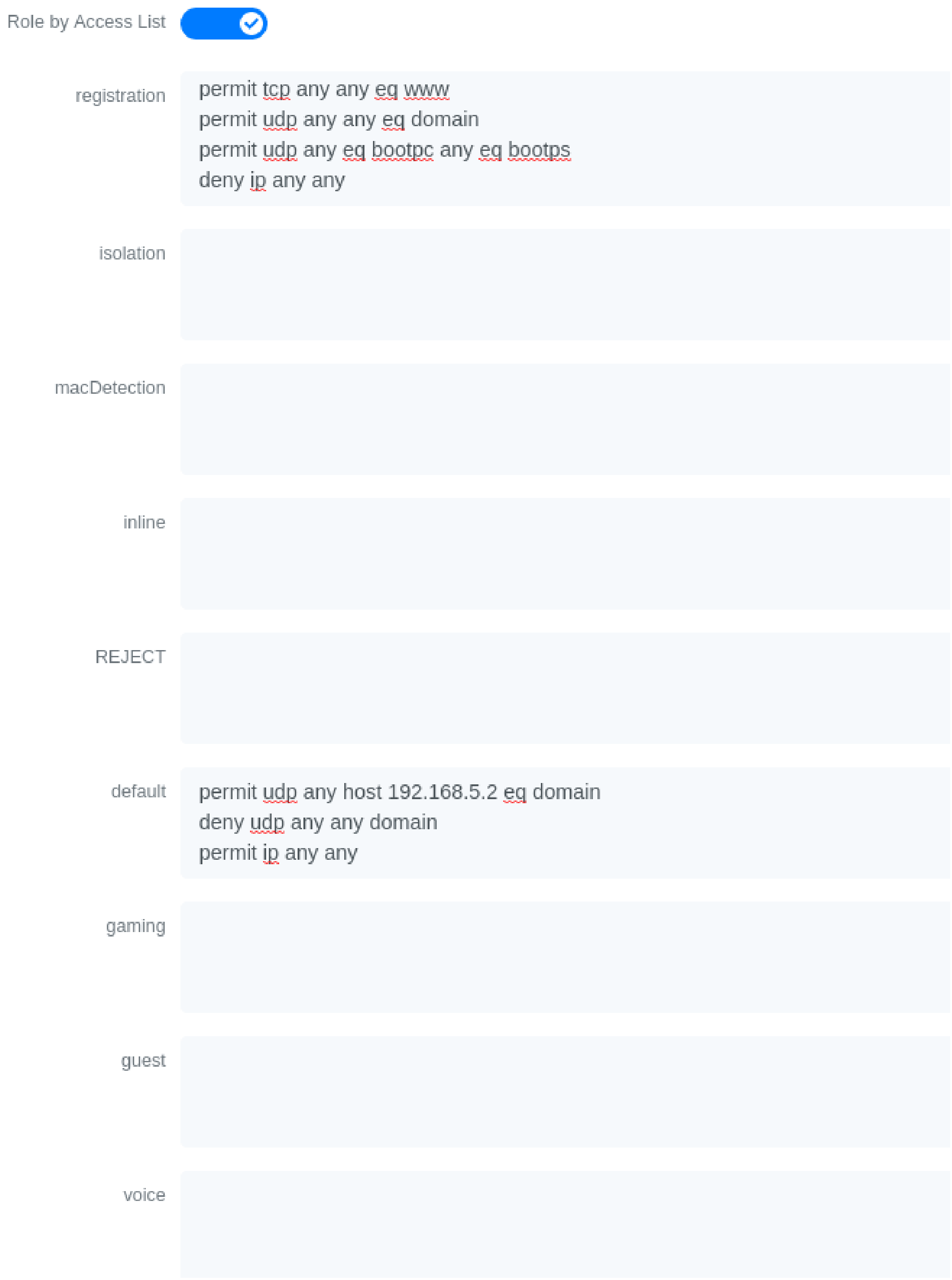
gaming

guest

```
deny tcp any any eq 445
deny tcp any any eq 139
permit ip any any
```

voice

Or also you could restrict your users to use only your DNS server where 192.168.5.2 is your DNS server



Role by Access List ●

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

```
permit udp any host 192.168.5.2 eq domain
deny udp any any domain
permit ip any any
```

gaming

guest

voice

5.9.6. Cisco IOS 15.5

CAUTION For 802.1X and MAB configurations, refer to this section below.

PortSecurity for IOS 12.2(46)SE or greater

Since version PacketFence 2.2.1, the way to handle VoIP when using port-security dramatically changed. Ensure that you follow the instructions below. To make the story short, instead on relying on the dynamic MAC learning for VoIP, we use a static entry on the voice VLAN so we can trigger a new security violation, and then authorize the phone MAC address on the network.

Global config settings:

```
snmp-server community public RO
snmp-server community private RW
snmp-server enable traps port-security
snmp-server enable traps port-security trap-rate 1
snmp-server host 192.168.1.5 version 2c public port-security
```

On each interface *without VoIP*:

```
switchport access vlan 4
switchport port-security
switchport port-security maximum 1 vlan access
switchport port-security violation restrict
switchport port-security mac-address 0200.000x.xxxx
```

where `xxxxx` stands for the interface `ifIndex`

On each interface *with VoIP*:

```
switchport voice vlan 100
switchport access vlan 4
switchport port-security
switchport port-security maximum 2
switchport port-security maximum 1 vlan access
switchport port-security maximum 1 vlan voice
switchport port-security violation restrict
switchport port-security mac-address 0200.010x.xxxx vlan voice
switchport port-security mac-address 0200.000x.xxxx vlan access
```

where `xxxxx` stands for the interface `ifIndex`

NOTE

ifIndex mapping

Use the following templates for interface `IfIndex` in bogus MAC addresses (0200.000x.xxxx):

- Fa0/1…Fa0/48 → 10001…10048
- Gi0/1…Gi0/48 → 10101…10148

2960, 2970, 3560, 3750

NOTE

You shouldn’t use any port-security features when doing 802.1X and/or MAC Authentication. This can cause unexpected behavior.

WARNING

Make sure that you have a local account, because enabling 802.1X or MAB will ask for a username and password on the next login.

WARNING

When doing 802.1X and network interface teaming on the same switch or stack, you might consider using the mac-move feature of the Cisco switches. When you authenticate the primary link of the team, the virtual MAC address will be published and authorized on the switchport. When something breaks on that link (ie. cable disconnected), the teaming driver will publish the MAC address on the secondary link, and the switch will try to authorize it. However, since the switch already has the MAC address in a session on another switchport, the switch will put the secondary link into err-disabled mode.

To prevent this behavior, you need to tell the switch to allow MAC address movements between ports. The global command is the following:

```
authentication mac-move permit
```

Global settings:

```
dot1x system-auth-control
aaa new-model
aaa group server radius packetfence
 server name pfnac
aaa authentication login default local
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
```

RADIUS server configuration:

```
radius server pfnac
  address ipv4 192.168.1.5 auth-port 1812 acct-port 1813
  automate-tester username dummy ignore-acct-port idle-time 3
  key 0 useStrongerSecret
```

```
radius-server vsa send authentication
```

CoA configuration

```
aaa server radius dynamic-author
 client 192.168.1.5 server-key useStrongerSecret
 port 3799
```

Activate SNMP v1 on the switch:

```
snmp-server community public RO
```

802.1X with MAC Authentication bypass (MultiDomain)

On each interface:

```
switchport mode access
switchport voice vlan 100
authentication host-mode multi-domain
authentication order dot1x mab
authentication priority dot1x mab
authentication port-control auto
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 10800
authentication violation replace
mab
no snmp trap link-status
dot1x pae authenticator
dot1x timeout quiet-period 2
dot1x timeout tx-period 3
```

802.1X with MAC Authentication bypass (MultiHost)

On each interface:

```
switchport mode access
authentication order dot1x mab
authentication priority dot1x mab
authentication port-control auto
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 7200
authentication violation replace
mab
no snmp trap link-status
dot1x pae authenticator
dot1x timeout quiet-period 2
dot1x timeout tx-period 3
```

MAC Authentication bypass only

On each interface:

```
switchport mode access
switchport voice vlan 100
dot1x mac-auth-bypass
dot1x pae authenticator
dot1x port-control auto
dot1x timeout tx-period 5
dot1x reauthentication
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 7200
authentication violation replace
mab
no snmp trap link-status
```

NOTE

802.1X on various models of 2960

There’s a lot of different versions of the Catalyst 2960. Some of them may not accept the command stated in this guide for 802.1X.

We have found a couple of commands that are working great or MAB:

On each interface

```
switchport mode access
authentication order mab
authentication port-control auto
mab
dot1x pae authenticator
```

But, as it is difficult for us to maintain the whole list of commands to configure each and every different model of 2960 with different IOS, please refer to Cisco documentation for very specific cases.

Web auth

The Catalyst 2960 supports web authentication from IOS 12.2.55SE3. This procedure has been tested on IOS 15.0.2SE5.

In this example, the ACL that triggers the redirection to the portal for registration is 'registration'.

Configure the global configuration of the switch using the section *MAC Authentication bypass only* of Cisco IOS 15.5 in this document.

Then add this additional configuration on the global level

```
ip device tracking
ip http server
ip http secure-server
snmp-server community public RO
snmp-server community private RW
```

Add the required access lists

```
ip access-list extended registration
 deny ip any host <your captive portal ip>
 permit tcp any any eq www
 permit tcp any any eq 443
```

Then on each controlled interface

```
switchport access vlan <vlan>
switchport mode access
authentication priority mab
authentication port-control auto
authentication periodic
authentication violation replace
mab
spanning-tree portfast
```

PacketFence switch configuration

- Select the type to 'Cisco IOS 15.5'
- Set the 'Registration' role to 'registration' (If left empty then it will use the role name)
- Set Role by Web Auth URL for registration to 'http://<your_captive_portal_ip>/Cisco::Cisco_IOS_15_5'
- The URL can contain dynamic parameters, like the MAC address ($mac), the switch IP ($switch_ip), the username ($user_name).
- Screenshots of this configuration are available in the Cisco WLC section of this guide.

Dynamic ACLs

The Cisco IOS 15.5 supports RADIUS pushed ACLs which means that you can define the ACLs centrally in PacketFence without configuring them in your switches and their rules will be applied to the switch during the authentication.

These ACLs are defined by role like the VLANs which means you can define different ACLs for your registration VLAN, production VLAN, guest VLAN, etc.

Add the following configuration setting on the global level

```
ip device tracking
```

For IOS 12.2, you need to create this acl and assign it to the switch port interface:

```
ip access-list extended Auth-Default-ACL
 permit udp any range bootps 65347 any range bootpc 65348
 permit udp any any range bootps 65347
 permit udp any any eq domain
 deny   ip any any
```

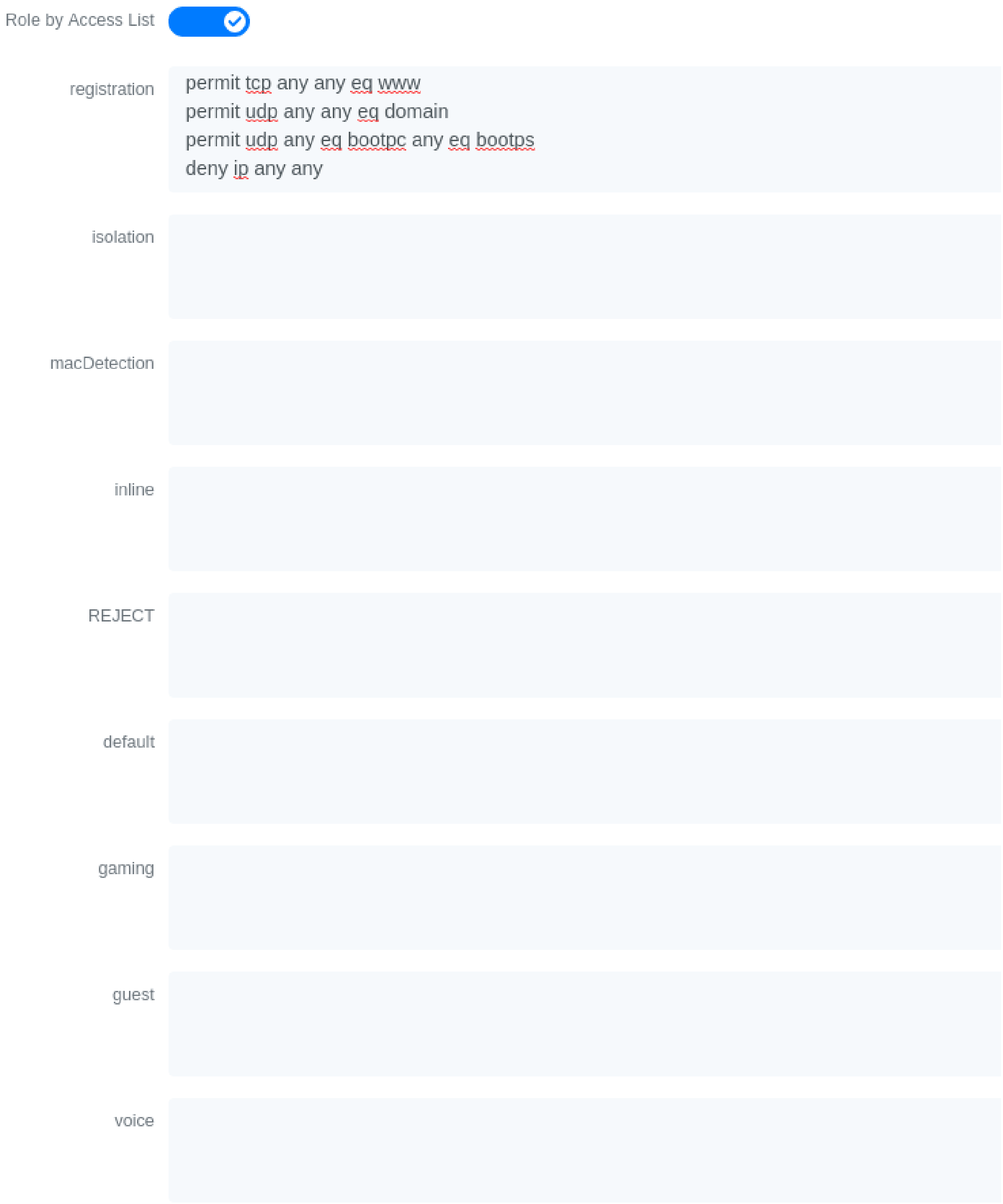
```
interface GigabitEthernetx/y/z
 ...
 ip access-group Auth-Default-ACL in
 ...
```

Before continuing, configure your switch to be in MAC authentication bypass or 802.1X.

Now in the PacketFence interface go in the switch configuration and in the Roles tab.

Check 'Role by access list' and you should now be able to configure the access lists as below.

For example if you want the users that are in the registration VLAN to only use HTTP, HTTPS, DNS and DHCP you can configure this ACL in the registration category.



Role by Access List ☑

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

gaming

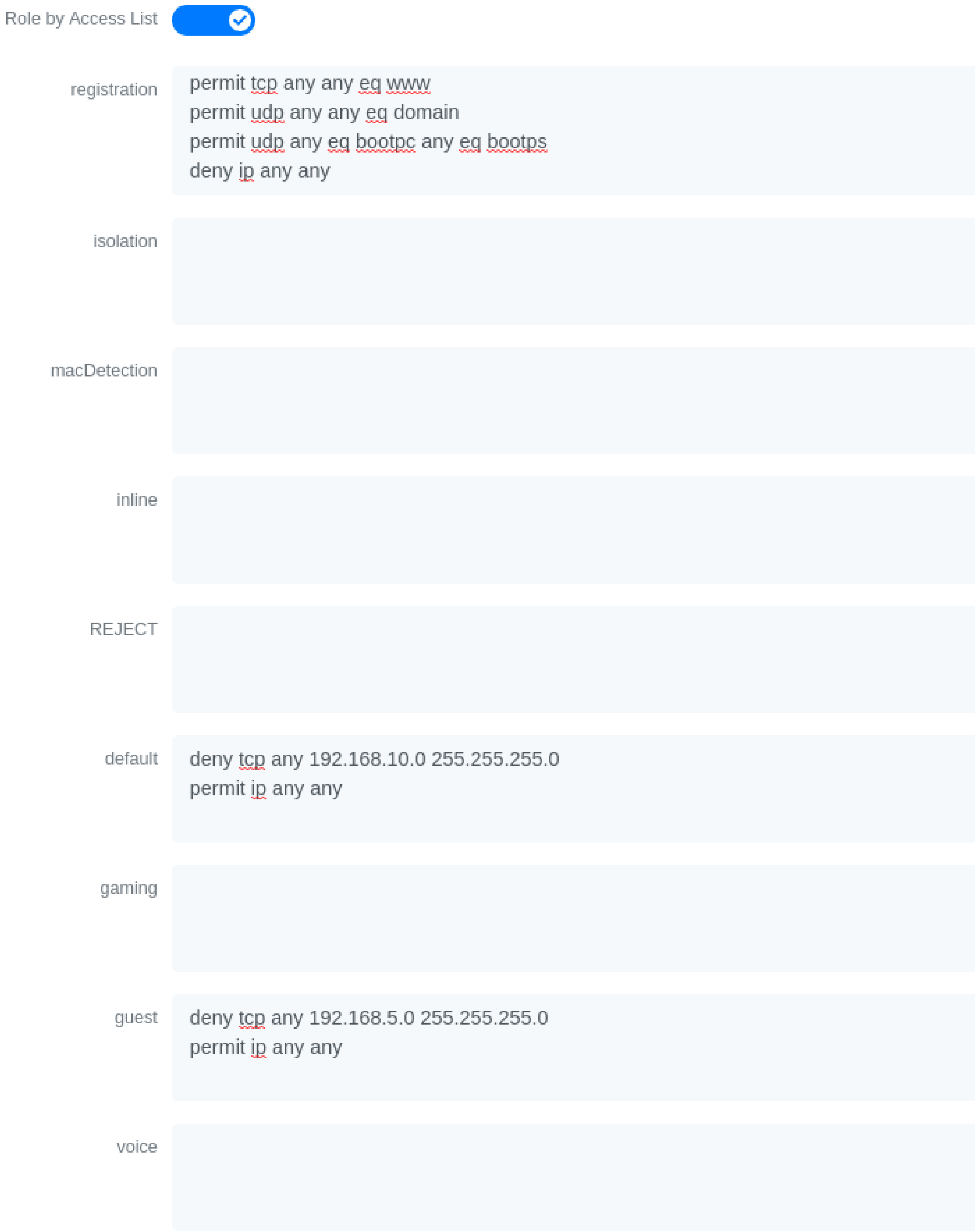
guest

voice

Now if for example, your normal users are placed in the 'default' category and your guests in the 'guest' category.

If for example the 'default' category uses the network 192.168.5.0/24 and your guest network uses the network 192.168.10.0/24.

You can prevent communications between both networks using these access lists



Role by Access List ☑

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

```
deny tcp any 192.168.10.0 255.255.255.0
permit ip any any
```

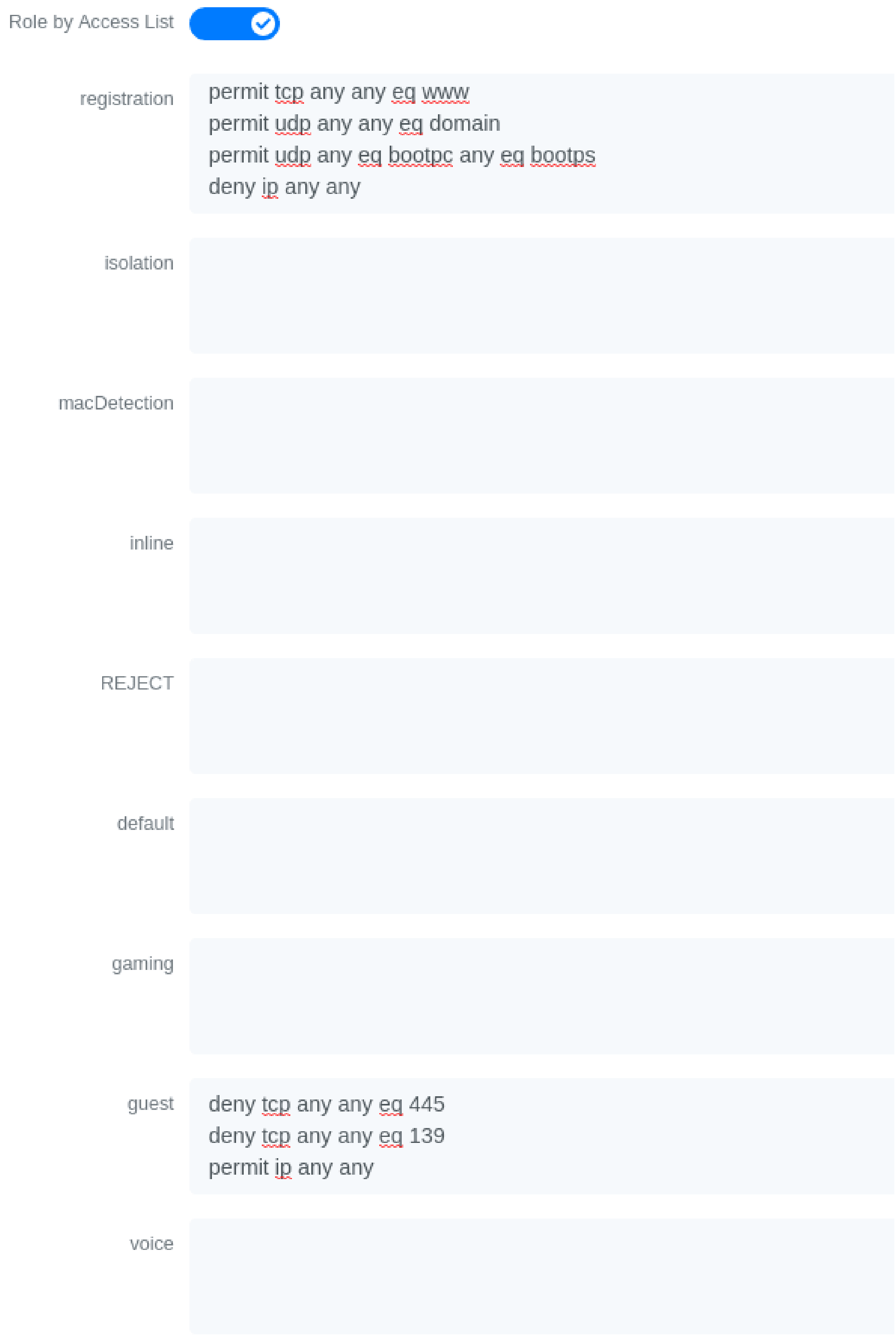
gaming

guest

```
deny tcp any 192.168.5.0 255.255.255.0
permit ip any any
```

voice

You could also only prevent your guest users from using shared directories



Role by Access List ☑

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

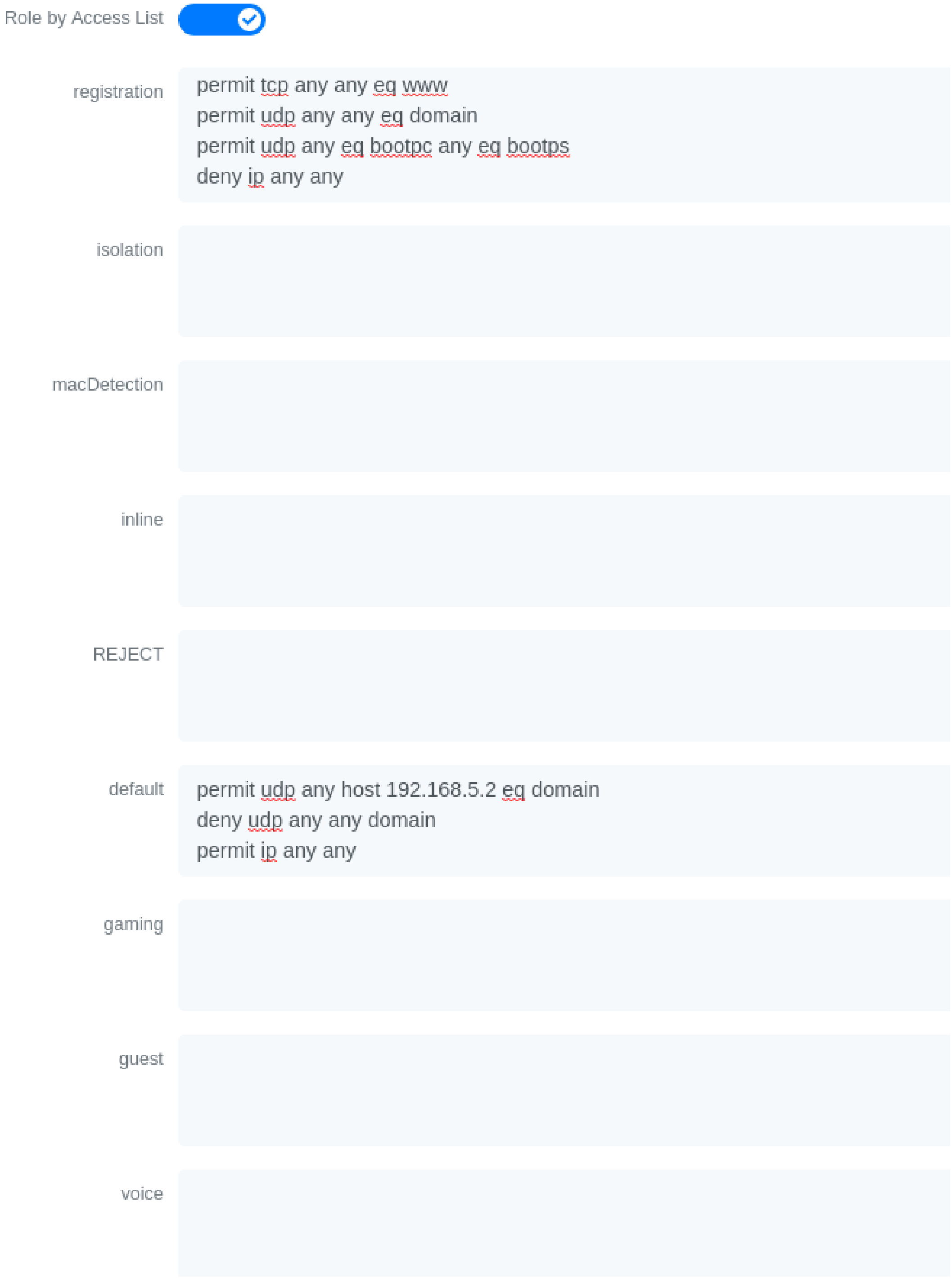
gaming

guest

```
deny tcp any any eq 445
deny tcp any any eq 139
permit ip any any
```

voice

Or also you could restrict your users to use only your DNS server where 192.168.5.2 is your DNS server



Role by Access List ☑

registration

```
permit tcp any any eq www
permit udp any any eq domain
permit udp any eq bootpc any eq bootps
deny ip any any
```

isolation

macDetection

inline

REJECT

default

```
permit udp any host 192.168.5.2 eq domain
deny udp any any domain
permit ip any any
```

gaming

guest

voice

Downloadable ACLs

Starting from IOS 15.2, Cisco switches supports Downloadable ACLs. The size of the radius packet limit the number of ACLs a switch can receive from a single Access-Accept answer, so Cisco Switches supports Downloadable ACLs which mean that the RADIUS server will do multiples Access-Challenge to send the complete ACL.

Use the Cisco::Cisco_IOS_15_5 switch module to use the DACLs method and use the same Global settings as the 'Dynamic ACLs' section above.

Add the following configuration setting on the global level

```
ip device tracking
```

Web auth and Dynamic ACLs

It’s possible to mix web authentication and downloadable ACLs starting from version 12.2 of the IOS, each roles can be configured to forward the device to the captive portal for an http or an https and only allow specific traffic with the ACL. To do that, you need to configure PacketFence with Role by Web Auth URL and with Role by access list (For each role you need). On the switch you need to change the Auth-Default-ACL to add the portal IP address:

For IOS 12.2:

```
ip access-list extended Auth-Default-ACL
 permit udp any range bootps 65347 any range bootpc 65348
 permit udp any any range bootps 65347
 permit ip any host ip_of_the_captive_portal
 permit udp any any eq domain
 deny   ip any any
```

And assign this ACL on the switch port yo want to do ACL per port.

```
interface GigabitEthernetx/y/z
 ...
 ip access-group Auth-Default-ACL in
 ...
```

For IOS 15.0:

```
Extended IP access list Auth-Default-ACL
  10 permit udp any range bootps 65347 any range bootpc 65348
  20 permit udp any any range bootps 65347
  30 deny ip any any
```

```
conf t
ip access-list extend  Auth-Default-ACL
21 permit ip any host ip_of_the_captive_portal
```

For IOS 15.2:

```
Extended IP access list Auth-Default-ACL
    10 permit udp any any eq domain
    20 permit tcp any any eq domain
    30 permit udp any eq bootps any
    40 permit udp any any eq bootpc
    50 permit udp any eq bootpc any
    60 deny ip any any
```

```
conf t
ip access-list extend  Auth-Default-ACL
51 permit ip any host ip_of_the_captive_portal
```

5.9.7. Stacked 29xx, Stacked 35xx, Stacked 3750, 4500 Series, 6500 Series

The 4500 Series and all the stacked switches work exactly the same way as if they were not stacked so the configuration is the same: they support port-security with static MAC address and allow us to secure a MAC on the data VLAN so we enable it whether there is VoIP or not.

We need to secure bogus MAC addresses on ports in order for the switch to send a trap when a new MAC appears on a port.

Global config settings

```
snmp-server community public RO
snmp-server community private RW
snmp-server enable traps port-security
snmp-server enable traps port-security trap-rate 1
snmp-server host 192.168.1.5 version 2c public port-security
```

On each interface *without VoIP*:

```
switchport access vlan 4
switchport port-security
switchport port-security maximum 1 vlan access
switchport port-security violation restrict
switchport port-security mac-address 0200.000x.xxxx
```

On each interface *with VoIP*:

```
switchport voice vlan 100
switchport access vlan 4
switchport port-security
switchport port-security maximum 2
switchport port-security maximum 1 vlan access
switchport port-security violation restrict
switchport port-security mac-address 0200.000x.xxxx
```

where `xxxxx` stands for the interface `ifIndex`

NOTE

ifIndex mapping

Use the following templates for interface `IfIndex` in bogus MAC addresses (0200.000x.xxxx):

- Fa1/0/1…Fa1/0/48 → 10001…10048
- Gi1/0/1…Gi1/0/48 → 10101…10148
- Fa2/0/1…Fa2/0/48 → 10501…10548
- Gi2/0/1…Gi2/0/48 → 10601…10648
- Fa3/0/1…Fa3/0/48 → 11001…11048
- Gi3/0/1…Gi3/0/48 → 11101…11148
- Fa4/0/1…Fa4/0/48 → 11501…11548
- Gi4/0/1…Gi4/0/48 → 11601…11648
- …

5.9.8. IOS XE Switches

PacketFence supports the IOS XE switches in MAC Authentication Bypass, 802.1X and web authentication.

MAC Authentication Bypass

Global config settings:

```
dot1x system-auth-control
```

On each interface:

```
authentication host-mode multi-domain
authentication order mab
authentication priority mab
authentication port-control auto
authentication periodic
authentication timer restart 10800
authentication timer reauthenticate 10800
authentication violation replace
mab
no snmp trap link-status
dot1x pae authenticator
dot1x timeout quiet-period 2
dot1x timeout tx-period 3
```

AAA groups and configuration:

```
aaa new-model
aaa group server radius packetfence
 server 192.168.1.5 auth-port 1812 acct-port 1813
aaa authentication login default local
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
```

RADIUS server configuration:

```
radius-server host 192.168.1.5 auth-port 1812 acct-port 1813 timeout 2 key
useStrongerSecret
radius-server vsa send authentication
```

CoA configuration:

```
aaa server radius dynamic-author
 client 192.168.1.5 server-key useStrongerSecret
port 3799
```

Activate SNMP on the switch:

```
snmp-server community public RO
```

802.1X only

Follow the same configuration as for MAC Authentication Bypass but change the `authentication priority` line with the following:

```
authentication priority dot1x
```

802.1X with MAC Authentication fallback

Follow the same configuration as for MAC Authentication Bypass but change the `authentication priority` line with the following:

```
authentication priority dot1x mab
```

Web auth

Web auth requires at least MAC Authentication Bypass to be activated on the switchport but can also work with 802.1X. Configure your switchports as you would usually do, then add the following access lists.

```
ip access-list extended redirect
 deny   ip any host 192.168.1.5
 deny   udp any any eq domain
 deny   tcp any any eq domain
 deny   udp any any eq bootpc
 deny   udp any any eq bootps
 permit tcp any any eq www
 permit tcp any any eq 443
ip access-list extended registered
 permit ip any any
```

Global config settings:

```
ip device tracking
```

PacketFence switch configuration:

- Select the type to 'Cisco IOS 15.5'
- Set the 'Registration' role to 'registration' (If left empty then it will use the role name)
- Set Role by Web Auth URL for registration to 'http://<your_captive_portal_ip>/Cisco::Cisco_IOS_15_5'
- The URL can contain dynamic parameters, like the MAC address ($mac), the switch IP ($switch_ip), the username ($user_name).
- Screenshots of this configuration are available in the Cisco WLC section of this guide.

NOTE

AAA authentication is slow to come up after a reload of the IOS XE switches. This makes the recovery from a reboot longer to complete. This is due to a bug in IOS XE. A workaround is to execute the following command `no aaa accounting system default start-stop group tacacs+`.

Identity Networking Policy

Starting from version 15.2(1)E (IOS) and 3.4.0E (IOSXE) , Cisco introduced the Identity Based Networking Services. It means that you can create an authentication workflow on the switch and create interfaces templates.

To enable it:

```
authentication display new-style
```

Global config settings:

```
dot1x system-auth-control
```

AAA groups and configuration:

```
aaa new-model
aaa group server radius packetfence
 server name packetfence
!
aaa authentication login default local
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
radius-server vsa send authentication
```

RADIUS server configuration:

```
radius-server dead-criteria time 5 tries 4
radius-server deadtime 1
radius server packetfence
 address ipv4 192.168.1.5 auth-port 1812 acct-port 1813
 key useStrongerSecret
 automate-tester username cisco ignore-acct-port idle-time 1
```

CoA configuration:

```
aaa server radius dynamic-author
 client 192.168.1.5 server-key useStrongerSecret
port 3799
```

Enable SNMP on the switch:

```
snmp-server community public RO
```

Enable HTTP and HTTPS server:

```
ip http server
ip http secure-server
```

Enable IP device tracking:

```
ip device tracking
```

Fallback ACL:

```
ip access-list extended ACL-CRITICAL-V4
 permit ip any any
```

Service Template:

```
service-template DEFAULT_LINKSEC_POLICY_MUST_SECURE
service-template DEFAULT_LINKSEC_POLICY_SHOULD_SECURE
service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
 voice vlan
service-template CRITICAL_AUTH_VLAN
service-template CRITICAL-ACCESS
 description *Fallback Policy on AAA Fail*
 access-group ACL-CRITICAL-V4
!
```

Class map:

```
class-map type control subscriber match-any IN_CRITICAL_AUTH
match activated-service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
match activated-service-template CRITICAL_AUTH_VLAN
match activated-service-template CRITICAL-ACCESS
!
class-map type control subscriber match-none NOT_IN_CRITICAL_AUTH
match activated-service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
match activated-service-template CRITICAL_AUTH_VLAN
match activated-service-template CRITICAL-ACCESS
!
class-map type control subscriber match-all AAA_SVR_DOWN_UNAUTHD_HOST
match result-type aaa-timeout
match authorization-status unauthorized
!
class-map type control subscriber match-all AAA_SVR_DOWN_AUTHD_HOST
match result-type aaa-timeout
match authorization-status authorized
!
class-map type control subscriber match-all DOT1X_NO_RESP
match method dot1x
match result-type method dot1x agent-not-found
!
class-map type control subscriber match-all MAB_FAILED
match method mab
match result-type method mab authoritative
!
class-map type control subscriber match-all DOT1X_FAILED
match method dot1x
match result-type method dot1x authoritative
```

Policy map:

On the 3 following configurations if the RADIUS server is down then we will apply

CRITICAL_AUTH_VLAN, DEFAULT_CRITICAL_VOICE_TEMPLATE and CRITICAL-ACCESS service template. If the RADIUS server goes up then it reinitializes the authentication if the port is in IN_CRITICAL_VLAN.

for 802.1X with MAC Authentication fallback:

```
policy-map type control subscriber DOT1X_MAB
 event session-started match-all
  10 class always do-until-failure
   10 authenticate using dot1x priority 10
 event authentication-failure match-first
  5 class DOT1X_FAILED do-until-failure
   10 terminate dot1x
   20 authenticate using mab priority 20
  10 class AAA_SVR_DOWN_UNAUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 authorize
   50 pause reauthentication
  20 class AAA_SVR_DOWN_AUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 pause reauthentication
   50 authorize
  30 class DOT1X_NO_RESP do-until-failure
   10 terminate dot1x
   20 authenticate using mab priority 20
  40 class MAB_FAILED do-until-failure
   10 terminate mab
   20 authentication-restart 10800
  60 class always do-until-failure
   10 terminate dot1x
   20 terminate mab
   30 authentication-restart 10800
 event agent-found match-all
  10 class always do-until-failure
   10 terminate mab
   20 authenticate using dot1x priority 10
 event aaa-available match-all
  10 class IN_CRITICAL_AUTH do-until-failure
   10 clear-session
  20 class NOT_IN_CRITICAL_AUTH do-until-failure
   10 resume reauthentication
 event inactivity-timeout match-all
  10 class always do-until-failure
   10 clear-session
 event authentication-success match-all
  10 class always do-until-failure
   10 activate service-template DEFAULT_LINKSEC_POLICY_SHOULD_SECURE
 event violation match-all
  10 class always do-all
   10 replace
```

for MAC Authentication only:

```
policy-map type control subscriber MACAUTH
 event session-started match-all
  10 class always do-until-failure
   10 authenticate using mab priority 10
 event authentication-failure match-first
  10 class AAA_SVR_DOWN_UNAUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 authorize
   50 pause reauthentication
  20 class AAA_SVR_DOWN_AUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 pause reauthentication
   50 authorize
  30 class always do-until-failure
   10 terminate mab
   20 authentication-restart 30
 event aaa-available match-all
  10 class IN_CRITICAL_AUTH do-until-failure
   10 clear-session
  20 class NOT_IN_CRITICAL_AUTH do-until-failure
   10 resume reauthentication
 event inactivity-timeout match-all
  10 class always do-until-failure
   10 clear-session
 event authentication-success match-all
  10 class always do-until-failure
   10 activate service-template DEFAULT_LINKSEC_POLICY_SHOULD_SECURE
```

for 802.1X only:

```
policy-map type control subscriber DOT1X
 event session-started match-all
  10 class always do-until-failure
```

```
   10 authenticate using dot1x priority 10
 event authentication-failure match-first
  10 class AAA_SVR_DOWN_UNAUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 authorize
   50 pause reauthentication
  20 class AAA_SVR_DOWN_AUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 pause reauthentication
   50 authorize
  30 class DOT1X_FAILED do-until-failure
   10 terminate dot1x
  40 class DOT1X_NO_RESP do-until-failure
   10 terminate dot1x
  60 class always do-until-failure
   10 terminate dot1x
   20 authentication-restart 10800
 event agent-found match-all
  10 class always do-until-failure
   10 authenticate using dot1x priority 10
 event aaa-available match-all
  10 class IN_CRITICAL_AUTH do-until-failure
   10 clear-session
  20 class NOT_IN_CRITICAL_AUTH do-until-failure
   10 resume reauthentication
 event inactivity-timeout match-all
  10 class always do-until-failure
   10 clear-session
 event authentication-success match-all
  10 class always do-until-failure
   10 activate service-template DEFAULT_LINKSEC_POLICY_SHOULD_SECURE
```

Interface Template (802.1X MAC Authentication):

```
template identity-template-mab
 dot1x pae authenticator
 spanning-tree portfast edge
 switchport access vlan 1
 switchport mode access
 switchport voice vlan 100
 mab
 access-session host-mode multi-domain
 access-session control-direction in
 access-session closed
 access-session port-control auto
 authentication periodic
 authentication timer reauthenticate server
 service-policy type control subscriber DOT1X_MAB
```

Interface Template (MAC Authentication):

```
template identity-template-macauth
 dot1x pae authenticator
 spanning-tree portfast edge
 switchport access vlan 1
 switchport mode access
 switchport voice vlan 100
 mab
 access-session host-mode single-host
 access-session control-direction in
 access-session closed
 access-session port-control auto
 authentication periodic
 authentication timer reauthenticate server
 service-policy type control subscriber MACAUTH
```

Interface Template (802.1X):

```
template identity-template-dot1x
 dot1x pae authenticator
 spanning-tree portfast edge
 switchport access vlan 1
 switchport mode access
 switchport voice vlan 100
 mab
 access-session host-mode single-host
 access-session control-direction in
 access-session closed
 access-session port-control auto
 authentication periodic
 authentication timer reauthenticate server
 service-policy type control subscriber DOT1X
```

On each interface for 802.1X with MAC Authentication:

```
source template identity-template-mab
dot1x timeout tx-period 5
```

On each interface for MAC Authentication:

```
source template identity-template-macauth
```

On each interface for 802.1X:

```
source template identity-template-dot1x
dot1x timeout tx-period 5
```

To see what is the status of a port let’s run:

```
sh access-session interface fastEthernet 0/2 details
           Interface:  FastEthernet0/2
         MAC Address:  101f.74b2.f6a5
        IPv6 Address:  Unknown
        IPv4 Address:  172.20.20.49
           User-Name:  ACME\bob
              Status:  Authorized
              Domain:  DATA
      Oper host mode:  multi-domain
    Oper control dir:  in
     Session timeout:  12380s (server), Remaining: 12206s
      Timeout action:  Terminate
   Common Session ID:  AC1487290000000C000F8B7A
     Acct Session ID:  Unknown
              Handle:  0x9C000001
      Current Policy:  DOT1X_MAB
```

```
Local Policies:
    Service Template: DEFAULT_LINKSEC_POLICY_SHOULD_SECURE (priority 150)
```

```
Server Policies:
          Vlan Group:  Vlan: 20
        Idle timeout:  30 sec
```

```
Method status list:
       Method           State
```

```
dot1x            Authc Success
```

Debug command:

In order to be able to debug the Identity Networking Policy you can launch the following command in the switch cli:

```
term mon
debug pre all
```

DHCP Option 82

In order to enable the DHCP Option 82, you need to add the following parameters. Let's say you want to enable it for the vlan 1 to 1024:

```
ip dhcp snooping
ip dhcp snooping vlan 1-1024
```

On uplink interfaces:

```
ip dhcp snooping trust
```

Router ISR 1800 Series

PacketFence supports the 1800 series Router with linkUp / linkDown traps. It cannot do anything about the router interfaces (ie: fa0 and fa1 on a 1811). VLAN interfaces `ifIndex` should also be marked as uplinks in the PacketFence switch configuration as they generate traps but are of no interest to PacketFence (layer 3).

Global config settings:

```
snmp-server enable traps snmp linkdown linkup
snmp-server host 192.168.1.5 trap version 2c public
```

On each interface:

```
switchport mode access
switchport access vlan 4
```

5.9.9. EAP-FAST authentication Support

PacketFence supports Cisco NEAT through EAP-MD5, EAP-FAST, EAP-GTC and EAP-MSCHAPv2 authentication methods. Upon successful authentication against PacketFence, the authenticator switch will give trunk access to the supplicant switch.

Here is an official Cisco guide, from which the following configuration derives: https://www.cisco.com/c/en/us/support/docs/lan-switching/8021x/116681-config-neat-cise-00.html

The following configuration example contains required changes to be applied on both authenticator and supplicant switches to provide EAP-FAST authentication against PacketFence.

Authenticator

Global settings:

```
aaa group server radius packetfence
 server 192.168.1.5 auth-port 1812 acct-port 1813
aaa authentication dot1x default group packetfence
aaa authorization network default group packetfence
```

```
cisp enable
```

Uplink configuration:

```
interface FastEthernet0/20
 switchport mode access
 authentication port-control auto
 dot1x pae authenticator
```

Supplicant

Global settings (replace username and password):

```
cisp enable
```

```
eap profile EAP_PRO
 method fast
```

```
dot1x credentials EAP_PRO
 username switches
 password 7 03174C02120C29495D
! Password is switches
!
dot1x supplicant force-multicast
```

Uplink settings:

```
interface GigabitEthernet1/0/24
 switchport mode trunk
 dot1x pae supplicant
 dot1x credentials EAP_PRO
 dot1x supplicant eap profile EAP_PRO
```

5.9.10. Device Sensor for Cisco Equipment

Device sensor is a way to be able to receive some information about endpoints from the RADIUS accounting packet. (like DHCP, CDP, LLDP and HTTP information) In order to enable Device Sensor feature, you need to add the following parameters to your switch configuration:

```
radius server packetfence
address ipv4 192.168.1.5 auth-port 1812 acct-port 1813
 key useStrongerSecret
```

```
aaa group server radius packetfence
 server name packetfence
!
aaa accounting update newinfo
aaa accounting identity default start-stop group packetfence
!
!
device-sensor filter-list dhcp list dhcp-list
 option name host-name
 option name parameter-request-list
 option name class-identifier
!
device-sensor filter-list lldp list lldp-list
 tlv name system-description
!
device-sensor filter-list cdp list cdp-list
 tlv name version-type
 tlv name platform-type
!
device-sensor filter-list dhcp list lldp-list
device-sensor filter-spec dhcp include list dhcp-list
device-sensor filter-spec lldp include list lldp-list
device-sensor filter-spec cdp include list cdp-list
device-sensor notify all-changes
```

This configuration will make the switch send information about DHCP, LLDP and CDP of the endpoint in the RADIUS accounting packets.

5.10. Cisco Small Business (SMB)

The Cisco Small Business switches support MAC based authentication (MAB) as well as 802.1X and VoIP. Both technologies can be combined and will work correctly together on the same switchport.

Nothing is required to activate VoIP on the switch, you must simply configure the voice VLAN you want PacketFence to assign in the PacketFence switch configuration as well as enabling VoIP there. Note that your phones must **not** tag their packets on the network and should send their traffic untagged when connected into a PacketFence enabled port. This means you should not have the voice VLAN capabilities enabled on the switch itself as they might conflict with the authorization attributes returned by PacketFence.

5.10.1. Global configuration

CAUTION

Before executing these steps, make sure you have a local account configured to login on the switch or are pointing to a RADIUS server for management. Otherwise, you will not be able to login into the switch anymore.

You must first define your RADIUS server and point it to PacketFence:

```
dot1x system-auth-control
radius-server key useStrongerSecret
radius-server host 192.168.1.5
```

```
aaa accounting dot1x start-stop group radius
```

```
snmp-server community public ro view Default
snmp-server community private rw view Default
```

SNMP configuration for the Cisco SG300:

```
snmp-server community public ro view DefaultSuper
snmp-server community private rw view DefaultSuper
```

5.10.2. MAC Authentication

In order to configure MAC authentication, you must enable it on each interface

```
interface x/y/z
 dot1x host-mode multi-sessions
 dot1x reauthentication
 dot1x timeout reauth-period 10800
 dot1x timeout quiet-period 10
 dot1x timeout server-timeout 5
 dot1x timeout supp-timeout 3
 dot1x authentication mac
 dot1x radius-attributes vlan
 dot1x port-control auto
 spanning-tree portfast
 switchport mode general
 switchport general pvid 2
```

5.10.3. 802.1X with MAB

In order to configure 802.1X with a fall-back to MAC authentication, you must enable it on each interface

```
interface x/y/z
 dot1x host-mode multi-sessions
 dot1x reauthentication
 dot1x timeout quiet-period 10
 dot1x timeout server-timeout 5
 dot1x timeout supp-timeout 3
 dot1x authentication dot1x mac
 dot1x radius-attributes vlan
 dot1x port-control auto
 spanning-tree portfast
 switchport mode general
 switchport general pvid 2
```

Once you have configured your switchports, you must configure the switch in PacketFence with the following information:

- **Definition → Type**: `Cisco SG500`
- **Definition → Mode**: `production`
- **Definition → Deauthentication Method**: `SNMP`
- **Definition → VoIP** enabled if you need VoIP on this switch.
- **Roles → voice VLAN** set to the VLAN you want to assign to the VoIP devices connecting to this switch.
- **RADIUS → Secret Passphrase**: `useStrongerSecret`
- **SNMP → Version**: `v2c`
- **SNMP → Community Read**: `public`
- **SNMP → Community Write**: `private`

5.10.4. 802.1X commands

```
show dot1x
show dot1x users
```

5.11. D-Link

PacketFence supports D-Link switches without VoIP using two different trap types:

- linkUp/linkDown

- MAC Notification

We recommend to enable linkUp/linkDown and MAC notification together.

Don’t forget to update the startup config!

5.11.1. DES3526 / 3550

Global config settings

```
To be contributed...
```

On each interface:

```
To be contributed...
```

5.11.2. DGS3100/3200

Enable MAC notification:

```
enable mac_notification
config mac_notification interval 1 historysize 1
config mac_notification ports 1:1-1:24 enable
```

Enable linkup/linkdown notification:

```
enable snmp traps
enable snmp linkchange_traps
```

Add SNMP host:

```
create snmp host 192.168.1.5 v2c  public
```

Enable MAC base access control:

```
enable mac_based_access_control
config mac_based_access_control authorization attributes radius enable local
disable
config mac_based_access_control method radius
config mac_based_access_control password useStrongerSecret
config mac_based_access_control password_type manual_string
config mac_based_access_control max_users no_limit
config mac_based_access_control trap state enable
config mac_based_access_control log state enable
```

On each interface:

```
config mac_based_access_control ports 1:1 state enable
config mac_based_access_control ports 1:1 max_users 128
config mac_based_access_control ports 1:1 aging_time 1440
config mac_based_access_control ports 1:1 block_time 300
config mac_based_access_control ports 1:1 mode host_based
```

5.12. Dell

NOTE When doing MAC Authentication, there is a known issue with some Dell switches. If you get errors where the device is using EAP type MD5, but PacketFence is expecting PEAP, you will need to edit the line **default_eap_type = peap** under the section **eap** in the file **/usr/local/pf/conf/radiusd/eap.conf** to **default_eap_type = md5**.

5.12.1. Force 10

PacketFence supports this switch using RADIUS, MAC-Authentication and 802.1X.

Global config settings

```
radius-server host 192.168.1.5 key s3cr3t auth-port 1812
```

MAB interface configuration:

```
interface GigabitEthernet 0/1
 no ip address
 switchport
 dot1x authentication
 dot1x mac-auth-bypass
 dot1x auth-type mab-only
 no shutdown
```

802.1X interface configuration:

```
interface GigabitEthernet 0/1
 no ip address
 switchport
 dot1x authentication
 no shutdown
```

5.12.2. PowerConnect 3424

PacketFence supports this switch using linkUp/linkDown traps.

Global config settings to define the RADIUS server

```
configure
radius-server host auth 10.34.200.30
name PacketFence
usage 802.1x
key s3cr3t
exit
```

Configure CoA

```
aaa server radius dynamic-author
client 10.34.200.30 server-key s3cr3t
auth-type all
exit
```

Enable authentication and globally enable 802.1x client authentication via RADIUS

```
authentication enable
aaa authentication dot1x default radius
aaa authorization network default radius
dot1x system-auth-control
```

(Optional)

```
dot1x dynamic-vlan enable
```

On the interface, enable MAC based authentication mode, enable MAB, and set the order of authentication to 802.1X followed by MAC authentication. Also enable periodic re-authentication.

```
interface te1/0/4
dot1x port-control mac-based
dot1x mac-auth-bypass
authentication order dot1x mab
dot1x reauthentication
default mab pap
exit
```

```
authentication order mab
authentication priority mab
```

5.12.3. N1500 Series Switch

PacketFence supports this switch using RADIUS, MAC-Authentication, 802.1x and VoIP

802.1X with MAC Authentication fallback and VoIP

We assume that the switch ip is 192.168.1.254

First on the uplink add this configuration:

```
dot1x port-control force-authorized
switchport mode trunk
switchport trunk allowed vlan 1-5,100
```

Global config settings

```
configure
vlan 2,3,4,5,100
vlan 2
name "Registration"
vlan 3
name "Isolation"
vlan 4
name "Mac detection"
vlan 5
name "Guest"
vlan 100
name "VoIP"
```

```
authentication enable
dot1x system-auth-control
aaa authentication dot1x default radius
aaa authorization network default radius
radius server vsa send authentication
dot1x dynamic-vlan enable
voice vlan
aaa server radius dynamic-author
client 192.168.1.5 server-key "useStrongerSecret"
exit
radius-server host auth 192.168.1.5
name "PacketFence"
usage 802.1x
key "useStrongerSecret"
exit
```

```
aaa server radius dynamic-author
client 192.168.1.5 server-key ”useStrongerSecret”
exit
```

```
snmp-server community ”private” rw
snmp-server community ”public” ro
```

On each interface (not uplink)

```
switchport voice detect auto
switchport mode general
switchport access vlan 10
dot1x port-control mac-based
dot1x reauthentication
dot1x mac-auth-bypass
authentication order mab
authentication priority mab
lldp transmit-tlv sys-desc sys-cap
lldp transmit-mgmt
lldp notification
lldp med confignotification
voice vlan 100
exit
```

5.12.4. N1500 Series (FW >= 6.6.0.17)

This configuration has been tested with firmware 6.6.0.17

Global config settings:

```
aaa authentication login ”defaultList” local
authentication enable
authentication dynamic-vlan enable
dot1x system-auth-control
aaa authentication dot1x default radius
aaa authorization network default radius
aaa accounting dot1x default start-stop radius
ip device tracking
authentication dynamic-vlan enable
radius server auth 192.168.1.5
key useStrongerSecret
usage authmgr
name ”PacketFence”
exit
radius server acct 192.168.1.5
```

```
name ”PacketFenceAccounting”
key useStrongerSecret
exit
snmp-server community ”private” rw
snmp-server community ”public” ro
```

802.1X/MAB with VoIP interface configuration:

```
switchport voice detect auto
switchport mode general
switchport general pvid 2
switchport general allowed vlan add 1-4093
authentication host-mode multi-domain
authentication periodic
dot1x timeout quiet-period 10
mab auth-type pap
authentication order mab
no authentication allow-unauth dhcp
lldp tlv-select system-description system-capabilities management-address
lldp notification
lldp med confignotification
switchport voice vlan 100
```

Uplink port:

```
switchport mode trunk
switchport trunk allowed vlan 1-4096
authentication port-control force-authorized
```

On other switch ports not managed by PacketFence:

```
switchport mode general
switchport general pvid x
switchport general allowed vlan add x
authentication port-control force-authorized
```

Web-Auth:

```
ip access-list registration
1000 deny ip any 192.168.1.5 0.0.0.0
1010 permit tcp any any eq http
1020 permit tcp any any eq 443
```

5.12.5. N1500 Series (FW >= 6.8.0)

Downloadable ACLs:

This configuration has been tested on FW 6.8.1. Important, even if "authentication allow-srcipanyacl enable" has been enable on the switch, it doesn’t support ACL with source ip and the ACL direction are only in. So, for example, if you have this configured in PacketFence:

```
permit ip 10.0.0.1 host 192.168.3.1
permit ip any any
```

Then you have to convert it to:

```
permit ip any host 192.168.3.1
permit ip any any
```

The configuration needs to be done is the one above (N1500 Series (FW >= 6.6.0.17))

Troubleshooting command:

```
debug console
debug authentication event Gigabitethernet 1/0/1
terminal monitor
show authentication clients gigabitethernet 1/0/1
```

5.12.6. N2000 Series (N2024P)

This configuration was tested with firmware version 6.2.1.6

Global config settings:

Radius configuration:

```
aaa authentication login ”defaultList” local
authentication enable
dot1x system-auth-control
aaa authentication dot1x default radius
aaa authorization network default radius
dot1x dynamic-vlan enable
radius-server key ”useStrongerSecret”
radius-server host auth 192.168.1.5
name ”PacketFence”
```

802.1X interface configuration:

```
interface Gi0/0/1
```

```
switchport mode general
switchport general allowed vlan add 1-3,100
dot1x port-control mac-based
dot1x unauth-vlan 2
dot1x mac-auth-bypass
authentication order mab dot1x
voice vlan 100
exit
```

5.13. Edge core

PacketFence supports Edge-corE switches without VoIP using linkUp/linkDown traps.

PacketFence also supports MAC authentication on the Edge-corE 4510

5.13.1. 3526XA and 3528M

Global config settings

```
SNMP-server host 192.168.1.5 public version 2c udp-port 162
```

5.13.2. 4510

Basic configuration

```
network-access aging
snmp-server community private rw
snmp-server community public rw


radius-server 1 host 192.168.1.5 auth-port 1812 acct-port 1813 timeout 5
retransmit 2 key useStrongerSecret
radius-server key useStrongerSecret
```

On each controlled interface

```
interface ethernet 1/8
 switchport allowed vlan add <your list of allowed vlans> untagged
 network-access max-mac-count 1
 network-access mode mac-authentication
!
```

5.14. Enterasys

PacketFence supports Enterasys switches *without VoIP* using two different trap types:

- linkUp/linkDown
- MAC Locking (Port Security with static MACs)

We recommend to enable MAC locking only.

Don't forget to update the startup config!

5.14.1. Matrix N3

linkUp/linkDown traps are enabled by default so we disable them and enable MAC locking only. Also, by default this switch doesn't do an electrical low-level linkDown when setting the port to admin down. So we need to activate a global option called `forcelinkdown` to enable this behavior. Without this option, clients don't understand that they lost their connection and they never do a new DHCP on VLAN change.

Global config settings

```
set snmp community public
set snmp targetparams v2cPF user public security-model v2c message-processing
v2c
set snmp notify entryPF tag TrapPF
set snmp targetaddr tr 192.168.1.5 param v2cPF taglist TrapPF
set maclock enable
set forcelinkdown enable
```

On each interface:

```
set port trap ge.1.xx disable
set maclock enable ge.1.xx
set maclock static ge.1.xx 1
set maclock firstarrival ge.1.xx 0
set maclock trap ge.1.xx enable
```

where `xx` stands for the interface index.

5.14.2. SecureStack C2

linkUp/linkDown traps are enabled by default so we disable them and enable MAC locking only.

Global config settings

```
set snmp community public
set snmp targetparams v2cPF user public security-model v2c message-processing
v2c
```

```
set snmp notify entryPF tag TrapPF
set snmp targetaddr tr 192.168.1.5 param v2cPF taglist TrapPF
set maclock enable
```

On each interface:

```
set port trap fe.1.xx disable
set maclock enable fe.1.xx
set maclock static fe.1.xx 1
set maclock firstarrival fe.1.xx 0
```

where xx stands for the interface index

5.14.3. SecureStack C3

This switch has the particular *feature* of allowing more than one untagged egress VLAN per port. This means that you must add all the VLAN created for PacketFence as untagged egress VLAN on the relevant interfaces. This is why there is a VLAN command on each interface below.

linkUp/linkDown traps are enabled by default so we disable them and enable MAC locking only.

Global config settings

```
set snmp community public
set snmp targetparams v2cPF user public security-model v2c message-processing
v2c
set snmp notify entryPF tag TrapPF
set snmp targetaddr tr 192.168.1.5 param v2cPF taglist TrapPF
set maclock enable
```

On each interface:

```
set vlan egress 1,2,3 ge.1.xx untagged
set port trap ge.1.xx disable
set maclock enable ge.1.xx
set maclock static ge.1.xx 1
set maclock firstarrival ge.1.xx 0
set maclock trap ge.1.xx enable
```

where xx stands for the interface index

5.14.4. Standalone D2

linkUp/linkDown traps are enabled by default so we disable them and enable MAC locking only.

CAUTION

This switch Switch accepts multiple untagged VLAN per port when configured through SNMP. This is problematic because on some occasions

> the untagged VLAN port list can become inconsistent with the switch's running config. To fix that, clear all untagged VLANs of a port even if the CLI interface doesn't show them. To do so, use: `clear vlan egress <vlans> <ports>`

Global config settings

```
set snmp community public
set snmp targetparams v2cPF user public security-model v2c message-processing
v2c
set snmp notify entryPF tag TrapPF
set snmp targetaddr tr 192.168.1.5 param v2cPF taglist TrapPF
set maclock enable
```

On each interface:

```
set port trap ge.1.xx disable
set maclock enable ge.1.xx
set maclock static ge.1.xx 1
set maclock firstarrival ge.1.xx 0
set maclock trap ge.1.xx enable
```

where `xx` stands for the interface index

5.15. Extreme Networks

PacketFence supports Extreme Networks switches using:

- linkUp/linkDown
- MAC Address Lockdown (Port Security)
- Netlogin - MAC Authentication
- Netlogin - 802.1X
- Netlogin - web authentication
- RADIUS authentication for CLI access

Don't forget to save the configuration!

5.15.1. All Extreme XOS based switches

In addition to the SNMP and VLANs settings, this switch needs the Web Services to be enabled and an administrative username and password provided in its PacketFence configuration for Web Services.

MAC Address Lockdown (Port-Security)

linkUp/linkDown traps are enabled by default so we disable them and enable MAC Address Lockdown only.

Global config settings without Voice over IP (VoIP):

```
enable snmp access
configure snmp add trapreceiver 192.168.1.5 community public
enable web http
configure vlan "Default" delete ports <portlist>
configure vlan registration add ports <portlist> untagged
configure ports <portlist> vlan registration lock-learning
disable snmp traps port-up-down ports <portlist>
```

where `<portlist>` are ports you want to secure. It can be an individual port or a port-range with a dash.

Global config settings with Voice over IP (VoIP):

```
enable snmp access
configure snmp add trapreceiver 192.168.1.5 community public
enable web http
configure vlan "Default" delete ports <portlist>
configure vlan registration add ports <portlist> untagged
configure vlan voice add ports <portlist> tagged
configure ports <portlist> vlan registration lock-learning
configure ports <portlist> vlan voice limit-learning 1
disable snmp traps port-up-down ports <portlist>
```

where `<portlist>` are ports you want to secure. It can be an individual port or a port-range with a dash.

CoA configuration

Starting from version EXOS 22.1 CoA is supported.

```
configure radius dynamic-authorization 1 server 192.168.1.5 client-ip 10.0.0.8
vr VR-Default shared-secret useStrongerSecret
enable radius dynamic-authorization
```

MAC Authentication

SNMP configuration

```
enable snmp access snmp-v1v2c
configure snmp add community readonly public
configure snmp add community readwrite private
```

AAA Configuration

```
configure radius netlogin primary server 192.168.1.5 1812 client-ip 10.0.0.8 vr
VR-Default
configure radius netlogin primary shared-secret useStrongerSecret
enable radius netlogin
```

Netlogin (MAC Authentication)

```
configure netlogin vlan temp
enable netlogin mac
configure netlogin add mac-list default
configure netlogin dynamic-vlan enable
configure netlogin dynamic-vlan uplink-ports 50
configure netlogin mac authentication database-order radius
enable netlogin ports 1-48 mac
configure netlogin ports 1-48 mode port-based-vlans
configure netlogin ports 1-48 no-restart
```

802.1X

SNMP configuration

```
enable snmp access snmp-v1v2c
configure snmp add community readonly public
configure snmp add community readwrite private
```

AAA Configuration

```
configure radius netlogin primary server 192.168.1.5 1812 client-ip 10.0.0.8 vr
VR-Default
configure radius netlogin primary shared-secret useStrongerSecret
enable radius netlogin
```

Netlogin (802.1X)

```
configure netlogin vlan temp
enable netlogin dot1x
configure netlogin dynamic-vlan enable
configure netlogin dynamic-vlan uplink-ports 50
enable netlogin ports 1-48 dot1x
configure netlogin ports 1-48 mode port-based-vlans
configure netlogin ports 1-48 no-restart
configure netlogin mac ports 1-48 timers reauth-period 86400 reauthentication
on
configure netlogin dot1x ports 1-48 timers server-timeout 10 reauth-period
```

```
84600
```

5.15.2. MAC Authentication + 802.1x

You can mix the MAC Authentication and 802.1X on the same switchport. If the device fails 802.1X authentication, it will fallback to the MAC Authentication. Configure the MAC Authentication and 802.1x like the section above and add this extra command:

```
enable netlogin ports 1-48 dot1x mac
```

Policy based access

You can assign policies defined on the switch via PacketFence.

First define your policy in the switch:

```
configure policy profile 1 name ”gaming” pvid-status ”enable” pvid 3521
untagged-vlans 3521
configure policy profile 2 name ”guest” pvid-status ”enable” pvid 3522
untagged-vlans 3522
configure policy maptable response both
configure policy vlanauthorization enable
```

Next, in PacketFence, enable 'Role by Switch Role' in your switch configuration and assign the policies to the roles there. They will be returned inside the Filter-Id attribute.

Make sure you use the 'Extreme EXOS' type for your switch to use this feature.

Web authentication

SNMP configuration

```
enable snmp access snmp-v1v2c
configure snmp add community readonly public
configure snmp add community readwrite private
```

AAA Configuration

```
configure radius netlogin primary server 192.168.1.5 1812 client-ip 10.0.0.8 vr
VR-Default
configure radius netlogin primary shared-secret useStrongerSecret
enable radius netlogin
```

Web-auth profile

```
configure dns-client add name-server 8.8.8.8 vr VR-Mgmt
configure dns-client add domain-suffix example.com
configure policy captive-portal web-redirect 1 server 1 url
http://192.168.1.5:80/Extreme::EXOS enable
configure policy profile 4 name ”Unregistered” pvid-status ”enable” pvid 0 web-
redirect 1
configure policy rule 4 ipdestsocket 192.168.1.5 mask 32 forward
configure policy rule 4 udpdestportIP 53 mask 16 forward
configure policy rule 4 udpdestportIP 67 mask 16 forward
configure policy rule 4 ether 0x0806 mask 16 forward
configure policy captive-portal listening 80
configure policy captive-portal listening 443
```

Next, in the switch configuration in PacketFence, enable 'External Portal Enforcement' and 'Role by Switch Role'. Under the 'registration' role, put 'Unregistered'

Make sure you use the 'Extreme EXOS' type for your switch to use this feature.

RADIUS authentication for CLI access

Configure RADIUS server IP address as primary server and the switch IP address as the client-ip. Be sure to specify the correct virtual router

```
configure radius mgmt-access primary server <SERVER_IP> 1815 client-ip
<CLIENT_IP> vr <VR>
```

Configure the RADIUS shared-secret

```
configure radius mgmt-access primary shared-secret <SHARED_SECRET>
```

Enable RADIUS for management access

```
enable radius mgmt-access
```

5.16. Foundry

5.16.1. FastIron 4802

PacketFence support this switch with optional VoIP using two different trap types:

- linkUp/linkDown
- Port Security (with static MACs)

We recommend to enable Port Security only.

Don’t forget to update the startup config!

Those switches support port-security with static MAC address and allow us to secure a MAC on the data VLAN so we enable it whether there is VoIP or not.

We need to secure bogus MAC addresses on ports in order for the switch to send a trap when a new MAC appears on a port.

Global config settings

```
snmp-server host 192.168.1.5 public
no snmp-server enable traps link-down
no snmp-server enable traps link-up
```

On each interface *without VoIP*:

```
int eth xx
  port security
    enable
    maximum 1
    secure 0200.0000.00xx 0
    violation restrict
```

where `xx` stands for the interface `ifIndex`.

With VoIP a little more work needs to be performed. Instead of the no-VoIP, put in the following config:

```
conf t
vlan <mac-detection-vlan>
  untagged eth xx
vlan <voice-vlan>
  tagged eth xx

int eth xx
  dual-mode <mac-detection-vlan>
  port security
    maximum 2
    secure 0200.00xx.xxxx <mac-detection-vlan>
    secure 0200.01xx.xxxx <voice-vlan>
    violation restrict
    enable
```

where `xxxxxx` stands for the interface number (filled with zeros), `<voice-vlan>` with your voice-VLAN number and `<mac-detection-vlan>` with your mac-detection VLAN number.

5.17. H3C

5.17.1. Comware v5

This switch version module is built for H3C switch series S5120 using Comware versions v5.

Note: "Comware v5" module is developed for the H3C S5120 Series switches using Comware v5 and also this module inherits all its capabilities from the old "S5120" module.

5.17.2. S5120 (Comware v5) Switch series

PacketFence supports these switches with the following technologies:

- 802.1X (with or without VoIP)
- 802.1X with MAC Authentication fallback (with or without VoIP)
- MAC Authentication (with or without VoIP)

802.1X

RADIUS scheme creation:

```
radius scheme packetfence
primary authentication 192.168.1.5 1812 key useStrongerSecret
primary accounting 192.168.1.5 1813 key useStrongerSecret
user-name-format without-domain
```

ISP-Domain creation:

```
domain packetfence
authentication default radius-scheme packetfence
authentication lan-access radius-scheme packetfence
authorization lan-access radius-scheme packetfence
```

SNMP settings:

```
snmp-agent
snmp-agent community read public
snmp-agent community write private
snmp-agent sys-info version v2c
```

Global configuration:

```
port-security enable
dot1x authentication-method eap
```

Global configuration (with VoIP):

Add the following to the previous global configuration.

```
undo voice vlan security enable
lldp compliance cdp
```

Interfaces configuration:

```
port link-type hybrid
port hybrid vlan 5 untagged
port hybrid pvid vlan 5
mac-vlan enable
stp edged-port enable
port-security max-mac-count 1
port-security port-mode userlogin-secure
port-security intrusion-mode blockmac
dot1x re-authenticate
dot1x max-user 1
dot1x guest-vlan 5
undo dot1x handshake
dot1x mandatory-domain packetfence
undo dot1x multicast-trigger
```

Interfaces configuration (with VoIP):

Add the following to the previous interfaces configuration.

```
port hybrid vlan 100 tagged
undo voice vlan mode auto
voice vlan 100 enable
lldp compliance admin-status cdp txrx
port-security max-mac-count 3
dot1x max-user 2
```

802.1X with MAC Authentication fallback

Since using MAC Authentication as a fallback of 802.1X, use the previous 802.1X configuration and add the followings.

This configuration is the same with or without VoIP.

Global configuration:

```
mac-authentication domain packetfence
```

Interfaces configuration:

```
mac-authentication guest-vlan 5
port-security port-mode userlogin-secure-or-mac
```

MAC Authentication

RADIUS scheme creation:

```
radius scheme packetfence
primary authentication 192.168.1.5 1812 key useStrongerSecret
primary accounting 192.168.1.5 1813 key useStrongerSecret
user-name-format without-domain
```

ISP-Domain creation:

```
domain packetfence
authentication default radius-scheme packetfence
authentication lan-access radius-scheme packetfence
authorization lan-access radius-scheme packetfence
```

SNMP settings:

```
snmp-agent
snmp-agent community read public
snmp-agent community write private
snmp-agent sys-info version v2c
```

Global configuration:

```
port-security enable
mac-authentication domain packetfence
```

Global configuration (with VoIP):

Add the following to the previous global configuration.

```
undo voice vlan security enable
lldp compliance cdp
```

Interfaces configuration:

```
port link-type hybrid
port hybrid vlan 5 untagged
port hybrid pvid vlan 5
mac-vlan enable
stp edged-port enable
mac-authentication guest-vlan 5
port-security max-mac-count 1
port-security port-mode mac-authentication
port-security intrusion-mode blockmac
```

Interfaces configuration (with VoIP):

Add the following to the previous interfaces configuration.

```
port hybrid vlan 100 tagged
undo voice vlan mode auto
voice vlan 100 enable
lldp compliance admin-status cdp txrx
port-security max-mac-count 3
```

5.18. HP

5.18.1. HPE 1910 Serie

The HP 1910 Serie is based on the 3Com OS and most of the configuration will be done from the GUI.

VLAN creation: * go to **Network**, **VLAN**, * click on the *Create* tab * create the VLANs

Configure PacketFence as a RADIUS server: * go to **Authentication**, **RADIUS** * click on the *RADIUS Server* tab * from *Server Type*, select **Authentication Server** * from *Primary Server*, give the **PacketFence IP address** * click **Apply**

Then: * click on the *RADIUS Setup* tab * check the box *Authentication Server Shared Key* * give the **shared key** * from *Username Format*, select **without-domain** * click **Apply**

Create a new authentication domain: * go to **Authentication**, **AAA**, * click on the *Domain Setup* tab,

WARNING	We will need to create a specific authentication domain and **not making it as the default domain**.

Configure the 802.1X and authentication method: * go to **Authentication** * click on the *802.1X* tab * check the *Enable 802.1X* box * from *Authentication Method*, select **EAP**

Configure the authentication domain:

INFO: Even limited, there is a command line access.

- connect to the switch using ss,
- type the command:

```
_cmdline-mode on
```

- password is: **512900**
- Type the commands:

```
System-view
Mac-authentication domain YOUR_DOMAIN_NAME
Mac-authentication user-name-format mac-address with-hyphen
```

- change the *YOUR_DOMAIN_NAME* with the one from your environment
- do not close your terminal, we will come back to this later
- from the GUI, go to **Authentication**, **802.1X**
- from *Port*, select the port your are connected to. **GigabitEthernet X/X/X**
- from *Port Control*, select **MAC Based**
- from *Max Number of Users*, give **2**
- check the box *Enable Re-Authentication*
- click on **Apply**

Enable the MAC Authentication in SSH, as well:

- back on the SSH terminal
- type the following command:

```
Mac-authentication interface gX/X/X
```

- modify the interface name for your environment

The configuration is done.

5.18.2. E4800G and E5500G Switch series

These are re-branded 3Com switches, see under the 3Com section for their documentation.

5.19. HP ProCurve

PacketFence supports ProCurve switches *without VoIP* using two different trap types:

- linkUp/linkDown
- Port Security (with static MACs)

We recommend to enable Port Security only.

Don't forget to update the startup config!

NOTE HP ProCurve only sends one security trap to PacketFence per security violation so make sure PacketFence runs when you configure port-security. Also, because of the above limitation, it is considered good practice to reset the intrusion flag as a first troubleshooting step.

If you want to learn more about intrusion flag and port-security, please refer to the ProCurve documentation.

CAUTION

If you configure a switch that is already in production be careful that enabling port-security causes active MAC addresses to be automatically added to the intrusion list without a security trap sent to PacketFence. This is undesired because PacketFence will not be notified that it needs to configure the port. As a work-around, unplug clients before activating port-security or remove the intrusion flag after you enabled port-security with: `port-security <port> clear-intrusion-flag`.

5.19.1. ArubaOS Switch 16.x (ProCurve)

These switch modules are built for ProCurve switch series 2500,2600,2920 and 5400 using ArubaOS-Switch versions earlier than and including AOS-Switch v16.11.xx.

5.19.2. Procurve

Note: The "Procurve" module is developed for the ProCurve 2500 Series switches using AOS Switch version 16.x and also this module inherits all its capabilities from the old "ProCurve 25 00 Series" module.

Port-Security

linkUp/linkDown traps are enabled by default so we disable them and enable Port Security only.

On Procurve, we need to secure bogus MAC addresses on ports in order for the switch to send a trap when a new MAC appears on a port.

Global config settings:

```
snmp-server community "public" Unrestricted
snmp-server host 192.168.1.5 "public" Not-INFO
no snmp-server enable traps link-change 1-26
```

On each interface:

```
port-security xx learn-mode static action send-alarm mac-address 0200000000xx
```

where `xx` stands for the interface index

CLI authentication

You can use PacketFence for RADIUS CLI authentication on the Procurve (2500 Series).

Global config settings

```
radius-server host 192.168.1.5 key useStrongerSecret
aaa authentication ssh login radius local
aaa authentication telnet login radius local
```

Next, make sure you configure the switch in PacketFence accordingly as well as the proper administrative access. Refer to the Administration Guide for more details.

5.19.3. 2600 and 3400cl Series

#Note: "Procurve_2600" module is developed for the ProCurve 2600 Series switches using AOS Switch version 16.x and also this module inherits all its capabilities from the old "ProCurve 2600 Series" module.

Port-Security

linkUp/linkDown traps are enabled by default so we disable them and enable Port Security only.

On 2600 (AOS Switch v16.x), we **don't** need to secure bogus MAC addresses on ports in order for the switch to send a trap when a new MAC appears on a port.

Global config settings

```
snmp-server community public manager unrestricted
snmp-server host 192.168.1.5 "public" Not-INFO
no snmp-server enable traps link-change 1-26
```

On each interface:

```
port-security xx learn-mode configured action send-alarm
```

where `xx` stands for the interface index

MAC Authentication (Firmware > 11.72)

In order to enable RADIUS mac authentication on the ports, you first need to join the ports to either the registration or the mac detection vlan (as a security measure).

Next, define the RADIUS server host:

```
radius-server host 192.168.1.5 key useStrongerSecret
```

Next, we create a server-group that points to the PacketFence server,

```
aaa server-group radius "packetfence" host 192.168.1.5
```

Configure the AAA authentication for MAC authentication to use the right server-group:

```
aaa authentication mac-based chap-radius server-group "packetfence"
```

Optionally, you can configure the SSH and telnet authentication to point to PacketFence (make sure you also follow instructions in the Administration Guide to activate the CLI access):

```
aaa authentication login privilege-mode
```

```
aaa authentication ssh login radius server-group packetfence local
aaa authentication telnet login radius server-group packetfence local
```

Finally, enable MAC authentication on all necessary ports:

```
aaa port-access mac-based 1-24
```

Don’t forget to permit address moves and the reauth period. x represents the port index:

```
aaa port-access mac-based x addr-moves
aaa port-access mac-based x reauth-period 14400
```

(Thanks to Jean-Francois Laporte for this contribution)

5.19.4. 2610 Switches

802.1X

Define the RADIUS server host:

```
radius-server host 192.168.1.5 key "useStrongerSecret"
radius-server host 192.168.1.5 acct-port 1813 key "useStrongerSecret"
```

Define the SNMP configuration:

```
snmp-server host 192.168.1.5 community "public" informs trap-level not-info
no snmp-server enable traps link-change C1
```

Configure the server-group:

```
aaa server-group radius "packetfence" host 192.168.1.5
```

Configure authentication:

```
aaa authentication port-access eap-radius server-group "packetfence"
aaa authentication mac-based chap-radius server-group "packetfence"
```

Configure the port-security:

```
port-security C1 learn-mode port-access action send-alarm
```

Configuration of the port:

```
aaa port-access authenticator C1
aaa port-access authenticator C1 client-limit 1
aaa port-access authenticator active
aaa port-access mac-based C1
aaa port-access mac-based C1 addr-moves
aaa port-access mac-based C1 reauth-period 14400
aaa port-access C1 controlled-direction in
```

(Thanks to Denis Bonnenfant for this contribution)

5.19.5. 4100, 5300, 5400 (ArubaOS Switch 16.x) Series

Note: The "ArubaOS Switch 16.x" module is developed for the ProCurve 5400 Series switches using AOS Switch version 16.x and also this module inherits all its capabilities from the old "ProCurve 5400 Series" module.

Port-Security

linkUp/linkDown traps are enabled by default and we have not found a way yet to disable them so do not forget to declare the trunk ports as uplinks in the switch config file.

On 4100's, we need to secure bogus MAC addresses on ports in order for the switch to send a trap when a new MAC appears on a port. The ports are indexed differently on 4100's: it's based on the number of modules you have in your 4100, each module is indexed with a letter.

Global config settings

```
snmp-server community "public" Unrestricted
snmp-server host 192.168.1.5 "public" Not-INFO
no snmp-server enable traps link-change 1-26
```

You should configure interfaces like this:

```
port-security A1 learn-mode static action send-alarm mac-address 020000000001
...
port-security A24 learn-mode static action send-alarm mac-address 020000000024
port-security B1 learn-mode static action send-alarm mac-address 020000000025
```

```
...
port-security B24 learn-mode static action send-alarm mac-address 020000000048
port-security C1 learn-mode static action send-alarm mac-address 020000000049
...
```

MAC Authentication (with VoIP)

In order to have MAC Authentication working with VoIP, you need to ensure that the Voice VLAN is tagged on all the port first. You also need to activate lldp notification on all ports that will handle VoIP. **Finally, make sure to change the value of the $VOICEVLANAME variable in the ArubaOS Switch 16.x (old Procurve 5400) module's source code.**

RADIUS configuration radius-server host 192.168.1.5 key strongKey

MAC Authentication

```
aaa port-access mac-based C5-C7
aaa port-access mac-based C5 addr-limit 2
aaa port-access mac-based C6 addr-limit 2
aaa port-access mac-based C7 addr-limit 2
aaa port-access C5 controlled-direction in
aaa port-access C6 controlled-direction in
aaa port-access C7 controlled-direction in
```

802.1X (with VoIP)

Same as MAC Authentication, you need to ensure that the Voice VLAN is tagged on all the port first if using 802.1X. You also need to activate lldp notification on all ports that will handle VoIP. **Finally, make sure to change the value of the $VOICEVLANAME variable in the ArubaOS Switch 16.x (old Procurve 5400) module's source code.**

RADIUS configuration

```
radius-server host 192.168.1.5 key strongKey
```

802.1X

```
aaa authentication port-access eap-radius
aaa port-access authenticator C3-C4
aaa port-access authenticator C3 client-limit 3
aaa port-access authenticator C4 client-limit 3
aaa port-access authenticator active
```

Downloadable ACLs

HP and Aruba switches running the ArubaOS-Switch operating system (previously called ProVision) support dynamic RADIUS-assigned ACLs. It requires RADIUS authentication using the

802.1X, Web authentication or MAC authentication available on the switch. You can define ACLs in PacketFence so that they can be automatically applied on the ports of the switches based on the role assigned. We have tested it successfully on the Aruba 2930M and 3810 series on version 16.05.0004.

To use this feature, first configure RADIUS and the authentication method on your switch. Next, in the PacketFence web admin interface, go to *Configuration → Policies and Access Control → Switches*. Click on the switch you want, then on the 'Roles' tab, and check 'Role by access list'. Now you are able to add ACLs for each role.

Configure RADIUS operation on the switch:

```
radius-server host <ipv4-address> key <key-string>
```

Configure RADIUS network accounting on the switch (optional).

```
aaa accounting network <start-stop|stop-only> radius
```

You can also view ACL counter hits using either of the following commands:

```
show access-list radius <port-list>
show port-access <authenticator|mac-based|web-based> <port-list> clients
detailed
```

Configure an authentication method. Options include 802.1X, web-based authentication, and MAC authentication. You can configure 802.1X, web-based authentication, and/or MAC authentication to operate simultaneously on the same ports.

- 802.1X Option:

  ```
  aaa port-access authenticator <port-list>
  aaa authentication port-access chap-radius
  aaa port-access authenticator active
  ```

- MAC Authentication Option:

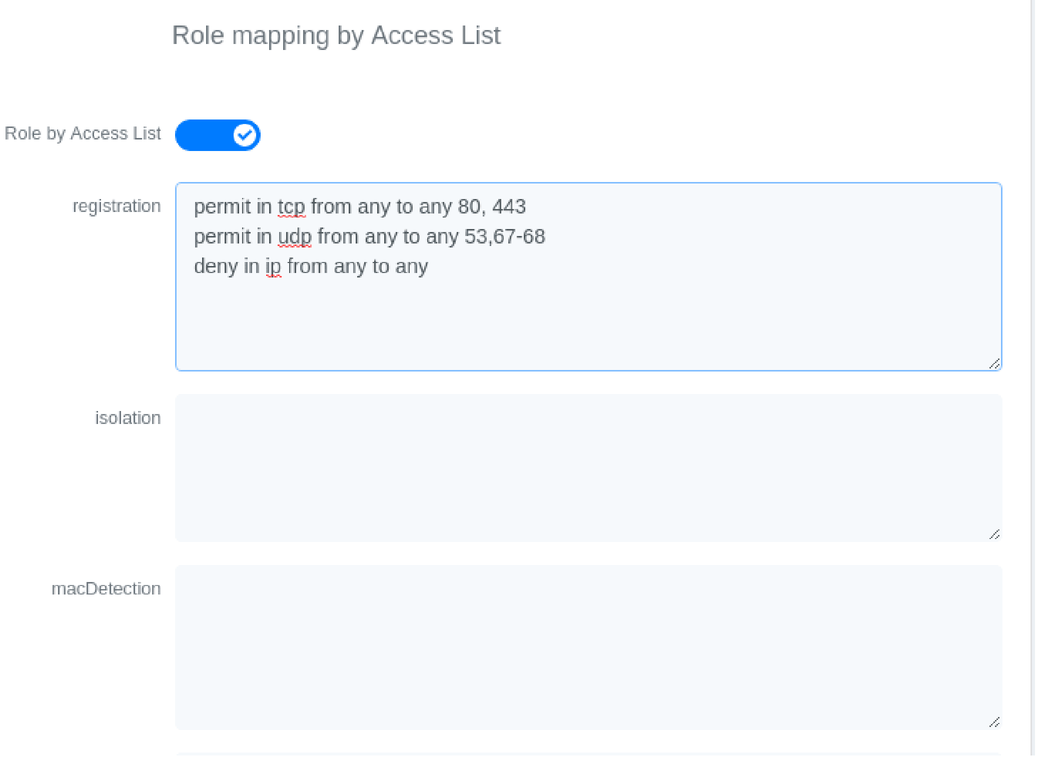
  ```
  aaa port-access mac-based <port-list>
  ```

- Web Authentication Option:

  ```
  aaa port-access web-based <port-list>
  ```

This command configures web-based authentication on the switch and activates this feature on the specified ports.

For example, if you want the users that are in the registration VLAN to only use HTTP, HTTPS, DNS and DHCP you can configure this ACL in the registration role.



Role by Access List ☑

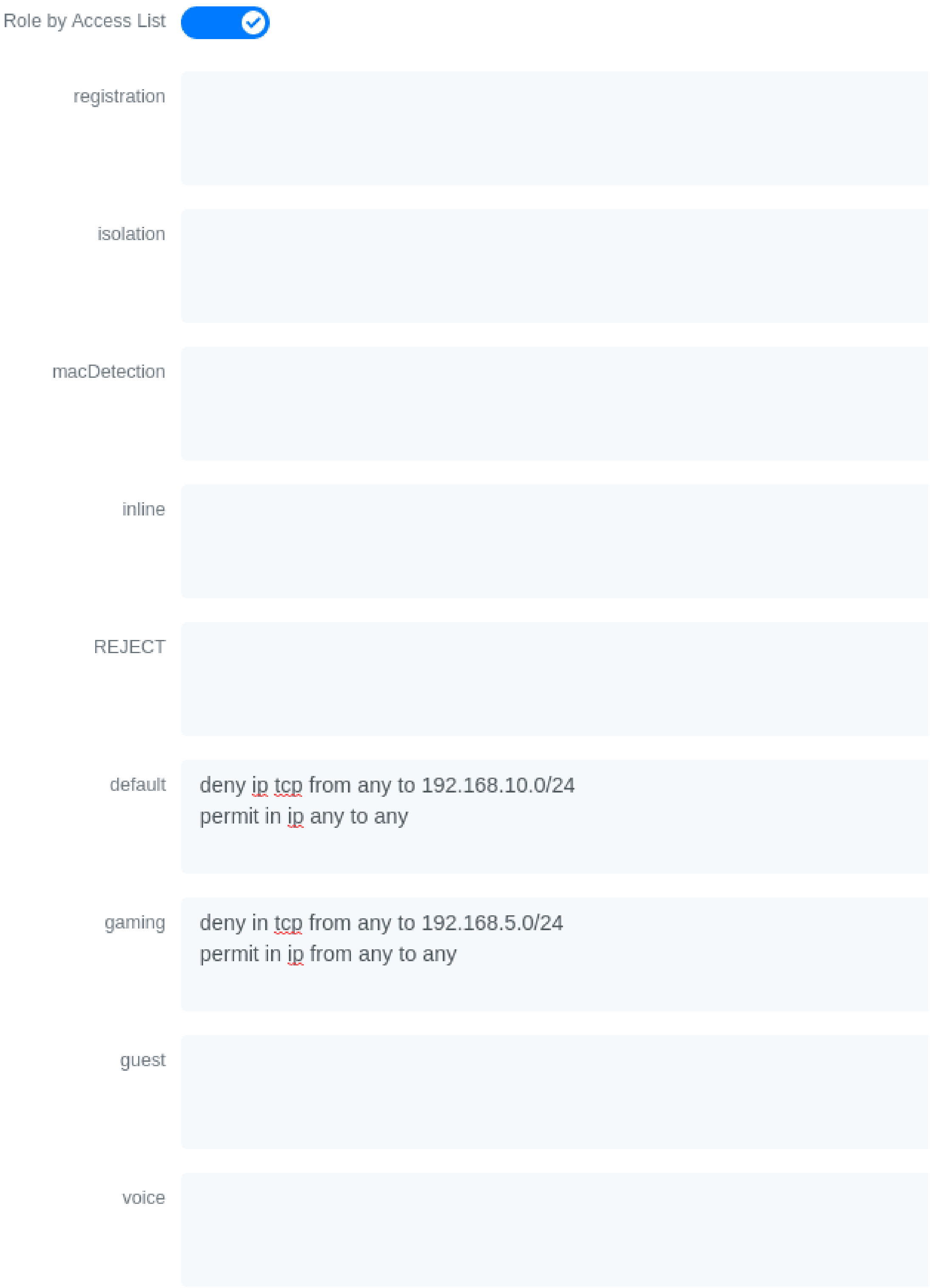
registration

```
permit in tcp from any to any 80, 443
permit in udp from any to any 53,67-68
deny in ip from any to any
```

Now, your normal users are placed in the 'default' role and your guests in the 'guest' role.

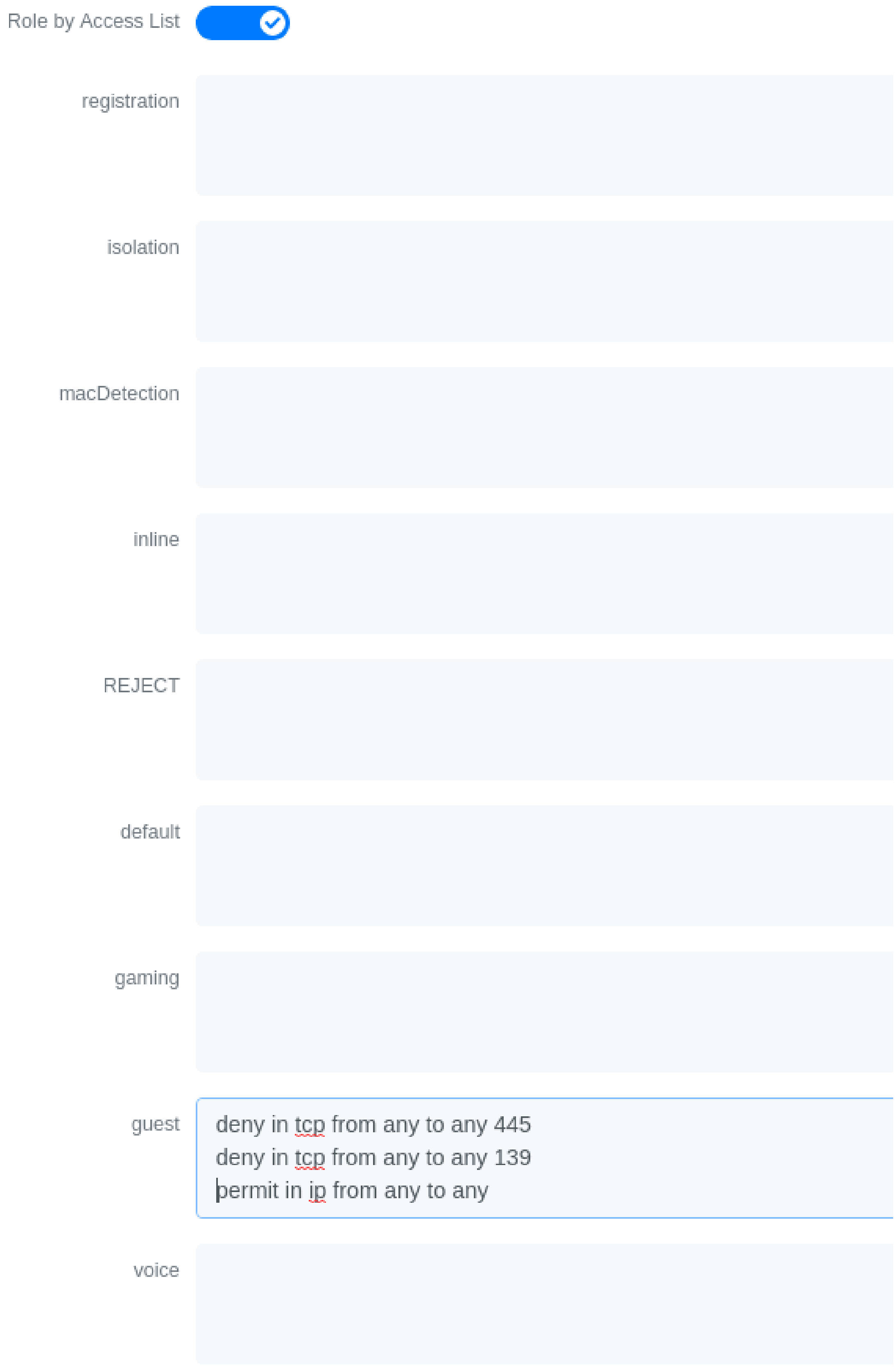
The 'default' role uses the network 192.168.5.0/24 and 'guest' uses the network 192.168.10.0/24.

You can prevent communications between both networks using these access lists



Role by Access List	☑
registration	
isolation	
macDetection	
inline	
REJECT	
default	deny ip tcp from any to 192.168.10.0/24 permit in ip any to any
gaming	deny in tcp from any to 192.168.5.0/24 permit in ip from any to any
guest	
voice	

You could also only prevent your guest users from using shared directories



Role by Access List ☑

registration

isolation

macDetection

inline

REJECT

default

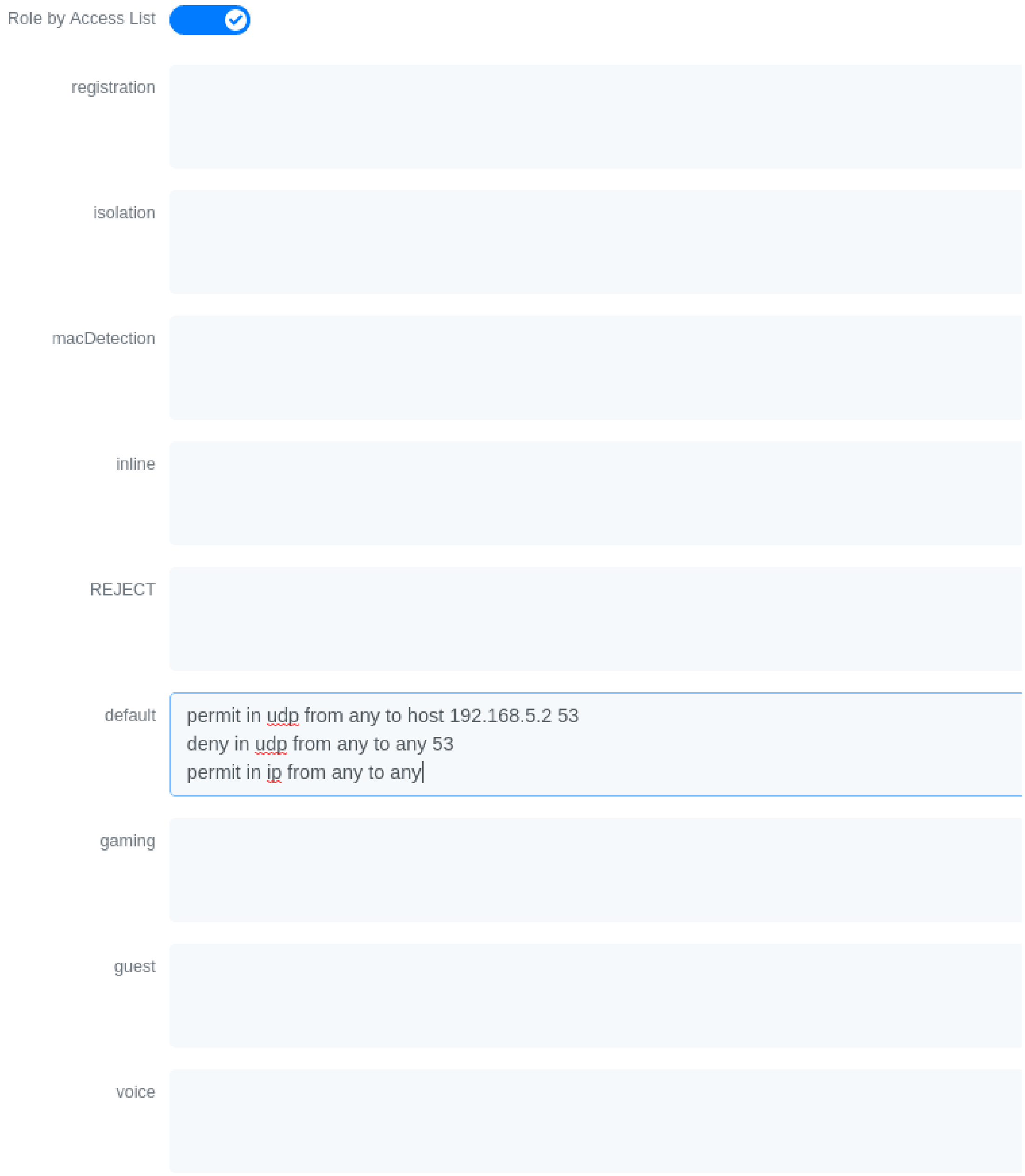
gaming

guest

```
deny in tcp from any to any 445
deny in tcp from any to any 139
permit in ip from any to any
```

voice

You could also restrict your users to use only your DNS server where 192.168.5.2 is your DNS server



```
permit in udp from any to host 192.168.5.2 53
deny in udp from any to any 53
permit in ip from any to any
```

5.20. Huawei

PacketFence supports the S5710/S5720/S5735 switch from Huawei.

5.20.1. Global configuration

Global configuration for 802.1X, Mac authentication, accounting and CLI login:

```
undo authentication unified-mode

radius-server template packetfence
 radius-server shared-key cipher <yourSecret>
 radius-server authentication 192.168.1.5 1812
 radius-server accounting 192.168.1.5 1813
 radius-server retransmit 2

# used for RADIUS Disconnect messages
radius-server authorization 192.168.1.5 shared-key cipher <yourSecret>

# to accept RADIUS Disconnect messages with MAC in AA-BB-CC-DD-FF-EE format
radius-server authorization calling-station-id decode-mac-format ascii hyphen-split common

aaa
 authentication-scheme pf-auth
  authentication-mode radius
 accounting-scheme pf-acct
  accounting-mode radius
 # for CLI authentication
 service-scheme pf-cli
 domain pf
  authentication-scheme pf-auth
  accounting-scheme pf-acct
  service-scheme pf-cli
  radius-server packetfence

# set default common domain used for authentication
domain pf
# if you want CLI login
# domain pf admin

dot1x enable
mac-authen
dot1x timer reauthenticate-period 10800
mac-authen timer reauthenticate-period 10800
dot1x dhcp-trigger

snmp-agent
snmp-agent local-engineid 800007DB0304F9389D2360
snmp-agent community read cipher <privateKey>
snmp-agent community write cipher <privateKey>
snmp-agent sys-info version v2c v3
```

5.20.2. SNMPv3

```
snmp-agent group v3 MYGROUP privacy read-view SNMP write-view SNMP
snmp-agent usm-user v3 MYUSER
snmp-agent usm-user v3 MYUSER group MYGROUP
snmp-agent usm-user v3 MYUSER authentication-mode md5 cipher SECRET1
snmp-agent usm-user v3 MYUSER privacy-mode aes128 cipher SECRET2
```

5.20.3. MAC authentication

```
interface GigabitEthernet0/0/8
 dot1x mac-bypass mac-auth-first
 dot1x mac-bypass
 dot1x max-user 1
 dot1x reauthenticate
 dot1x authentication-method eap
```

5.20.4. 802.1X with MAC Auth bypass

```
interface GigabitEthernet0/0/8
 port link-type hybrid
 dot1x mac-bypass
 dot1x max-user 1
 dot1x reauthenticate
 dot1x authentication-method eap
```

5.20.5. Voice port

Configuration of a switchport where a phone is plugged:

```
interface GigabitEthernet0/0/2
 port link-type hybrid
 voice-vlan 100 enable
 port hybrid tagged vlan 100
 mac-authen
```

5.20.6. Troubleshooting commands

```
display aaa configuration
display dot1x
display access-user
display radius-server
```

```
test-aaa user password radius-template packetfence pap
```

5.21. IBM

5.21.1. RackSwitch G8052

PacketFence supports only 802.1X authentication. It has been tested on version 7.9.11.0.

RADIUS configuration

```
RS G8052(config)# radius-server primary-host 192.168.1.5
RS G8052(config)# radius-server enable
RS G8052(config)# radius-server primary-host 192.168.1.5 key useStrongerSecret
```

802.1X (dot1x) configuration

```
RS G8052(config)# dot1x enable
```

SNMP configuration

```
RS G8052(config)# snmp-server read-community packetfence
RS G8052(config)# snmp-server write-community packetfence
```

Port configuration

```
RS G8052(config)# configure terminal
RS G8052(config)# interface port 1
RS G8052(config-if)# dot1x mode auto
RS G8052(config-if)# dot1x quiet-time 2
RS G8052(config-if)# dot1x server-timeout 3
RS G8052(config-if)# dot1x re-authenticate
RS G8052(config-if)# dot1x re-authentication-interval 10800
RS G8052(config-if)# dot1x vlan-assign
RS G8052(config-if)# end
```

PacketFence configuration

In order to configure the IBM RackSwitch G8052 switch module, go in the PacketFence administration interface under **Configuration→Switches→Add switch**

Definition:

```
IP: This will be the IP of the IBM StackSwitch G8052 switch on the management
```

```
network
Description: IBM StackSwitch G8052
Type: IBM RackSwitch G8052
Mode: Production
Deauthentication: SNMP
Dynamic Uplinks: Checked
```

Roles:

```
Role by VLAN ID: checked
registration VLAN: 2
isolation VLAN: 3
default: 10
```

Radius:

```
Secret Passphrase: useStrongerSecret
```

Snmp:

```
SNMP Version: 2c
SNMP Read Community: packetfence
SNMP Write Community: packetfence
```

Click Save to add the switch

5.22. Intel

5.22.1. Express 460 and Express 530

PacketFence support these switches *without VoIP* using one trap type:

- linkUp/linkDown

Exact command-line configuration to be contributed…

5.23. Juniper

PacketFence supports Juniper switches in MAC Authentication (Juniper's MAC RADIUS) mode and 802.1X. PacketFence supports VoIP on the EX2200 (JUNOS 12.6) and EX4200 (JUNOS 13.2)

```
# load replace terminal
[Type ^D at a new line to end input]
interfaces {
    interface-range access-ports {
        member-range ge-0/0/1 to ge-0/0/46;
        unit 0 {
            family ethernet-switching {
                port-mode access;
            }
        }
    }
}

protocols {
    dot1x {
        authenticator {
            authentication-profile-name packetfence;
            interface {
                access-ports {
                    supplicant multiple;
                    mac-radius;
                }
            }
        }
    }
}

access {
    radius-server {
        192.168.1.5 {
            port 1812;
            secret "useStrongerSecret";
        }
    }

    profile packetfence {
        authentication-order radius;
        radius {
            authentication-server 192.168.1.5;
            accounting-server 192.168.1.5;
        }
        accounting {
            order radius;
            accounting-stop-on-failure;
            accounting-stop-on-access-deny;
        }
    }
}

ethernet-switching-options {
    secure-access-port {
        interface access-ports {
            mac-limit 1 action drop;
        }
    }
}

snmp {
    name "EX 4200";
    description juniper;
    location EX;
    contact "email@example.com";
    client-list list0 {
        192.168.1.5/32;
    }
    community public {
        authorization read-only;
        client-list-name list0;
    }
    community private {
        authorization read-write;
        client-list-name list0;
    }
}

Ctrl-D
# commit comment "packetfenced"
```

Change the `interface-range` statement to reflect the ports you want to secure with PacketFence.

5.23.1. VoIP configuration

```
# load replace terminal
[Type ^D at a new line to end input]
protocols{
    lldp {
        advertisement-interval 5;
        transmit-delay 1;
        ptopo-configuration-trap-interval 1;
        lldp-configuration-notification-interval 1;
        interface all;
    }
    lldp-med {
        interface all;
    }
}
```

```
ethernet-switching-options {
    secure-access-port {
        interface access-ports {
            mac-limit 2 action drop;
        }
    }
    voip {
        interface access-ports {
            vlan voice;
            forwarding-class voice;
        }
    }
   }
}

vlans {
    voice {
        vlan-id 3;
    }
}

Ctrl-D
# commit comment ”packetfenced VoIP”
```

5.23.2. 802.1X configuration

```
protocols {
    dot1x {
        authenticator {
            authentication-profile-name packetfence;
            interface {
                access-ports {
                    supplicant multiple;
                    mac-radius;
                }
            }
        }
    }
}
Ctrl-D
# commit comment ”packetfenced dot1x”
```

5.23.3. MAC Authentication configuration

```
protocols {
    dot1x {
        authenticator {
            authentication-profile-name packetfence;
            interface {
                access-ports {
                    supplicant multiple;
                    mac-radius {
                        restrict;
                    }
                }
            }
        }
    }
}
Ctrl-D
# commit comment ”packetfenced mac auth”
```

5.23.4. Configuration for MAC authentication floating devices

To support floating devices on a Juniper switch you need to configure the 'flap-on-disconnect' option on each interface individually and remove it from the access-ports group.

```
# load replace terminal
[Type ^D at a new line to end input]
protocols {
    dot1x {
        authenticator {
            authentication-profile-name packetfence;
            interface {
                ge-0/0/1.0 {
                    mac-radius{
                        flap-on-disconnect;
                    }
                }
                 ge-0/0/2.0 {
                    mac-radius{
                        flap-on-disconnect;
                    }
                }
                .....

                access-ports {
                    supplicant multiple;
                    mac-radius {
                        restrict;
                    }
                }
            }
        }
    }
}
Ctrl-D
# commit comment ”configured for floating devices”
```

NOTE

`flap-on-disconnect` option takes effect only when the `restrict` option is also set.

5.23.5. Radius CLI login

```
set system authentication-order [ radius password ]

set system radius-server 192.168.1.5 secret useStrongerSecret

set system login user RO class read-only

set system login user SU class super-user
```

5.24. LG-Ericsson

PacketFence supports iPECS series switches *without VoIP* using two different trap types:

- linkUp / linkDown
- Port Security (with static MACs)

On some recent models, we can also use more secure and robust features, like:

- MAC Authentication
- 802.1X

5.24.1. ES-4500G Series

LinkUp / LinkDown

Firmware 1.2.3.2 is required for linkUp / linkDown

Prior to config, make sure to create all necessaries VLANs and config the appropriate uplink port.

Global config settings

```
snmp-server community public ro
snmp-server community private rw
!
snmp-server enable traps authentication
snmp-server host 192.168.1.5 public version 2c udp-port 162
```

```
snmp-server notify-filter traphost.192.168.1.5.public remote 192.168.1.5
```

Firmware is kinda buggy so you'll need to enable linkUp / linkDown using the Web Interface under Administration → SNMP.

Some reports shows that the switch doesn't always send linkDown traps.

On each interface (except uplink)

```
switchport allowed vlan add 4 untagged
switchport native vlan 4
switchport allowed vlan remove 1
switchport mode access
```

Port-Security

Firmware 1.2.3.2 is required for port-security.

Prior to config, make sure to create all necessaries VLANs and config the appropriate uplink port.

Global config settings

```
snmp-server community public ro
snmp-server community private rw
!
snmp-server enable traps authentication
snmp-server host 192.168.1.5 public version 2c udp-port 162
snmp-server notify-filter traphost.192.168.1.5.public remote 192.168.1.5
```

On each interface (except uplink)

```
port security max-mac-count 1
port security
port security action trap
switchport allowed vlan add 2 untagged
switchport native vlan 2
switchport allowed vlan remove 1
switchport mode access
```

The above *port security* command may not work using the CLI. In this case, use the Web Interface under the *Security* → *Port Security* menu and enable each ports using the checkboxes.

It is also recommended, when using port-security, to disable link-change (UP / DOWN) traps.

Don't forget to update the startup config!

5.25. Linksys

PacketFence supports Linksys switches *without VoIP* using one trap type:

- linkUp/linkDown

Don’t forget to update the startup config!

5.25.1. SRW224G4

Global config settings

```
no snmp-server trap authentication
snmp-server community CS_2000_le rw view Default
snmp-server community CS_2000_ls ro view Default
snmp-server host 192.168.1.5 public 2
```

On each interface

```
switchport access vlan 4
```

5.26. Netgear

The "web-managed smart switch" models GS108Tv2/GS110/GS110TP are supported with Link up/down traps only.

Higher-end "fully managed" switches including FSM726v1 are supported in Port Security mode.

5.26.1. FSM726 / FSM726S version 1

PacketFence supports FSM726 / FSM726S version 1 switches *without VoIP* in Port Security mode (with static MACs) – called Trusted MAC table on Netgear’s hardware.

Using the HTTP GUI, follow the steps below to configure such feature. Of course, you must create all your VLANs on the switch as well.

SNMP Settings

In *Advanced* → *SNMP* → *Community Table*, create a read-write community string and a trap community string. You can use the same community for all the 3 functions (Get, Set, Trap).

Next, under *Advanced* → *SNMP* → *Host Table*, enable the Host Authorization feature and add the PacketFence server into the allowed host list.

Finally, under *Advanced* → *SNMP* → *Trap Setting*, enable the authentication trap.

Trusted MAC Security

Under *Advanced* → *Advanced Security* → *Trusted MAC Address*, create a fake MAC address per port (ie. 02:00:00:00:00:xx where `xx` is the port number). This will have the effect of sending a security trap to PacketFence when a new device plugs on the port.

Don’t forget to save the configuration!

5.26.2. GS108Tv2 / GS110T / GS110TP

PacketFence supports certain lower-end Netgear switches in Link Up/Link Down traps. These "web-managed" switches have no command-line interface and only a subset of the port security and 802.1X functionality needed to interoperate with PacketFence in these more advanced modes. There is no way to send a trap upon port security violation, and there is only pure 802.1X, no MAC Address Bypass.

Switch Configuration

It can be difficult to find the advanced features in the web GUI. We recommend using the GUI "Maintenance" tab to Upload the configuration to a file, and then edit it there.

Hints on file upload/download:

From the File Type menu, choose Text Configuration.

If you’re uploading to the TFTP root directory, leave Path blank.

At the top of the config file, you need:

```
vlan database
vlan 1,2,3,4,5
vlan name 1 ”Normal”
vlan name 2 ”Registration”
vlan name 3 ”Isolation”
vlan name 4 ”MAC Detection”
vlan name 5 ”Guest”
exit
```

In the same section as "users passwd", you need to specify your PacketFence server’s management address:

```
snmptrap useStrongerSecret ipaddr 192.168.1.5
```

In the same section as the "voip oui" lines, you need to allow your SNMP server:

```
snmp-server community ”public”
snmp-server community rw useStrongerSecret
snmp-server community ipaddr 192.168.1.5 public
snmp-server community ipmask 255.255.255.0 public
snmp-server community ipaddr 192.168.1.5 useStrongerSecret
snmp-server community ipmask 255.255.255.0 useStrongerSecret
no voip vlan
```

You should use port 1 as the uplink. If you connect port 1 of a GS108Tv2 switch into a Power over Ethernet switch, then the GS108Tv2 does not need AC power. If you bought GS110T(P) switches, presumably it's for the SFP uplink option. You'll want to configure both port 1 and the SFP ports 9-10 as trunks:

```
interface 0/1
no snmp trap link-status
ip dhcp filtering trust
vlan pvid 1
vlan ingressfilter
vlan participation include 1,2,3,4,5
vlan tagging 2,3,4,5
no auto-voip
exit
```

Each user-facing, PacketFence-managed port should be configured like:

```
interface 0/2
vlan pvid 4
vlan ingressfilter
vlan participation include 4
no auto-voip
exit
```

5.26.3. M Series

PacketFence supports the Netgear M series in wired MAC authentication without VoIP.

Switch configuration

radius server host auth 192.168.1.5 radius server key auth 192.168.1.5 (then press enter and input your secret) radius server primary 192.168.1.5 radius server host acct 192.168.1.5 radius server key acct 192.168.1.5 (then press enter and input your secret)

aaa session-id unique dot1x system-auth-control aaa authentication dot1x default radius authorization network radius radius accounting mode

On your uplinks

dot1x port-control force-authorized

On your interfaces

interface 0/x dot1x port-control mac-based dot1x timeout guest-vlan-period 1 dot1x mac-auth-bypass exit

5.27. Nortel

PacketFence supports Nortel switches with VoIP using one trap type:

- Mac Security

Don't forget to update the startup config!

NOTE

if you are using a 5500 series with a firmware version of 6 or above, you must use a different module called Nortel::BayStack5500_6x in your `/usr/local/pf/conf/switches.conf`. Indeed, Nortel introduced an incompatible change of behavior in this firmware.

5.27.1. BayStack 470, ERS2500 Series, ERS4500 Series, 4550, 5500 Series and ES325

Global config settings

```
snmp-server authentication-trap disable
snmp-server host 192.168.1.5 "public"
snmp trap link-status port 1-24 disable
no mac-security mac-address-table
interface FastEthernet ALL
mac-security port ALL disable
mac-security port 1-24 enable
default mac-security auto-learning port ALL max-addrs
exit
mac-security enable
mac-security snmp-lock disable
mac-security intrusion-detect disable
mac-security filtering enable
mac-security snmp-trap enable
mac-security auto-learning aging-time 60
mac-security learning-ports NONE
mac-security learning disable
```

VoIP support

You need to ensure that all your ports are tagged with the voice VLAN. The switch should do the rest for you.

```
vlan create 6 name ”Telephone” type port learning ivl
vlan members 6 1-20,23-24
```

5.27.2. BPS2000

You can only configure this switch through menus.

Enable MAC Address Security:

```
MAC Address Security: Enabled
MAC Address Security SNMP-Locked: Disabled
Partition Port on Intrusion Detected: Disabled
DA Filtering on Intrusion Detected: Enabled
Generate SNMP Trap on Intrusion: Enabled
Current Learning Mode: Disabled
Learn by Ports: NONE

Port  Trunk  Security
----  -----  --------
   1         Enabled
 ...
  24         Enabled
```

5.28. Pica8

PacketFence supports Pica8 switches without VoIP using CoA to:

- bounce-host-port
- reauthenticate-host

Notes

- **SNMP is not supported yet**
- **Port Security is not supported**

For interfaces with MAC Authentication, perform the following:

```
set interface gigabit-ethernet ge-1/1/25 family ethernet-switching port-mode
trunk
set protocols dot1x interface ge-1/1/25 auth-mode mac-radius
set protocols dot1x interface ge-1/1/25 dynamic-vlan-enable true
set protocols dot1x traceoptions interface ge-1/1/25 flag all disable false
```

For interfaces with 802.1X, perform:

```
set interface gigabit-ethernet ge-1/1/4 family ethernet-switching port-mode
trunk
set protocols dot1x interface ge-1/1/4 auth-mode dot1x
set protocols dot1x interface ge-1/1/4 dynamic-vlan-enable true
set protocols dot1x traceoptions interface ge-1/1/4 flag all disable false
```

Global configuration:

```
set protocols dot1x aaa radius nas-ip 10.10.51.169
set protocols dot1x aaa radius authentication server-ip 192.168.1.5 shared-key
useStrongerSecret
set protocols dot1x aaa radius dynamic-author client 192.168.1.5 shared-key
useStrongerSecret
set protocols dot1x traceoptions interface ge-1/1/4 flag all disable false
set protocols dot1x traceoptions flag radius disable false
set vlans vlan-id 10
set vlans vlan-id 20
set vlans vlan-id 30
commit
```

- `10.10.51.169` is the switch IP
- For interfaces where auth-mode is unknown, use the following command set protocols dot1x interface ge-1/1/12 auth-mode dot1x-mac-radius This allows the switch to first try 802.1X and if there is no response from the client then fallback to MAC Authentication.
- Create VLAN(s) on the switch as per your requirements
- Please note that traceoptions are only for debugging

5.29. SMC

5.29.1. TigerStack 6128L2, 8824M and 8848M

PacketFence supports these switches without VoIP using two different trap types:

- linkUp/linkDown
- Port Security (with static MACs)

We recommend to enable Port Security only.

Global config settings

```
SNMP-server host 192.168.1.5 public version 2c udp-port 162
no snmp-server enable traps link-up-down
```

On each interface:

```
port security max-mac-count 1
port security
port security action trap
```

5.29.2. TigerStack 6224M

Supports linkUp/linkDown mode

Global config settings

```
SNMP-server host 192.168.1.5 public version 1
```

5.30. Ubiquiti

5.30.1. EdgeSwitch

PacketFence supports the EdgeSwitch with the following techniques:

- 802.1X with MAC Authentication fallback
- 802.1X with MAC Authentication fallback with VoIP

802.1X with MAC Authentication fallback

We assume that the switch ip is 192.168.1.254

First on the uplink add this configuration:

```
dot1x port-control force-authorized
vlan participation include 1,2,3,4,5,100
vlan tagging 2,3,4,5,100
```

Global config settings:

```
vlan database
vlan 1
vlan 2
vlan 3
vlan 4
vlan 5
vlan 100
exit
```

```
configure
dot1x system-auth-control
```

```
aaa authentication dot1x default radius
authorization network radius
dot1x dynamic-vlan enable
radius accounting mode
radius server host auth ”192.168.1.5” name ”PacketFence”
radius server key auth ”192.168.1.5”
```

```
Enter secret (64 characters max):useStrongerSecret
```

```
radius server primary ”192.168.1.5”
no radius server msgauth ”192.168.1.5”
radius server attribute 4 192.168.1.254
```

```
radius server attribute 32 ”EdgeSwitch”
radius server host acct ”192.168.1.5” name PacketFence-ACCT
radius server key acct ”192.168.1.5”
```

```
Enter secret (64 characters max):useStrongerSecret
```

```
snmp-server community public ro
snmp-server community private rw
exit
```

On each interface (not uplink)

```
dot1x port-control mac-based
dot1x re-authentication
dot1x timeout reauth-period 1800
dot1x timeout supp-timeout 10
dot1x timeout guest-vlan-period 3
dot1x timeout server-timeout 1800
dot1x mac-auth-bypass
dot1x unauthenticated-vlan 4
vlan participation include 1,2,3,4,5,100
exit
```

802.1X with MAC Authentication fallback with VoIP

We assume that the switch ip is 192.168.1.254

First on the uplink add this configuration:

```
dot1x port-control force-authorized
vlan participation include 1,2,3,4,5,100
vlan tagging 2,3,4,5,100
```

Global config settings:

```
vlan database
vlan 1
vlan 2
vlan 3
vlan 4
vlan 5
vlan 100
exit
```

```
configure
dot1x system-auth-control
aaa authentication dot1x default radius
authorization network radius
dot1x dynamic-vlan enable
voice vlan 100
radius accounting mode
radius server host auth "192.168.1.5" name "PacketFence"
radius server key auth "192.168.1.5"
```

```
Enter secret (64 characters max):useStrongerSecret
```

```
radius server primary "192.168.1.5"
no radius server msgauth "192.168.1.5"
radius server attribute 4 192.168.1.254
```

```
radius server attribute 32 "EdgeSwitch"
radius server host acct "192.168.1.5" name PacketFence-ACCT
radius server key acct "192.168.1.5"
```

```
Enter secret (64 characters max):useStrongerSecret
```

```
snmp-server community public ro
snmp-server community private rw
```

```
exit
```

On each interface (not uplink)

```
dot1x port-control mac-based
dot1x re-authentication
dot1x timeout reauth-period 1800
dot1x timeout supp-timeout 10
dot1x timeout guest-vlan-period 3
dot1x timeout server-timeout 1800
dot1x mac-auth-bypass
dot1x unauthenticated-vlan 4
vlan participation include 1,2,3,4,5,100
voice vlan 100
auto-voip protocol-based
lldp transmit
lldp receive
lldp transmit-tlv port-desc
lldp transmit-tlv sys-name
lldp transmit-tlv sys-desc
lldp transmit-tlv sys-cap
lldp transmit-mgmt
lldp notification
lldp med
lldp med confignotification
exit
```

6. Wireless Controllers and Access Point Configuration

6.1. Assumptions

Throughout this configuration example we use the following assumptions for our network infrastructure:

- PacketFence is fully configured with FreeRADIUS running
- PacketFence IP address: 192.168.1.5
- Normal VLAN: 1
- Registration VLAN: 2
- Isolation VLAN: 3
- MAC Detection VLAN: 4
- Guest VLAN: 5
- VoIP, Voice VLAN: 100
- use SNMP v2c
- SNMP community name: public
- RADIUS Secret: useStrongerSecret [1]
- Open SSID: PacketFence-Public
- WPA-Enterprise SSID: PacketFence-Secure

6.2. Unsupported Equipment

Wireless network access configuration is a lot more consistent between vendors. This is due to the fact that the situation is a lot more standardized than the wired side: VLAN assignment is done centrally with RADIUS and that the client protocol is consistent (MAC-Authentication or 802.1X).

This consistency has the benefit that a lot of the wireless network devices tend to work out-of-the-box with PacketFence. The only missing piece being, in most cases, remote deauthentication of the client which is used for VLAN assignment (deauth user so it'll reconnect and get new VLAN).

So, even if your wireless equipment is not explicitly supported by PacketFence, it's recommended that you give it a try. The next section covers the objectives that you want to accomplish for trying out your equipment even if we don't have configuration for it.

Here are the high-level requirements for proper wireless integration with PacketFence

- The appropriate VLANs must exist

- Allow controller to honor VLAN assignments from AAA (sometimes called AAA override)
- Put your open SSID (if any) in MAC-Authentication mode and authenticate against the FreeRADIUS hosted on PacketFence
- Put your secure SSID (if any) in 802.1X mode and authenticate against FreeRADIUS hosted on PacketFence.
- On registration / isolation VLANs the DHCP traffic must reach the PacketFence server
- On your production VLANs a copy of the DHCP traffic must reach PacketFence where a pfdhcplistener listens (configurable in `pf.conf` under `interfaces`)

At this point, user registration with the captive-portal is possible and registered users should have access to the appropriate VLANs. However, VLAN changes (like after a registration) won't automatically happen, you will need to disconnect / reconnect. An explanation is provided in introduction section above about this behavior.

You can try modules similar to your equipment if any (read appropriate instructions) or you can try to see if RFC3576 is supported. RFC3576 covers RADIUS Packet of Disconnect (PoD) also known as Disconnect Messages (DM) or Change of Authorization (CoA). You can try the Aruba module if you want to verify if RFC3576 is supported by your hardware.

If none of the above worked then you can fallback to inline enforcement or let us know what equipment you are using on the packetfence-devel mailing list.

6.3. Aerohive Networks

Aerohive products are a bit different compared to the other vendors. They support either a local HiveManager (similar to a wireless controller) or a cloud-based HiveManager. However, the configuration is the same for the local and the cloud-based controller. Note that all the configurations are made on the HiveManager and then pushed to the APs.

6.3.1. MAC Authentication and 802.1X Configuration

Assumptions

- the network architecture is in order to give acces to the Aerohive Access Point, and has access to Internet
- the VLANs are defined for registration, isolation and management networks
- from this documentation, we will assume that the VLANs tags are define like following:
  - PacketFence Management VLAN: 1 IP address: 192.168.1.5
  - registration VLAN ID 2, subnet 192.168.2.0/24
  - isolation VLAN ID 3, subnet 192.168.3.0/24
  - production VLAN ID 10, subnet 172.16.1.0/24
- the VLANs are spanned in the switches and switching L2 equipments, from the *Production Network* to the PacketFence server(s)
- the VLANs are allowed in the trunks
- Aerohive Access Point is loaded with HiveOS with version 6 or later
- HiveManager with version 6 or later
- Wireless AP: 172.16.1.1

- RADIUS Secret: useStrongerSecret

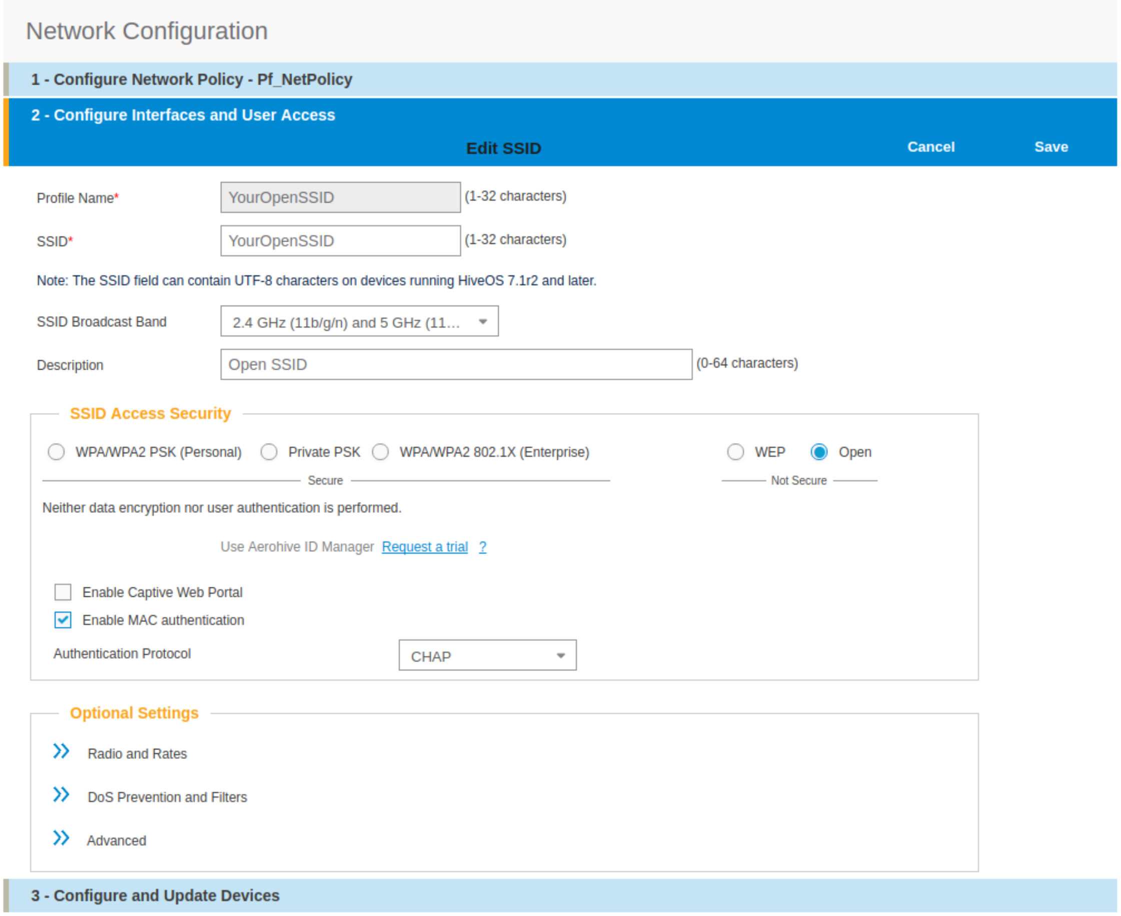
Configure the Aerohive APs and SSID

Logon to your HiveManager interface:

- for this example, we assume that we are on the *Cloud* MyHive.aerohive.com solution
- from *HiveManager*, click on your **HiveManagerOnline Instances** *VHM-XXXXXX*
- from *Network Configuration / 1-Choose Network Policy*, click on **New**
- give a name to your Policy, and click **Create**
- from *2-Configure Interfaces and User Access*, *SSID*, click on **Choose** and click on **New**
- give a SSID Profile Name, SSID Name

For an open (no encryption) SSID using MAC-based authentication:

- click on **New**
  - SSID Access Security: **Open**
  - check the box *Enable MAC authentication*
- click on **Save**


Network Configuration

1 - Configure Network Policy - Pf_NetPolicy

2 - Configure Interfaces and User Access

Edit SSID

Profile Name*: YourOpenSSID (1-32 characters)

SSID*: YourOpenSSID (1-32 characters)

Note: The SSID field can contain UTF-8 characters on devices running HiveOS 7.1r2 and later.

SSID Broadcast Band: 2.4 GHz (11b/g/n) and 5 GHz (11...

Description: Open SSID (0-64 characters)

SSID Access Security

○ WPA/WPA2 PSK (Personal) ○ Private PSK ○ WPA/WPA2 802.1X (Enterprise) — Secure

○ WEP ● Open — Not Secure

Neither data encryption nor user authentication is performed.

Use Aerohive ID Manager Request a trial ?

□ Enable Captive Web Portal

☑ Enable MAC authentication

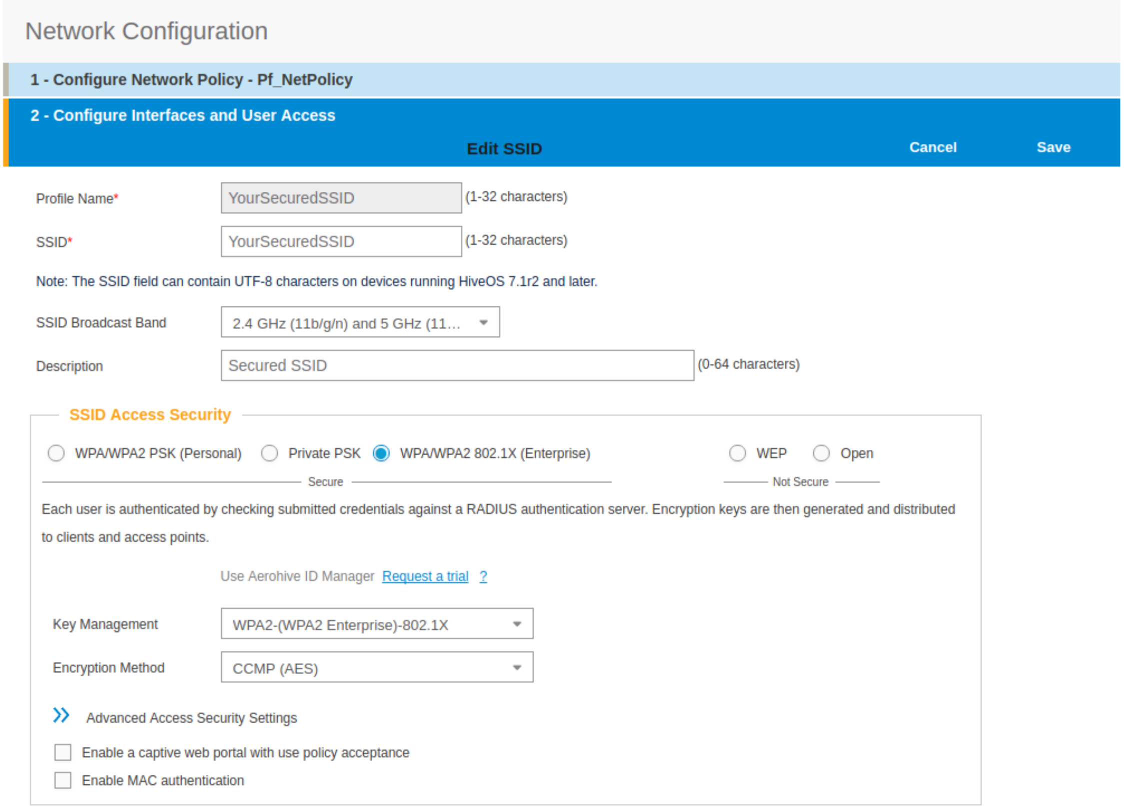
Authentication Protocol: CHAP

Optional Settings

3 - Configure and Update Devices

For a secure SSID using 802.1X:

- click on **New**
    - SSID Access Security: **WPA/WPA2 802.1X (Enterprise)**
    - Key Management; **WPA2-(WPA2 enterprise)-802.1X**
    - Encryption method: **CCMP (AES)**



Network Configuration
1 - Configure Network Policy - Pf_NetPolicy
2 - Configure Interfaces and User Access
Edit SSID
Cancel
Save

Profile Name*: YourSecuredSSID (1-32 characters)

SSID*: YourSecuredSSID (1-32 characters)

Note: The SSID field can contain UTF-8 characters on devices running HiveOS 7.1r2 and later.

SSID Broadcast Band: 2.4 GHz (11b/g/n) and 5 GHz (11…

Description: Secured SSID (0-64 characters)

SSID Access Security

○ WPA/WPA2 PSK (Personal) ○ Private PSK ● WPA/WPA2 802.1X (Enterprise) ○ WEP ○ Open

Secure — Not Secure

Each user is authenticated by checking submitted credentials against a RADIUS authentication server. Encryption keys are then generated and distributed to clients and access points.

Use Aerohive ID Manager Request a trial ?

Key Management: WPA2-(WPA2 Enterprise)-802.1X

Encryption Method: CCMP (AES)

» Advanced Access Security Settings

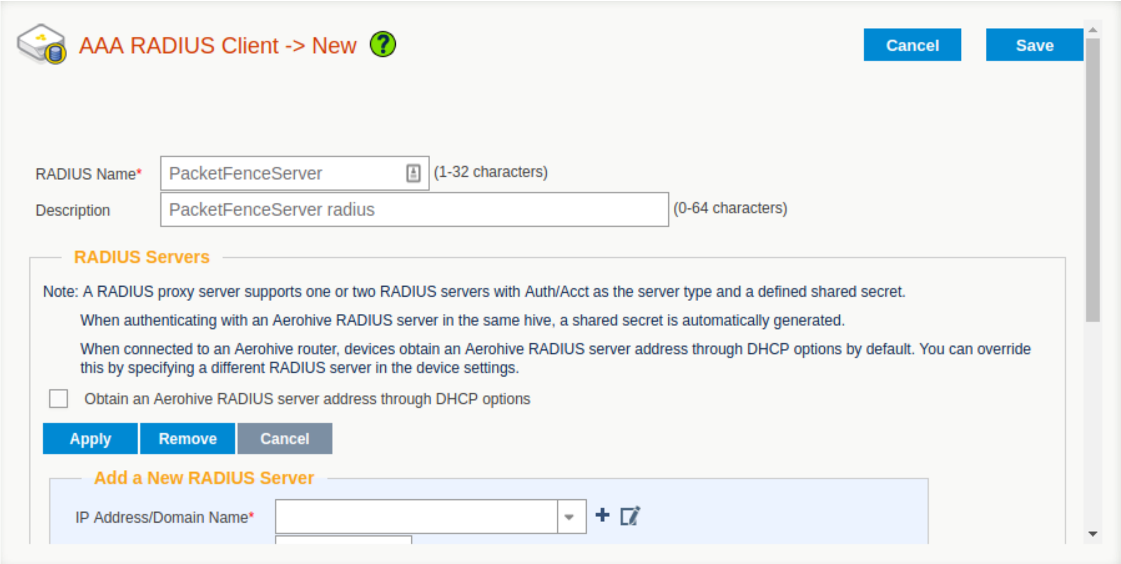
□ Enable a captive web portal with use policy acceptance

□ Enable MAC authentication

- click on **Save**
- from SSID, be sure to have selected both SSIDs previously created, and click **OK**

Add the RADIUS parameters created before:

- under *Authentication* click on **<RADIUS Setting>**, and click on **New**
- from *RADIUS Name*, give the name of the PaketFence server, for example



RADIUS Name* PacketFenceServer (1-32 characters)

Description PacketFenceServer radius (0-64 characters)

RADIUS Servers

Note: A RADIUS proxy server supports one or two RADIUS servers with Auth/Acct as the server type and a defined shared secret.

When authenticating with an Aerohive RADIUS server in the same hive, a shared secret is automatically generated.

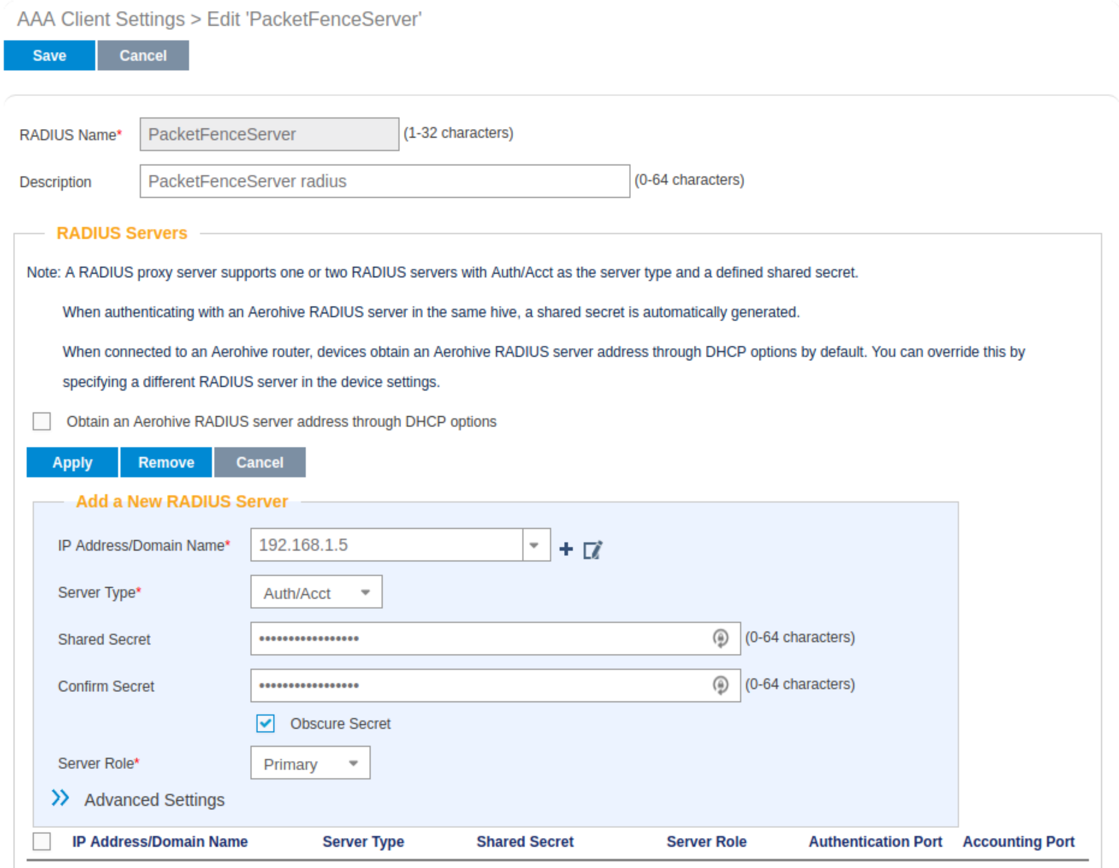
When connected to an Aerohive router, devices obtain an Aerohive RADIUS server address through DHCP options by default. You can override this by specifying a different RADIUS server in the device settings.

☐ Obtain an Aerohive RADIUS server address through DHCP options

Add a New RADIUS Server

IP Address/Domain Name*

- from *Add a New RADIUS Server*, in *IP Adresse/Domain Name*, put the PacketFence Server IP
- hive the *Shared Secret* (**useStrongerSecret**) and *Confirm* it
- and Click on **Apply**



AAA Client Settings > Edit 'PacketFenceServer'

RADIUS Name* PacketFenceServer (1-32 characters)

Description PacketFenceServer radius (0-64 characters)

RADIUS Servers

Note: A RADIUS proxy server supports one or two RADIUS servers with Auth/Acct as the server type and a defined shared secret.

When authenticating with an Aerohive RADIUS server in the same hive, a shared secret is automatically generated.

When connected to an Aerohive router, devices obtain an Aerohive RADIUS server address through DHCP options by default. You can override this by specifying a different RADIUS server in the device settings.

☐ Obtain an Aerohive RADIUS server address through DHCP options

Add a New RADIUS Server

IP Address/Domain Name* 192.168.1.5

Server Type* Auth/Acct

Shared Secret ••••••••••••••••• (0-64 characters)

Confirm Secret ••••••••••••••••• (0-64 characters)

☑ Obscure Secret

Server Role* Primary

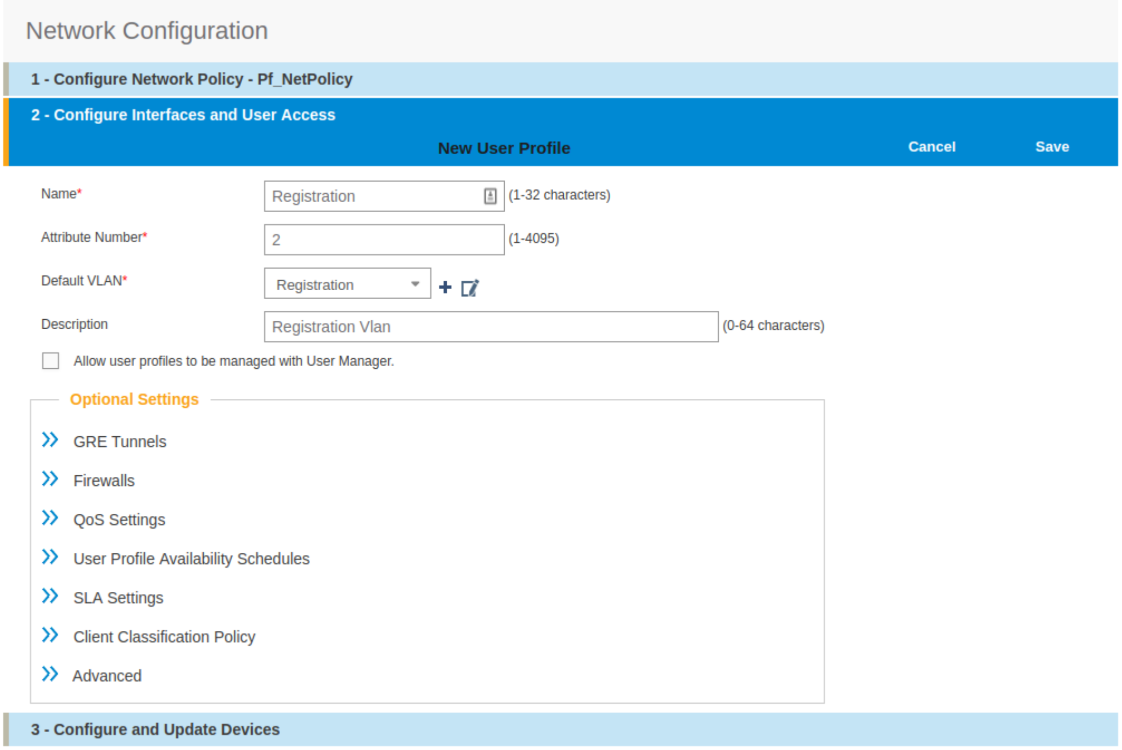
☐	IP Address/Domain Name	Server Type	Shared Secret	Server Role	Authentication Port	Accounting Port

- deploy the *Optionnal Setting(not supported by RADIUS Proxy)* section and check the *Permit Dynamic Change of Authorization Message (RFC 3576)*

- click on **Save**
- next to your *SSID Name* Click on the **<RADIUS Setting>**, Click **OK**

We will create the default VLAN to be assign by the AP, when a new endpoint get in the SSID:

- Under *User Profile*, Click on **Add/Remove**,and Click on **New**, in the *Default* section
    - You will need to create one *User Profile* for each VLANs used, for us, we will create 3 Users Profiles, Registration, Isolation and Production
- from name, give the name of a rule to manage the VLANs with PacketFence (Registration ; Isolation ; Production)
- from *Attribute Name*, give the VLAN ID of the VLAN
- from *Default VLan*, Click on the (**+**) (New)
- as a VLAN ID, give the VLAN ID earlier Registration(2) , Isolation(3) or Production(10)
- click on **Save** and click on **Save** again on the *Configure interfaces and User Access*



Network Configuration

1 - Configure Network Policy - Pf_NetPolicy

2 - Configure Interfaces and User Access

New User Profile

Name*	Registration (1-32 characters)
Attribute Number*	2 (1-4095)
Default VLAN*	Registration
Description	Registration Vlan (0-64 characters)

□ Allow user profiles to be managed with User Manager.

3 - Configure and Update Devices

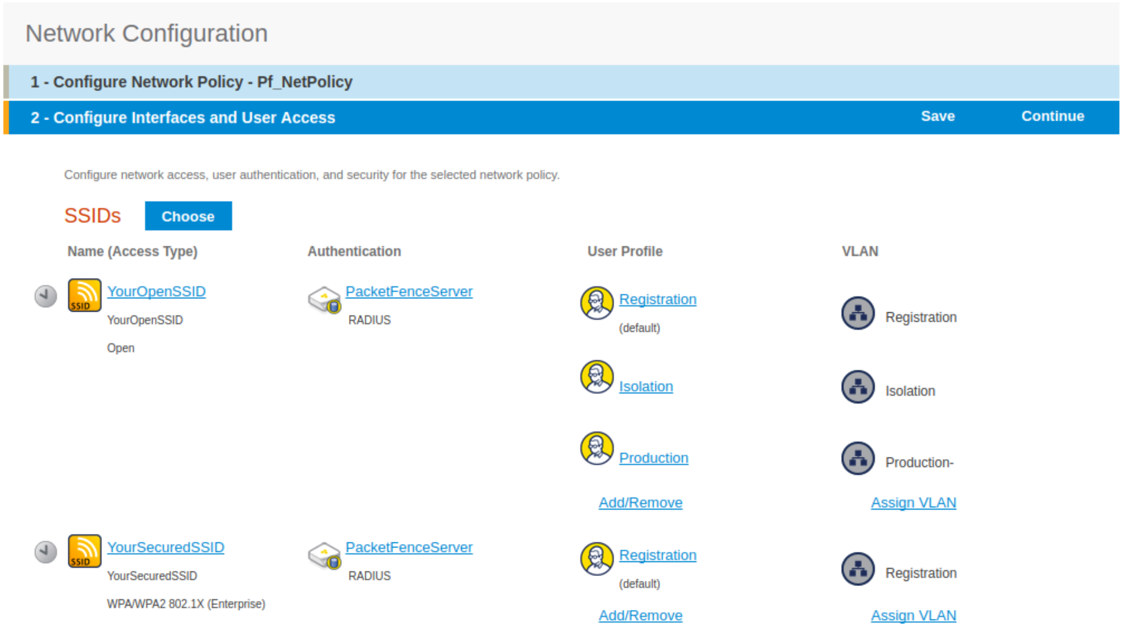
Create and add the other VLANs:

- Follow the same procedure to create the others VLANs

Once done with the VLANs configuration:

- From the *Choose User Profiles*, select the *Default* tab and click on you *Registration* VLAN tag
- From the *Authentication* tab, select the *Isolation* and the *Production* VLANs tag
- Click on **Save**

For our example, here is what it looks like, with two SSIDs



Network Configuration

1 - Configure Network Policy - Pf_NetPolicy

2 - Configure Interfaces and User Access — Save — Continue

Configure network access, user authentication, and security for the selected network policy.

SSIDs — Choose

Name (Access Type)	Authentication	User Profile	VLAN
YourOpenSSID YourOpenSSID Open	PacketFenceServer RADIUS	Registration (default) Isolation Production Add/Remove	Registration Isolation Production- Assign VLAN
YourSecuredSSID YourSecuredSSID WPA/WPA2 802.1X (Enterprise)	PacketFenceServer RADIUS	Registration (default) Add/Remove	Registration Assign VLAN

Then, click on *Continue*, on top right of the page.

Push your configuration to your AP:

- from *Configure and Update Devices*, check your AP in *Device to Update*
- click on *Update*
- select *Update Devices*
- from *HiveOS Number of devices running earlier versions of HiveOS*, select **Upgrade these devices to the latest version of HiveOS**
- click on *Update*
- wait until the date and time apprears under *Update Status*

NOTE

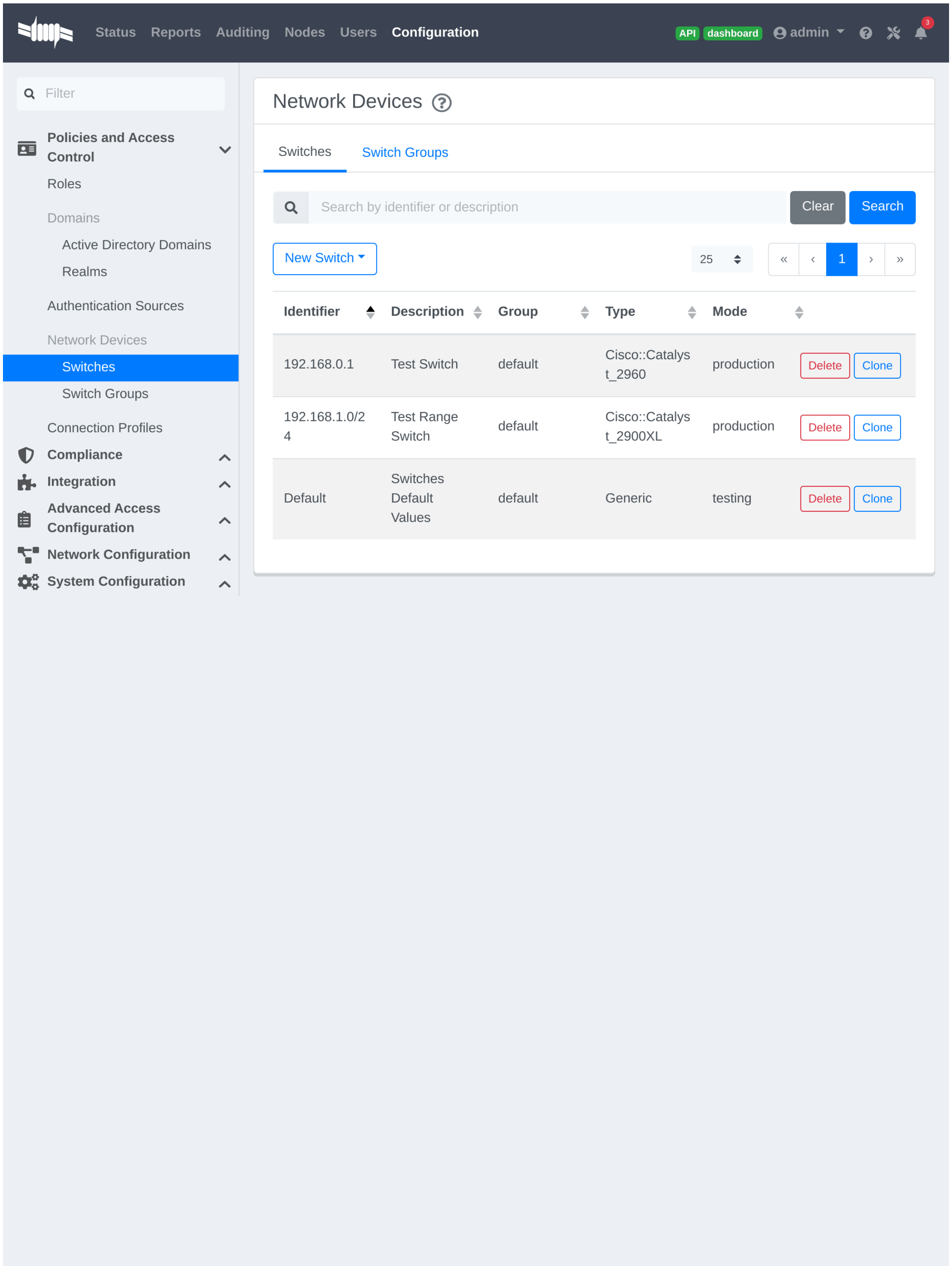
Aerohive have a session replication feature to ease the EAP session roaming between two access points. However, this may cause problems when you bounce the wireless card of a client, it will not do a new RADIUS request. Two settings can be tweaked to reduce the caching impact, it is the roaming cache update interval and roaming cache ageout. They are located in **Configuration → SSIDs → [SSID Name] → Optional Settings → Advanced**. The other way to support Roaming is to enable SNMP trap in the Aerohive configuration to PacketFence server. PacketFence will recognize the ahConnectionChangeEvent and will change the location of the node in his base.

Configure PacketFence

We will now need to create a new switch in PacketFence to be able to manage the endpoints behind the Aerohive APs.

Logon to your PacketFence interface:

- from *Configuration / Policies and Access Control / Switches /*
- on the line where there is the *default*, on the right, Click on *CLONE*

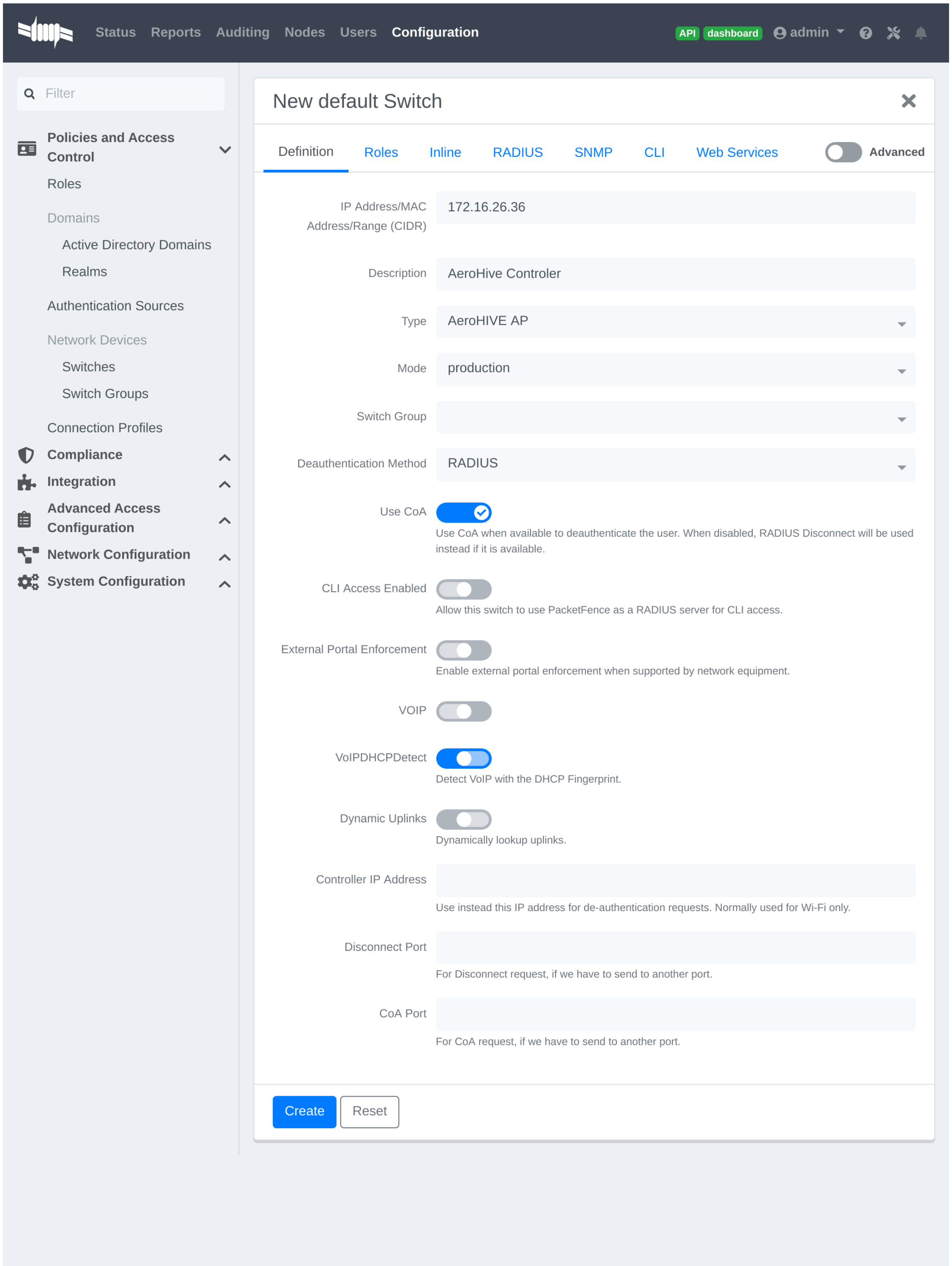


Identifier	Description	Group	Type	Mode	
192.168.0.1	Test Switch	default	Cisco::Catalyst_2960	production	Delete Clone
192.168.1.0/24	Test Range Switch	default	Cisco::Catalyst_2900XL	production	Delete Clone
Default	Switches Default Values	default	Generic	testing	Delete Clone

In *Definition*:

- *IP Address/MAC Address/Range (CIDR)*, give the network address of your *Production* network; For us, it will be **172.16.1.1**
- *Description*, give a description so you can quickly see what it is about

- from the *Type* list, select **Aerohive AP**
- from *Mode* select **Production**
- *Switch Group* by default set to **None**
- *Deauthentication Method* set to **RADIUS**
- click **SAVE**



IP Address/MAC Address/Range (CIDR): 172.16.26.36

Description: AeroHive Controler

Type: AeroHIVE AP

Mode: production

Switch Group:

Deauthentication Method: RADIUS

Use CoA: on
Use CoA when available to deauthenticate the user. When disabled, RADIUS Disconnect will be used instead if it is available.

CLI Access Enabled: off
Allow this switch to use PacketFence as a RADIUS server for CLI access.

External Portal Enforcement: off
Enable external portal enforcement when supported by network equipment.

VOIP: off

VoIPDHCPDetect: on
Detect VoIP with the DHCP Fingerprint.

Dynamic Uplinks: off
Dynamically lookup uplinks.

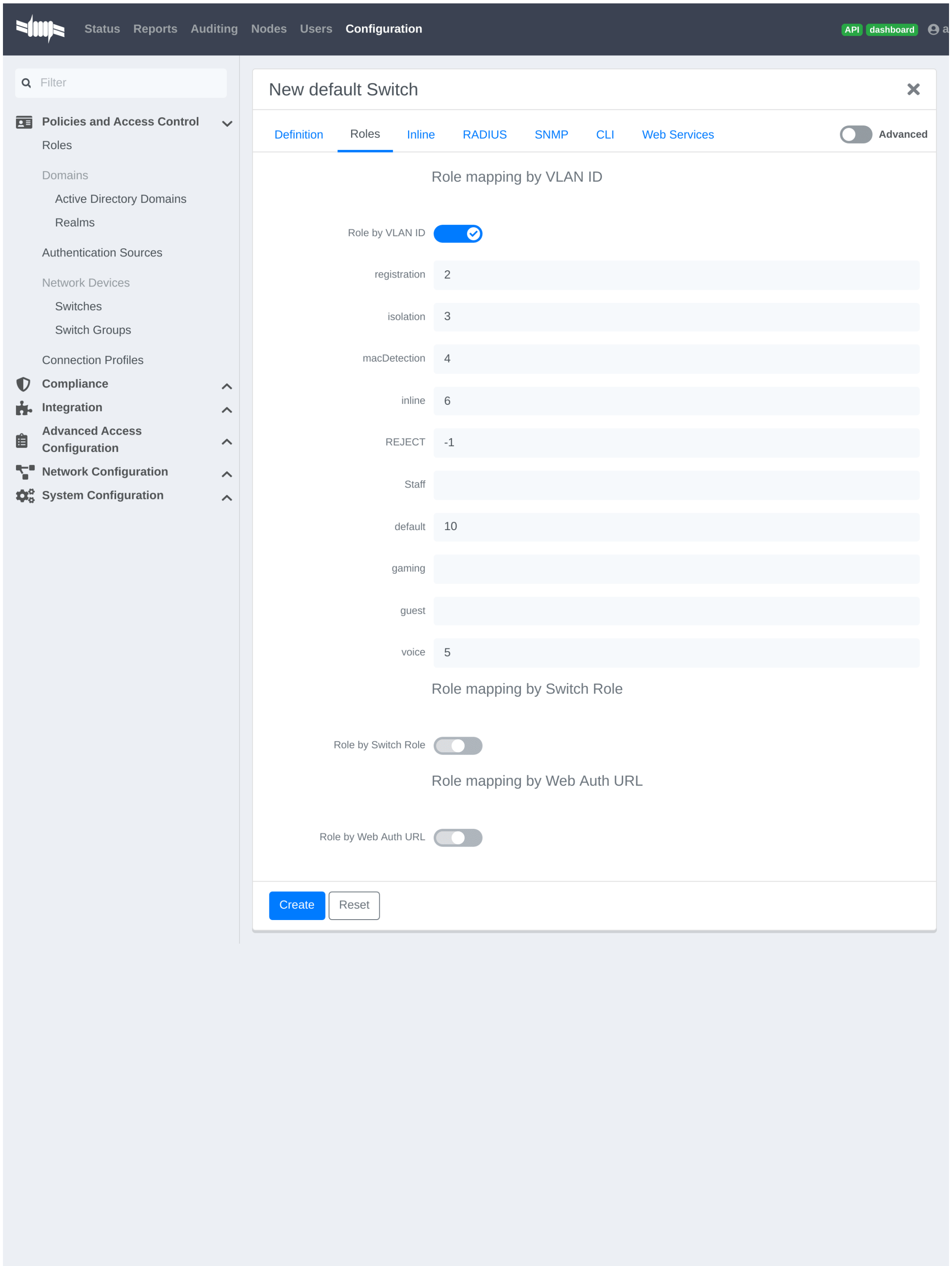
Controller IP Address:
Use instead this IP address for de-authentication requests. Normally used for Wi-Fi only.

Disconnect Port:
For Disconnect request, if we have to send to another port.

CoA Port:
For CoA request, if we have to send to another port.

From *Role*:

- set all VLAN ID for each roles



New default Switch

Role mapping by VLAN ID

Role by VLAN ID: ☑

registration	2
isolation	3
macDetection	4
inline	6
REJECT	-1
Staff	
default	10
gaming	
guest	
voice	5

Role mapping by Switch Role

Role by Switch Role: ○

Role mapping by Web Auth URL

Role by Web Auth URL: ○

From *RADIUS*:

- modify the secret passphrase previously sets in the Aerohive HiveManager
- click on **SAVE**

This ends the PacketFence configuration.

6.3.2. Web Auth (External Captive Portal) Configuration

In this section we will describe the WebAuth configuration using PacketFence as an external captive poral.

Assumptions

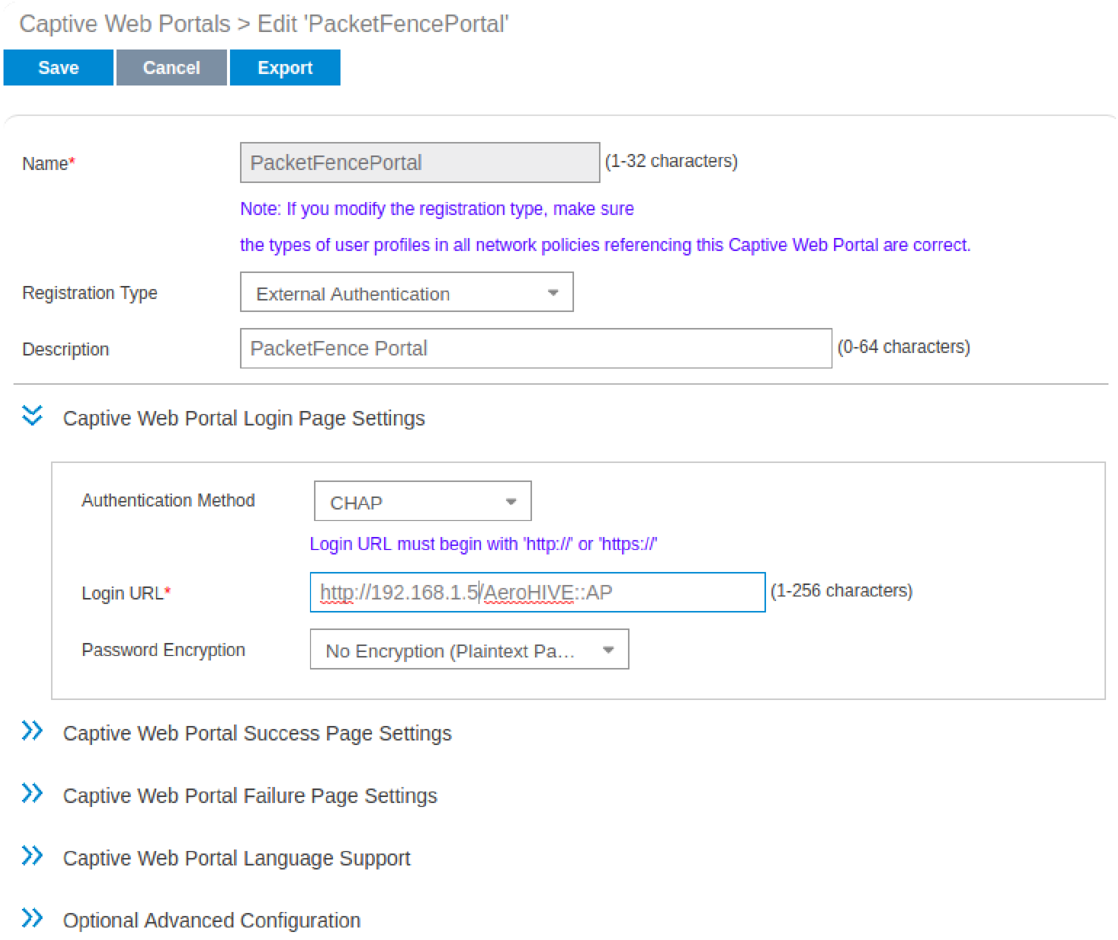
In this part, it is recommended that the default VLAN must be the native VLAN. This way, the AP and the others network equipments will be able to manage VLANs.

You already have a Network Policy and at least one Access Point configured.

Configure the external captive portal

Create a new Captive Portal Profile:

- from the HiveManager, go to **CONFIGURATION → ADVANCED CONFIGURATION → AUTHENTICATION → Captive Web Portals**
- click on **New**
- give it a name
- *Registration Type* must be **External Authentication**
- click on *Captive Web Portal Login Page Settings* to deploy the configuration window
- *Login URL* must be http://192.168.1.5/AeroHIVE::AP
- *Password Encryption* : **No Encryption (Plaintext Password)**
- click on **Save**



Captive Web Portals > Edit 'PacketFencePortal'

Name* PacketFencePortal (1-32 characters)

Note: If you modify the registration type, make sure the types of user profiles in all network policies referencing this Captive Web Portal are correct.

Registration Type External Authentication

Description PacketFence Portal (0-64 characters)

Captive Web Portal Login Page Settings

Authentication Method CHAP

Login URL must begin with 'http://' or 'https://'

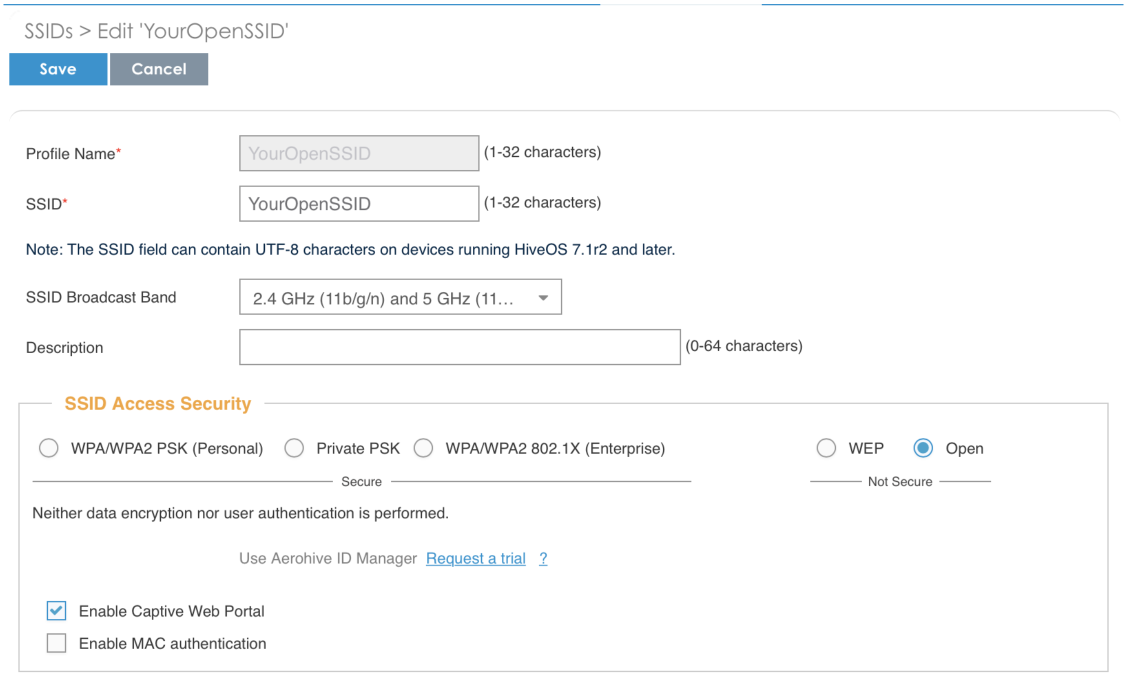
Login URL* http://192.168.1.5/AeroHIVE::AP (1-256 characters)

Password Encryption No Encryption (Plaintext Pa…

Captive Web Portal Success Page Settings
Captive Web Portal Failure Page Settings
Captive Web Portal Language Support
Optional Advanced Configuration

Create a SSID to enable Captive Portal functionality:

- from the HiveManager, go to **CONFIGURATION → SSIDS**
- click on the New button
- give your Profile and SSID a name
- from *SSID Access Security* , Check **Enable Captive Web Portal**
- before clicking on the button **Save** you should have something like this:



SSIDs > Edit 'YourOpenSSID'

Profile Name*	YourOpenSSID	(1-32 characters)
SSID*	YourOpenSSID	(1-32 characters)

Note: The SSID field can contain UTF-8 characters on devices running HiveOS 7.1r2 and later.

SSID Broadcast Band	2.4 GHz (11b/g/n) and 5 GHz (11…	
Description		(0-64 characters)

SSID Access Security

○ WPA/WPA2 PSK (Personal) ○ Private PSK ○ WPA/WPA2 802.1X (Enterprise) ○ WEP ● Open

Secure — Not Secure

Neither data encryption nor user authentication is performed.

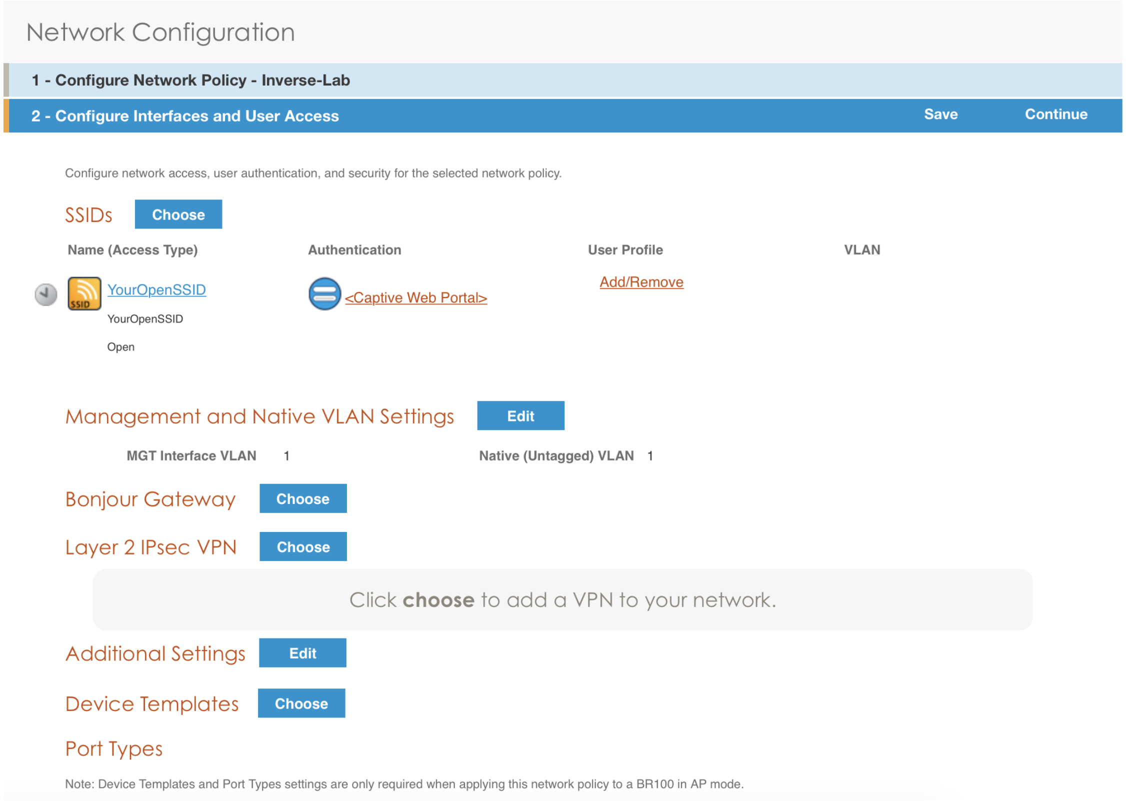
Use Aerohive ID Manager Request a trial ?

☑ Enable Captive Web Portal

□ Enable MAC authentication

Configure and broadcast your SSID:

- from the HiveManager, go to **CONFIGURATION → NETWORK POLICIES**
- choose Network Policy and click OK, you should see this:



Network Configuration

1 - Configure Network Policy - Inverse-Lab

2 - Configure Interfaces and User Access

Configure network access, user authentication, and security for the selected network policy.

SSIDs

Name (Access Type)	Authentication	User Profile	VLAN
YourOpenSSID YourOpenSSID Open	<Captive Web Portal>	Add/Remove	

Management and Native VLAN Settings

MGT Interface VLAN 1 Native (Untagged) VLAN 1

Bonjour Gateway

Layer 2 IPsec VPN

Click **choose** to add a VPN to your network.

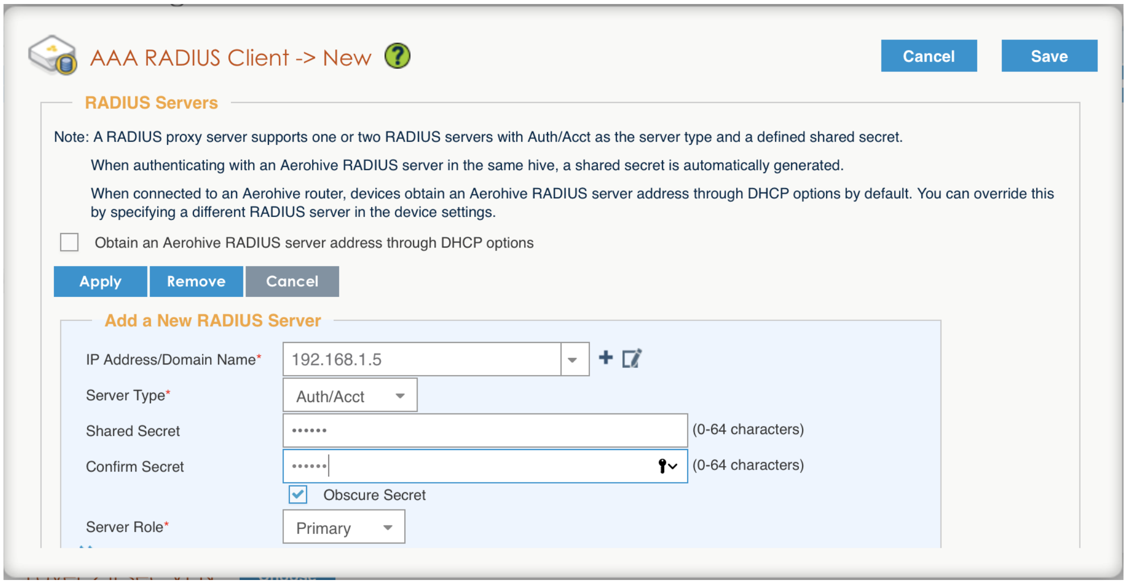
Additional Settings

Device Templates

Port Types

Note: Device Templates and Port Types settings are only required when applying this network policy to a BR100 in AP mode.

- under Authentication click on <*Captive Web Portal*> and select the captive portal previously configured
- once the <*RADIUS Settings*> appears under the captive portal, click on it
- on that new window *Choose RADIUS* click New
- give it a description and a name
- under *RADIUS Servers* click New



RADIUS Servers

Note: A RADIUS proxy server supports one or two RADIUS servers with Auth/Acct as the server type and a defined shared secret.

When authenticating with an Aerohive RADIUS server in the same hive, a shared secret is automatically generated.

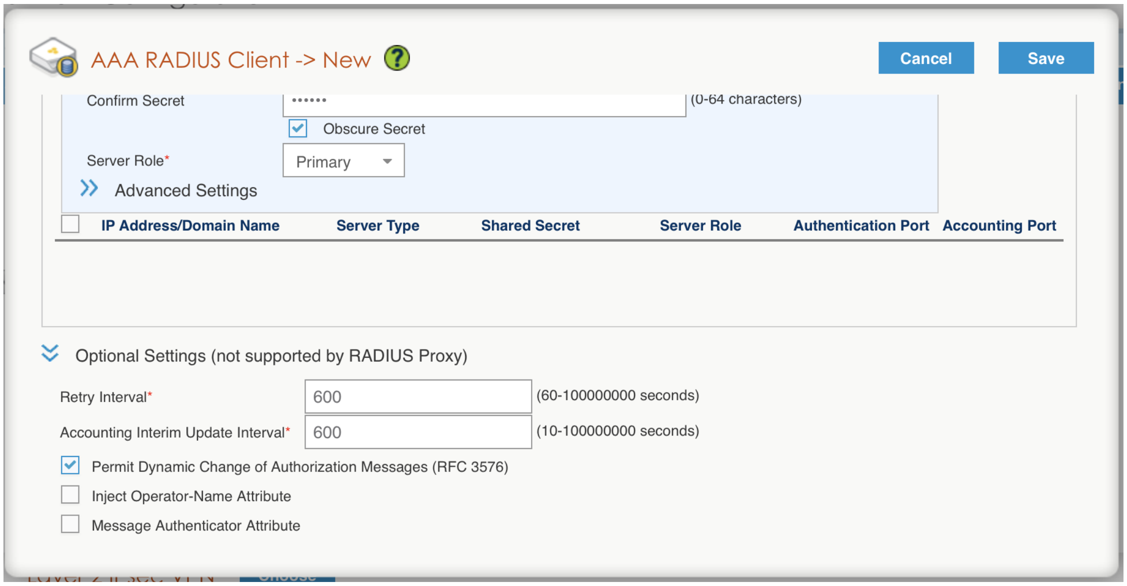
When connected to an Aerohive router, devices obtain an Aerohive RADIUS server address through DHCP options by default. You can override this by specifying a different RADIUS server in the device settings.

□ Obtain an Aerohive RADIUS server address through DHCP options

Add a New RADIUS Server

IP Address/Domain Name*	192.168.1.5	
Server Type*	Auth/Acct	
Shared Secret	••••••	(0-64 characters)
Confirm Secret	••••••	(0-64 characters)
	☑ Obscure Secret	
Server Role*	Primary	

- click on Apply
- click on *Optional Settings (not supported by RADIUS Proxy)* and check **Permit Dynamic Change of Authorization Messages (RFC 3576)**



Confirm Secret	••••••	(0-64 characters)
	☑ Obscure Secret	
Server Role*	Primary	

□	IP Address/Domain Name	Server Type	Shared Secret	Server Role	Authentication Port	Accounting Port

Optional Settings (not supported by RADIUS Proxy)

Retry Interval*	600	(60-100000000 seconds)
Accounting Interim Update Interval*	600	(10-100000000 seconds)

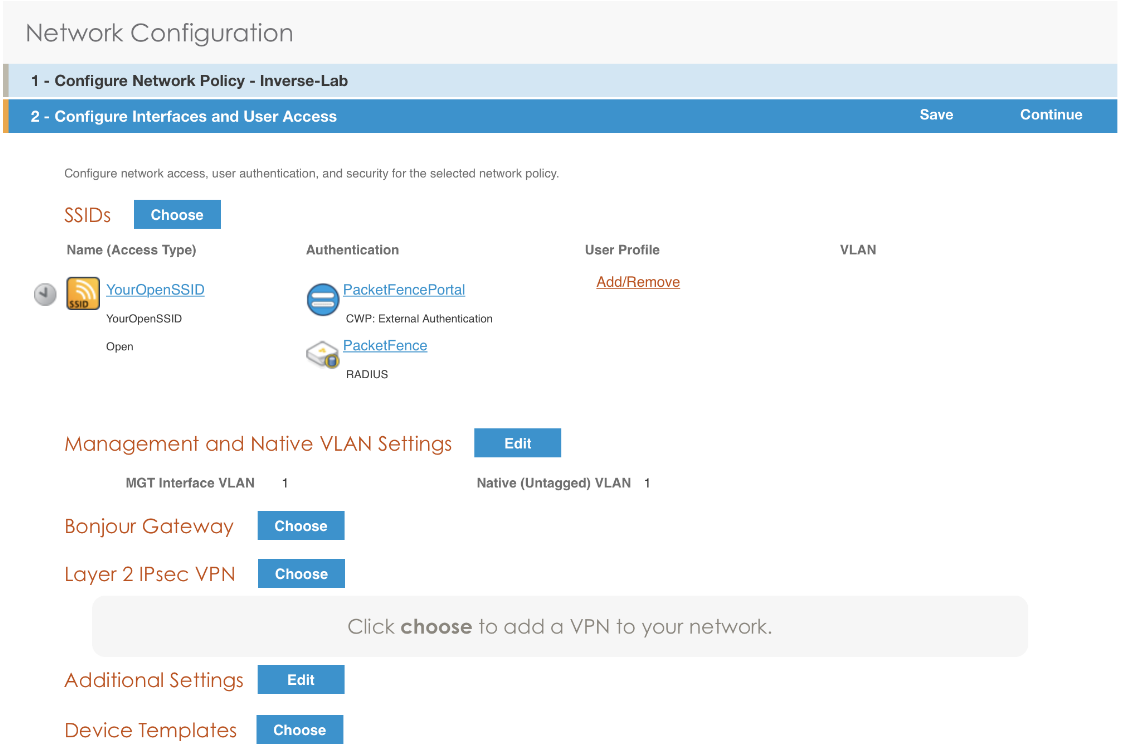
☑ Permit Dynamic Change of Authorization Messages (RFC 3576)

□ Inject Operator-Name Attribute

□ Message Authenticator Attribute

- click on the Save button

Configure the User profile:



Network Configuration

1 - Configure Network Policy - Inverse-Lab

2 - Configure Interfaces and User Access — Save — Continue

Configure network access, user authentication, and security for the selected network policy.

SSIDs — Choose

Name (Access Type)	Authentication	User Profile	VLAN
YourOpenSSID YourOpenSSID Open	PacketFencePortal CWP: External Authentication PacketFence RADIUS	Add/Remove	

Management and Native VLAN Settings — Edit

MGT Interface VLAN 1 — Native (Untagged) VLAN 1

Bonjour Gateway — Choose

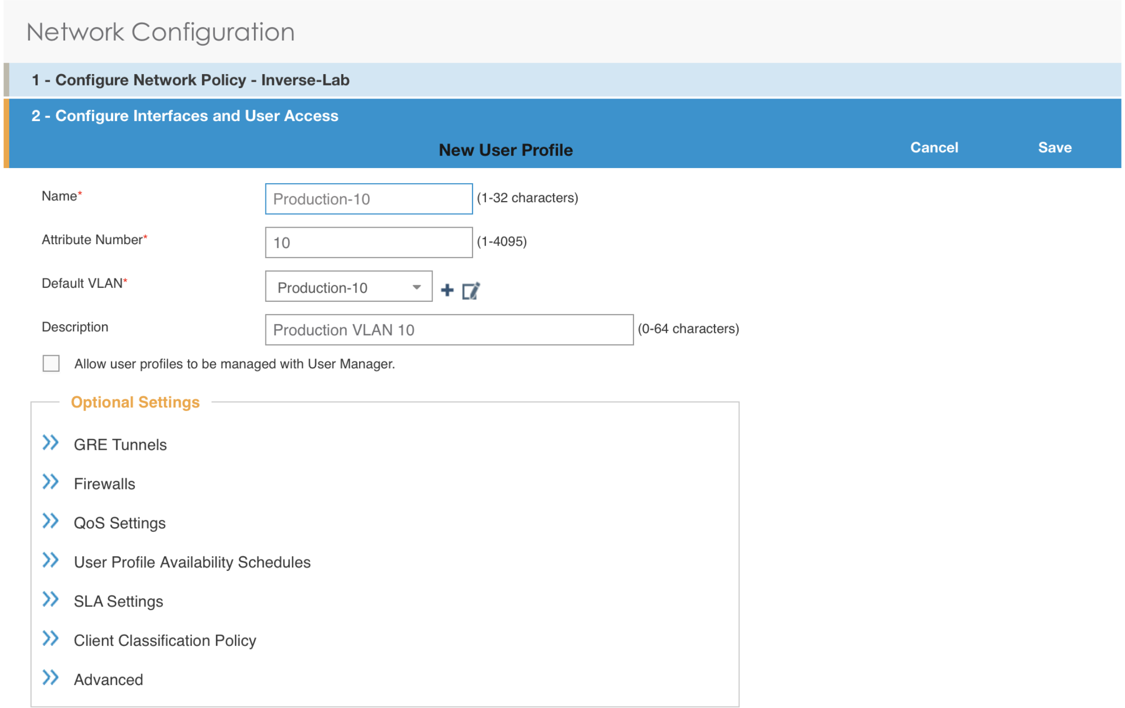
Layer 2 IPsec VPN — Choose

Click **choose** to add a VPN to your network.

Additional Settings — Edit

Device Templates — Choose

- under *User Profile* , click on **Add/Remove** and click on New



Network Configuration

1 - Configure Network Policy - Inverse-Lab

2 - Configure Interfaces and User Access

New User Profile — Cancel — Save

Name* Production-10 (1-32 characters)

Attribute Number* 10 (1-4095)

Default VLAN* Production-10

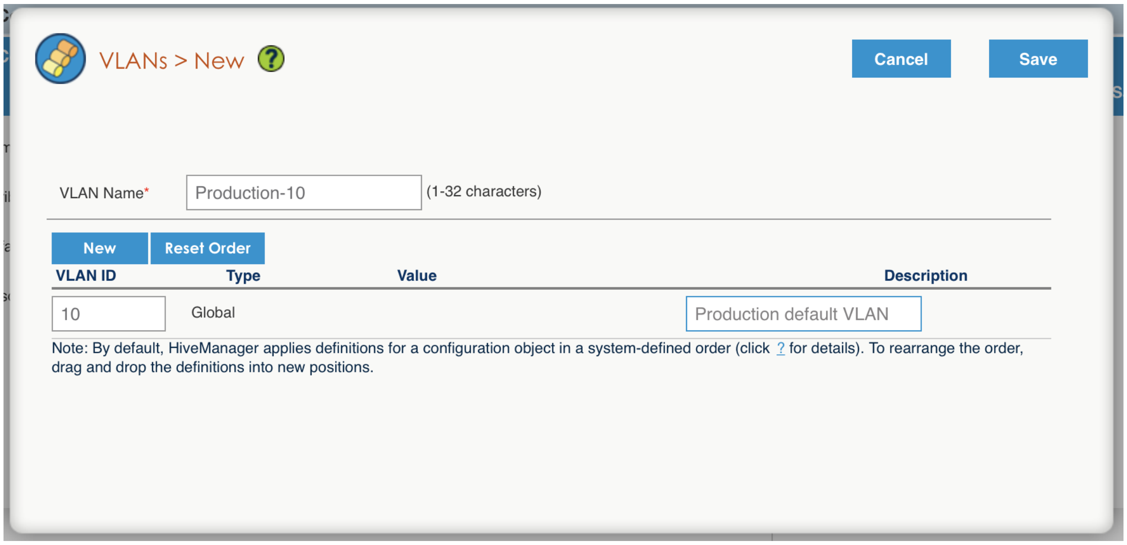
Description Production VLAN 10 (0-64 characters)

□ Allow user profiles to be managed with User Manager.

Optional Settings

- GRE Tunnels
- Firewalls
- QoS Settings
- User Profile Availability Schedules
- SLA Settings
- Client Classification Policy
- Advanced

- enter the profile name, the VLAN ID and create the default VLAN as the same as the attribute number
- create a new default VLAN, click on the **+** button



VLAN Name* Production-10 (1-32 characters)

VLAN ID	Type	Value	Description
10	Global		Production default VLAN

Note: By default, HiveManager applies definitions for a configuration object in a system-defined order (click ? for details). To rearrange the order, drag and drop the definitions into new positions.

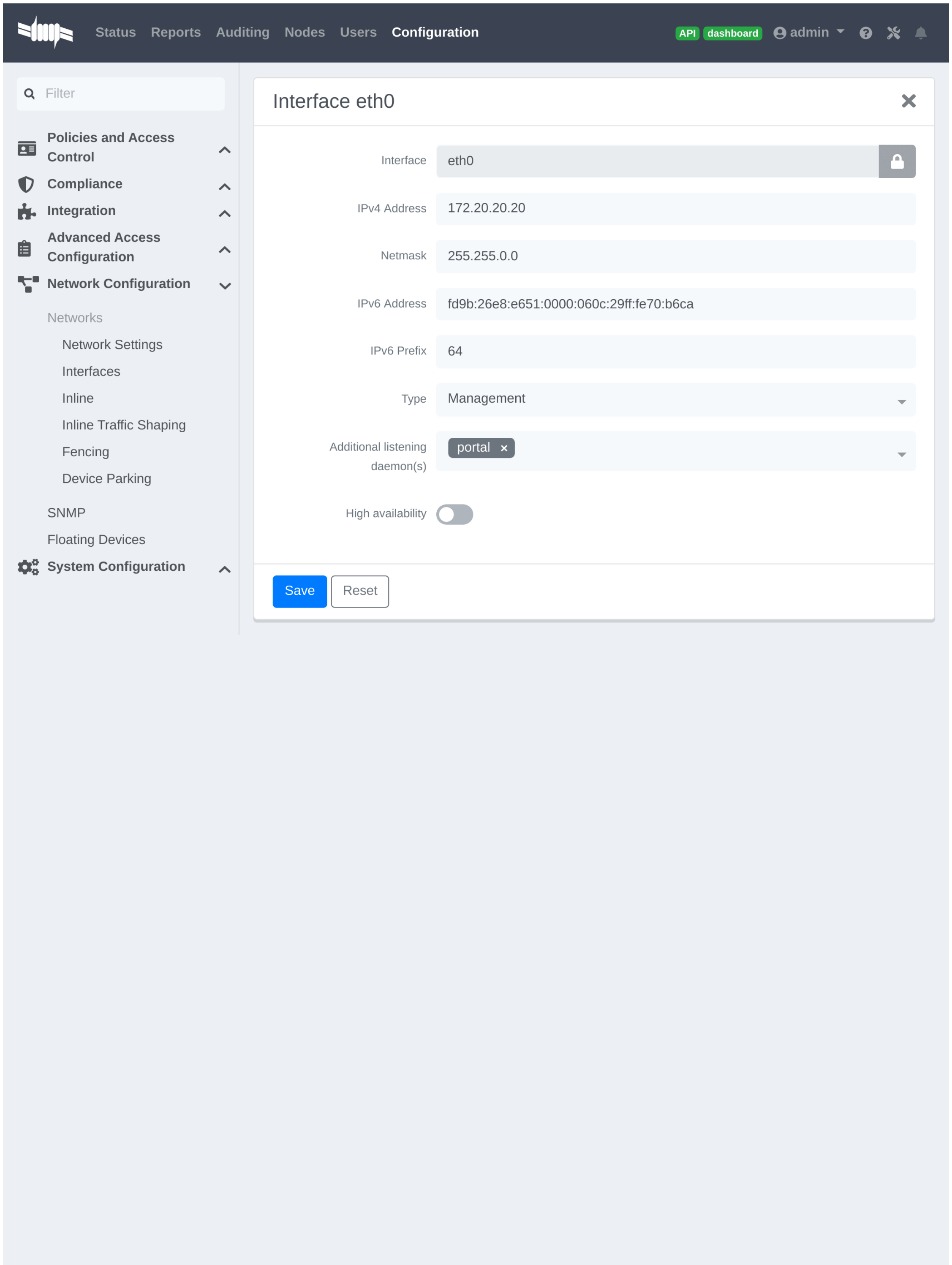
- click the Save button
- make sure the new user profile name is selected and then Save

Push the configuration to the Access Point: * click on Continue * select the AP and click Update - Update Devices * under Configuration: select **Perform a complete configuration update for all selected devices** * under HiveOS: select **Don't upgrade** * click on Update * wait until the AP is back online

Configure PacketFence

Configure the *Production* interface to send the *Portal*:

- go to **Configuration → Network Configuration → Interfaces**
- under *Logical Name*, click on your interface name,
- *Additionnal listening daemon(s)*, Add **portal**
- click on **SAVE**



Interface eth0

Interface	eth0
IPv4 Address	172.20.20.20
Netmask	255.255.0.0
IPv6 Address	fd9b:26e8:e651:0000:060c:29ff:fe70:b6ca
IPv6 Prefix	64
Type	Management
Additional listening daemon(s)	portal ×
High availability	○

6.3.3. MAC Authentication/802.1X and Web Auth Configuration

In this case we want to be able to enable a MAC Authentication/802.1X and Web Auth SSID on the same wireless equipment. By default it's not possible to provide a MAC Authentication/802.1X SSID and a Web Auth SSID with the same switch configuration, but by using the *Switch Filters* it will be possible to do it.

We will assume that we have an up and running SSID (*YourSecuredSSID*) already configured with Mac Authentication/802.1X:

- from this documentation, we will assume that the VLANs tags are defined like following :
  - PacketFence Management VLAN: 1 IP address: 192.168.1.5
  - registration VLAN ID 2,subnet 192.168.2.0/24
  - isolation VLAN ID 3, subnet 192.168.3.0/24
  - production VLAN ID 10, subnet 172.16.1.0/24

Our SSID will be named *YourOpenSSID*, assuming that we want to provide a public Internet hotspot for example.

Add a New SSID

You should create a new SSID, has explained before, secured or open, as you need.

Configure Filters in PacketFence

Logon to your PacketFence server:

- Go to **Configuration → Advanced Acccess Configuration → Filter Engines**
- From the tab **Switch filters**,
- Go to the bottom of the configuration file and set the folllowing section.

```
[enable_external_portal_on_guest_ssid]
status=enabled
description=enable_external_portal_on_guest_ssid
scopes=radius_authorize
param.0=ExternalPortalEnforcement=Y
top_op=and
param.1=VlanMap=N
condition=ssid == "YourOpenSSID"
```

Click on **SAVE**.

NOTE The default configuration in the *Switch filters* for *ExternalPortalEnforcement* is set to **N**

6.3.4. Advanced Topics

Roles (User Profiles)

PacketFence supports user profiles on the Aerohive equipment. To build a User Profile, go to **Configuration → User Profiles**, and create what you need. When you define the switch definition in PacketFence, the role will match the User Profile attribute number. For example:

```
roles=CategoryStudent=1;CategoryStaff=2
```

And in the Aerohive configuration, you have:

```
StudentProfile attribute number 1
StaffProfile attribute number 2
```

Last step is to allow the User Profile to be returned for a particular SSID. Go to **Configuration → SSIDs → Your_SSID → User Profiles for Traffic Management**, and select the User Profiles you will return for the devices.

In version 6 or later of the HiveOS, we do return VLAN ID matching the number that the **User Profile** has. Create your **User Profile** in the HiveManager as usual, assign the matching VLAN, and in PacketFence configuration add the wanted VLAN ID in the section **Roles by VLAN**.

Roles (User Profiles)

Since PacketFence 3.3.0, we now support user profiles on the AeroHIVE hardware. To build a User Profile, go to *Configuration → User Profiles*, and create what you need. When you define the switch definition in PacketFence, the role will match the User Profile attribute number. Example

```
roles=CategoryStudent=1;CategoryStaff=2
```

And in the AeroHIVE configuration, you have :

```
StudentProfile attribute number 1
StaffProfile attribute number 2
```

Last step is to allow the User Profile to be returned for a particular SSID. Go to *Configuration → SSIDs → Your_SSID → User Profiles* for Traffic Management*, and select the User Profiles you will return for the devices.

In version 6 or later of the HiveOS, we do return VLAN ID matching the number that the **User Profile** has. Create your **User Profile** in the HiveManager as usual, assign the matching VLAN, and in PacketFence configuration add the wanted VLAN ID in the section **Roles by VLAN**.

6.4. Anyfi Networks

This section will discuss about the configuration of your Anyfi Gateway and Controller in order to use it with our configured PacketFence environment.

6.4.1. Deploy Anyfi Controller and Gateway

First thing, you will need to deploy the Anyfi Gateway and Controller on your network and configure basic connectivity between both of them.

When installing the Anyfi Gateway, have one interface in trunk mode for the packet bridge. In this example it will be `eth2` which is the last card on the machine.

6.4.2. Anyfi Gateway Basic Configuration

Connect to the gateway using SSH and enter configuration mode. Now you need to add the configuration for `br0 which will link the access point traffic to your network.

```
interfaces {
    bridge br0 {
        aging 300
        hello-time 2
        max-age 20
        priority 0
        stp false
    }
}
```

In this example `eth1` will be the management interface of the Anyfi Gateway and `eth2` will be the interface that will contain the outbound WiFi traffic.

```
interfaces {
    ethernet eth1 {
        address <your management ip address>/<mask>
        duplex auto
        smp_affinity auto
        speed auto
    }
    ethernet eth2 {
        bridge-group {
            bridge br0
        }
        duplex auto
        smp_affinity auto
        speed auto
    }
}
```

6.4.3. Open SSID Configuration

Still in configuration mode, configure the RADIUS server and SSID security.

```
service {
    anyfi {
        gateway ma-gw {
            accounting {
                radius-server <Management IP of PacketFence> {
                    port 1813
                    secret useStrongerSecret
                }
            }
            authorization {
                radius-server <Management IP of PacketFence> {
                    port 1812
                    secret useStrongerSecret
                }
            }
            bridge br0
            controller <IP or FQDN of the Anyfi Controller>
            isolation
            nas {
                identifier anyfi
                port 3799
            }
            ssid DemoOpen
        }
}
```

6.4.4. Secure SSID Configuration

Still in configuration mode, configure the Anyfi Gateway to broadcast a WPA2 enterprise SSID.

```
service {
    anyfi{
        gateway secure-gw {
            authentication {
                eap {
                    radius-server <Management IP of PacketFence> {
                        port 1812
                        secret useStrongerSecret
                    }
                }
            }
            bridge br0
            controller <IP or FQDN of the Anyfi Controller>
            isolation
            ssid DemoSecure
            wpa2 {
            }
        }
    }
}
```

6.4.5. Deploy Access Point

You will now need to install CarrierWRT on a compatible access point and configure the Anyfi Controller in it. Depending on the access point you're using, the method to install CarrierWRT will vary. For specifics about the CarrierWRT installation, refer to Anyfi's documentation. Once this step is done, the SSID should be broadcasted.

6.5. Avaya

6.5.1. Wireless Controller

NOTE | To be contributed....

6.6. Aruba

6.6.1. All Aruba OS

In this section, we cover the basic configuration of the Aruba wireless controller for PacketFence via the web GUI. It was done on an Aruba Controller 200 software version ArubaOS 5.0.3.3, tested on a Controller 600 with ArubaOS 6.0 but it should apply to all Aruba models.

CAUTION | If you are already using your Aruba controllers and don't want to impact your users you should create new AAA profiles and apply them to new SSIDs instead of modifying the default ones.

NOTE | Starting with PacketFence 3.3, Aruba supports role-based access control. Read the Administration Guide under "Role-based enforcement support" for more information about how to configure it on the PacketFence side.

AAA Settings

In the Web interface, go to *Configuration → Authentication → RADIUS Server* and add a RADIUS server named "packetfence" then edit it:

- Set Host to PacketFence's IP (192.168.1.5)
- Set the Key to your RADIUS shared secret (useStrongerSecret)
- Click Apply

Under *Configuration → Authentication → Server Group* add a new Server Group named "packetfence" then edit it to add your RADIUS Server "packetfence" to the group. Click Apply.

Under *Configuration → Authentication → RFC3576* add a new server with PacketFence's IP (192.168.1.5) and your RADIUS shared secret (useStrongerSecret). Click Apply. Under *Configuration → Authentication → L2 Authentication* edit the MAC Authentication Profile called "default" then edit it to change the Delimiter to dash. Click Apply.

Under *Configuration → Authentication → L2 Authentication* edit the 802.1X Authentication Profile called "default" then edit it to uncheck the Opportunistic Key Caching under Advanced. Click Apply.

Under *Configuration → Authentication → AAA Profiles* click on the "default-mac-auth" profile then click on MAC Authentication Server Group and choose the "packetfence" server group. Click

Apply. Move to the RFC3576 server sub item and choose PacketFence’s IP (192.168.1.5) click add then apply.

Under *Configuration → Authentication → AAA Profiles* click on the "default-dot1x" profile then click on 802.1X Authentication Server Group and choose the "packetfence" server group. Click Apply. Move to the RFC3576 server sub item and choose PacketFence’s IP (192.168.1.5) click add then apply.

Public SSID

In the Web interface, go to *Configuration → AP Configuration* then edit the "default" AP Group. Go in *Wireless LAN → Virtual AP* create a new profile with the following:

- AAA Profile: default-mac-auth
- SSID Profile: Select NEW then add an SSID (PacketFence-Public) and Network authentication set to None

Secure SSID

In the Web interface, go to *Configuration → AP Configuration* then edit the "default" AP Group. Go in *Wireless LAN → Virtual AP* create a new profile with the following:

- AAA Profile: default-dot1x
- SSID Profile: Select NEW then add an SSID (PacketFence-Secure) and Network authentication set to WPA2

Roles

Since PacketFence 3.3.0, we now support roles for the Aruba hardware. To add roles, go in *Configuration → Access Control → User Roles → Add*. You don’t need to force a VLAN usage in the Role since we send also the VLAN ID along with the Aruba User Role in the RADIUS request. Refer to the Aruba User Guide for more information about the Role creation.

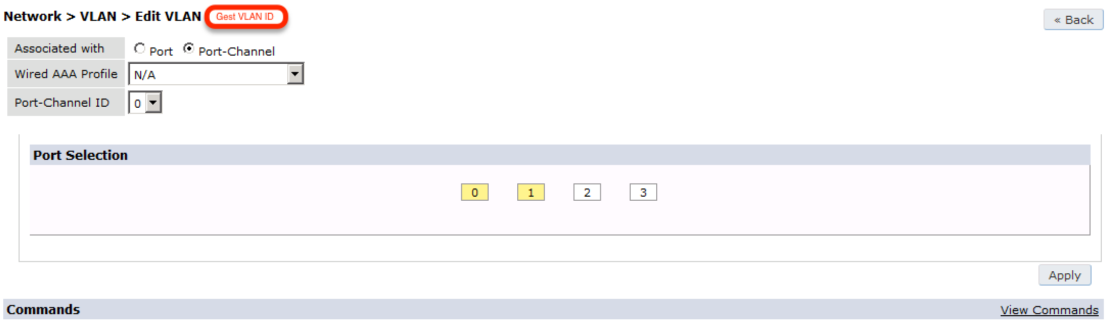
WIPS

In order to use the WIPS feature in PacketFence, please follow those simple steps to send the traps to PacketFence.

First, configure PacketFence to be a trap receiver. Under *Configuration → SNMP → Trap Receivers*, add an entry for the PF management IP. By default, all traps will be enabled. If you want to disable some, you will need to connect via CLI, and run the **snmp-server trap disable <trapname>** command.

WebAuth

First of all you will need to configure a guest VLAN.

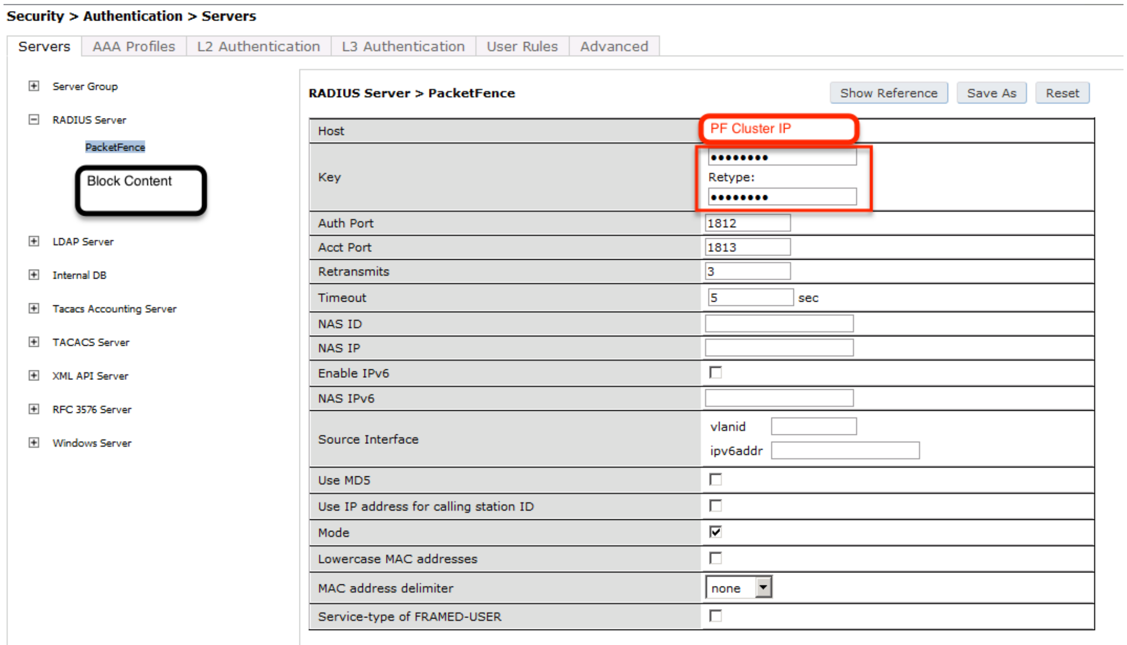


Network > VLAN > Edit VLAN Gest VLAN ID

Associated with	○ Port ● Port-Channel
Wired AAA Profile	N/A
Port-Channel ID	0

Port Selection

Next, you will need to configure a RADIUS server.



Security > Authentication > Servers

RADIUS Server > PacketFence

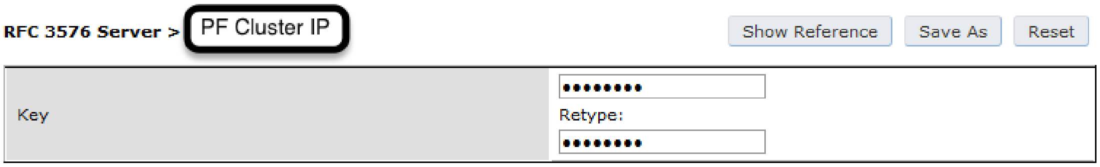
Host	PF Cluster IP
Key	•••••••• Retype: ••••••••
Auth Port	1812
Acct Port	1813
Retransmits	3
Timeout	5 sec
NAS ID	
NAS IP	
Enable IPv6	□
NAS IPv6	
Source Interface	vlanid ipv6addr
Use MD5	□
Use IP address for calling station ID	□
Mode	☑
Lowercase MAC addresses	□
MAC address delimiter	none
Service-type of FRAMED-USER	□

```
aaa authentication-server radius "packetfence"
host 192.168.1.5
key useStrongerSecret
```

Add your RADIUS server to a AAA group, under *Security → Authentication → Servers → Server Group*:

```
aaa server-group "packetfence"
auth-server "packetfence" position 1
```

Then define the `RFC 3576` server, which will allow you to do CoA.

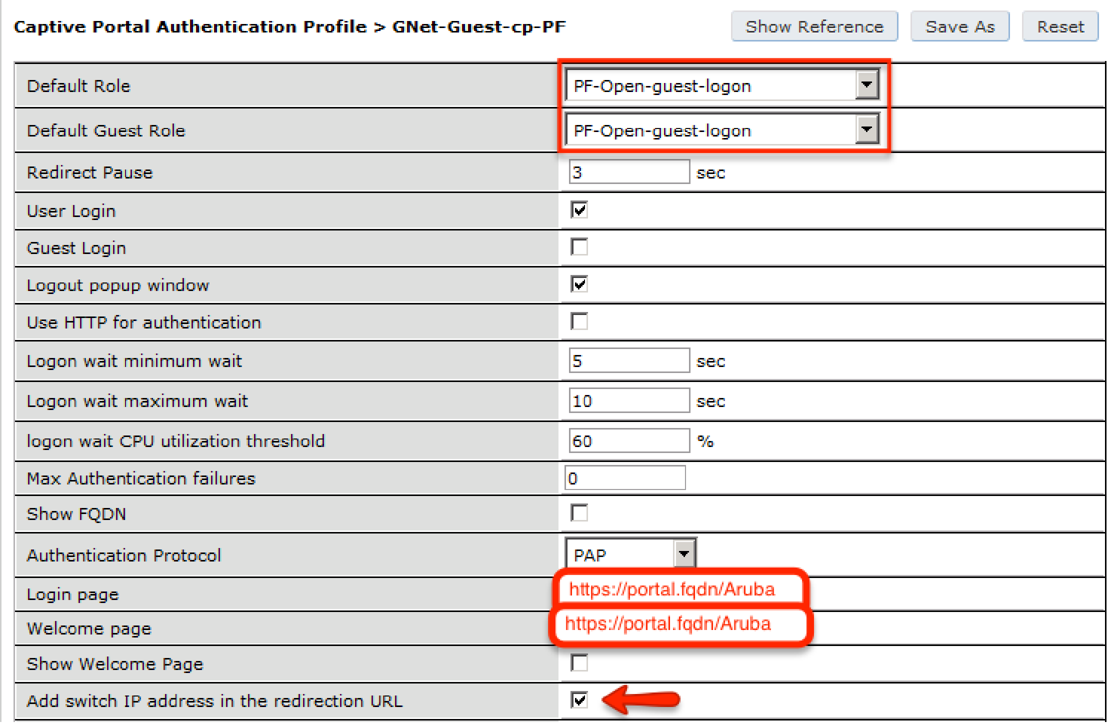


RFC 3576 Server > PF Cluster IP

Key	•••••••• Retype: ••••••••

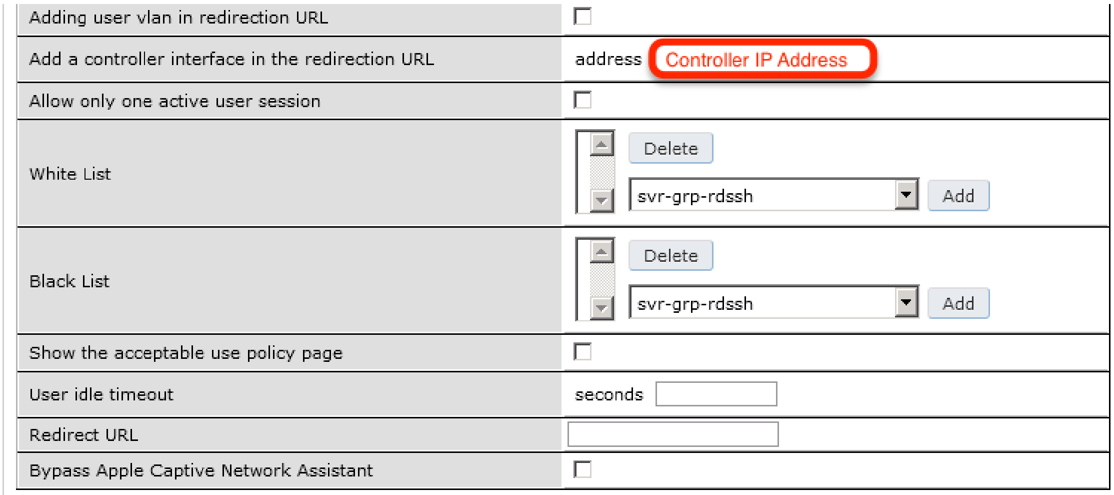
```
aaa rfc-3576-server "192.168.1.5"
key useStrongerSecret
```

Next, you will need to create the policy that will redirect users to the PacketFence captive portal when they are not authenticated. Go to *Security → Authentication → L3 Authentication → Captive Portal Authentication Profile*.



Captive Portal Authentication Profile > GNet-Guest-cp-PF

Default Role	PF-Open-guest-logon
Default Guest Role	PF-Open-guest-logon
Redirect Pause	3 sec
User Login	☑
Guest Login	□
Logout popup window	☑
Use HTTP for authentication	□
Logon wait minimum wait	5 sec
Logon wait maximum wait	10 sec
logon wait CPU utilization threshold	60 %
Max Authentication failures	0
Show FQDN	□
Authentication Protocol	PAP
Login page	https://portal.fqdn/Aruba
Welcome page	https://portal.fqdn/Aruba
Show Welcome Page	□
Add switch IP address in the redirection URL	☑



Adding user vlan in redirection URL	□
Add a controller interface in the redirection URL	address Controller IP Address
Allow only one active user session	□
White List	Delete svr-grp-rdssh Add
Black List	Delete svr-grp-rdssh Add
Show the acceptable use policy page	□
User idle timeout	seconds
Redirect URL	
Bypass Apple Captive Network Assistant	□

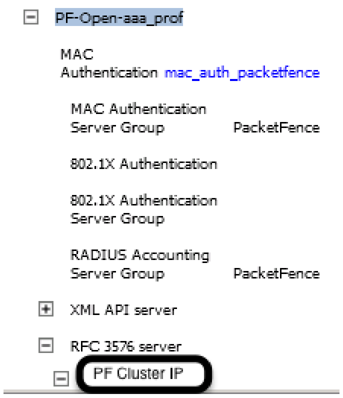
```
aaa authentication captive-portal "packetfence-externalportal"
default-role auth-guest
redirect-pause 3
no logout-popup-window
login-page https://192.168.1.5/Aruba
switchip-in-redirection-url
```

Now create the policy for the guest access, for example Internet only.

Add the authentication for the Captive Portal Profile via *Security → Authentication → L3 Authentication → Captive Portal Authentication Profile → Server Group*:

```
aaa authentication captive-portal "packetfence-externalportal"
server-group "packetfence"
```

Adjust the configuration of the AAA profile through *Security → Authentication → Profiles → AAA Profiles*:



PF-Open-aaa_prof

MAC Authentication mac_auth_packetfence

MAC Authentication Server Group PacketFence

802.1X Authentication

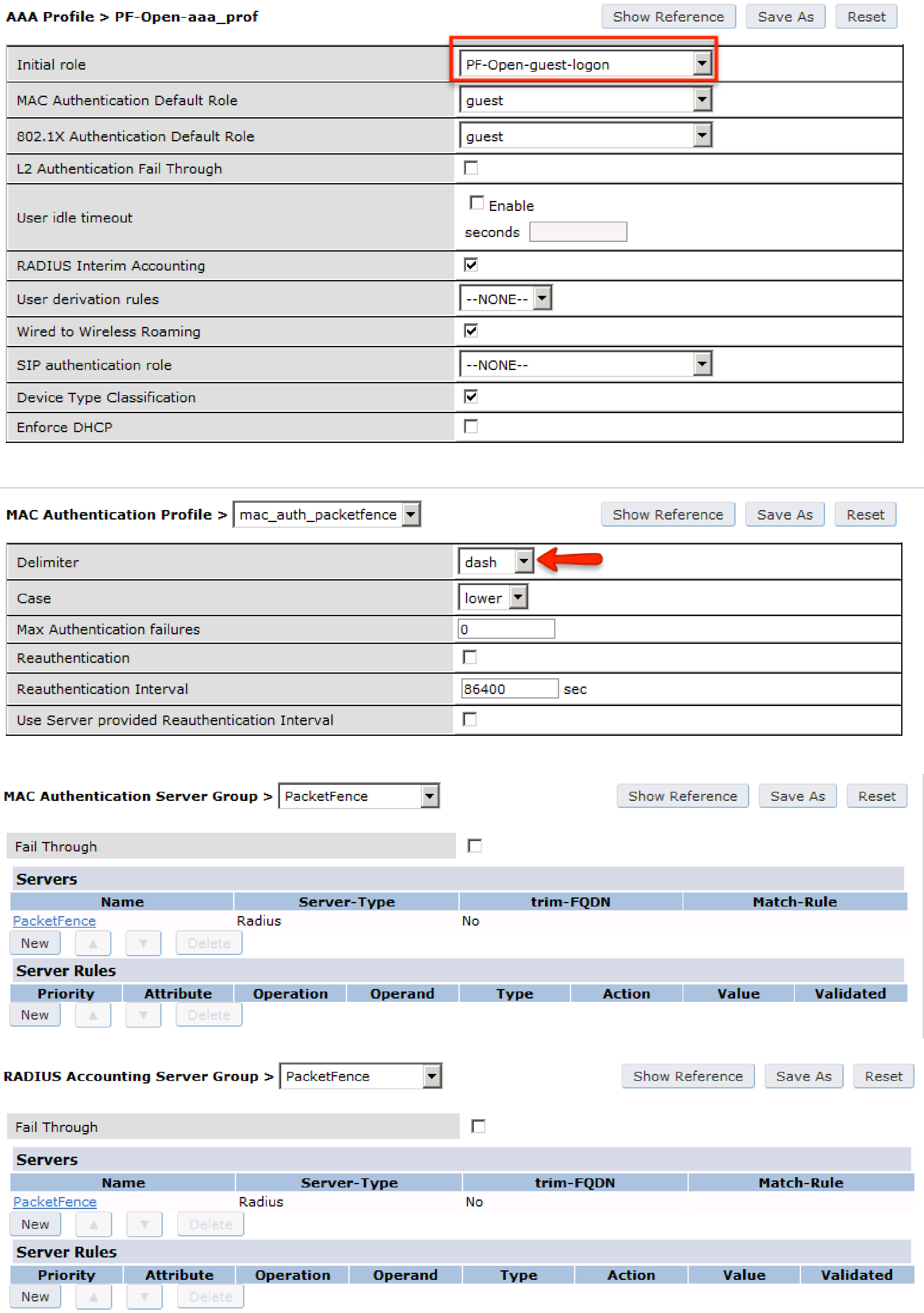
802.1X Authentication Server Group

RADIUS Accounting Server Group PacketFence

XML API server

RFC 3576 server

PF Cluster IP



AAA Profile > PF-Open-aaa_prof

Initial role	PF-Open-guest-logon
MAC Authentication Default Role	guest
802.1X Authentication Default Role	guest
L2 Authentication Fail Through	☐
User idle timeout	☐ Enable seconds
RADIUS Interim Accounting	☑
User derivation rules	--NONE--
Wired to Wireless Roaming	☑
SIP authentication role	--NONE--
Device Type Classification	☑
Enforce DHCP	☐

MAC Authentication Profile > mac_auth_packetfence

Delimiter	dash
Case	lower
Max Authentication failures	0
Reauthentication	☐
Reauthentication Interval	86400 sec
Use Server provided Reauthentication Interval	☐

MAC Authentication Server Group > PacketFence

Fail Through ☐

Servers

Name	Server-Type	trim-FQDN	Match-Rule
PacketFence	Radius	No	

Server Rules

Priority	Attribute	Operation	Operand	Type	Action	Value	Validated

RADIUS Accounting Server Group > PacketFence

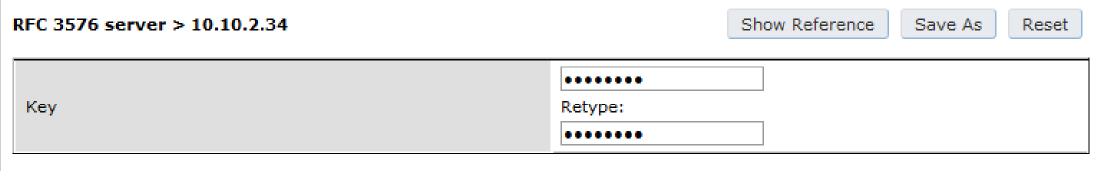
Fail Through ☐

Servers

Name	Server-Type	trim-FQDN	Match-Rule
PacketFence	Radius	No	

Server Rules

Priority	Attribute	Operation	Operand	Type	Action	Value	Validated


RFC 3576 server > 10.10.2.34

Key	•••••••• Retype: ••••••••

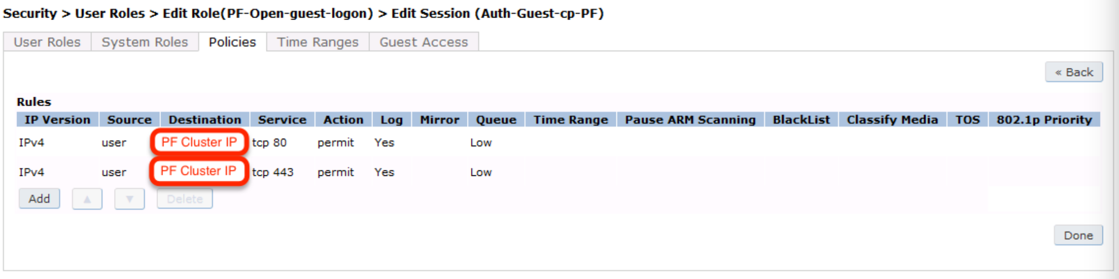
```
aaa profile "packetfence-externalportal"
initial-role packetfence-portal
radius-interim-accounting
radius-accounting "packetfence"
rfc-3576-server "192.168.1.5"
```

Define a policy to permit the traffic.

First add a destination, *Advanced Services → Stateful Firewall → Destinations*:

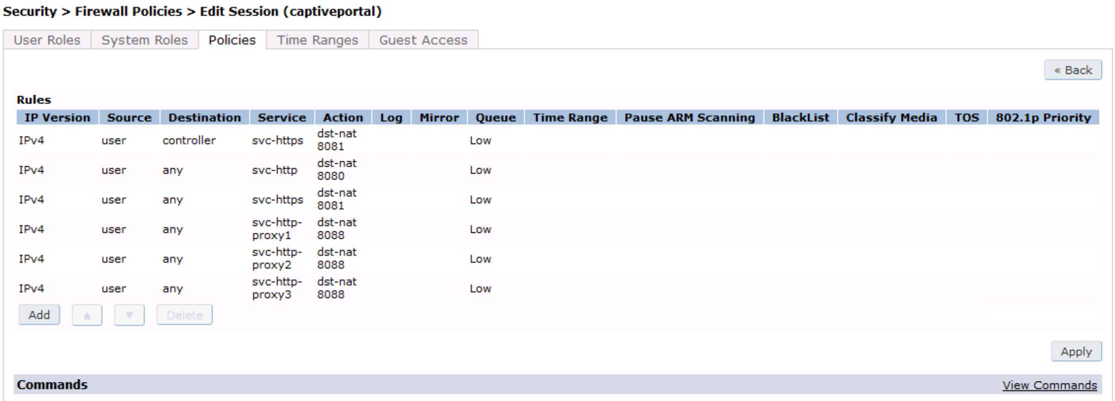
```
netdestination packetfence-portal
host 192.168.1.5
```

Create an ACL for the redirection, *Security → Firewall Policies*:


Security > User Roles > Edit Role(PF-Open-guest-logon) > Edit Session (Auth-Guest-cp-PF)

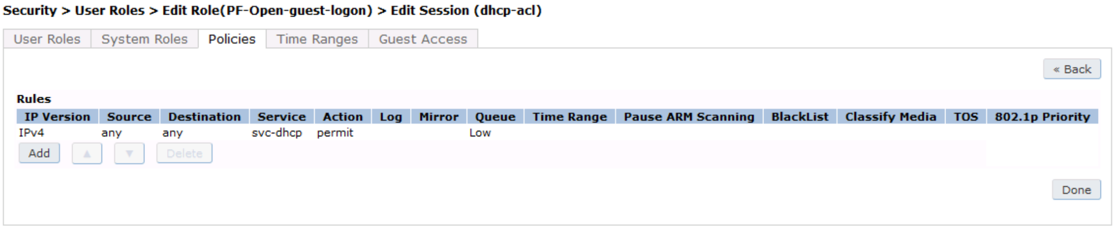
Rules

IP Version	Source	Destination	Service	Action	Log	Mirror	Queue	Time Range	Pause ARM Scanning	BlackList	Classify Media	TOS	802.1p Priority
IPv4	user	PF Cluster IP	tcp 80	permit	Yes		Low						
IPv4	user	PF Cluster IP	tcp 443	permit	Yes		Low						


Security > Firewall Policies > Edit Session (captiveportal)

Rules

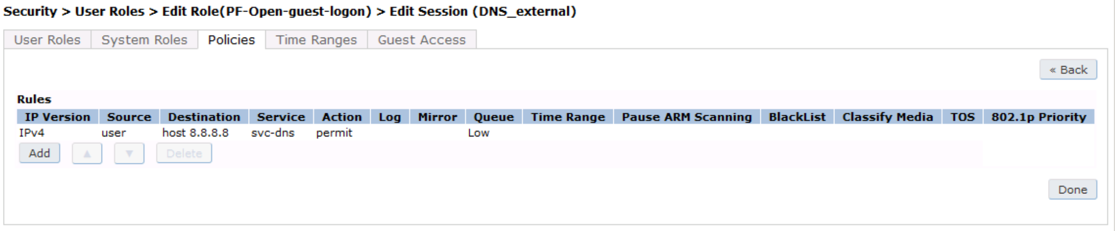
IP Version	Source	Destination	Service	Action	Log	Mirror	Queue	Time Range	Pause ARM Scanning	BlackList	Classify Media	TOS	802.1p Priority
IPv4	user	controller	svc-https	dst-nat 8081			Low						
IPv4	user	any	svc-http	dst-nat 8080			Low						
IPv4	user	any	svc-https	dst-nat 8081			Low						
IPv4	user	any	svc-http-proxy1	dst-nat 8088			Low						
IPv4	user	any	svc-http-proxy2	dst-nat 8088			Low						
IPv4	user	any	svc-http-proxy3	dst-nat 8088			Low						



Security > User Roles > Edit Role(PF-Open-guest-logon) > Edit Session (dhcp-acl)

Rules

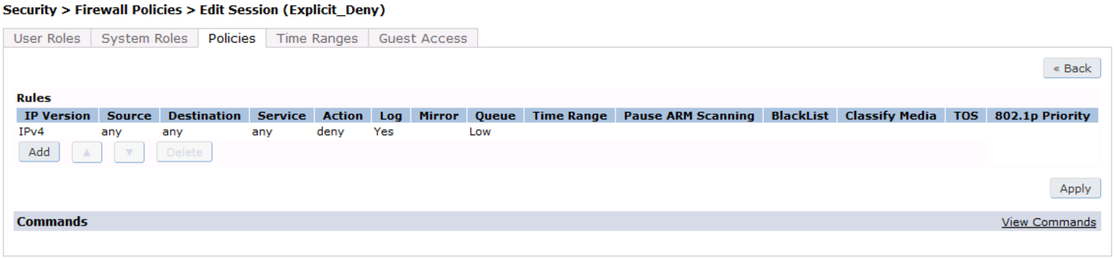
IP Version	Source	Destination	Service	Action	Log	Mirror	Queue	Time Range	Pause ARM Scanning	BlackList	Classify Media	TOS	802.1p Priority
IPv4	any	any	svc-dhcp	permit			Low						



Security > User Roles > Edit Role(PF-Open-guest-logon) > Edit Session (DNS_external)

Rules

IP Version	Source	Destination	Service	Action	Log	Mirror	Queue	Time Range	Pause ARM Scanning	BlackList	Classify Media	TOS	802.1p Priority
IPv4	user	host 8.8.8.8	svc-dns	permit			Low						



Security > Firewall Policies > Edit Session (Explicit_Deny)

Rules

IP Version	Source	Destination	Service	Action	Log	Mirror	Queue	Time Range	Pause ARM Scanning	BlackList	Classify Media	TOS	802.1p Priority
IPv4	any	any	any	deny	Yes		Low						

Source NAT on VLAN

```
ip access-list session "packetfence-externalportal"
alias "user" alias "packetfence-portal" "svc-http" permit queue low
alias "user" alias "packetfence-portal" "svc-https" permit queue low
```

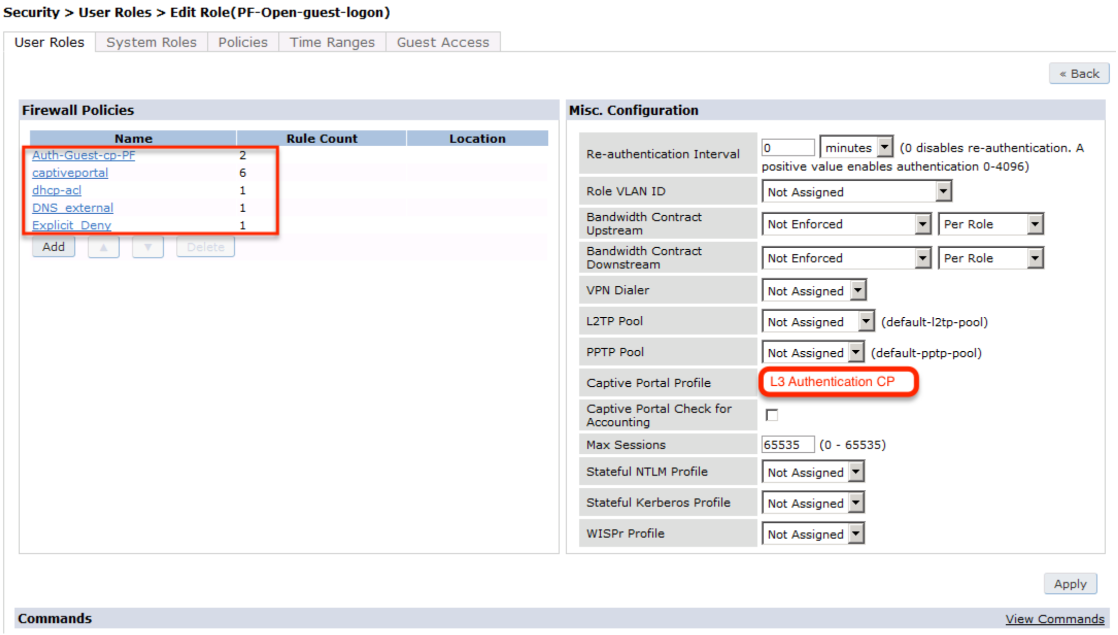
Enable the "firewall allow-tri-session" :

```
firewall allow-tri-session
```

Source NAT per Application

```
ip access-list session "packetfence-externalportal"
alias "user" alias "packetfence-portal" "svc-http" src-nat queue low
alias "user" alias "packetfence-portal" "svc-https" src-nat queue low
```

Now add the newly created policy to the Captive Portal Profile, *Security → User Roles*:



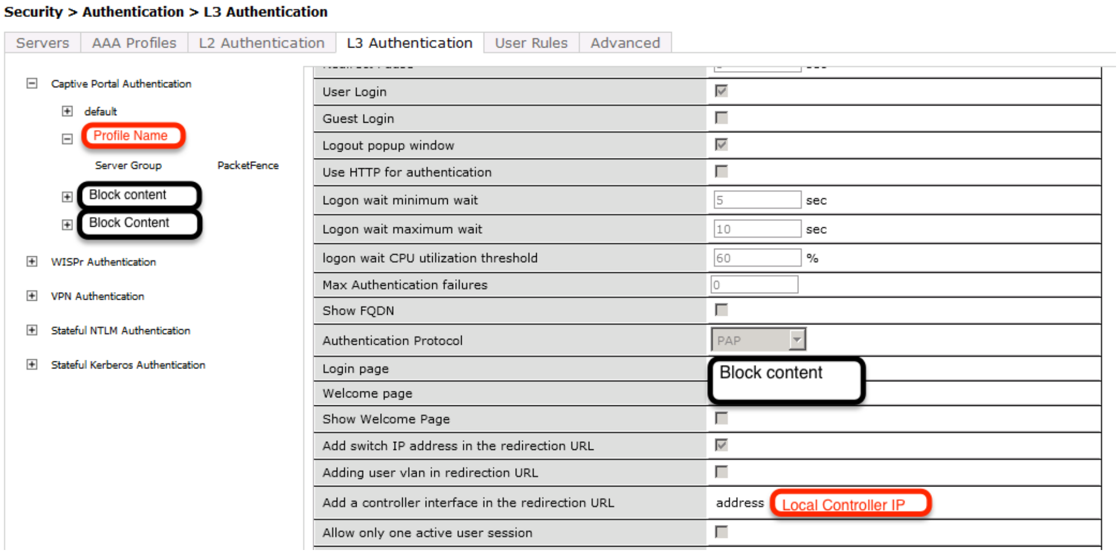
Security > User Roles > Edit Role(PF-Open-guest-logon)

Firewall Policies

Name	Rule Count	Location
Auth-Guest-cp-PF	2	
captiveportal	6	
dhcp-acl	1	
DNS_external	1	
Explicit_Deny	1	

Misc. Configuration

Re-authentication Interval	0 minutes (0 disables re-authentication. A positive value enables authentication 0-4096)
Role VLAN ID	Not Assigned
Bandwidth Contract Upstream	Not Enforced / Per Role
Bandwidth Contract Downstream	Not Enforced / Per Role
VPN Dialer	Not Assigned
L2TP Pool	Not Assigned (default-l2tp-pool)
PPTP Pool	Not Assigned (default-pptp-pool)
Captive Portal Profile	L3 Authentication CP
Captive Portal Check for Accounting	☐
Max Sessions	65535 (0 - 65535)
Stateful NTLM Profile	Not Assigned
Stateful Kerberos Profile	Not Assigned
WISPr Profile	Not Assigned



Security > Authentication > L3 Authentication

- Captive Portal Authentication
  - default
  - Profile Name
    - Server Group PacketFence
  - Block content
  - Block Content
- WISPr Authentication
- VPN Authentication
- Stateful NTLM Authentication
- Stateful Kerberos Authentication

User Login	☑
Guest Login	☐
Logout popup window	☑
Use HTTP for authentication	☐
Logon wait minimum wait	5 sec
Logon wait maximum wait	10 sec
logon wait CPU utilization threshold	60 %
Max Authentication failures	0
Show FQDN	☐
Authentication Protocol	PAP
Login page	Block content
Welcome page	
Show Welcome Page	☐
Add switch IP address in the redirection URL	☑
Adding user vlan in redirection URL	☐
Add a controller interface in the redirection URL	address Local Controller IP
Allow only one active user session	☐

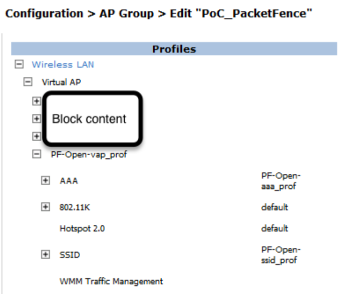
```
user-role "packetfence-portal"
access-list session "packetfence-externalportal" position 1
access-list session "captiveportal" position 2
access-list session "guest-logon-access" position 3
access-list session "block-internal-access" position 4
access-list session "v6-logon-control" position 5
access-list session "captiveportal6" position 6
captive-portal "packetfence-externalportal"
```

Finaly create the SSID and associate the profile to it, `Virtual AP profile`:

```
wlan virtual-ap "packetfence-externalportal"
```

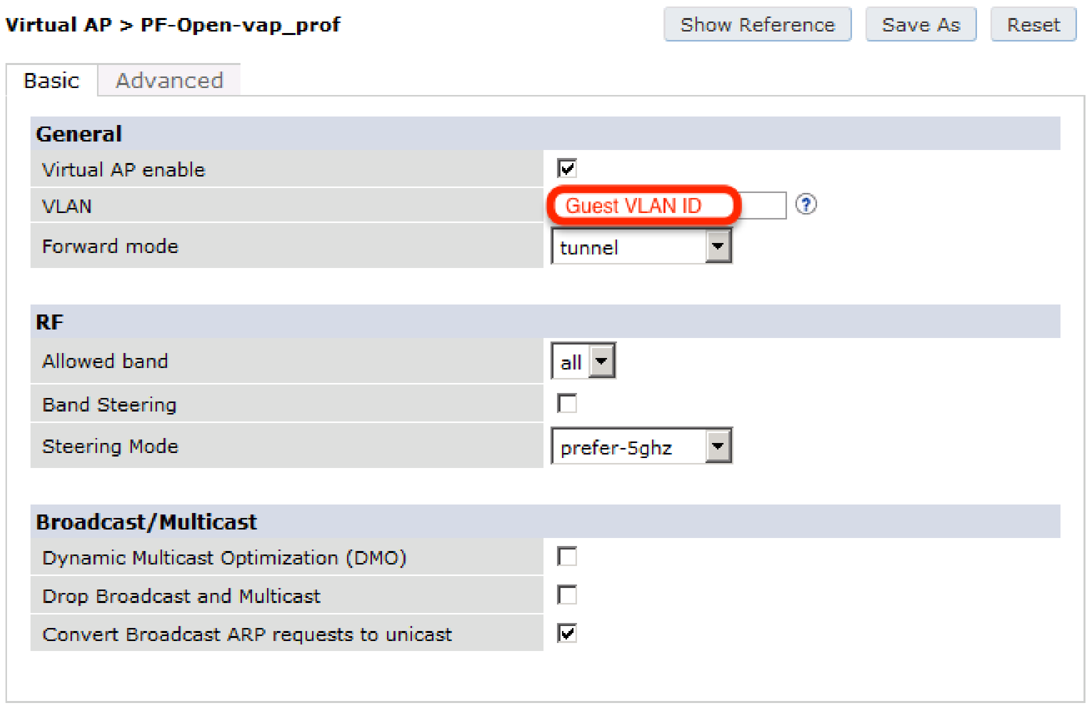
```
ssid-profile "packetfence-externalportal"
aaa-profile "packetfence"
```

General AP settings and master-slave controller case.



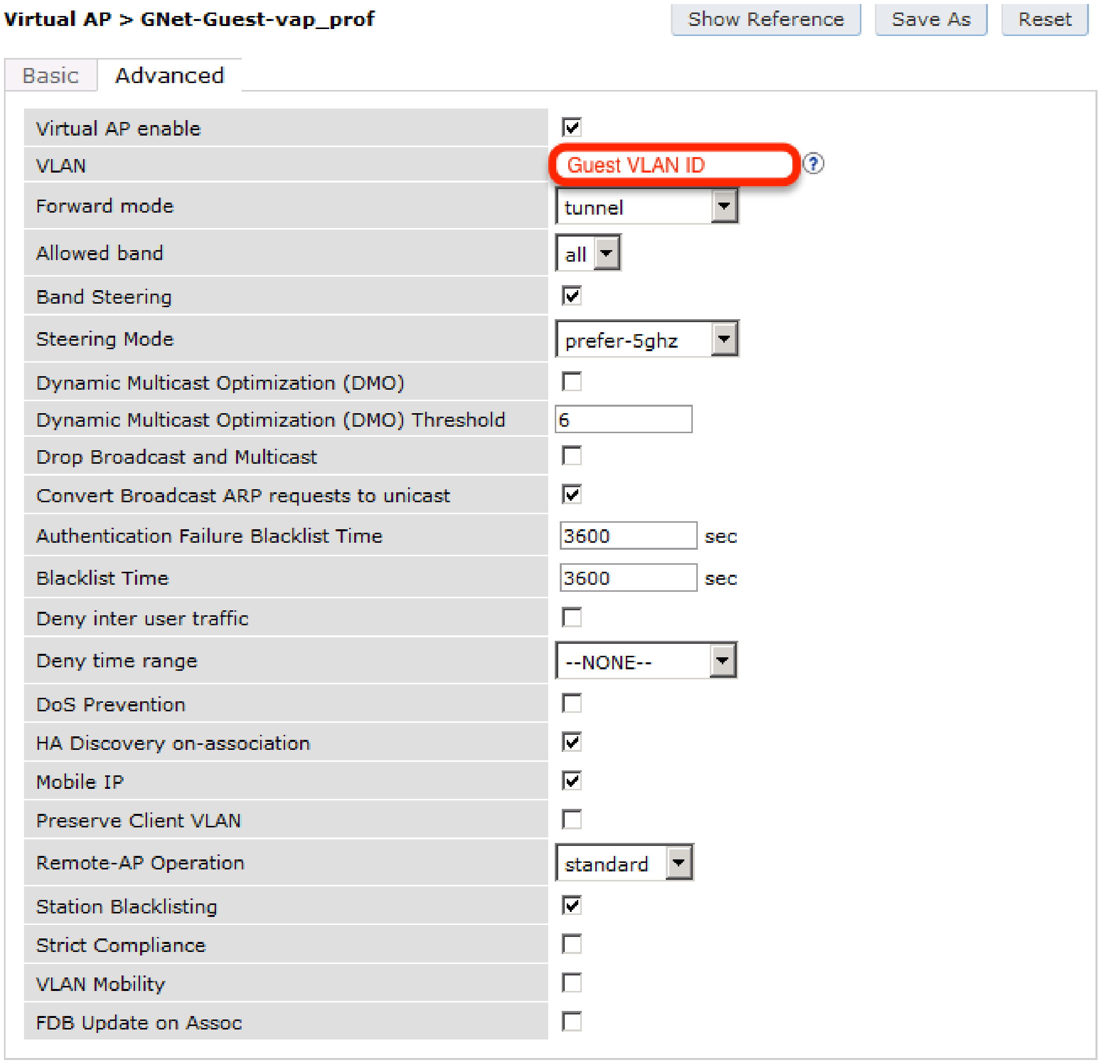
Configuration > AP Group > Edit "PoC_PacketFence"

Profiles	
⊟ Wireless LAN	
⊟ Virtual AP	
⊞ Block content	
⊞	
⊞	
⊟ PF-Open-vap_prof	
⊞ AAA	PF-Open-aaa_prof
⊞ 802.11K	default
Hotspot 2.0	default
⊞ SSID	PF-Open-ssid_prof
WMM Traffic Management	

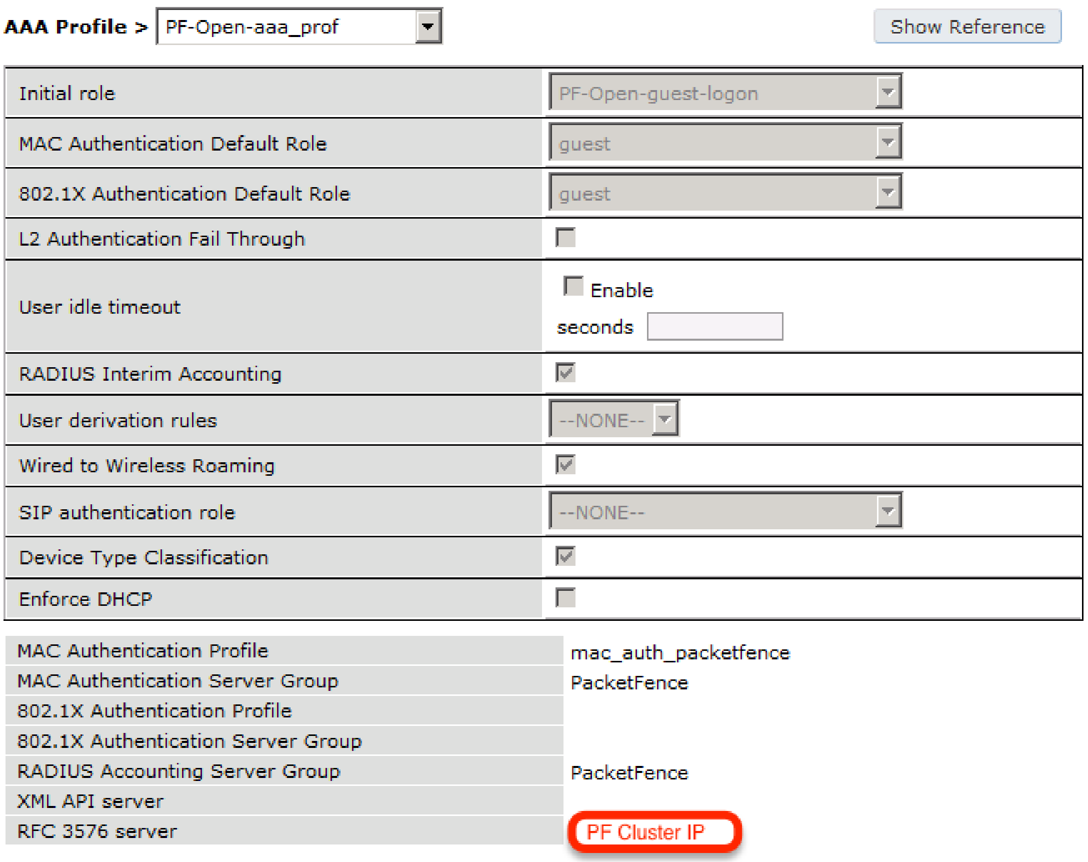


Virtual AP > PF-Open-vap_prof

General	
Virtual AP enable	☑
VLAN	Guest VLAN ID
Forward mode	tunnel
RF	
Allowed band	all
Band Steering	☐
Steering Mode	prefer-5ghz
Broadcast/Multicast	
Dynamic Multicast Optimization (DMO)	☐
Drop Broadcast and Multicast	☐
Convert Broadcast ARP requests to unicast	☑



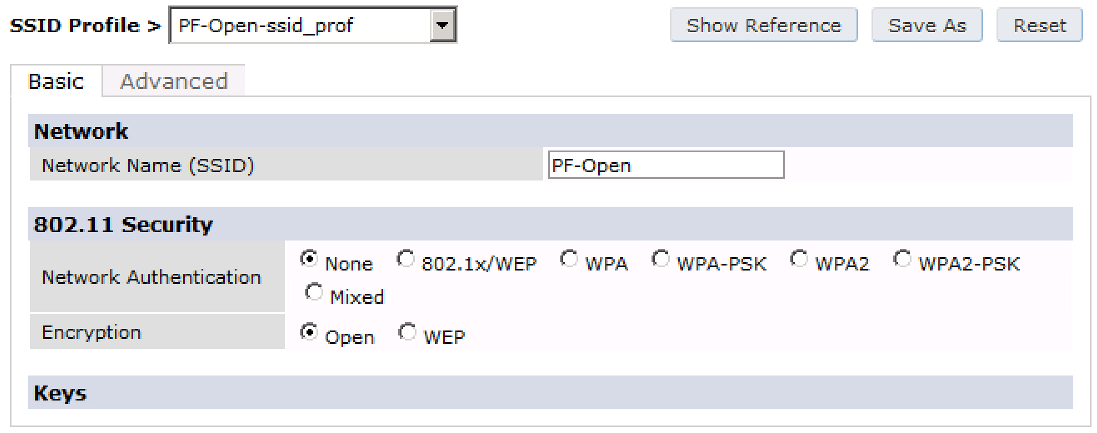
Virtual AP enable	☑
VLAN	Guest VLAN ID
Forward mode	tunnel
Allowed band	all
Band Steering	☑
Steering Mode	prefer-5ghz
Dynamic Multicast Optimization (DMO)	□
Dynamic Multicast Optimization (DMO) Threshold	6
Drop Broadcast and Multicast	□
Convert Broadcast ARP requests to unicast	☑
Authentication Failure Blacklist Time	3600 sec
Blacklist Time	3600 sec
Deny inter user traffic	□
Deny time range	--NONE--
DoS Prevention	□
HA Discovery on-association	☑
Mobile IP	☑
Preserve Client VLAN	□
Remote-AP Operation	standard
Station Blacklisting	☑
Strict Compliance	□
VLAN Mobility	□
FDB Update on Assoc	□



AAA Profile > PF-Open-aaa_prof

Initial role	PF-Open-guest-logon
MAC Authentication Default Role	guest
802.1X Authentication Default Role	guest
L2 Authentication Fail Through	□
User idle timeout	□ Enable seconds
RADIUS Interim Accounting	☑
User derivation rules	--NONE--
Wired to Wireless Roaming	☑
SIP authentication role	--NONE--
Device Type Classification	☑
Enforce DHCP	□

MAC Authentication Profile	mac_auth_packetfence
MAC Authentication Server Group	PacketFence
802.1X Authentication Profile	
802.1X Authentication Server Group	
RADIUS Accounting Server Group	PacketFence
XML API server	
RFC 3576 server	PF Cluster IP



SSID Profile > PF-Open-ssid_prof

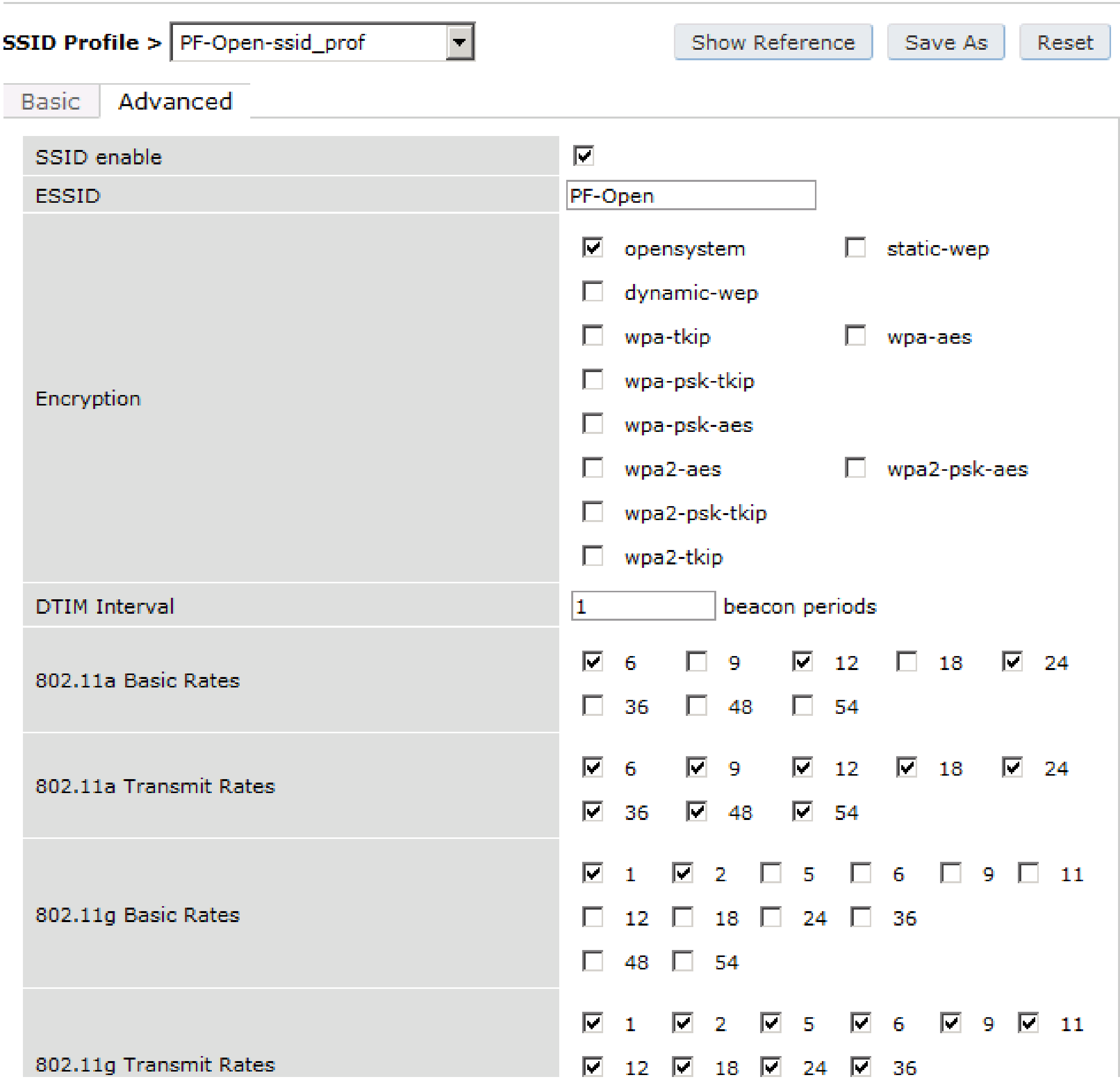
Network

Network Name (SSID)	PF-Open

802.11 Security

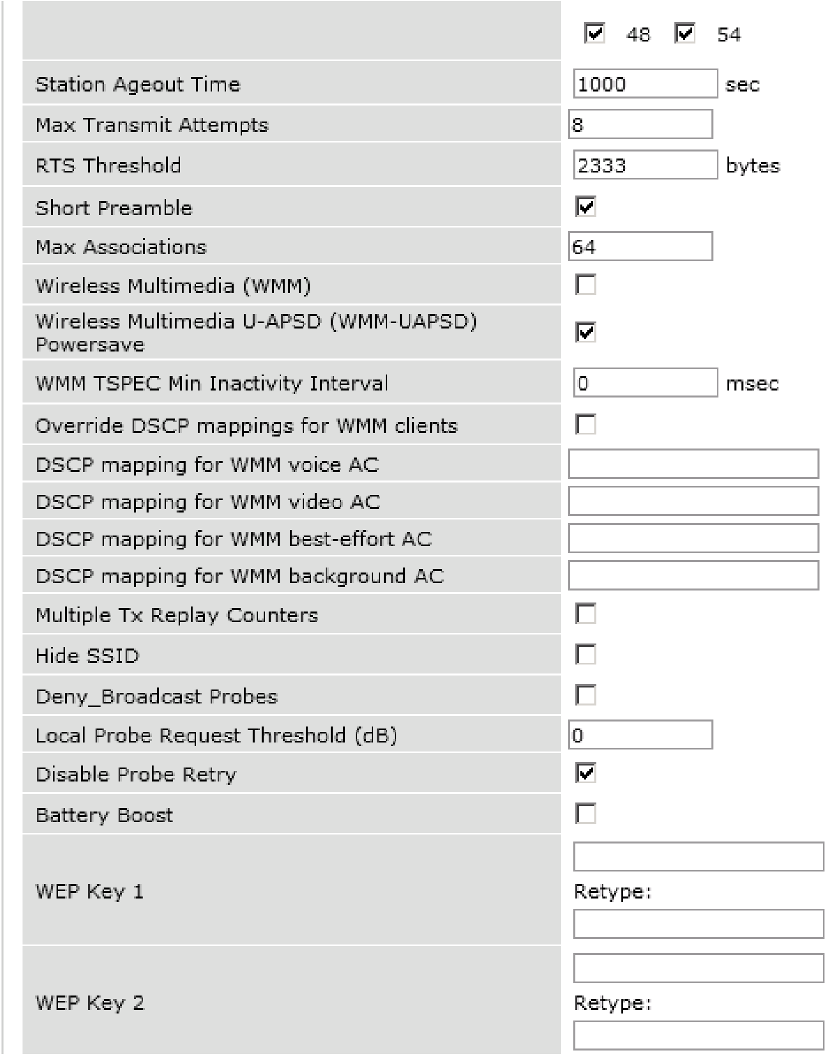
Network Authentication	● None ○ 802.1x/WEP ○ WPA ○ WPA-PSK ○ WPA2 ○ WPA2-PSK ○ Mixed
Encryption	● Open ○ WEP

Keys

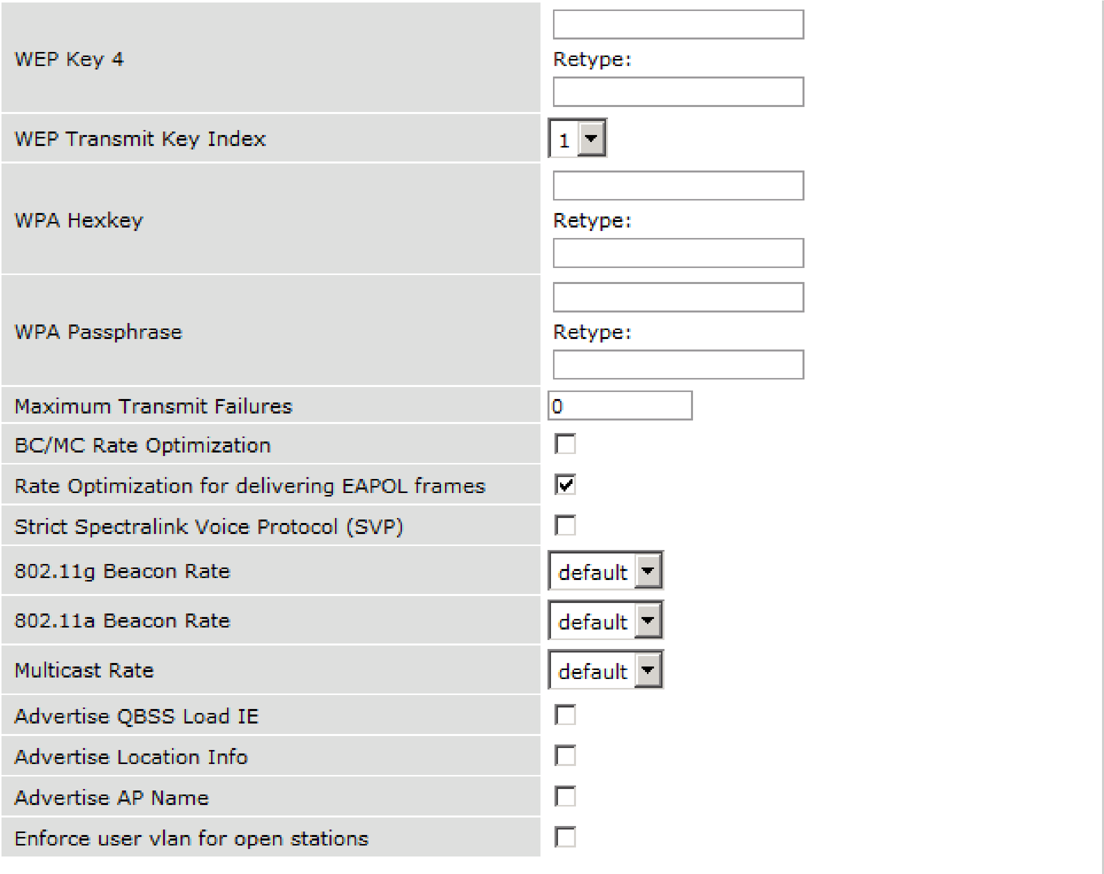


SSID Profile > PF-Open-ssid_prof

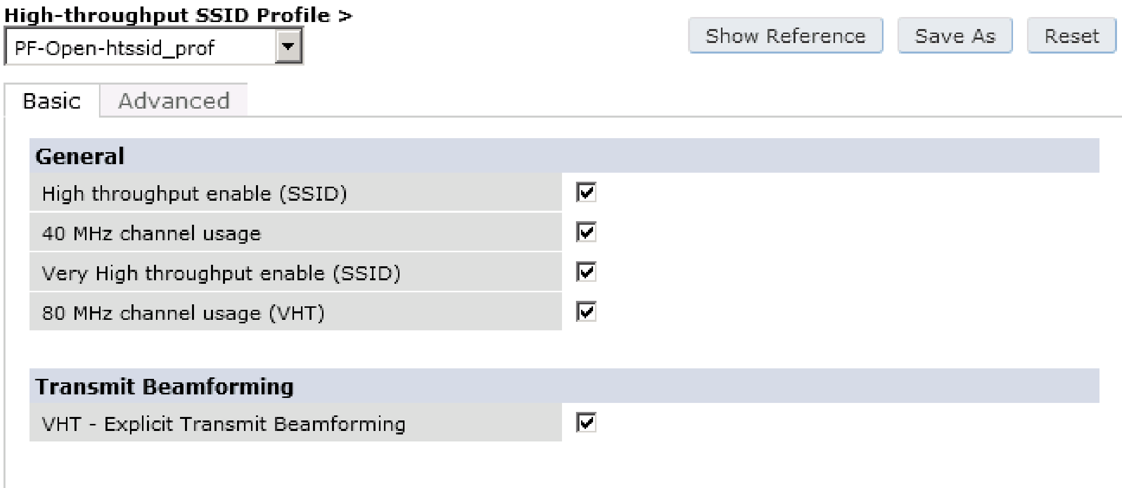
SSID enable	☑
ESSID	PF-Open
Encryption	☑ opensystem ☐ static-wep ☐ dynamic-wep ☐ wpa-tkip ☐ wpa-aes ☐ wpa-psk-tkip ☐ wpa-psk-aes ☐ wpa2-aes ☐ wpa2-psk-aes ☐ wpa2-psk-tkip ☐ wpa2-tkip
DTIM Interval	1 beacon periods
802.11a Basic Rates	☑ 6 ☐ 9 ☑ 12 ☐ 18 ☑ 24 ☐ 36 ☐ 48 ☐ 54
802.11a Transmit Rates	☑ 6 ☑ 9 ☑ 12 ☑ 18 ☑ 24 ☑ 36 ☑ 48 ☑ 54
802.11g Basic Rates	☑ 1 ☑ 2 ☐ 5 ☐ 6 ☐ 9 ☐ 11 ☐ 12 ☐ 18 ☐ 24 ☐ 36 ☐ 48 ☐ 54
802.11g Transmit Rates	☑ 1 ☑ 2 ☑ 5 ☑ 6 ☑ 9 ☑ 11 ☑ 12 ☑ 18 ☑ 24 ☑ 36



	☑ 48 ☑ 54
Station Ageout Time	1000 sec
Max Transmit Attempts	8
RTS Threshold	2333 bytes
Short Preamble	☑
Max Associations	64
Wireless Multimedia (WMM)	□
Wireless Multimedia U-APSD (WMM-UAPSD) Powersave	☑
WMM TSPEC Min Inactivity Interval	0 msec
Override DSCP mappings for WMM clients	□
DSCP mapping for WMM voice AC	
DSCP mapping for WMM video AC	
DSCP mapping for WMM best-effort AC	
DSCP mapping for WMM background AC	
Multiple Tx Replay Counters	□
Hide SSID	□
Deny_Broadcast Probes	□
Local Probe Request Threshold (dB)	0
Disable Probe Retry	☑
Battery Boost	□
WEP Key 1	Retype:
WEP Key 2	Retype:



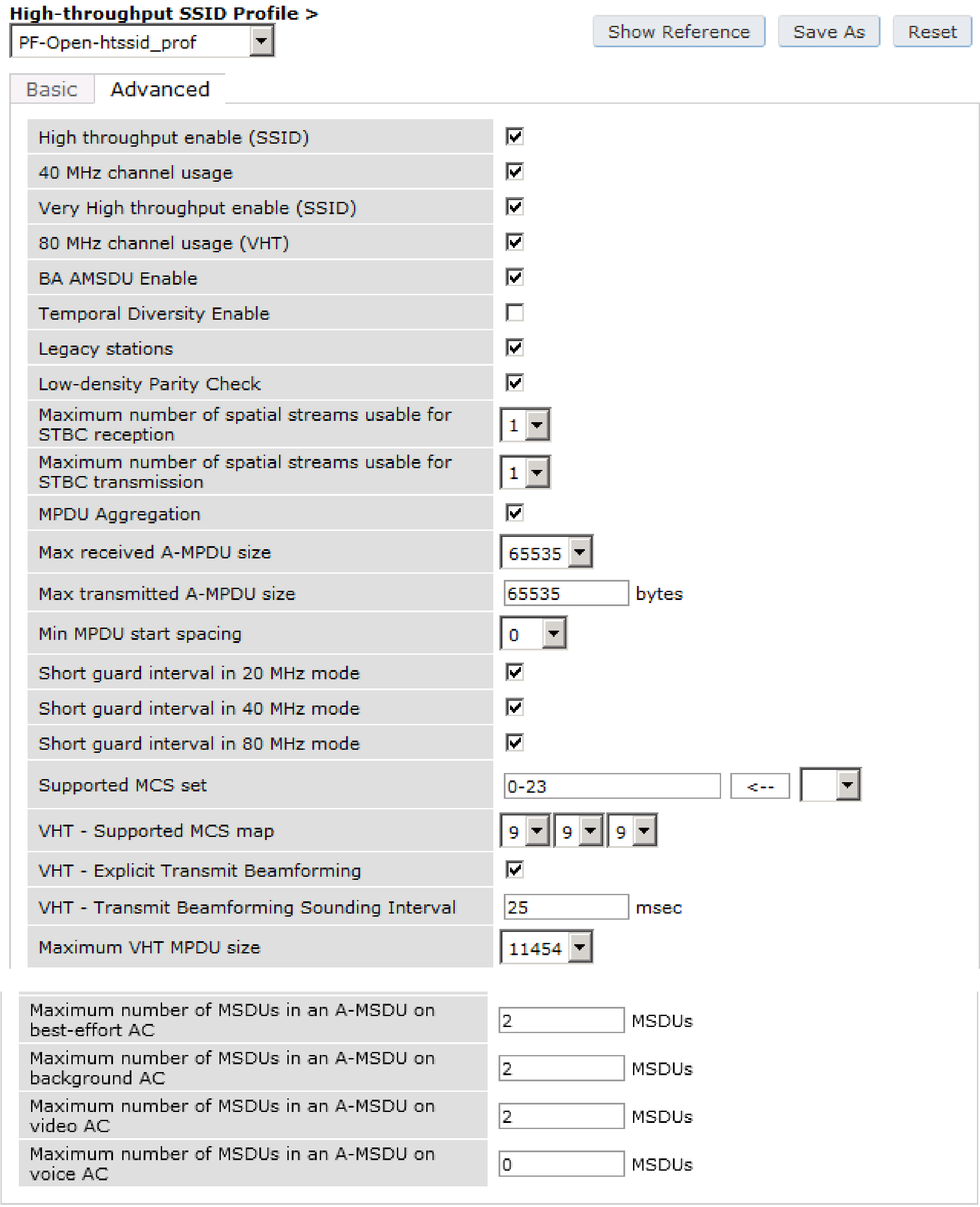
WEP Key 4	Retype:
WEP Transmit Key Index	1
WPA Hexkey	Retype:
WPA Passphrase	Retype:
Maximum Transmit Failures	0
BC/MC Rate Optimization	□
Rate Optimization for delivering EAPOL frames	☑
Strict Spectralink Voice Protocol (SVP)	□
802.11g Beacon Rate	default
802.11a Beacon Rate	default
Multicast Rate	default
Advertise QBSS Load IE	□
Advertise Location Info	□
Advertise AP Name	□
Enforce user vlan for open stations	□



High-throughput SSID Profile >

PF-Open-htssid_prof

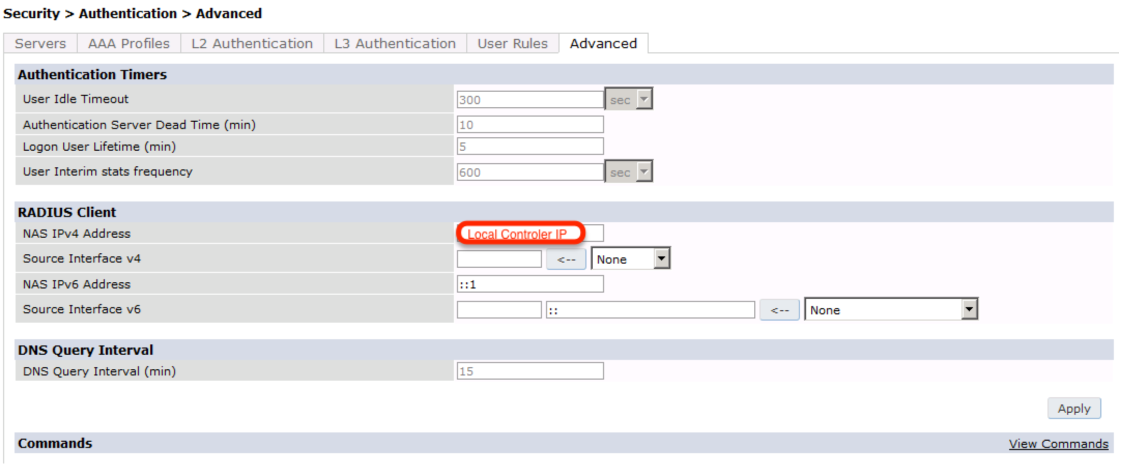
General	
High throughput enable (SSID)	☑
40 MHz channel usage	☑
Very High throughput enable (SSID)	☑
80 MHz channel usage (VHT)	☑
Transmit Beamforming	
VHT - Explicit Transmit Beamforming	☑



High-throughput SSID Profile >

PF-Open-htssid_prof

High throughput enable (SSID)	☑
40 MHz channel usage	☑
Very High throughput enable (SSID)	☑
80 MHz channel usage (VHT)	☑
BA AMSDU Enable	☑
Temporal Diversity Enable	□
Legacy stations	☑
Low-density Parity Check	☑
Maximum number of spatial streams usable for STBC reception	1
Maximum number of spatial streams usable for STBC transmission	1
MPDU Aggregation	☑
Max received A-MPDU size	65535
Max transmitted A-MPDU size	65535 bytes
Min MPDU start spacing	0
Short guard interval in 20 MHz mode	☑
Short guard interval in 40 MHz mode	☑
Short guard interval in 80 MHz mode	☑
Supported MCS set	0-23 <--
VHT - Supported MCS map	9 9 9
VHT - Explicit Transmit Beamforming	☑
VHT - Transmit Beamforming Sounding Interval	25 msec
Maximum VHT MPDU size	11454
Maximum number of MSDUs in an A-MSDU on best-effort AC	2 MSDUs
Maximum number of MSDUs in an A-MSDU on background AC	2 MSDUs
Maximum number of MSDUs in an A-MSDU on video AC	2 MSDUs
Maximum number of MSDUs in an A-MSDU on voice AC	0 MSDUs



Security > Authentication > Advanced

Authentication Timers

User Idle Timeout	300 sec
Authentication Server Dead Time (min)	10
Logon User Lifetime (min)	5
User Interim stats frequency	600 sec

RADIUS Client

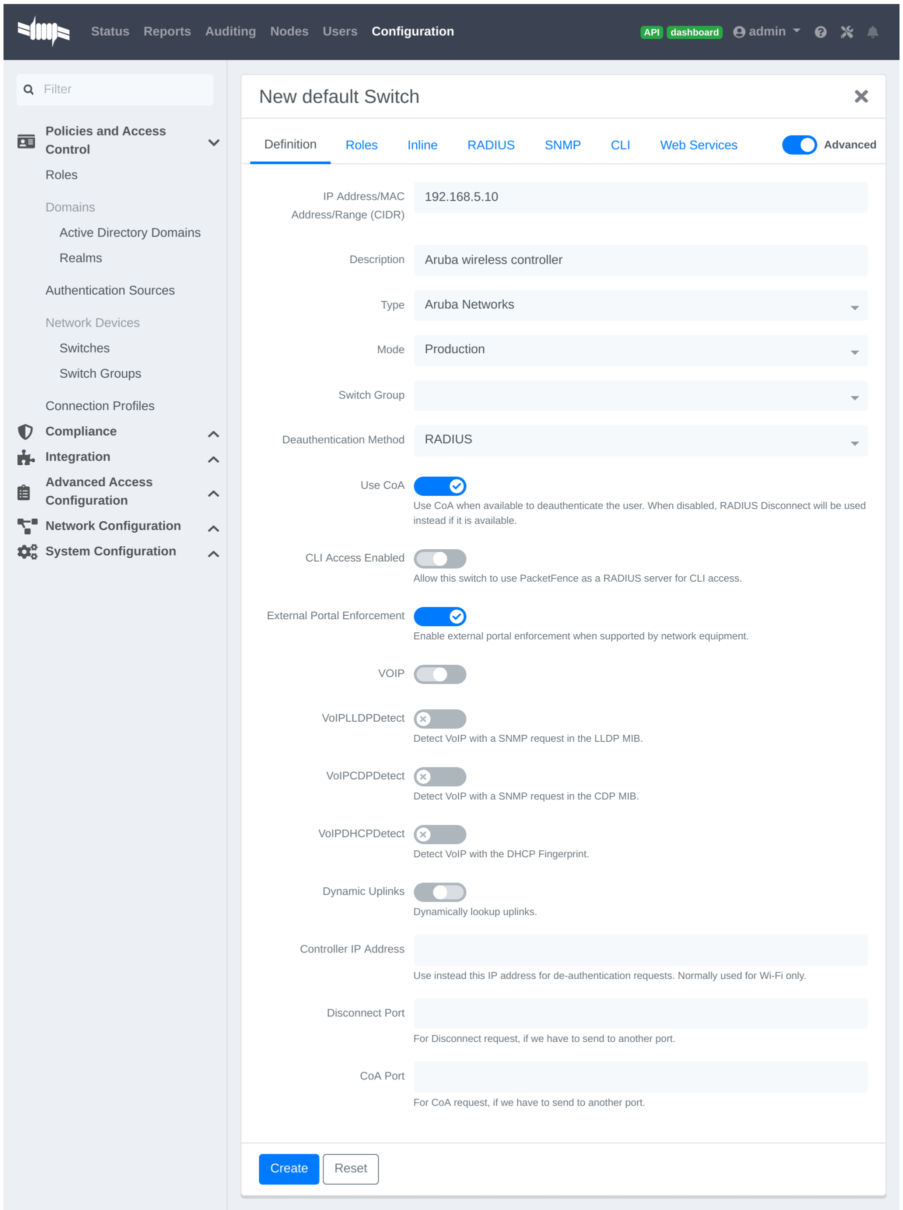
NAS IPv4 Address	Local Controler IP
Source Interface v4	<-- None
NAS IPv6 Address	::1
Source Interface v6	:: <-- None

DNS Query Interval

DNS Query Interval (min)	15

Commands View Commands

The next step will be to configure the Aruba WiFi controller for WebAuth in PacketFence, add the switch with the model choice `Aruba Network`,



New default Switch

IP Address/MAC Address/Range (CIDR): 192.168.5.10

Description: Aruba wireless controller

Type: Aruba Networks

Mode: Production

Switch Group:

Deauthentication Method: RADIUS

Use CoA: ✓
Use CoA when available to deauthenticate the user. When disabled, RADIUS Disconnect will be used instead if it is available.

CLI Access Enabled: ○
Allow this switch to use PacketFence as a RADIUS server for CLI access.

External Portal Enforcement: ✓
Enable external portal enforcement when supported by network equipment.

VOIP: ○

VoIPLLDPDetect: ☒
Detect VoIP with a SNMP request in the LLDP MIB.

VoIPCDPDetect: ☒
Detect VoIP with a SNMP request in the CDP MIB.

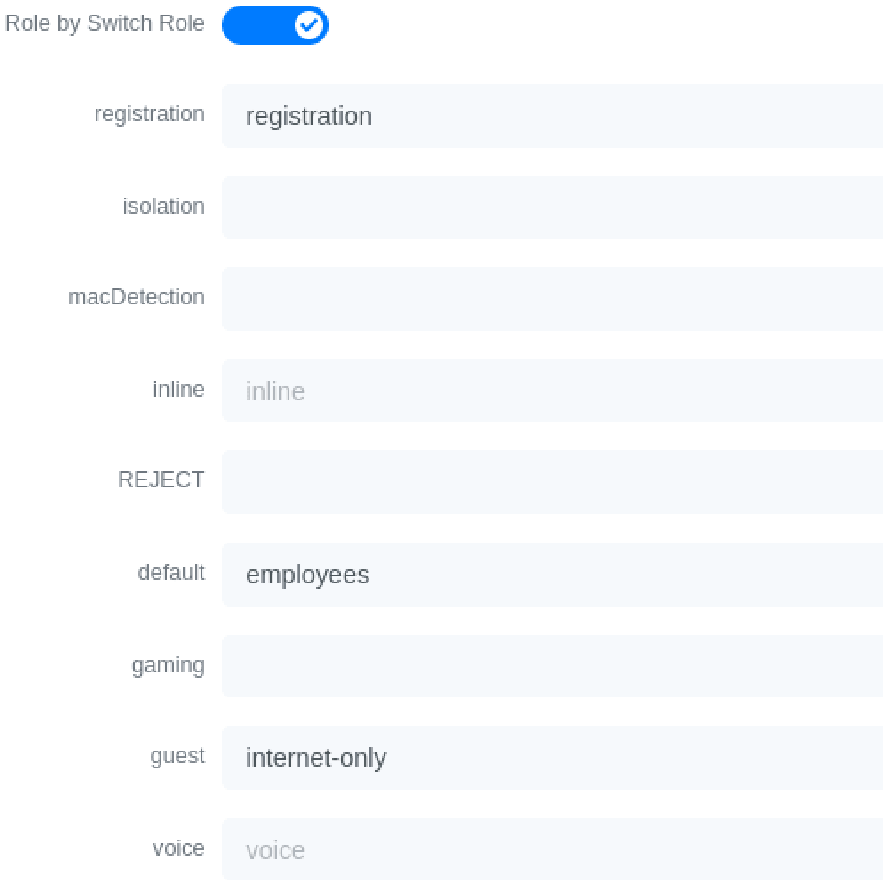
VoIPDHCPDetect: ☒
Detect VoIP with the DHCP Fingerprint.

Dynamic Uplinks: ○
Dynamically lookup uplinks.

Controller IP Address:
Use instead this IP address for de-authentication requests. Normally used for Wi-Fi only.

Disconnect Port:
For Disconnect request, if we have to send to another port.

CoA Port:
For CoA request, if we have to send to another port.



Role by Switch Role	☑
registration	registration
isolation	
macDetection	
inline	inline
REJECT	
default	employees
gaming	
guest	internet-only
voice	voice

Check the box `External Portal Enforcement`, in the Roles section, choose `Role by Switch Role`, as the registration role, enter your default role: `packetfence-portal` and choose the policy matching roles, for instance guest: `internet-only`.

CLI authentication

In order to enable CLI login on the Aruba controller via the PacketFence server, you need to point management authentication to the RADIUS server you created while configuring the SSIDs in the previous sections above.

aaa authentication mgmt default-role read-only enable server-group PacketFence

6.6.2. Aruba Controller 200

In this section, we cover the basic configuration of the Aruba Controller 200 for PacketFence using the command line interface. We suggest you to use the instructions above for the Web GUI instead.

VLAN definition

Here, we create our PacketFence VLANs, and our AccessPoint VLAN (VID 66). It is recommended to isolate the management of the thin APs in a separate VLAN.

```
vlan 2
vlan 3
vlan 5
vlan 10
vlan 66
```

AAA Authentication Server

```
aaa authentication-server radius ”PacketFence”
   host 192.168.1.5
   key useStrongerSecret
aaa server-group ”Radius-Group”
 auth-server PacketFence
```

AAA Profiles

```
aaa profile ”default-dot1x”
   authentication-dot1x ”default”
   dot1x-default-role ”authenticated”
   dot1x-server-group ”Radius-Group”
   radius-accounting ”Radius-Group”
aaa profile ”PacketFence”
   authentication-mac ”pf_mac_auth”
   mac-server-group ”Radius-Group”
   radius-accounting ”Radius-Group”
```

WLAN SSIDs: profiles and virtual AP

```
wlan ssid-profile ”PacketFence-Public”
   essid ”PacketFence-Public”
wlan ssid-profile ”PacketFence-Secure”
   essid ”PacketFence-Secure”
   opmode wpa2-aes
wlan virtual-ap ”Inverse-Guest”
   aaa-profile ”PacketFence”
   ssid-profile ”PacketFence-Public”
wlan virtual-ap ”Inverse-Secure”
   aaa-profile ”default-dot1x”
   ssid-profile ”PacketFence-Secure”
ap-group ”Inverse”
   virtual-ap ”Inverse-Guest”
   virtual-ap ”Inverse-Secure”
   ids-profile ”ids-disabled”
```

6.6.3. All Aruba Instant OS

Add your packetfence instance to your configuration:

wlan auth-server packetfence

```
ip 192.168.1.5
port 1812
acctport 1813
timeout 10
retry-count 5
key useStrongerSecret
nas-ip [Aruba Virtual Controller IP]
rfc3576
```

Add dynamic vlan rules and mac auth to your ssid profile:

wlan ssid-profile SSID

```
index 0
type employee
essid ESSID
wpa-passphrase WPA-Passphrase
opmode wpa2-psk-aes
max-authentication-failures 0
vlan 1
auth-server packetfence
set-vlan Tunnel-Private-Group-Id contains 1 1
set-vlan Tunnel-Private-Group-Id contains 4 4
rf-band all
captive-portal disable
mac-authentication
dtim-period 1
inactivity-timeout 1000
broadcast-filter none
radius-reauth-interval 5
dmo-channel-utilization-threshold 90
```

6.7. Belair Networks (now Ericsson)

6.7.1. BE20

The Belair Networks BE20s are fairly easy to configure.

Add VLANs

On the BE20 Web Interface, click on **Eth-1-1**. By default, there will be nothing in there. You need to first create an untagged VLAN (VLAN 0). In order to do that, you need to set the PVID, Reverse PVID, and the VLAN field to 0. Then click add.

Repeat that step for each of your VLANs by entering the proper VLAN ID in the VLAN field.

AAA Servers

Once you have the VLANs setup, you need to add PacketFence into the AAA Server list. Go to *System → Radius Servers*. Click on **Add server**, and fill out the proper information.

- Ensure the Enabled checkbox is selected
- IP Address: Insert the IP Address of the PacketFence Management Interface
- Shared Secret: Insert the shared secret for RADIUS communication

When done, click on the **Apply** button.

Secure SSID

Since the BE20 doesn’t support Open SSID with MAC Authentication, we will only describe how to configure a WPA2-Enterprise SSID. First, we will configure the 5GHz antenna.

Click on *Wifi-1-1 → Access SSID Config*. From the **Configuration for SSID** dropdown, select the 1 entry. Modify the fields like the following:

- SSID: Put your SSID Name you would like
- Type: Broadcast
- Use Privacy Mode: WPA2(AES) with EAP/DOT1x
- RADIUS NAS Identifier: You can put a string to identify your AP
- Radius Accounting Enabled: Checkbox Selected
- Radius Station ID Delimiter: dash
- Radius StationId Append Ssid: Checkbox Selected
- RADIUS Server 1: Select the AAA Server you created earlier

When done click **Apply**. Repeat the same configuration for the 2.4GHz Antenna (Wifi-1-2).

That should conclude the configuration. You can now save the configs to the flash by hitting the **Config Save** button on top of the Interface.

6.8. Bluesocket

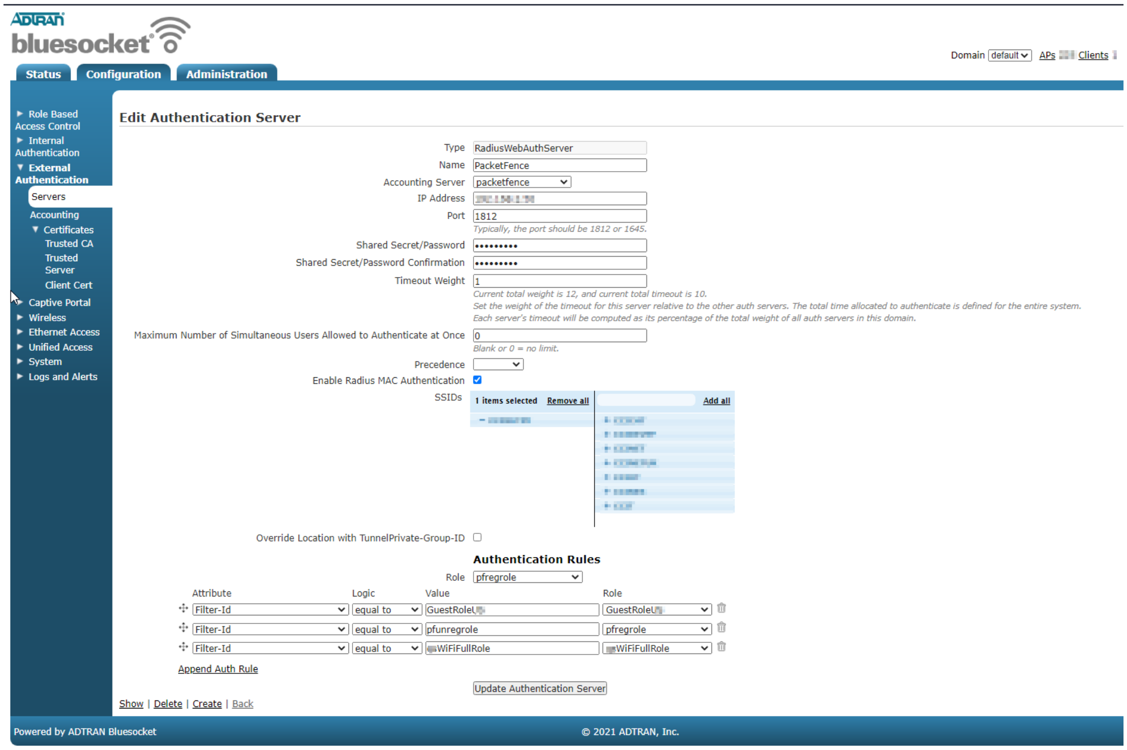
6.8.1. MAC Authentication

Bluesocket side

In order to configure mac authentication on the Bluesocket, you must have access to the controller.

First, you must configure a RadiusWebAuthServer in External Authentication and enable "Enable Radius MAC Authentication" and add Authentications rules.

This Authentication Rules needs to match with the PacketFence role you define.



Edit Authentication Server

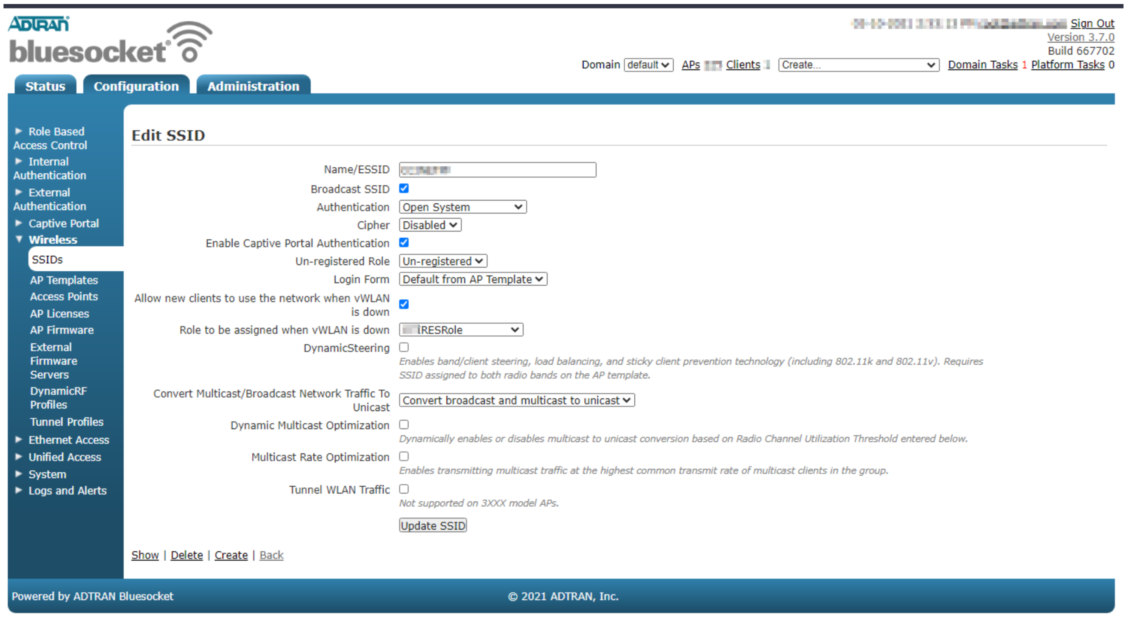
Type: RadiusWebAuthServer
Name: PacketFence
Accounting Server: packetfence
IP Address: [redacted]
Port: 1812
Typically, the port should be 1812 or 1645.
Shared Secret/Password: •••••••••
Shared Secret/Password Confirmation: •••••••••
Timeout Weight: 1
Current total weight is 12, and current total timeout is 10.
Set the weight of the timeout for this server relative to the other auth servers. The total time allocated to authenticate is defined for the entire system.
Each server's timeout will be computed as its percentage of the total weight of all auth servers in this domain.
Maximum Number of Simultaneous Users Allowed to Authenticate at Once: 0
Blank or 0 = no limit.
Precedence:
Enable Radius MAC Authentication: ☑
SSIDs: 1 items selected [redacted]
Override Location with TunnelPrivate-Group-ID: ☐

Authentication Rules

Role: pfregrole

Attribute	Logic	Value	Role
Filter-Id	equal to	GuestRoleU[redacted]	GuestRoleU[redacted]
Filter-Id	equal to	pfunregrole	pfregrole
Filter-Id	equal to	[redacted]WiFiFullRole	[redacted]WiFiFullRole

Next, you need to create an SSID in Wireless → SSIDs and important, check for "Enable Captive Portal Authentication".



Edit SSID

Name/ESSID: [redacted]
Broadcast SSID: ☑
Authentication: Open System
Cipher: Disabled
Enable Captive Portal Authentication: ☑
Un-registered Role: Un-registered
Login Form: Default from AP Template
Allow new clients to use the network when vWLAN is down: ☑
Role to be assigned when vWLAN is down: [redacted]IRESRole
DynamicSteering: ☐
Enables band/client steering, load balancing, and sticky client prevention technology (including 802.11k and 802.11v). Requires SSID assigned to both radio bands on the AP template.
Convert Multicast/Broadcast Network Traffic To Unicast: Convert broadcast and multicast to unicast
Dynamic Multicast Optimization: ☐
Dynamically enables or disables multicast to unicast conversion based on Radio Channel Utilization Threshold entered below.
Multicast Rate Optimization: ☐
Enables transmitting multicast traffic at the highest common transmit rate of multicast clients in the group.
Tunnel WLAN Traffic: ☐
Not supported on 3XXX model APs.

PacketFence side

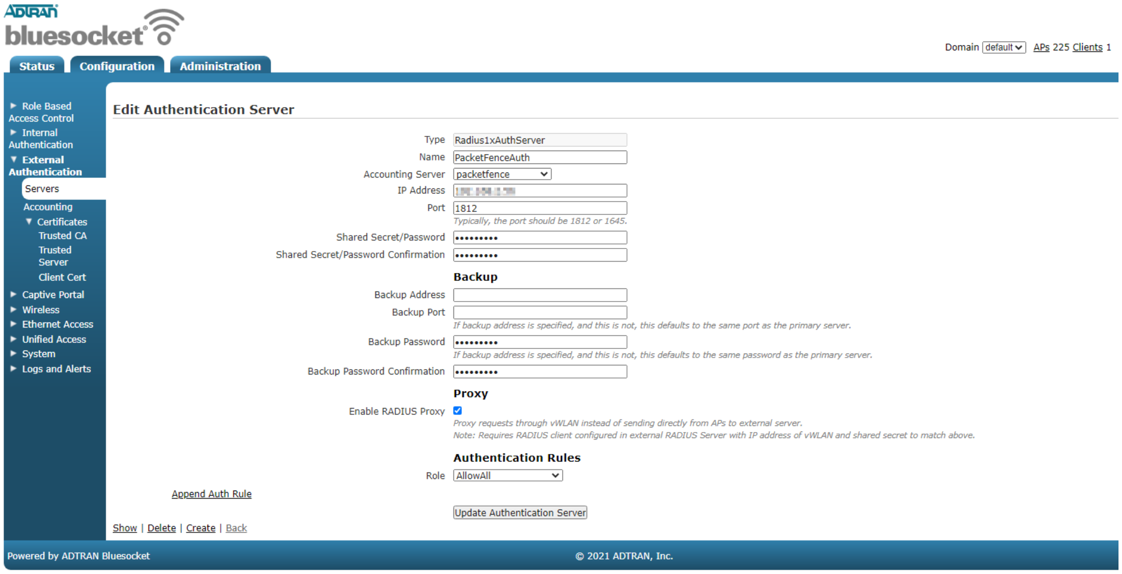
You have to define the ip address of the Blusocket controller in PacketFence.

Since the vlan assignation is made by role, you need to enable role by switch role and define the role you previously created in the Bluesocket "Authentications rules".

For the deauthentication you need to select HTTPS and fill the Web Services section with the username and password to connect to the Bluesocket API.

6.8.2. 802.1x

First, you must configure a Radius1XAuthServer in External Authentication.



Edit Authentication Server

Type: Radius1xAuthServer
Name: PacketFenceAuth
Accounting Server: packetfence
IP Address: [redacted]
Port: 1812
Typically, the port should be 1812 or 1645.
Shared Secret/Password: •••••••••
Shared Secret/Password Confirmation: •••••••••

Backup

Backup Address:
Backup Port:
If backup address is specified, and this is not, this defaults to the same port as the primary server.
Backup Password: •••••••••
If backup address is specified, and this is not, this defaults to the same password as the primary server.
Backup Password Confirmation: •••••••••

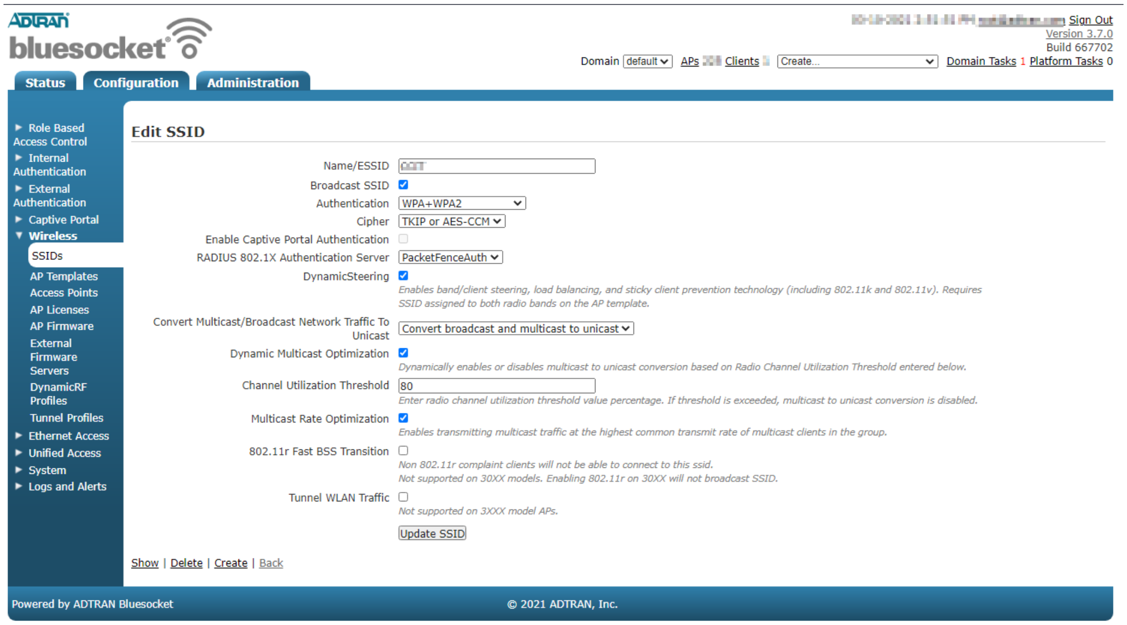
Proxy

Enable RADIUS Proxy: ☑
Proxy requests through vWLAN instead of sending directly from APs to external server.
Note: Requires RADIUS client configured in external RADIUS Server with IP address of vWLAN and shared secret to match above.

Authentication Rules

Role: AllowAll

Next you need to create a new SSID with AUthentication WPA+WPA2 and select the radius server you previously created as the "RADIUS 802.1x Authentication Server"



Edit SSID

Name/ESSID: [redacted]
Broadcast SSID: ☑
Authentication: WPA+WPA2
Cipher: TKIP or AES-CCM
Enable Captive Portal Authentication: ☐
RADIUS 802.1X Authentication Server: PacketFenceAuth
DynamicSteering: ☑
Enables band/client steering, load balancing, and sticky client prevention technology (including 802.11k and 802.11v). Requires SSID assigned to both radio bands on the AP template.
Convert Multicast/Broadcast Network Traffic To Unicast: Convert broadcast and multicast to unicast
Dynamic Multicast Optimization: ☑
Dynamically enables or disables multicast to unicast conversion based on Radio Channel Utilization Threshold entered below.
Channel Utilization Threshold: 80
Enter radio channel utilization threshold value percentage. If threshold is exceeded, multicast to unicast conversion is disabled.
Multicast Rate Optimization: ☑
Enables transmitting multicast traffic at the highest common transmit rate of multicast clients in the group.
802.11r Fast BSS Transition: ☐
Non 802.11r complaint clients will not be able to connect to this ssid.
Not supported on 30XX models. Enabling 802.11r on 30XX will not broadcast SSID.
Tunnel WLAN Traffic: ☐
Not supported on 3XXX model APs.

PacketFence side

You have to define the ip address of the Bluesocket controller in PacketFence.

Since the vlan assignation is made by role, you need to enable role by switch role and define the role you that exist in the Bluesocket.

For the deauthentication you need to select HTTPS and fill the Web Services section with the username and password to connect to the Bluesocket API.

6.9. Brocade

6.9.1. RF Switches

See the Motorola RF Switches documentation.

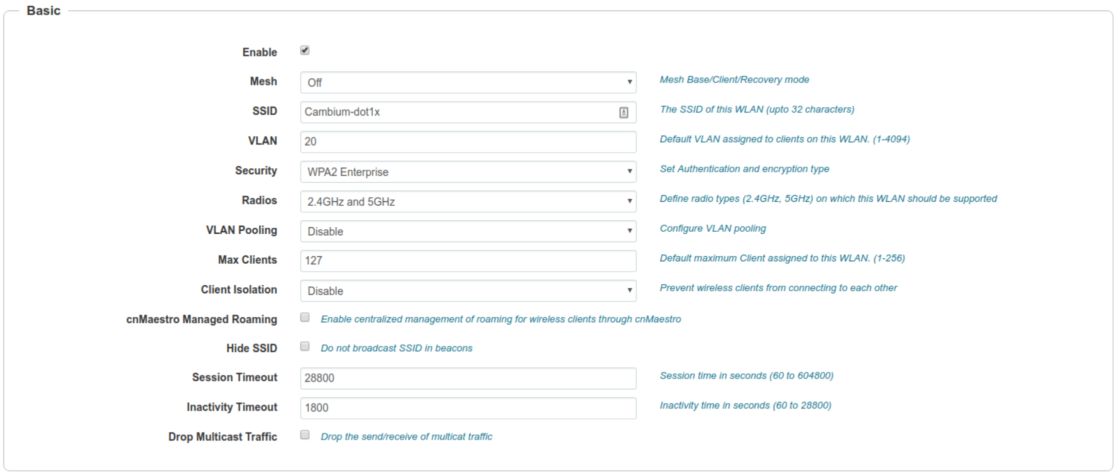
6.10. Cambium

6.10.1. cnPilot E410

802.1X

To setup the Cambium cnPilot E410 AP to use 802.1x, first, you need to already have configured the VLANs that will be used in the AP under *Configure → Network*. Make sure that in *Configure → Network → Ethernet Ports*, the port is configured to **Trunk Multiple VLANs**, and the list of VLANs are allowed.

Next, go to *Configure → WLAN*, and click on `Add New WLAN`. Give it the desired ID, and enter your SSID, default VLAN, and select **WPA2 Enterprise** for Security.

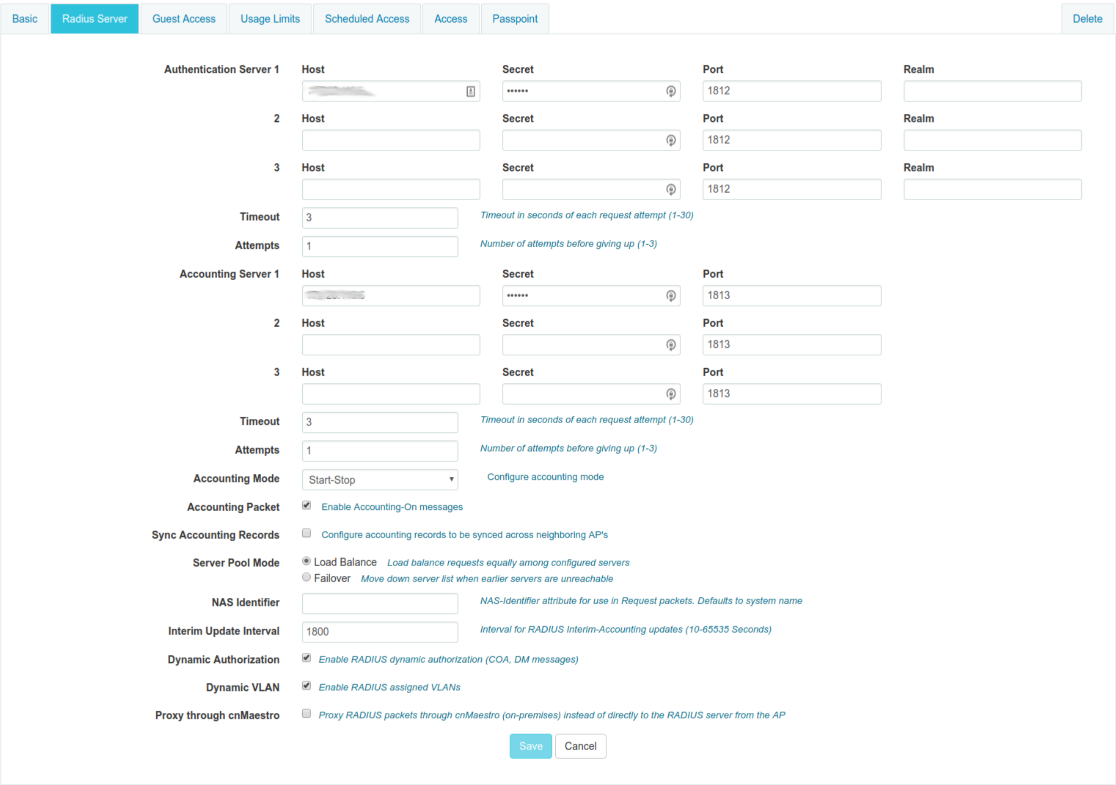


Basic

Enable	☑	
Mesh	Off	*Mesh Base/Client/Recovery mode*
SSID	Cambium-dot1x	*The SSID of this WLAN (upto 32 characters)*
VLAN	20	*Default VLAN assigned to clients on this WLAN. (1-4094)*
Security	WPA2 Enterprise	*Set Authentication and encryption type*
Radios	2.4GHz and 5GHz	*Define radio types (2.4GHz, 5GHz) on which this WLAN should be supported*
VLAN Pooling	Disable	*Configure VLAN pooling*
Max Clients	127	*Default maximum Client assigned to this WLAN. (1-256)*
Client Isolation	Disable	*Prevent wireless clients from connecting to each other*
cnMaestro Managed Roaming	☐ *Enable centralized management of roaming for wireless clients through cnMaestro*	
Hide SSID	☐ *Do not broadcast SSID in beacons*	
Session Timeout	28800	*Session time in seconds (60 to 604800)*
Inactivity Timeout	1800	*Inactivity time in seconds (60 to 28800)*
Drop Multicast Traffic	☐ *Drop the send/receive of multicat traffic*	

In the *RADIUS Server_ tab, enter the management IP address of PacketFence (VIP in case of a cluster) and the Radius secret for Authentication and Accounting servers.

Check the **Dynamic Authorization** and **Dynamic VLAN** boxes and save.

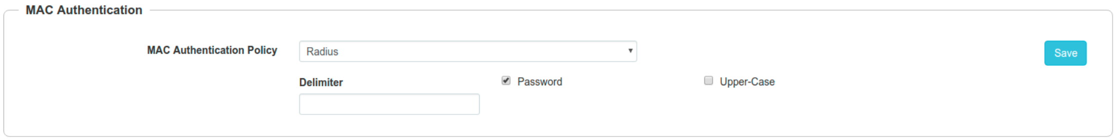


Authentication Server 1	Host: [redacted]	Secret: ••••••	Port: 1812	Realm:
2	Host:	Secret:	Port: 1812	Realm:
3	Host:	Secret:	Port: 1812	Realm:
Timeout	3	Timeout in seconds of each request attempt (1-30)		
Attempts	1	Number of attempts before giving up (1-3)		
Accounting Server 1	Host: [redacted]	Secret: ••••••	Port: 1813	
2	Host:	Secret:	Port: 1813	
3	Host:	Secret:	Port: 1813	
Timeout	3	Timeout in seconds of each request attempt (1-30)		
Attempts	1	Number of attempts before giving up (1-3)		
Accounting Mode	Start-Stop	Configure accounting mode		
Accounting Packet	☑ Enable Accounting-On messages			
Sync Accounting Records	☐ Configure accounting records to be synced across neighboring AP's			
Server Pool Mode	● Load Balance *Load balance requests equally among configured servers* ○ Failover *Move down server list when earlier servers are unreachable*			
NAS Identifier		*NAS-Identifier attribute for use in Request packets. Defaults to system name*		
Interim Update Interval	1800	*Interval for RADIUS Interim-Accounting updates (10-65535 Seconds)*		
Dynamic Authorization	☑ *Enable RADIUS dynamic authorization (COA, DM messages)*			
Dynamic VLAN	☑ *Enable RADIUS assigned VLANs*			
Proxy through cnMaestro	☐ *Proxy RADIUS packets through cnMaestro (on-premises) instead of directly to the RADIUS server from the AP*			

MAC Authentication

To enable MAC authentication in the Cambium E410, go to *Configure → WLAN*, select your WLAN, set the Security to open and click on the tab **Access**.

In the **MAC Authentication** section, select Radius as the policy, and check the box for **Password** to use the MAC address as the password in the Radius request. Click on Save.



MAC Authentication

MAC Authentication Policy: Radius

Delimiter:

☑ Password

☐ Upper-Case

Web Authentication

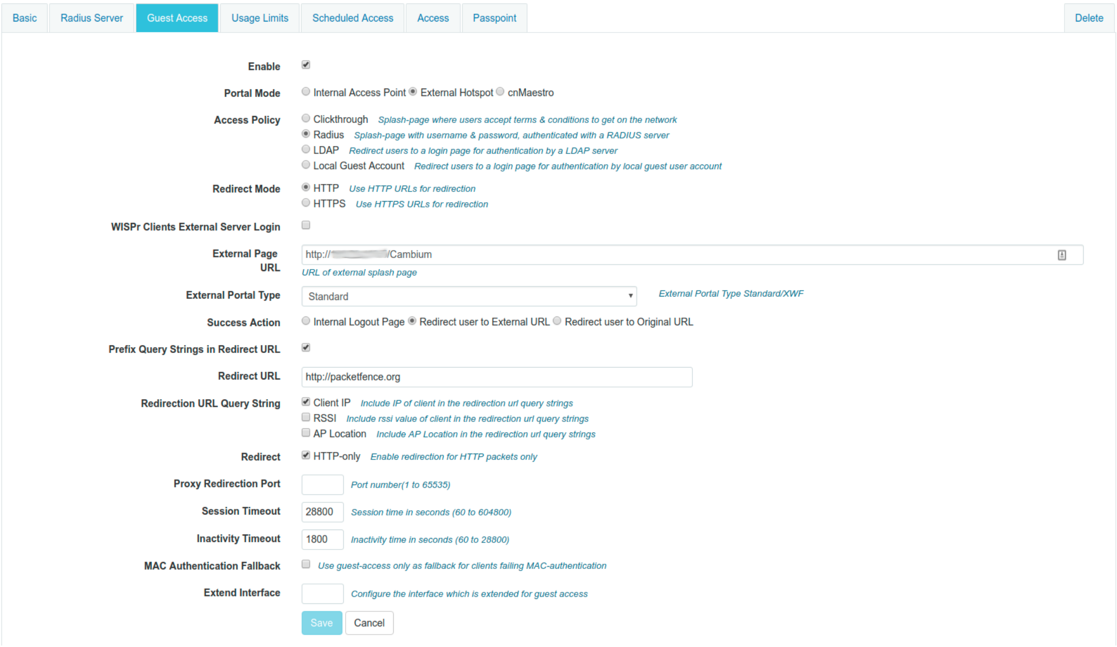
To enable Web Authentication, go to your WLAN in *Configure → WLAN*, create a new WLAN with open Security, and click on the tab **Guest Access** to set the following:

- Enable: check the box
- Portal Mode: External Hotspot
- Access Policy: Radius
- Redirect Mode: HTTP
- External Page URL: http://_IP_ADDRESS_OF_PACKETFENCE/Cambium
- External Portal Type: Standard
- Success Action: Your preferred action.

- Prefix Query Strings in Redirect URL: check the box
- Redirection URL Query String: check Client IP
- Redirect: check HTTP-only

Click Save.

In the **Add Whitelist** section, add the IP address or domain name of your PacketFence server, then save.



Enable ☑

Portal Mode ○ Internal Access Point ● External Hotspot ○ cnMaestro

Access Policy
○ Clickthrough *Splash-page where users accept terms & conditions to get on the network*
● Radius *Splash-page with username & password, authenticated with a RADIUS server*
○ LDAP *Redirect users to a login page for authentication by a LDAP server*
○ Local Guest Account *Redirect users to a login page for authentication by local guest user account*

Redirect Mode
● HTTP *Use HTTP URLs for redirection*
○ HTTPS *Use HTTPS URLs for redirection*

WISPr Clients External Server Login □

External Page URL http://[redacted]/Cambium
URL of external splash page

External Portal Type Standard *External Portal Type Standard/XWF*

Success Action ○ Internal Logout Page ● Redirect user to External URL ○ Redirect user to Original URL

Prefix Query Strings in Redirect URL ☑

Redirect URL http://packetfence.org

Redirection URL Query String
☑ Client IP *Include IP of client in the redirection url query strings*
□ RSSI *Include rssi value of client in the redirection url query strings*
□ AP Location *Include AP Location in the redirection url query strings*

Redirect ☑ HTTP-only *Enable redirection for HTTP packets only*

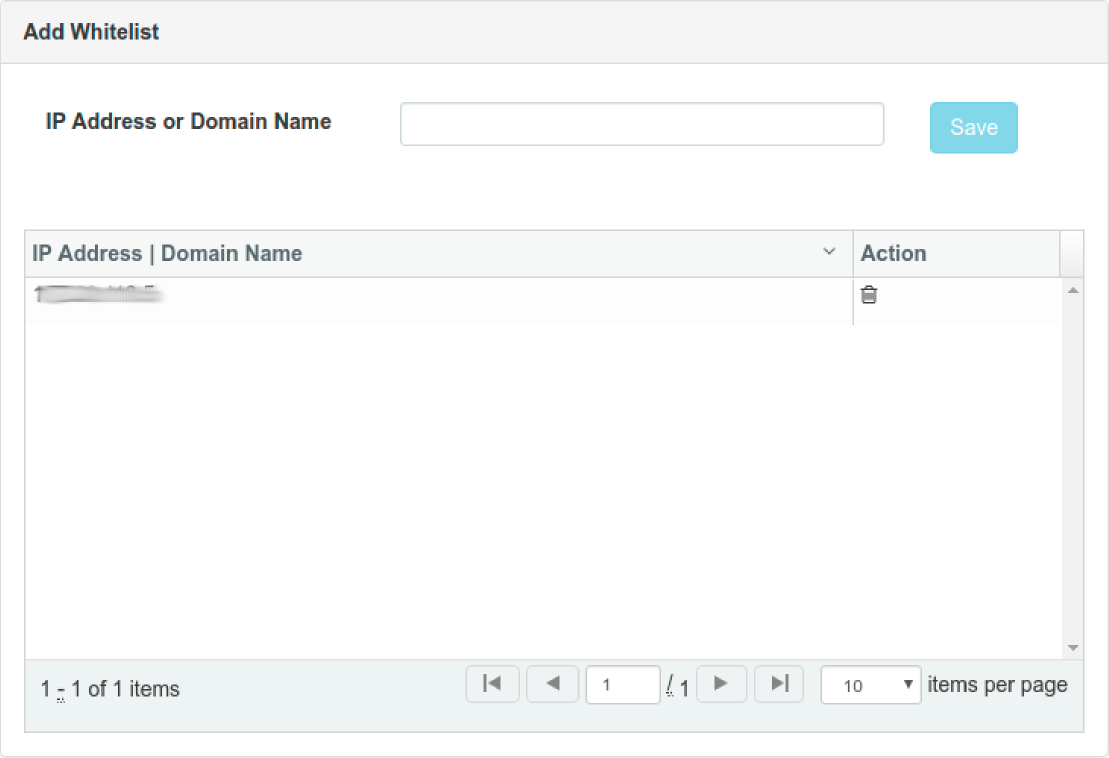
Proxy Redirection Port *Port number(1 to 65535)*

Session Timeout 28800 *Session time in seconds (60 to 604800)*

Inactivity Timeout 1800 *Inactivity time in seconds (60 to 28800)*

MAC Authentication Fallback □ *Use guest-access only as fallback for clients failing MAC-authentication*

Extend Interface *Configure the interface which is extended for guest access*



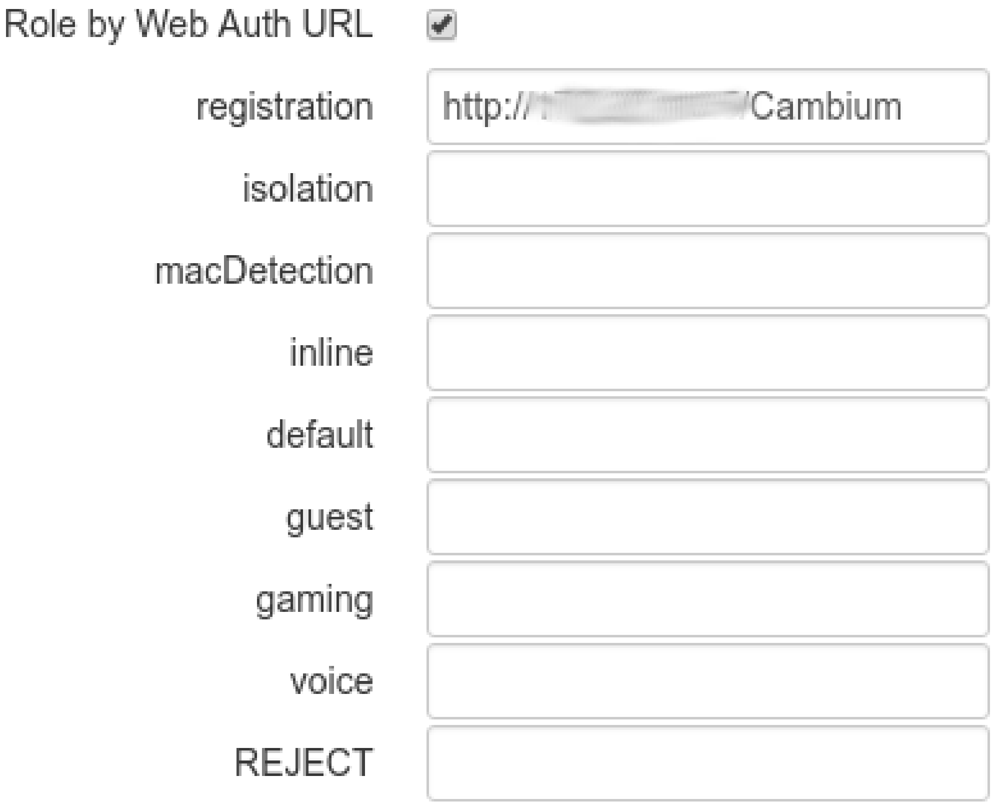
Add Whitelist

IP Address or Domain Name

IP Address | Domain Name	Action
[redacted]	🗑

1 - 1 of 1 items

On PacketFence web admin, in the Switch configuration for your AP, Roles tab, check Role by Web Auth URL box, and enter http://_IP_ADDRESS_OF_PACKETFENCE/Cambium in the registration field.



Role by Web Auth URL	☑
registration	http://[redacted]/Cambium
isolation	
macDetection	
inline	
default	
guest	
gaming	
voice	
REJECT	

6.11. Cisco

6.11.1. Aironet 1121, 1130, 1242, 1250, 1600

CAUTION

With this equipment, the same VLAN cannot be shared between two SSIDs. Have this in mind in your design. For example, you need two isolation VLAN if you want to isolate hosts on the public and secure SSIDs.

MAC-Authentication + 802.1X configuration

Radio Interfaces:

```
dot11 vlan-name normal vlan 1
dot11 vlan-name registration vlan 2
dot11 vlan-name isolation vlan 3
dot11 vlan-name guest vlan 5

interface Dot11Radio0
  encryption vlan 1 mode ciphers aes-ccm
  encryption vlan 2 mode ciphers aes-ccm
  ssid PacketFence-Public
  ssid PacketFence-Secure
```

```
interface Dot11Radio0.2
  encapsulation dot1Q 2
  no ip route-cache
  bridge-group 253
  bridge-group 253 subscriber-loop-control
  bridge-group 253 block-unknown-source
  no bridge-group 253 source-learning
  no bridge-group 253 unicast-flooding
  bridge-group 253 spanning-disabled

interface Dot11Radio0.3
  encapsulation dot1Q 3
  no ip route-cache
  bridge-group 254
  bridge-group 254 subscriber-loop-control
  bridge-group 254 block-unknown-source
  no bridge-group 254 source-learning
  no bridge-group 254 unicast-flooding
  bridge-group 254 spanning-disabled

interface Dot11Radio0.5
  encapsulation dot1Q 5
  no ip route-cache
  bridge-group 255
  bridge-group 255 subscriber-loop-control
  bridge-group 255 block-unknown-source
  no bridge-group 255 source-learning
  no bridge-group 255 unicast-flooding
  bridge-group 255 spanning-disabled
```

LAN interfaces:

```

interface FastEthernet0.2
  encapsulation dot1Q 2
  no ip route-cache
  bridge-group 253
  no bridge-group 253 source-learning
  bridge-group 253 spanning-disabled

interface FastEthernet0.3
  encapsulation dot1Q 3
  no ip route-cache
  bridge-group 254
  no bridge-group 254 source-learning
  bridge-group 254 spanning-disabled

interface FastEthernet0.5
```

```
  encapsulation dot1Q 5
  no ip route-cache
  bridge-group 255
  no bridge-group 255 source-learning
  bridge-group 255 spanning-disabled
```

Then create the two SSIDs:

```
dot11 ssid PacketFence-Secure
  vlan 3 backup normal
  authentication open eap eap_methods
  authentication key-management wpa

dot11 ssid PacketFence-Public
  vlan 2 backup guest
  authentication open mac-address mac_methods
  mbssid guest-mode
```

Configure the RADIUS server (we assume here that the FreeRADIUS server and the PacketFence server are located on the same box):

```
radius-server host 192.168.1.5 auth-port 1812 acct-port 1813 key
useStrongerSecret
aaa group server radius rad_eap
  server 192.168.1.5 auth-port 1812 acct-port 1813
aaa authentication login eap_methods group rad_eap
aaa group server radius rad_mac
  server 192.168.1.5 auth-port 1812 acct-port 1813
aaa authentication login mac_methods group rad_mac
```

6.11.2. Aironet 1600

CoA and radius:

```
radius-server attribute 32 include-in-access-req format %h
radius-server vsa send accounting
aaa server radius dynamic-author
 client 192.168.1.5
 server-key 7 useStrongerSecret
 port 3799
 auth-type all
```

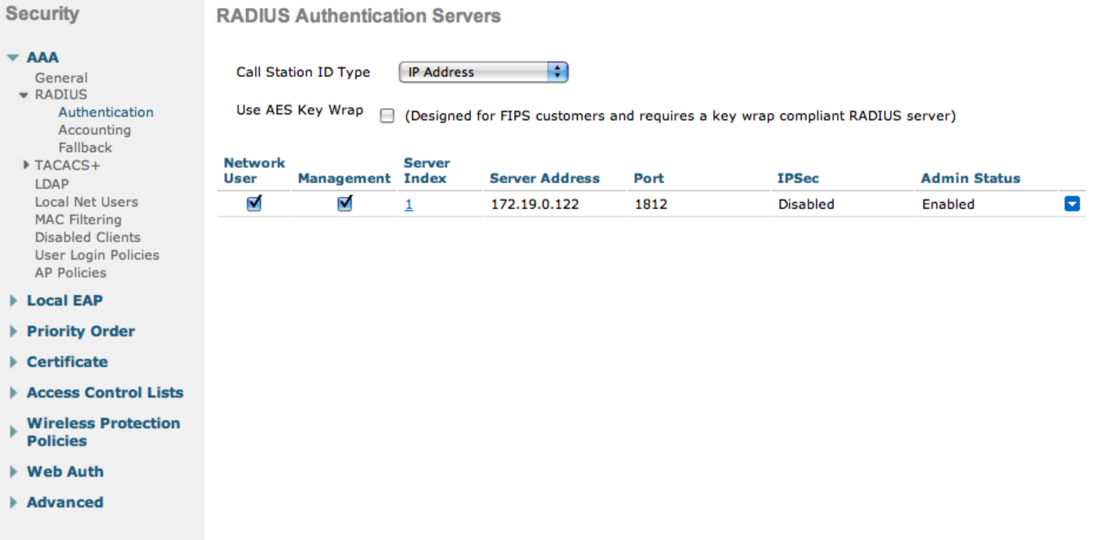
6.11.3. Aironet (WDS)

```
To be contributed...
```

6.11.4. Wireless LAN Controller (WLC) or Wireless Services Module (WiSM)

In this section, we cover the basic configuration of the WiSM for PacketFence using the web interface.

- First, globally define the FreeRADIUS server running on PacketFence (PacketFence's IP) and make sure *Support for RFC 3576* (also called *Support for CoA*) is enabled. When the option is missing from your WLC, it is enabled by default.



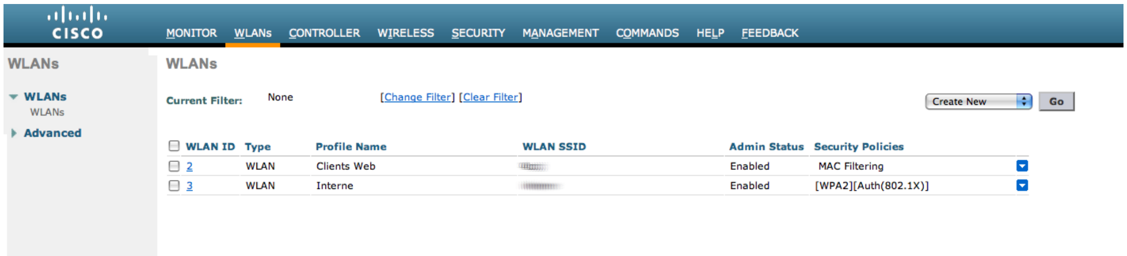
RADIUS Authentication Servers

Call Station ID Type: IP Address

Use AES Key Wrap □ (Designed for FIPS customers and requires a key wrap compliant RADIUS server)

Network User	Management	Server Index	Server Address	Port	IPSec	Admin Status
☑	☑	1	172.19.0.122	1812	Disabled	Enabled

- Then we create two SSIDs:
  - PacketFence-Public: non-secure with MAC authentication only
  - PacketFence-Secure: secure with WPA2 Enterprise PEAP/MSCHAPv2

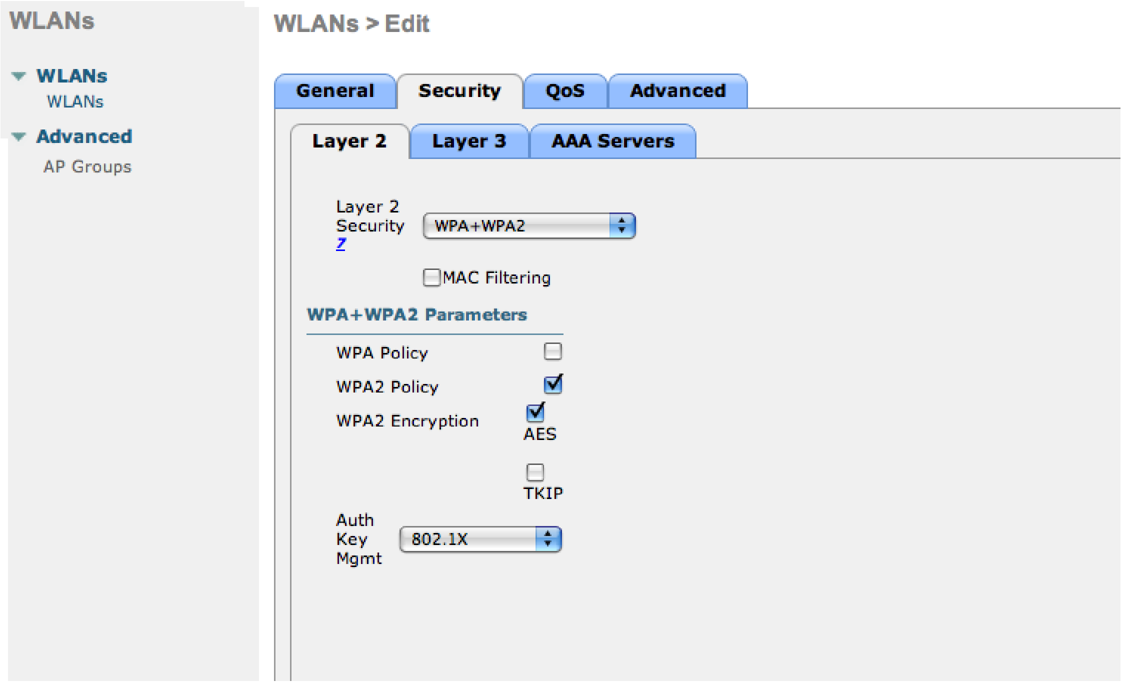


WLANs

Current Filter: None [Change Filter] [Clear Filter]

□ WLAN ID	Type	Profile Name	WLAN SSID	Admin Status	Security Policies
□ 2	WLAN	Clients Web	[redacted]	Enabled	MAC Filtering
□ 3	WLAN	Interne	[redacted]	Enabled	[WPA2][Auth(802.1X)]

- In the secure SSID, make sure 802.1X is enabled and select the appropriate encryption for your needs (recommended: WPA + WPA2)



Layer 2 Security 7 WPA+WPA2

□ MAC Filtering

WPA+WPA2 Parameters

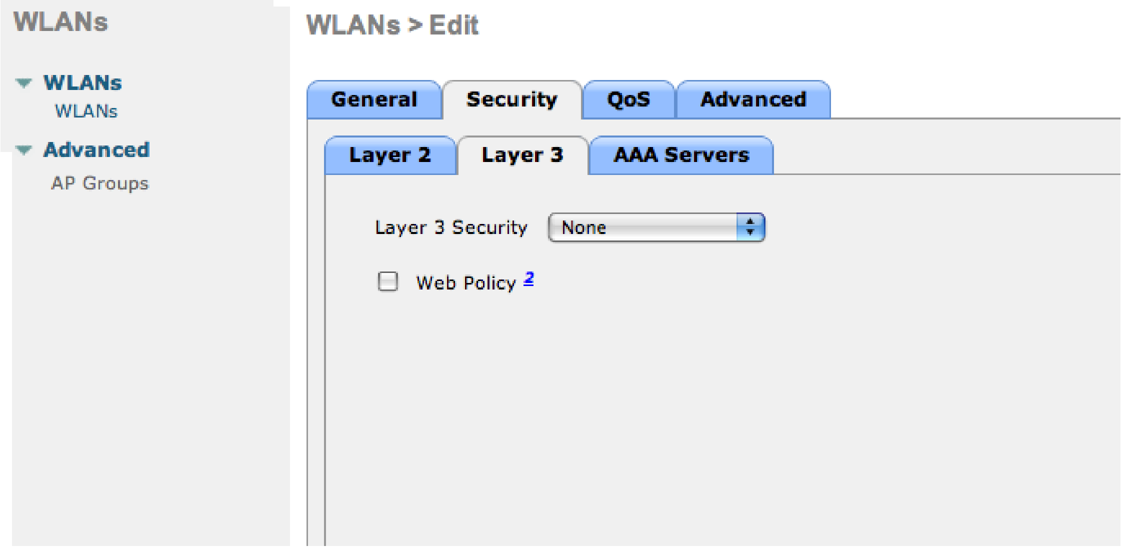
WPA Policy □

WPA2 Policy ☑

WPA2 Encryption ☑ AES □ TKIP

Auth Key Mgmt 802.1X

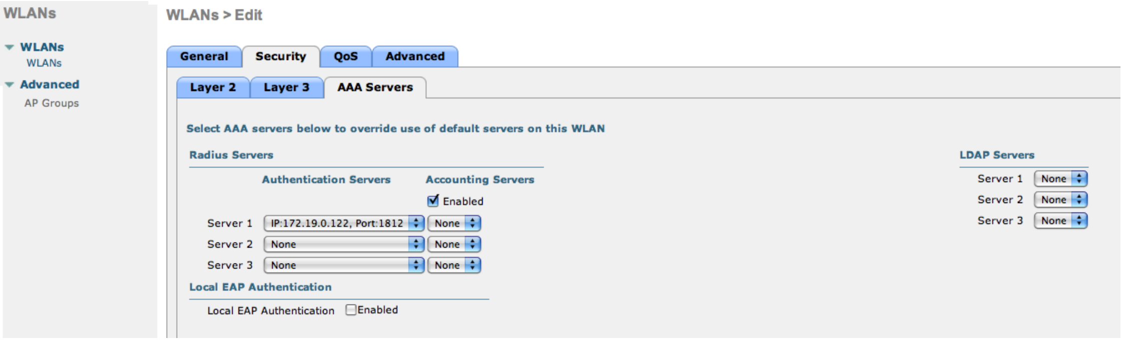
- No layer 3 security



Layer 3 Security None

□ Web Policy 2

- We set the IP of the FreeRADIUS server



Select AAA servers below to override use of default servers on this WLAN

Radius Servers

	Authentication Servers	Accounting Servers
		☑ Enabled
Server 1	IP:172.19.0.122, Port:1812	None
Server 2	None	None
Server 3	None	None

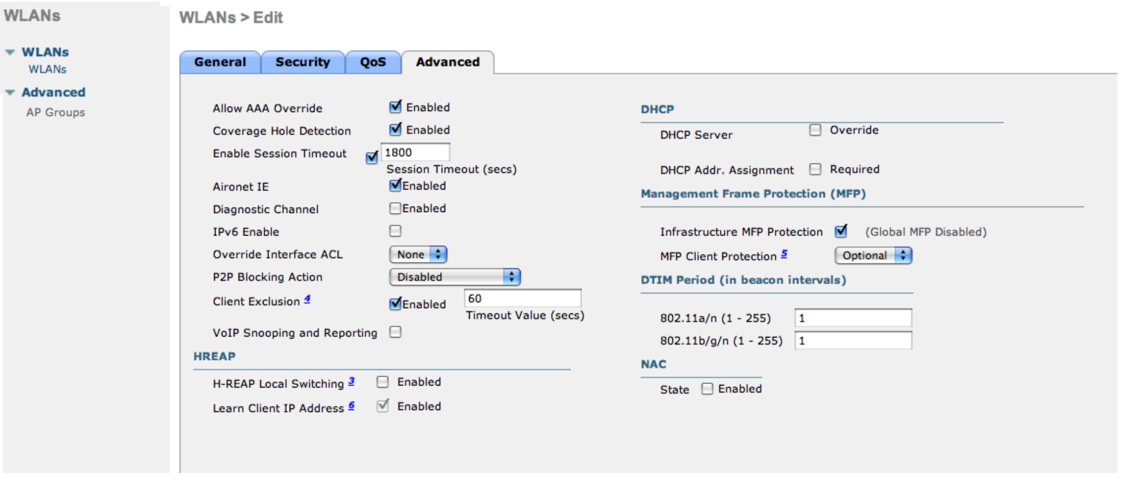
LDAP Servers

Server 1	None
Server 2	None
Server 3	None

Local EAP Authentication

Local EAP Authentication ☐ Enabled

- VERY IMPORTANT: Allow AAA override (this allows VLAN assignment from RADIUS)



Allow AAA Override	☑ Enabled
Coverage Hole Detection	☑ Enabled
Enable Session Timeout	☑ 1800 Session Timeout (secs)
Aironet IE	☑ Enabled
Diagnostic Channel	☐ Enabled
IPv6 Enable	☐
Override Interface ACL	None
P2P Blocking Action	Disabled
Client Exclusion 4	☑ Enabled 60 Timeout Value (secs)
VoIP Snooping and Reporting	☐

HREAP

H-REAP Local Switching 2	☐ Enabled
Learn Client IP Address 5	☑ Enabled

DHCP

DHCP Server	☐ Override
DHCP Addr. Assignment	☐ Required

Management Frame Protection (MFP)

Infrastructure MFP Protection	☑ (Global MFP Disabled)
MFP Client Protection 5	Optional

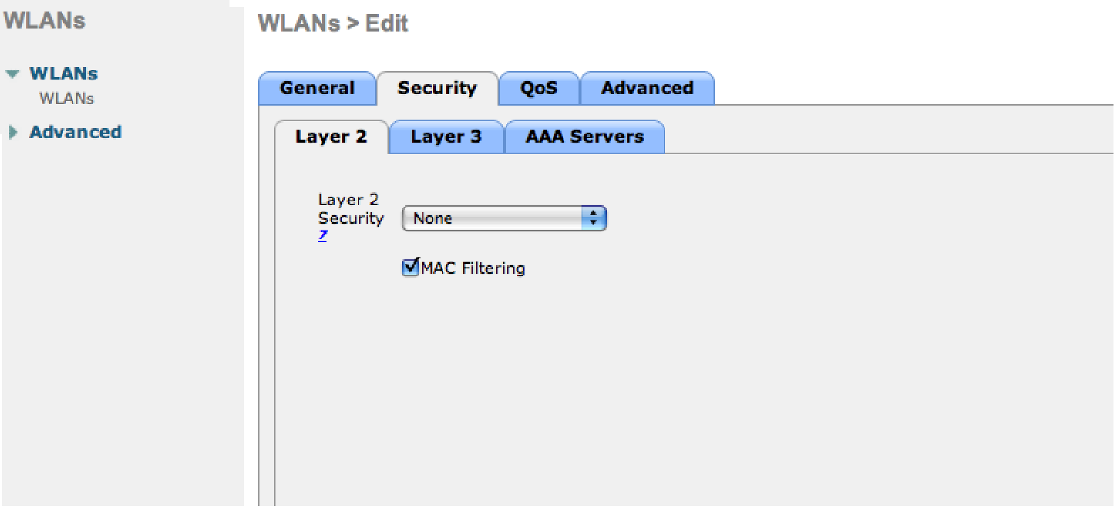
DTIM Period (in beacon intervals)

802.11a/n (1 - 255)	1
802.11b/g/n (1 - 255)	1

NAC

State ☐ Enabled

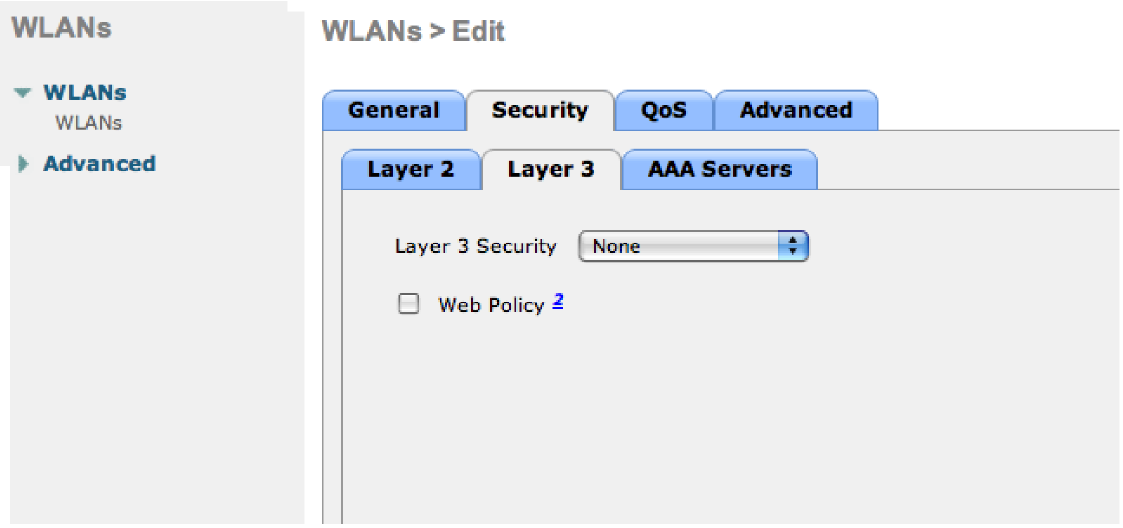
- Edit the non-secure SSID: Enable MAC authentication at level 2



Layer 2 Security 7 None

☑ MAC Filtering

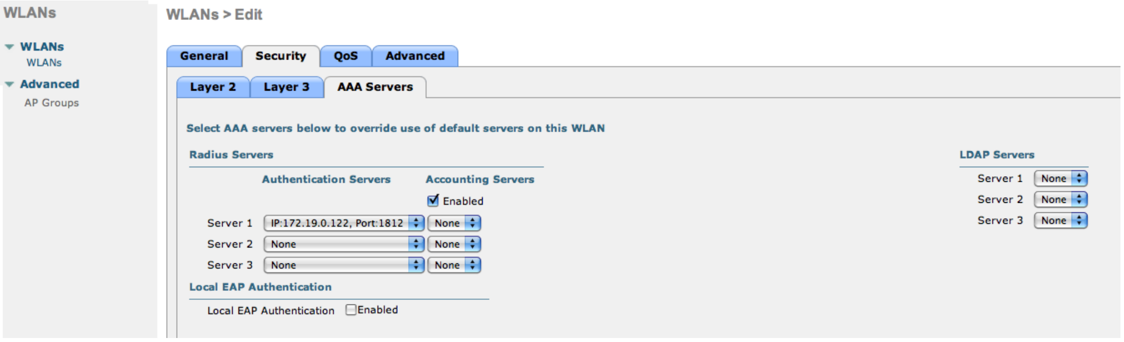
- Nothing at level 3



Layer 3 Security: None

□ Web Policy [2]

- We set the IP of the FreeRADIUS server



Select AAA servers below to override use of default servers on this WLAN

Radius Servers

	Authentication Servers	Accounting Servers
		☑ Enabled
Server 1	IP:172.19.0.122, Port:1812	None
Server 2	None	None
Server 3	None	None

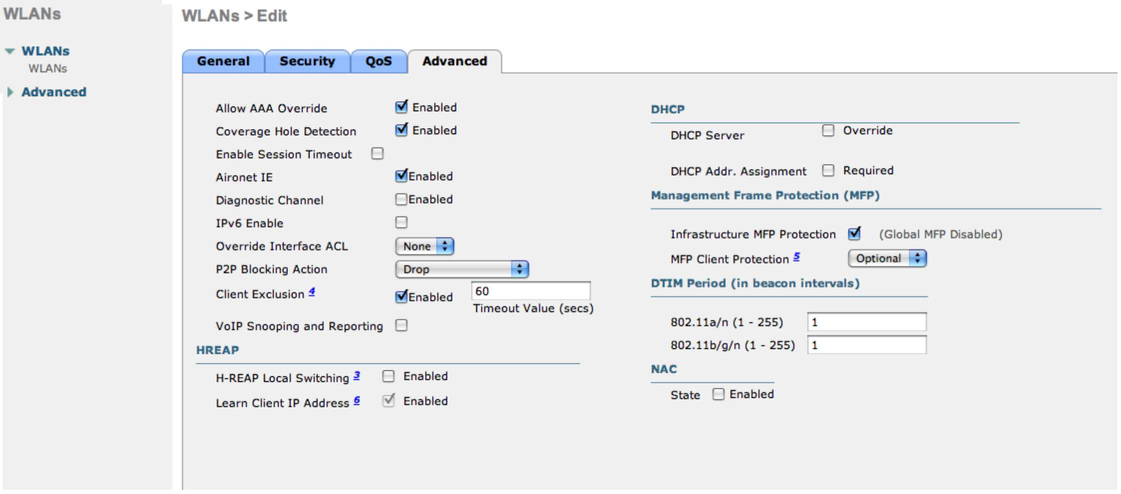
LDAP Servers

Server 1	None
Server 2	None
Server 3	None

Local EAP Authentication

Local EAP Authentication □Enabled

- VERY IMPORTANT: Allow AAA override (this allows VLAN assignment from RADIUS)



Allow AAA Override ☑ Enabled

Coverage Hole Detection ☑ Enabled

Enable Session Timeout □

Aironet IE ☑Enabled

Diagnostic Channel □Enabled

IPv6 Enable □

Override Interface ACL None

P2P Blocking Action Drop

Client Exclusion [4] ☑Enabled 60 Timeout Value (secs)

VoIP Snooping and Reporting □

HREAP

H-REAP Local Switching [3] □ Enabled

Learn Client IP Address [6] ☑ Enabled

DHCP

DHCP Server □ Override

DHCP Addr. Assignment □ Required

Management Frame Protection (MFP)

Infrastructure MFP Protection ☑ (Global MFP Disabled)

MFP Client Protection [5] Optional

DTIM Period (in beacon intervals)

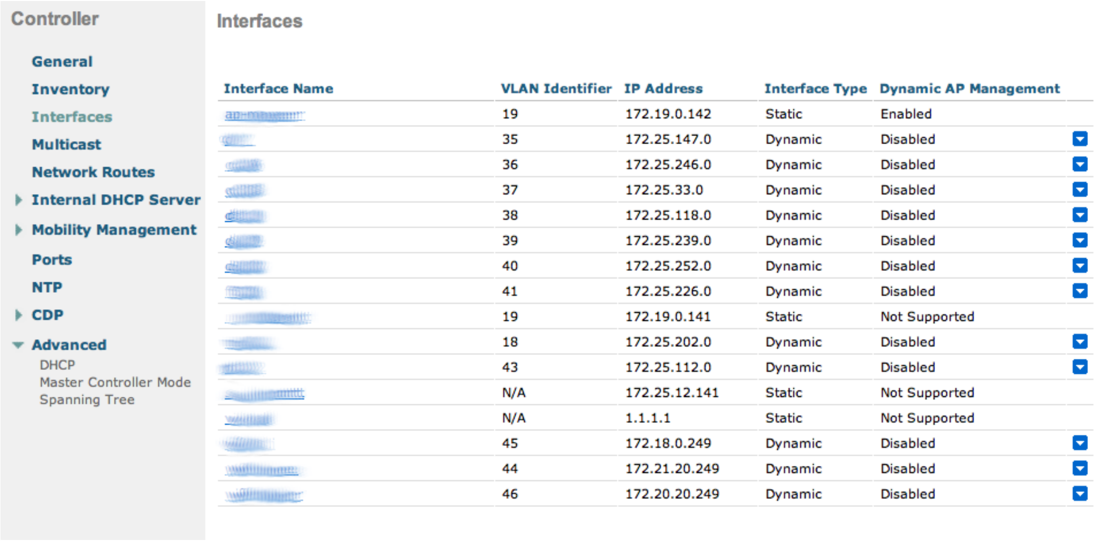
802.11a/n (1 - 255) 1

802.11b/g/n (1 - 255) 1

NAC

State □ Enabled

- Finally, in *Controller* → *Interfaces* tab, create an interface per VLAN that could be assigned



Interfaces

Interface Name	VLAN Identifier	IP Address	Interface Type	Dynamic AP Management
[redacted]	19	172.19.0.142	Static	Enabled
[redacted]	35	172.25.147.0	Dynamic	Disabled
[redacted]	36	172.25.246.0	Dynamic	Disabled
[redacted]	37	172.25.33.0	Dynamic	Disabled
[redacted]	38	172.25.118.0	Dynamic	Disabled
[redacted]	39	172.25.239.0	Dynamic	Disabled
[redacted]	40	172.25.252.0	Dynamic	Disabled
[redacted]	41	172.25.226.0	Dynamic	Disabled
[redacted]	19	172.19.0.141	Static	Not Supported
[redacted]	18	172.25.202.0	Dynamic	Disabled
[redacted]	43	172.25.112.0	Dynamic	Disabled
[redacted]	N/A	172.25.12.141	Static	Not Supported
[redacted]	N/A	1.1.1.1	Static	Not Supported
[redacted]	45	172.18.0.249	Dynamic	Disabled
[redacted]	44	172.21.20.249	Dynamic	Disabled
[redacted]	46	172.20.20.249	Dynamic	Disabled

WARNING When creating interfaces, it's important to configure DHCP servers. Otherwise, WLC will block DHCP requests.

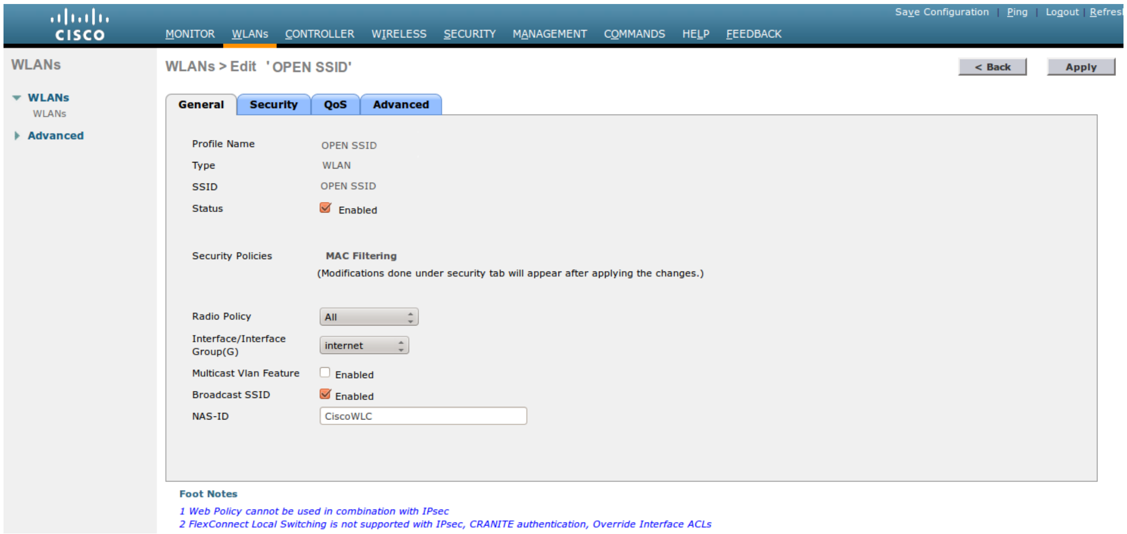
You are good to go!

Wireless LAN Controller (WLC) Web Auth

In this section, we cover the basic configuration of the WLC Web Auth for PacketFence using the web interface. The idea is to forward the device to the captive portal with an ACL if the device is in an unreg state and allow the device to reach Internet (or the normal network) by changing the ACL once registered. In the unreg state, the WLC will intercept the HTTP traffic and forward the device to the captive portal.

In this sample configuration, the captive portal uses the IP address 172.16.0.250, the administration interface uses the IP address 172.16.0.249 and the WLC uses the IP address 172.16.0.248. The DHCP and DNS servers are not managed by PacketFence (WLC DHCP Server, Production DHCP Server)

- First, globally define the FreeRADIUS server running on PacketFence (PacketFence's Administration Interface) and make sure *Support for RFC 3576* is enabled (if not present it is enabled by default)
- Then we create a SSID:
  - OPEN SSID: non-secure with MAC authentication only


MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
Save Configuration | Ping | Logout | Refresh
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced

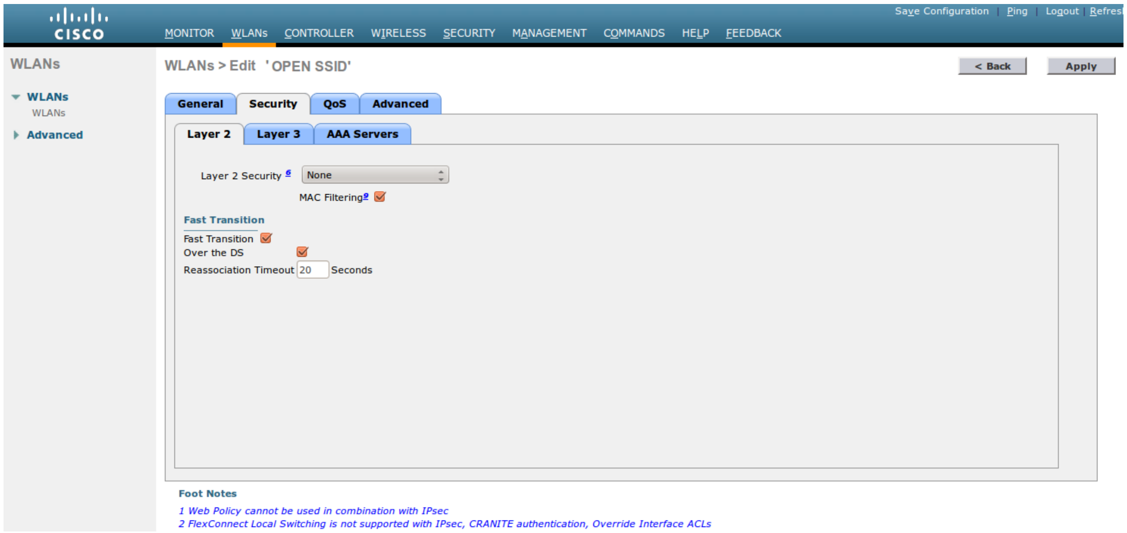
WLANs > Edit 'OPEN SSID'

Profile Name	OPEN SSID
Type	WLAN
SSID	OPEN SSID
Status	☑ Enabled
Security Policies	MAC Filtering (Modifications done under security tab will appear after applying the changes.)
Radio Policy	All
Interface/Interface Group(G)	internet
Multicast Vlan Feature	□ Enabled
Broadcast SSID	☑ Enabled
NAS-ID	CiscoWLC

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs


MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
Save Configuration | Ping | Logout | Refresh
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced
Layer 2
Layer 3
AAA Servers

WLANs > Edit 'OPEN SSID'

Layer 2 Security [6] None

MAC Filtering[9] ☑

Fast Transition

Fast Transition ☑

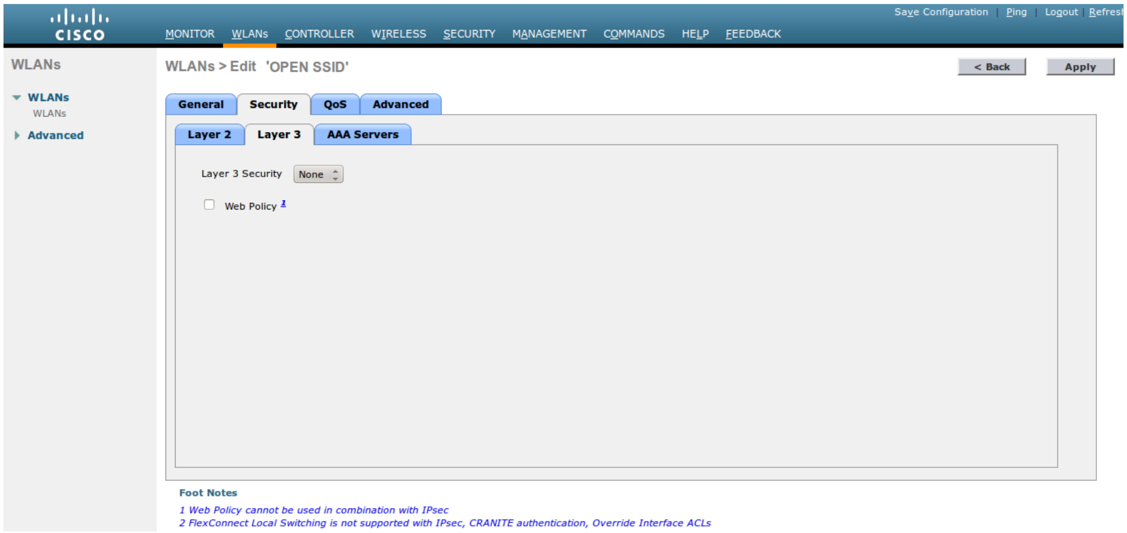
Over the DS ☑

Reassociation Timeout 20 Seconds

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs


MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
Save Configuration | Ping | Logout | Refresh
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced
Layer 2
Layer 3
AAA Servers

WLANs > Edit 'OPEN SSID'

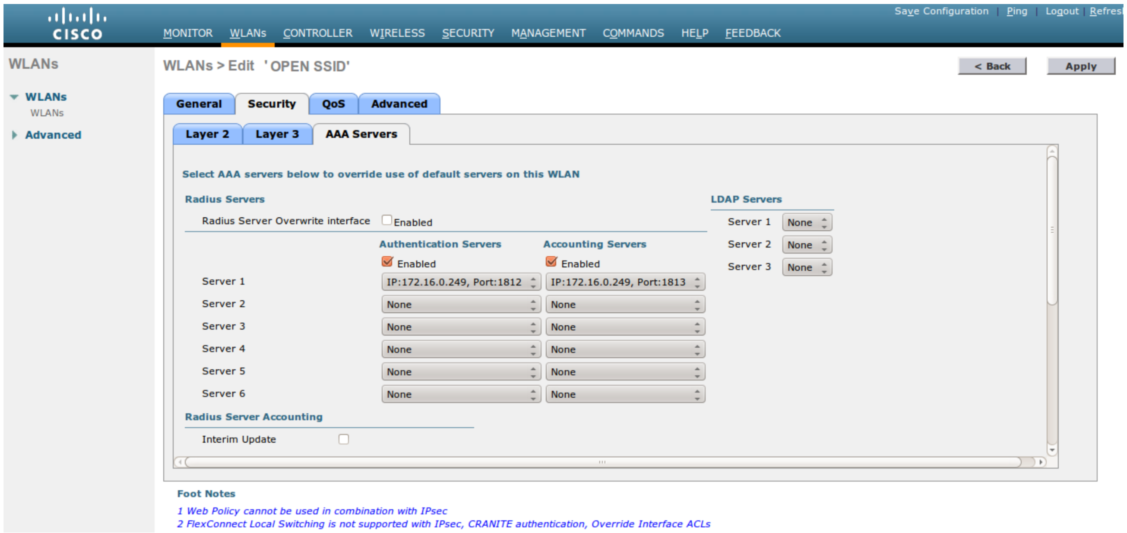
Layer 3 Security None

□ Web Policy [1]

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs


Save Configuration | Ping | Logout | Refres
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced
Layer 2
Layer 3
AAA Servers

WLANs > Edit 'OPEN SSID'

Select AAA servers below to override use of default servers on this WLAN

Radius Servers

Radius Server Overwrite interface □ Enabled

	Authentication Servers	Accounting Servers
	☑ Enabled	☑ Enabled
Server 1	IP:172.16.0.249, Port:1812	IP:172.16.0.249, Port:1813
Server 2	None	None
Server 3	None	None
Server 4	None	None
Server 5	None	None
Server 6	None	None

LDAP Servers

LDAP Servers	
Server 1	None
Server 2	None
Server 3	None

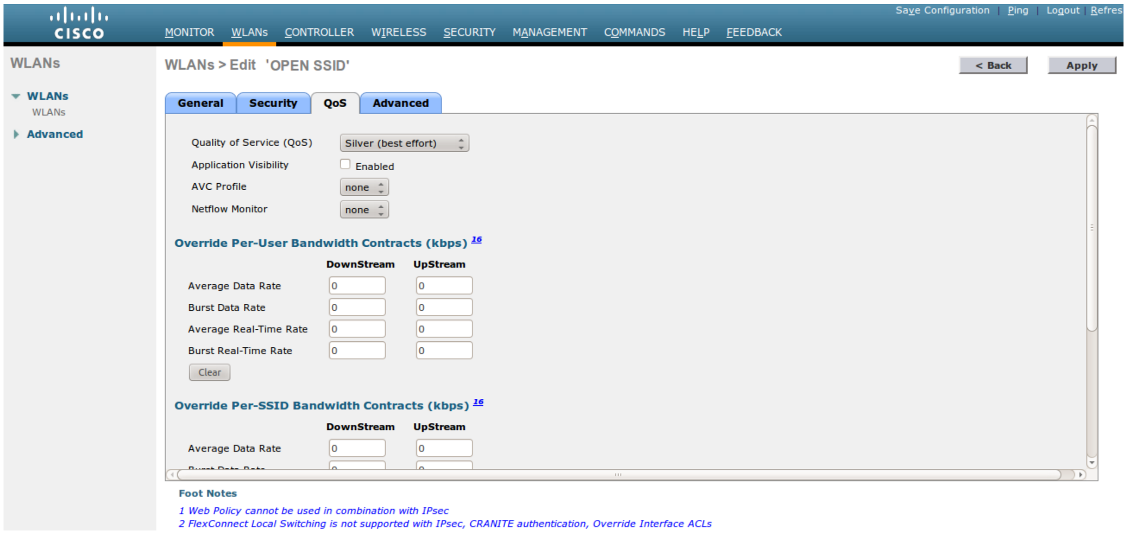
Radius Server Accounting

Interim Update □

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs


Save Configuration | Ping | Logout | Refres
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced
Clear

WLANs > Edit 'OPEN SSID'

Quality of Service (QoS) Silver (best effort)

Application Visibility □ Enabled

AVC Profile none

Netflow Monitor none

Override Per-User Bandwidth Contracts (kbps) [16]

	DownStream	UpStream
Average Data Rate	0	0
Burst Data Rate	0	0
Average Real-Time Rate	0	0
Burst Real-Time Rate	0	0

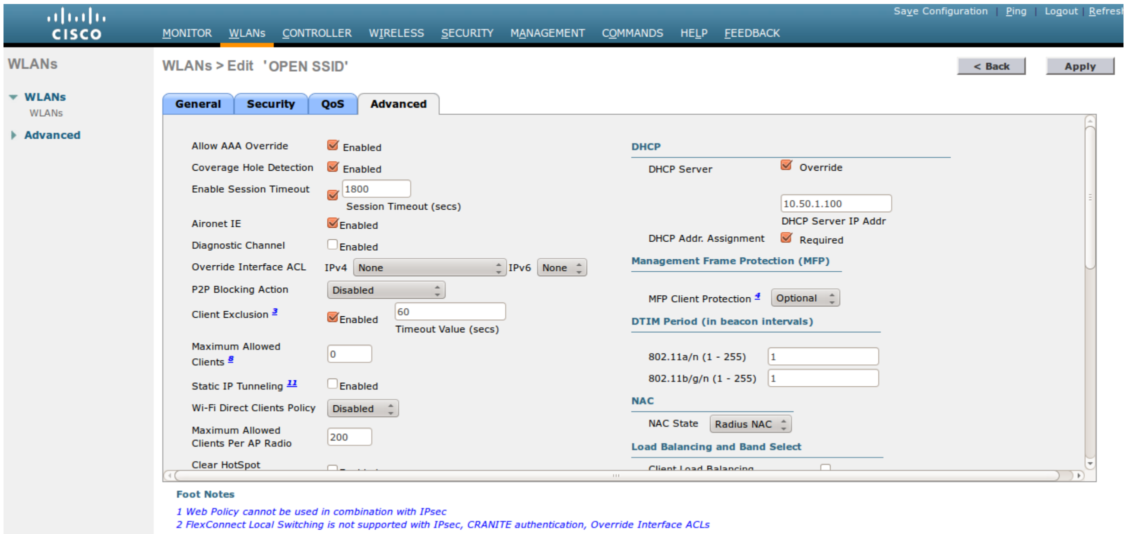
Override Per-SSID Bandwidth Contracts (kbps) [16]

	DownStream	UpStream
Average Data Rate	0	0
Burst Data Rate	0	0

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs


Save Configuration | Ping | Logout | Refres
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced

WLANs > Edit 'OPEN SSID'

Allow AAA Override ☑ Enabled

Coverage Hole Detection ☑ Enabled

Enable Session Timeout ☑ 1800 Session Timeout (secs)

Aironet IE ☑ Enabled

Diagnostic Channel □ Enabled

Override Interface ACL IPv4 None IPv6 None

P2P Blocking Action Disabled

Client Exclusion [3] ☑ Enabled 60 Timeout Value (secs)

Maximum Allowed Clients [8] 0

Static IP Tunneling [11] □ Enabled

Wi-Fi Direct Clients Policy Disabled

Maximum Allowed Clients Per AP Radio 200

Clear HotSpot

DHCP

DHCP Server ☑ Override

10.50.1.100 DHCP Server IP Addr

DHCP Addr. Assignment ☑ Required

Management Frame Protection (MFP)

MFP Client Protection [4] Optional

DTIM Period (in beacon intervals)

802.11a/n (1 - 255) 1

802.11b/g/n (1 - 255) 1

NAC

NAC State Radius NAC

Load Balancing and Band Select

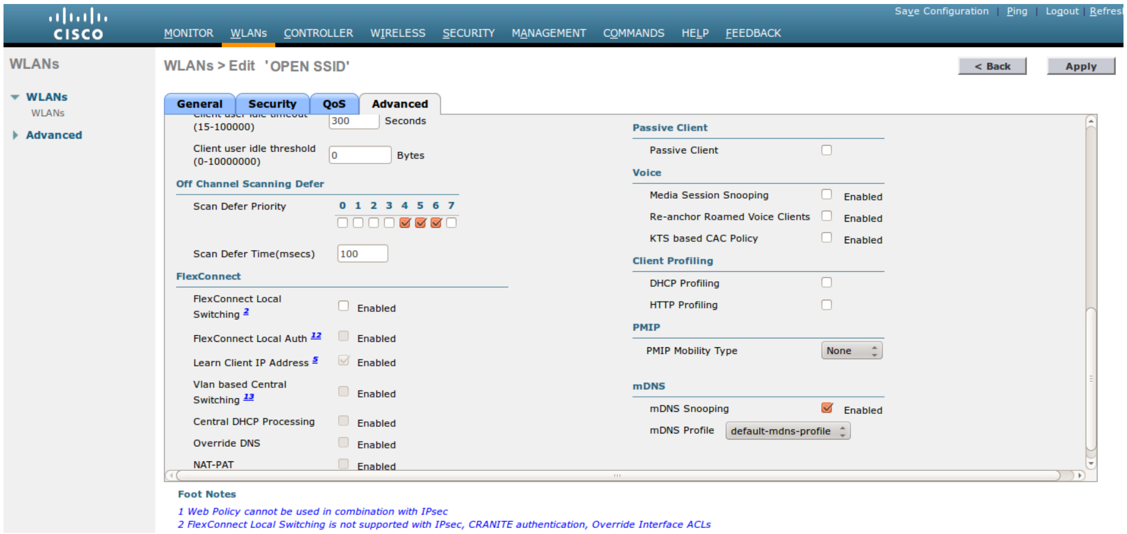
Client Load Balancing □

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs

NOTE On more recent controllers, the value 'Radius NAC' in the 'NAC State' setting will be called 'ISE NAC'.


Save Configuration | Ping | Logout | Refresh
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
< Back
Apply
General
Security
QoS
Advanced

WLANs > Edit 'OPEN SSID'

Client user idle timeout (15-100000) 300 Seconds

Client user idle threshold (0-10000000) 0 Bytes

Off Channel Scanning Defer

Scan Defer Priority 0 1 2 3 4 5 6 7
□ □ □ □ ☑ ☑ ☑ □

Scan Defer Time(msecs) 100

FlexConnect

FlexConnect Local Switching [2] □ Enabled

FlexConnect Local Auth [12] □ Enabled

Learn Client IP Address [5] ☑ Enabled

Vlan based Central Switching [13] □ Enabled

Central DHCP Processing □ Enabled

Override DNS □ Enabled

NAT-PAT □ Enabled

Passive Client

Passive Client □

Voice

Media Session Snooping □ Enabled

Re-anchor Roamed Voice Clients □ Enabled

KTS based CAC Policy □ Enabled

Client Profiling

DHCP Profiling □

HTTP Profiling □

PMIP

PMIP Mobility Type None

mDNS

mDNS Snooping ☑ Enabled

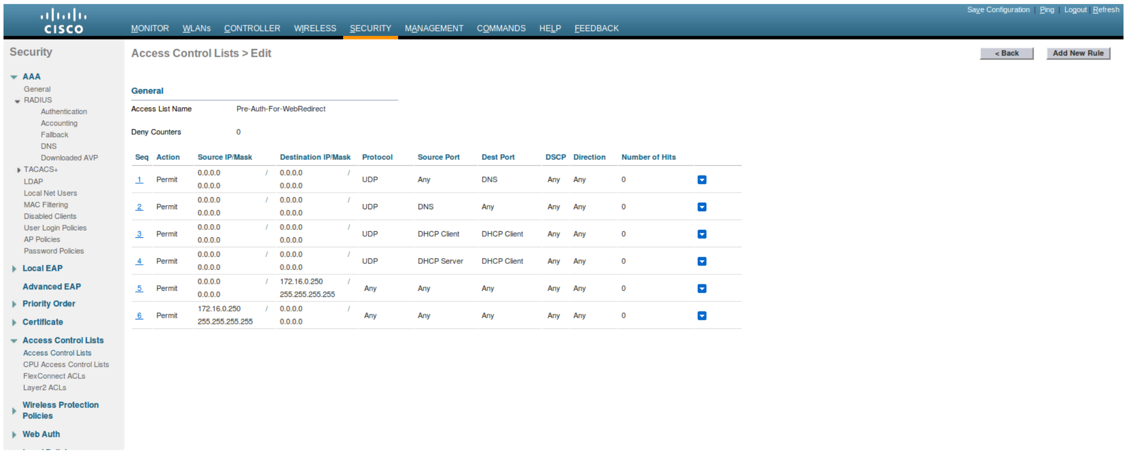
mDNS Profile default-mdns-profile

Foot Notes

1 Web Policy cannot be used in combination with IPsec

2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs

- Then you have to create two ACLs - one to deny all traffic except the required one to hit the portal (Pre-Auth-For-WebRedirect) and the other one to allow anything (Authorize_any) .



Access Control Lists > Edit

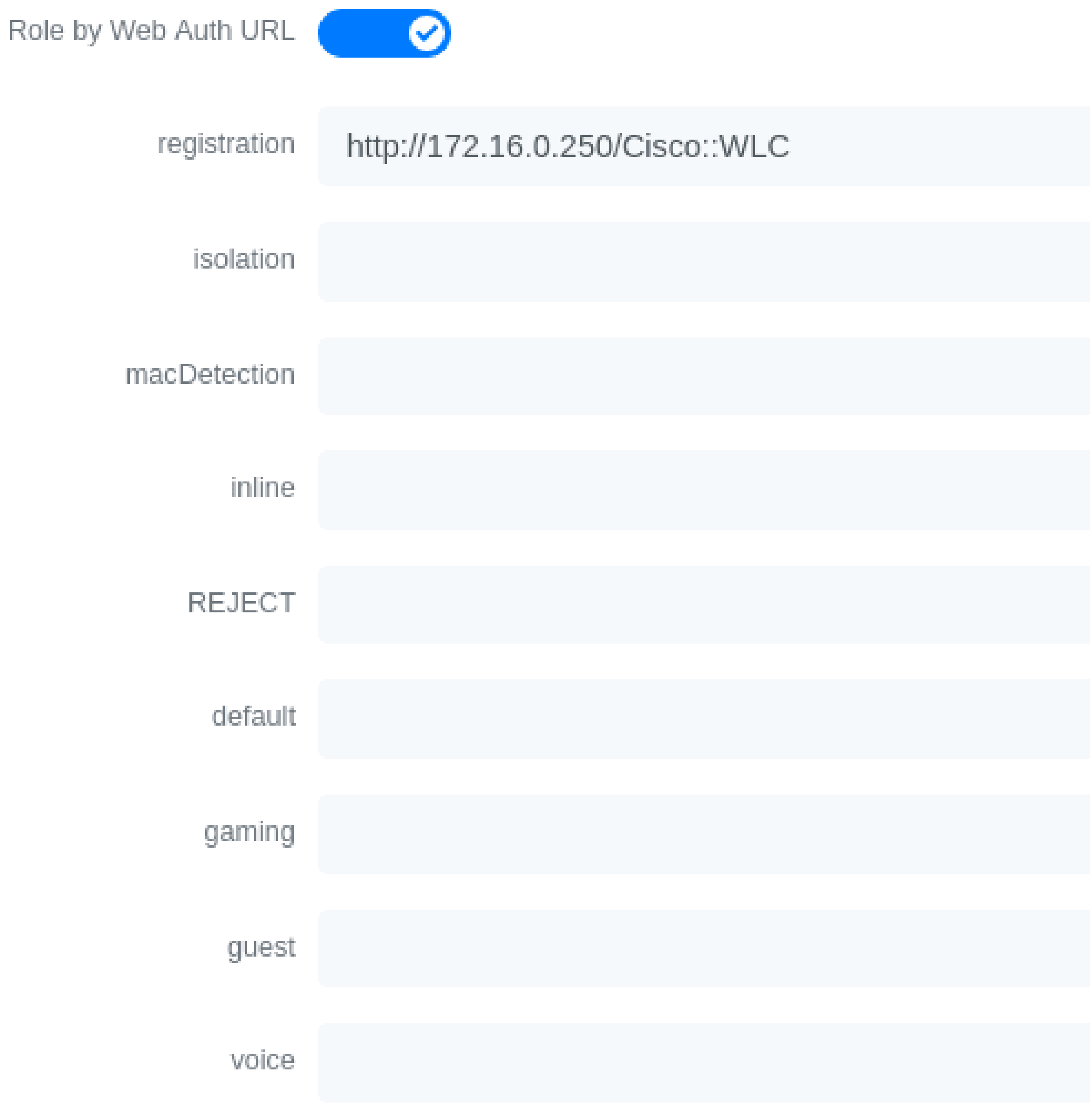
General

Access List Name Pre-Auth-For-WebRedirect

Deny Counters 0

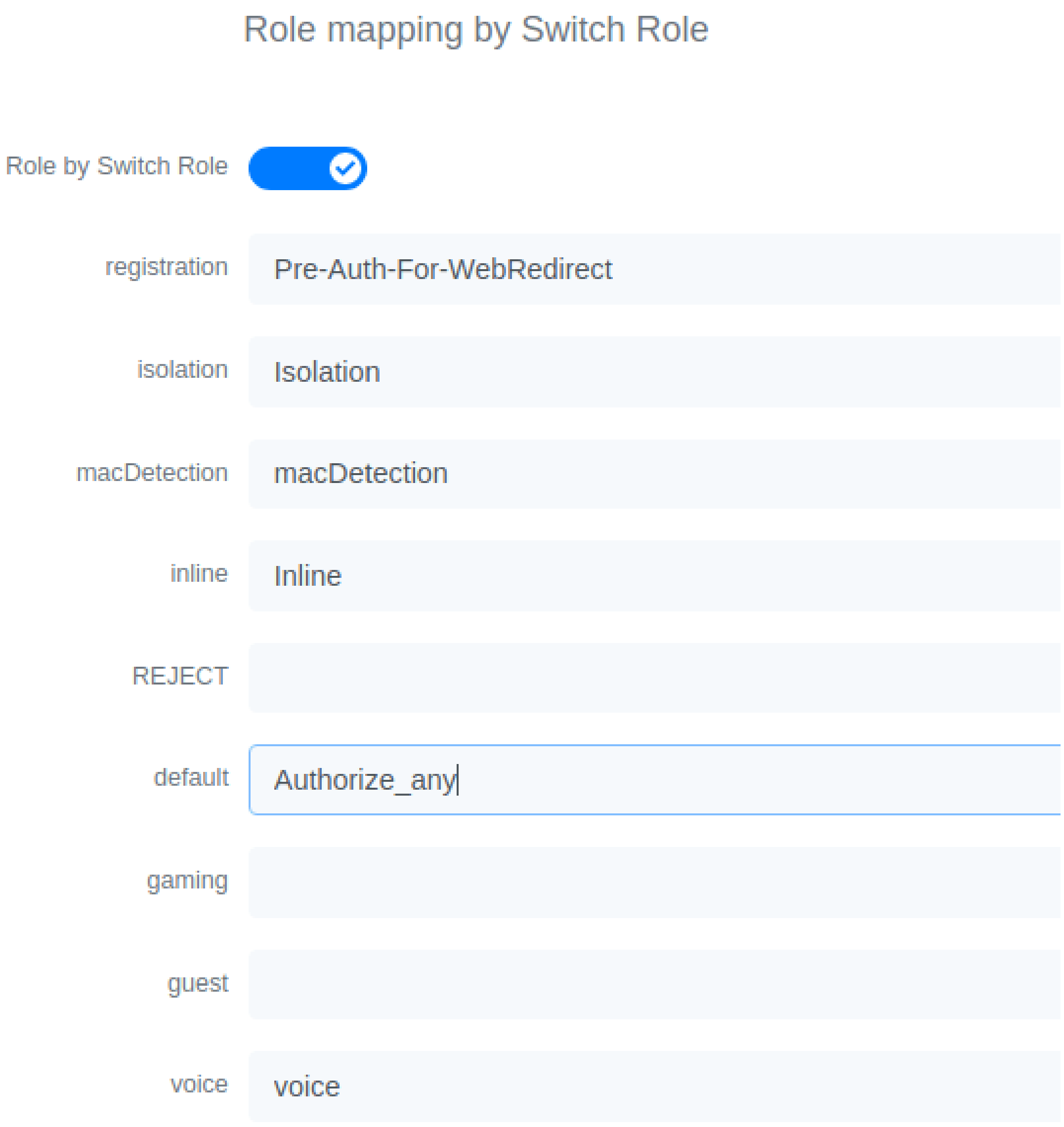
Seq	Action	Source IP/Mask	Destination IP/Mask	Protocol	Source Port	Dest Port	DSCP	Direction	Number of Hits
1	Permit	0.0.0.0 / 0.0.0.0	0.0.0.0 / 0.0.0.0	UDP	Any	DNS	Any	Any	0
2	Permit	0.0.0.0 / 0.0.0.0	0.0.0.0 / 0.0.0.0	UDP	DNS	Any	Any	Any	0
3	Permit	0.0.0.0 / 0.0.0.0	0.0.0.0 / 0.0.0.0	UDP	DHCP Client	DHCP Client	Any	Any	0
4	Permit	0.0.0.0 / 0.0.0.0	0.0.0.0 / 0.0.0.0	UDP	DHCP Server	DHCP Client	Any	Any	0
5	Permit	0.0.0.0 / 0.0.0.0	172.16.0.250 / 255.255.255.255	Any	Any	Any	Any	Any	0
6	Permit	172.16.0.250 / 255.255.255.255	0.0.0.0 / 0.0.0.0	Any	Any	Any	Any	Any	0

- Then the last step is to configure the WLC in PacketFence. Role by Web Auth URL



Role by Web Auth URL	✓
registration	http://172.16.0.250/Cisco::WLC
isolation	
macDetection	
inline	
REJECT	
default	
gaming	
guest	
voice	

Role definition



Role mapping by Switch Role

Role by Switch Role	☑
registration	Pre-Auth-For-WebRedirect
isolation	Isolation
macDetection	macDetection
inline	Inline
REJECT	
default	Authorize_any
gaming	
guest	
voice	voice

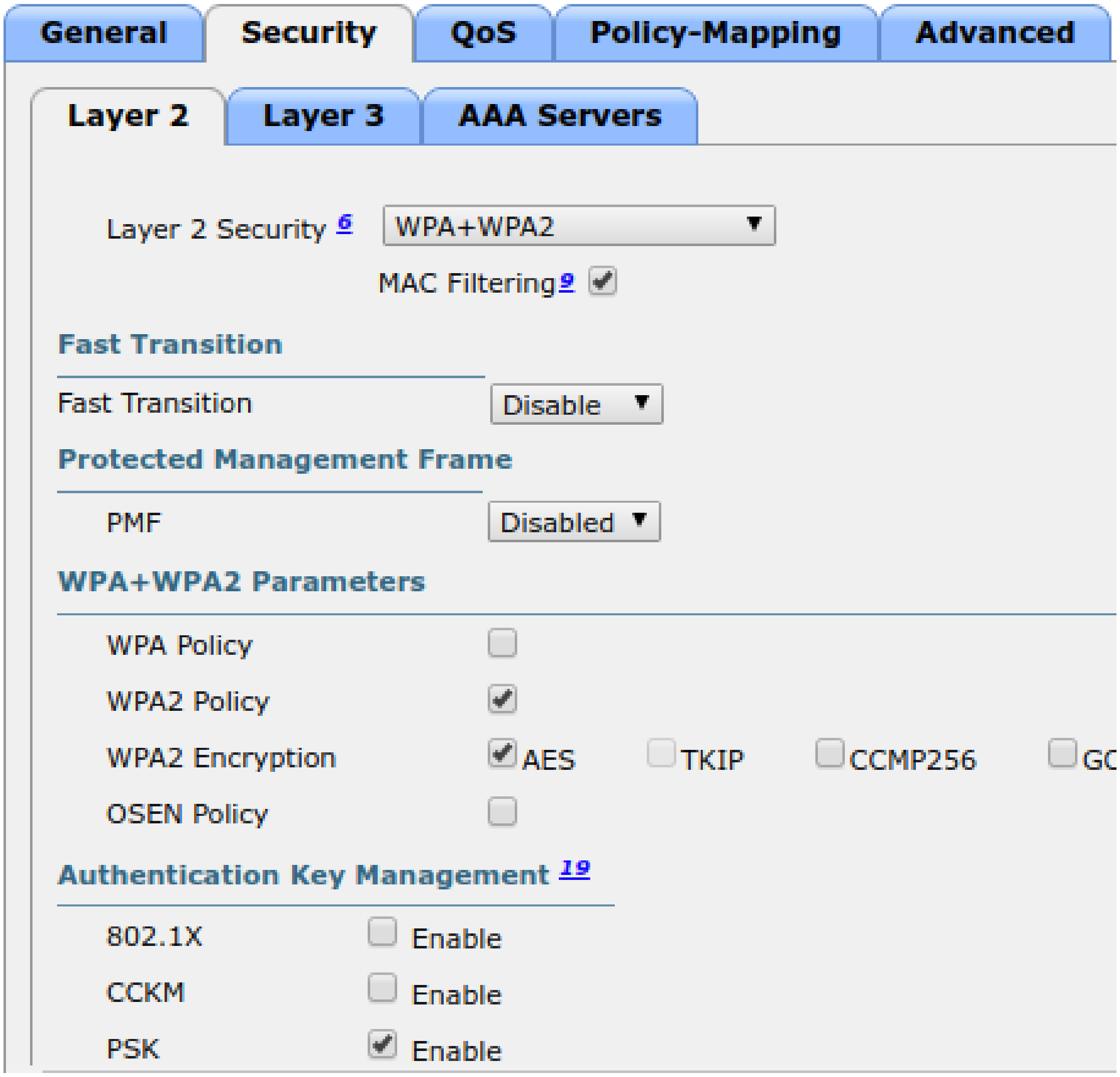
Wireless LAN Controller (WLC) IPSK

In this section, we cover the basic configuration of the WLC IPSK feature. Starting from WLC 8.5 release, Cisco introduces the IPSK feature. Identity PSKs are unique pre-shared keys created for individuals or groups of users on the same SSID.

In this section we will cover the WLC configuration and the PacketFence configuration.

WLC Configuration:

- First, globally define the RADIUS server running on PacketFence (PacketFence's IP) and make sure *Support for RFC 3576* (also called *Support for CoA*) is enabled. When the option is missing from your WLC, it is enabled by default.
- Next, configure a new SSID like in the following screenshots



Layer 2 Security [6] WPA+WPA2

MAC Filtering[9] ☑

Fast Transition

Fast Transition Disable

Protected Management Frame

PMF Disabled

WPA+WPA2 Parameters

WPA Policy □

WPA2 Policy ☑

WPA2 Encryption ☑ AES □ TKIP □ CCMP256 □ GC

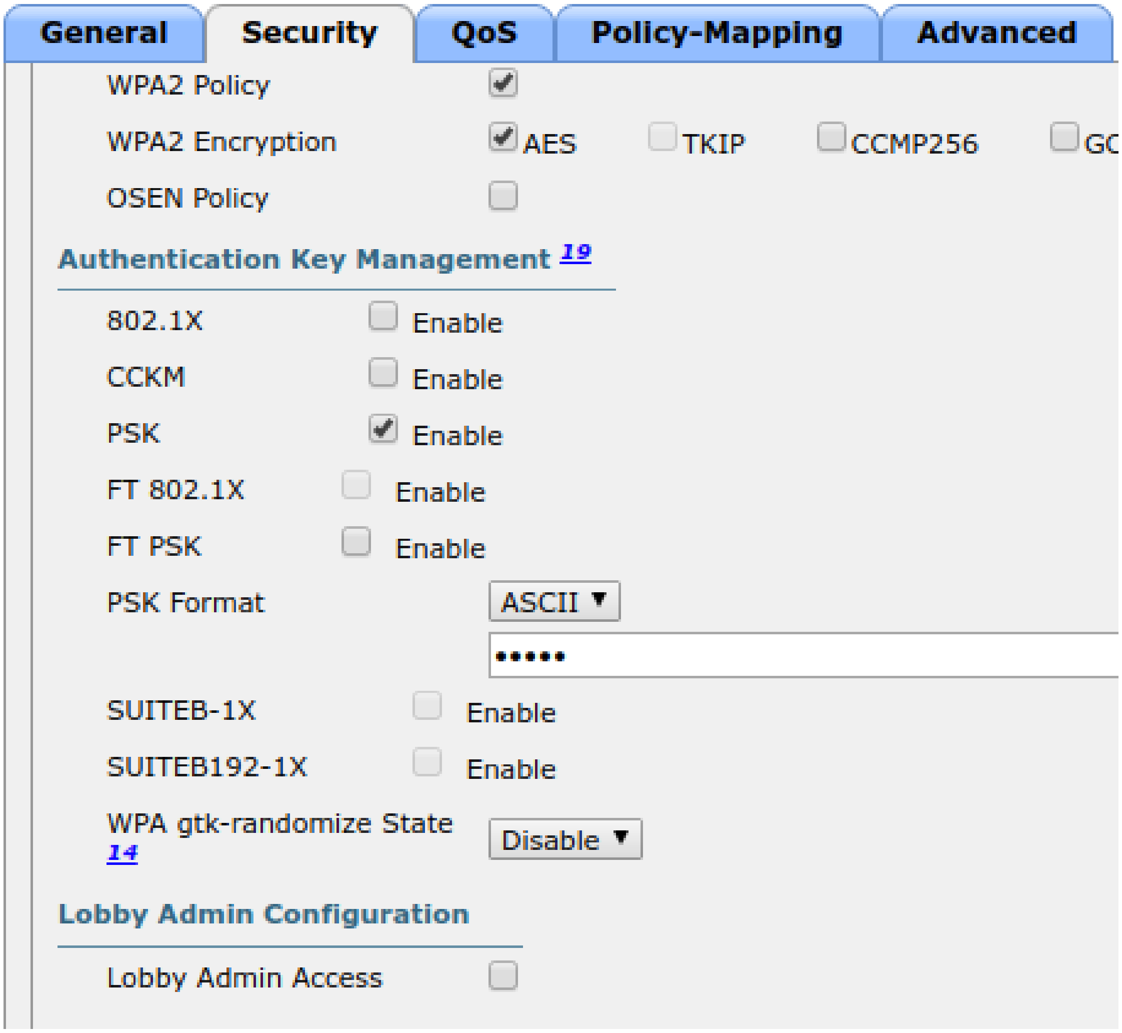
OSEN Policy □

Authentication Key Management [19]

802.1X □ Enable

CCKM □ Enable

PSK ☑ Enable



General | Security | QoS | Policy-Mapping | Advanced

WPA2 Policy ☑

WPA2 Encryption ☑ AES ☐ TKIP ☐ CCMP256 ☐ GC

OSEN Policy ☐

Authentication Key Management [19]

802.1X ☐ Enable

CCKM ☐ Enable

PSK ☑ Enable

FT 802.1X ☐ Enable

FT PSK ☐ Enable

PSK Format ASCII ▼

•••••

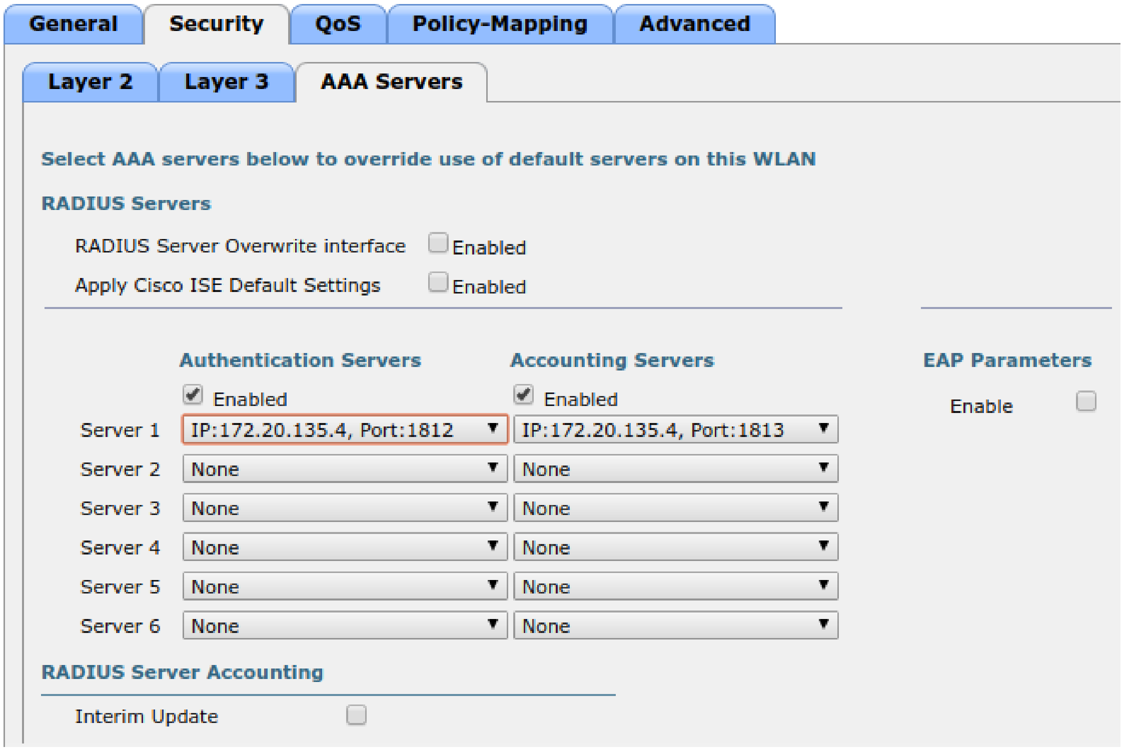
SUITEB-1X ☐ Enable

SUITEB192-1X ☐ Enable

WPA gtk-randomize State [14] Disable ▼

Lobby Admin Configuration

Lobby Admin Access ☐



Select AAA servers below to override use of default servers on this WLAN

RADIUS Servers

RADIUS Server Overwrite interface □ Enabled

Apply Cisco ISE Default Settings □ Enabled

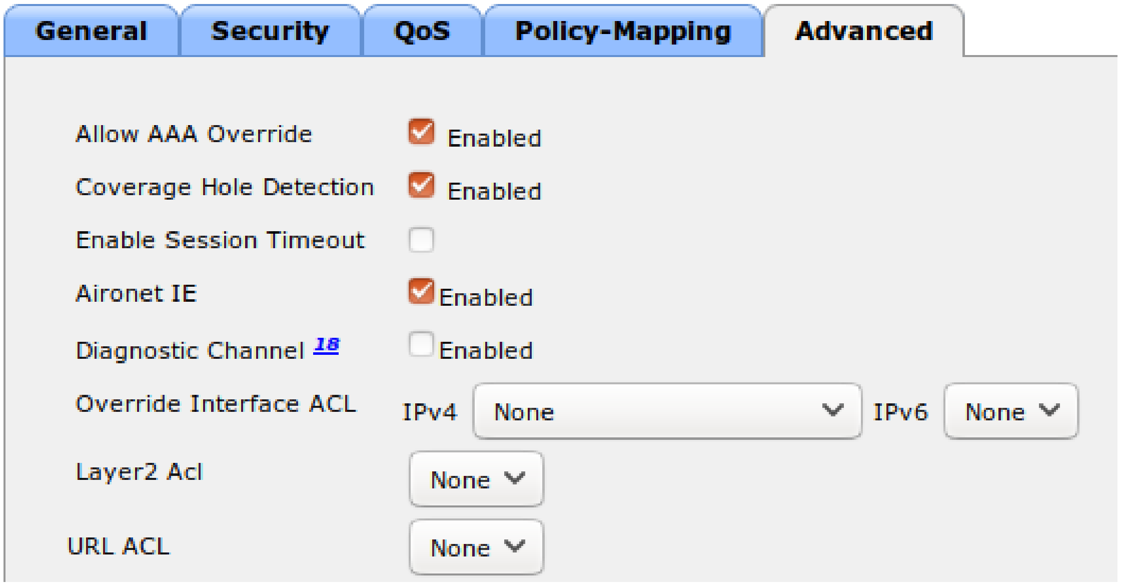
	Authentication Servers	Accounting Servers
	☑ Enabled	☑ Enabled
Server 1	IP:172.20.135.4, Port:1812	IP:172.20.135.4, Port:1813
Server 2	None	None
Server 3	None	None
Server 4	None	None
Server 5	None	None
Server 6	None	None

EAP Parameters

Enable □

RADIUS Server Accounting

Interim Update □



Allow AAA Override ☑ Enabled

Coverage Hole Detection ☑ Enabled

Enable Session Timeout □

Aironet IE ☑ Enabled

Diagnostic Channel 18 □ Enabled

Override Interface ACL IPv4 None IPv6 None

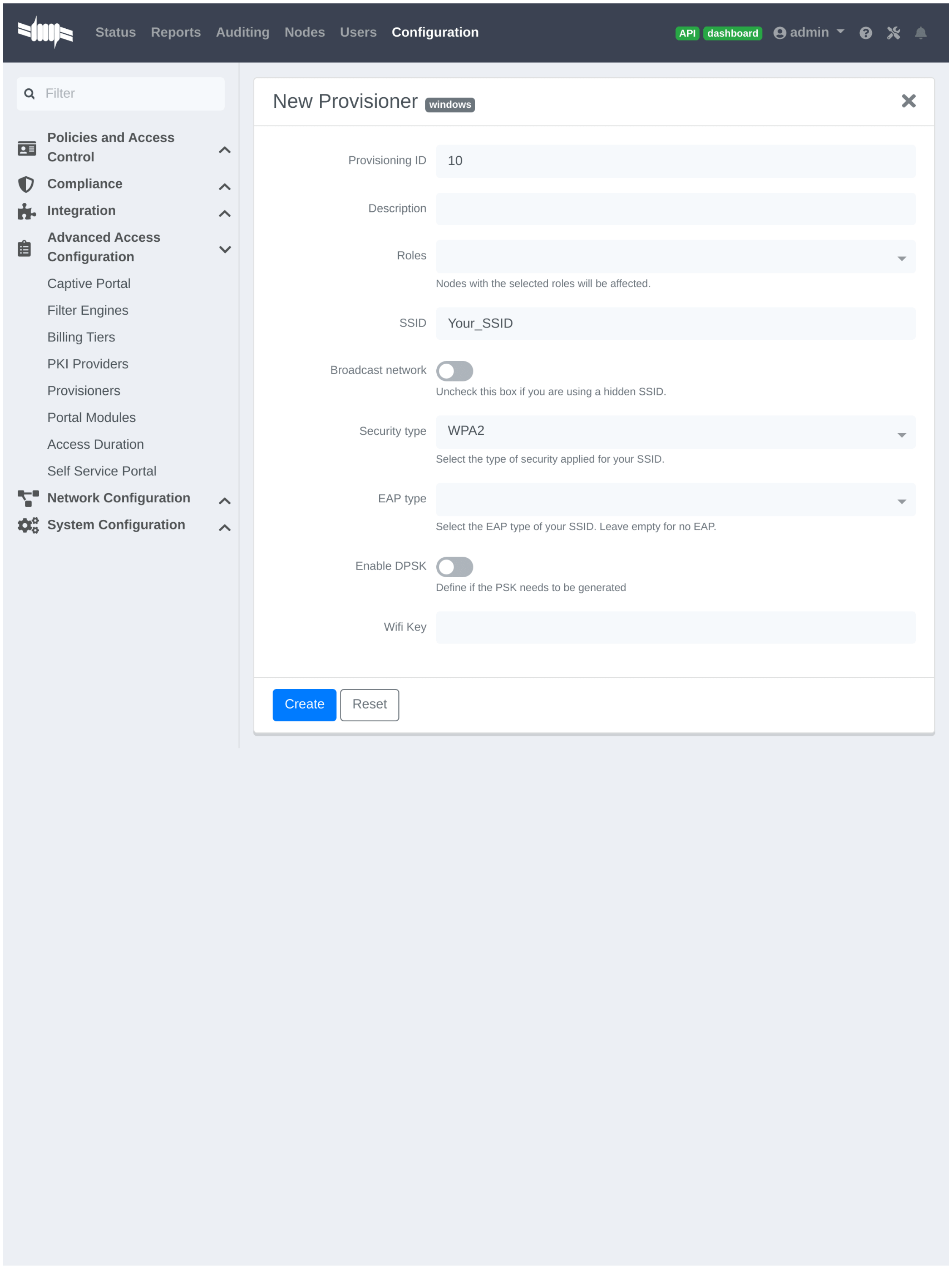
Layer2 Acl None

URL ACL None

PacketFence Configuration:

- First because there is no way to detect in the RADIUS request that the request is for an SSID configured for IPSK, you need to configure PacketFence to trigger IPSK on a connection profile. To do that, create a new connection profile, set a Filter based on the SSID (Example SSID PSK_SSID), enable IPSK and set a default PSK key. So each time a device will connect on this specific SSID PacketFence will know that it has to answer with specific VSA attributes.
- Second step is to associate the device to a user, you have two ways to do it, the first one is to manually edit an user and in Miscellaneous tab fill the PSK entry (8 characters minimum) then edit a node and change the owner with the one you just edit before. The second way to

associate the device is to use a provisioner. There are also 2 ways to do it, use the "IPSK" provisioner (it will show you a page on the portal with the PSK key to use and the SSID to connect to, or use the "Windows/Apple Devices/Android" provisioner and configure it to do IPSK.



New Provisioner windows

Provisioning ID: 10

Description:

Roles:
Nodes with the selected roles will be affected.

SSID: Your_SSID

Broadcast network: ○
Uncheck this box if you are using a hidden SSID.

Security type: WPA2
Select the type of security applied for your SSID.

EAP type:
Select the EAP type of your SSID. Leave empty for no EAP.

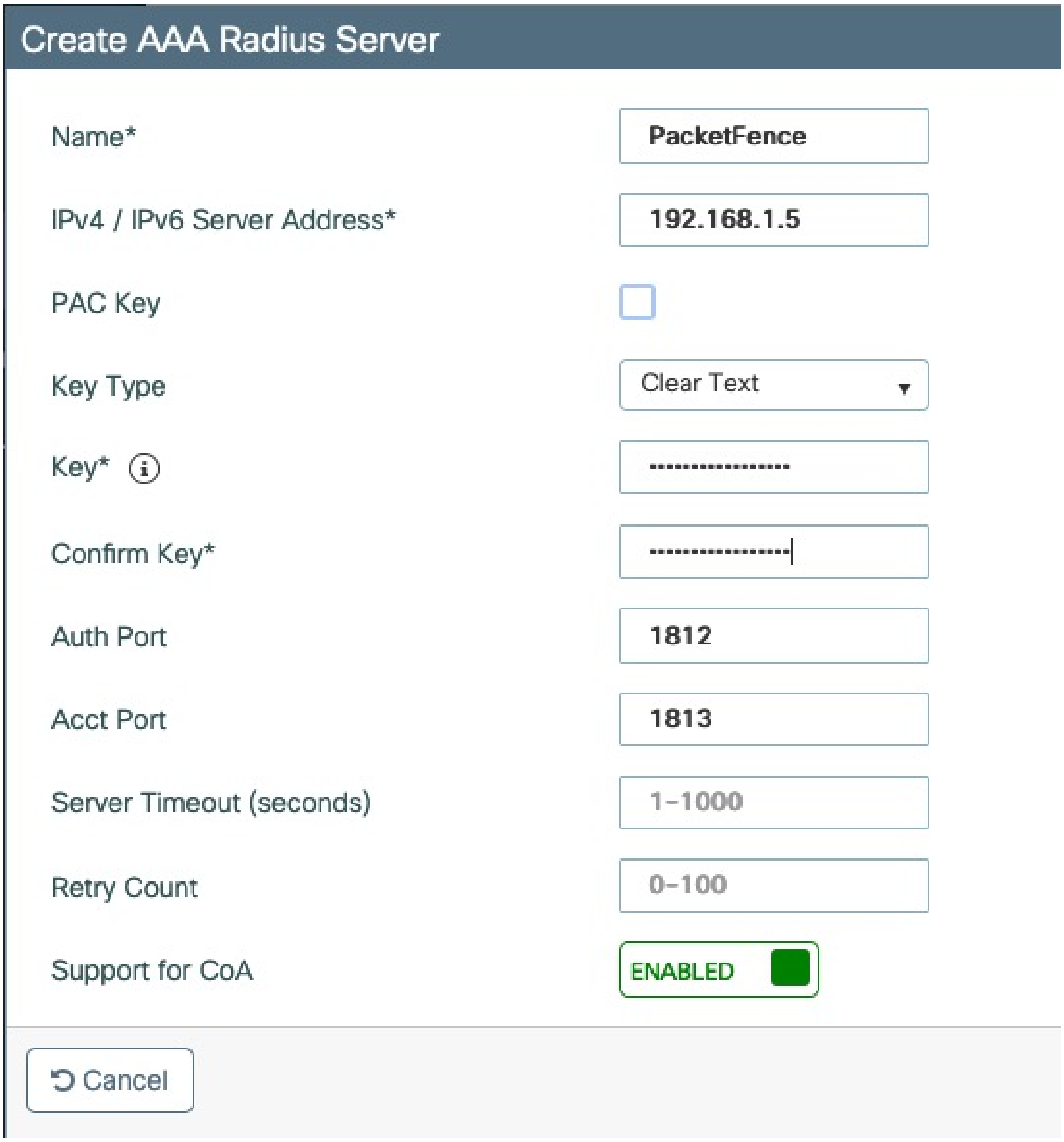
Enable DPSK: ○
Define if the PSK needs to be generated

Wifi Key:

6.11.5. Wireless LAN Controller (WLC) 9800

General RADIUS Configuration

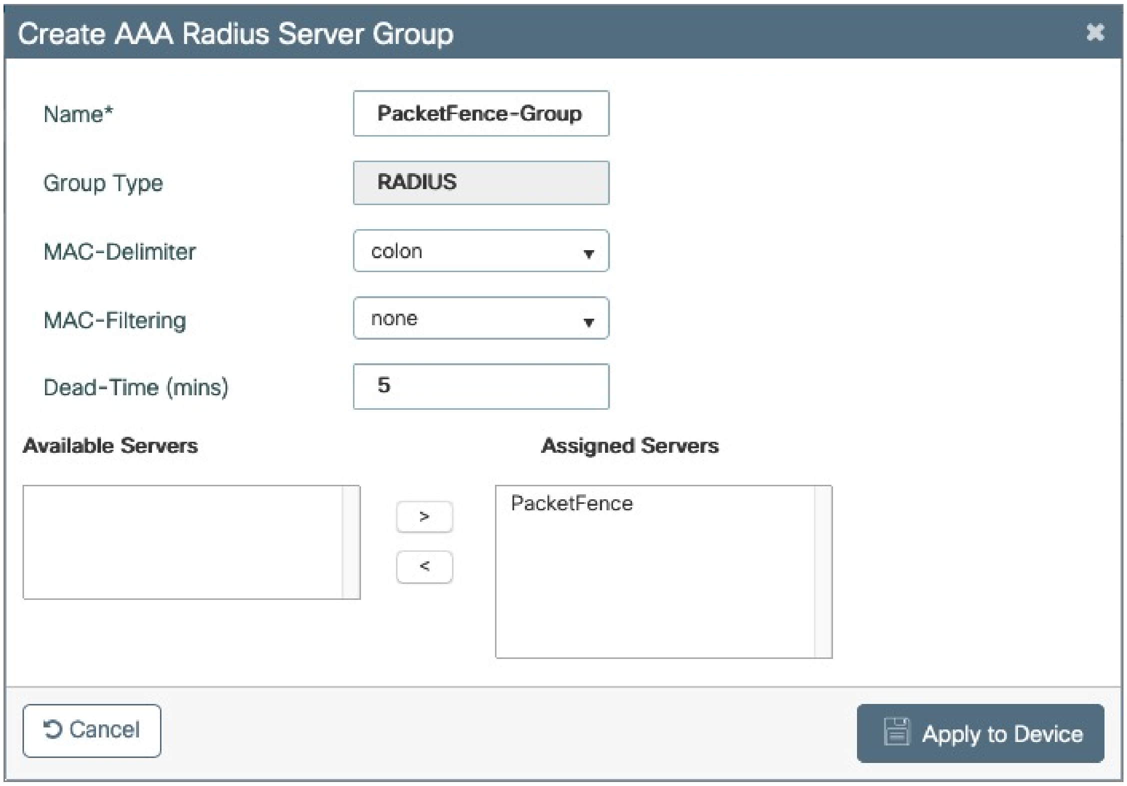
Go to Configuration → Security → AAA → Servers / Groups → Servers, click add



Create AAA Radius Server

Name*	PacketFence
IPv4 / IPv6 Server Address*	192.168.1.5
PAC Key	□
Key Type	Clear Text ▾
Key* ⓘ	-----------------
Confirm Key*	-----------------
Auth Port	1812
Acct Port	1813
Server Timeout (seconds)	1-1000
Retry Count	0-100
Support for CoA	ENABLED

Click Server Groups, click add


Create AAA Radius Server Group

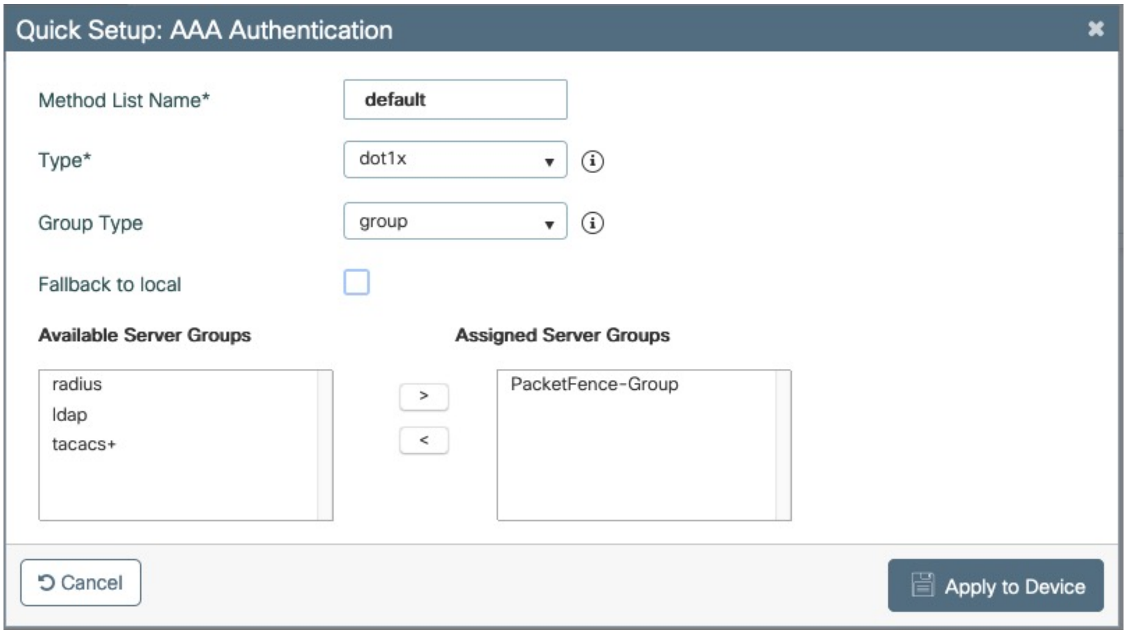
Name*	PacketFence-Group
Group Type	RADIUS
MAC-Delimiter	colon
MAC-Filtering	none
Dead-Time (mins)	5

Available Servers

Assigned Servers

PacketFence

Go to Configuration → Security → AAA → AAA Method List → Authentication, click add


Quick Setup: AAA Authentication

Method List Name*	default
Type*	dot1x
Group Type	group
Fallback to local	□

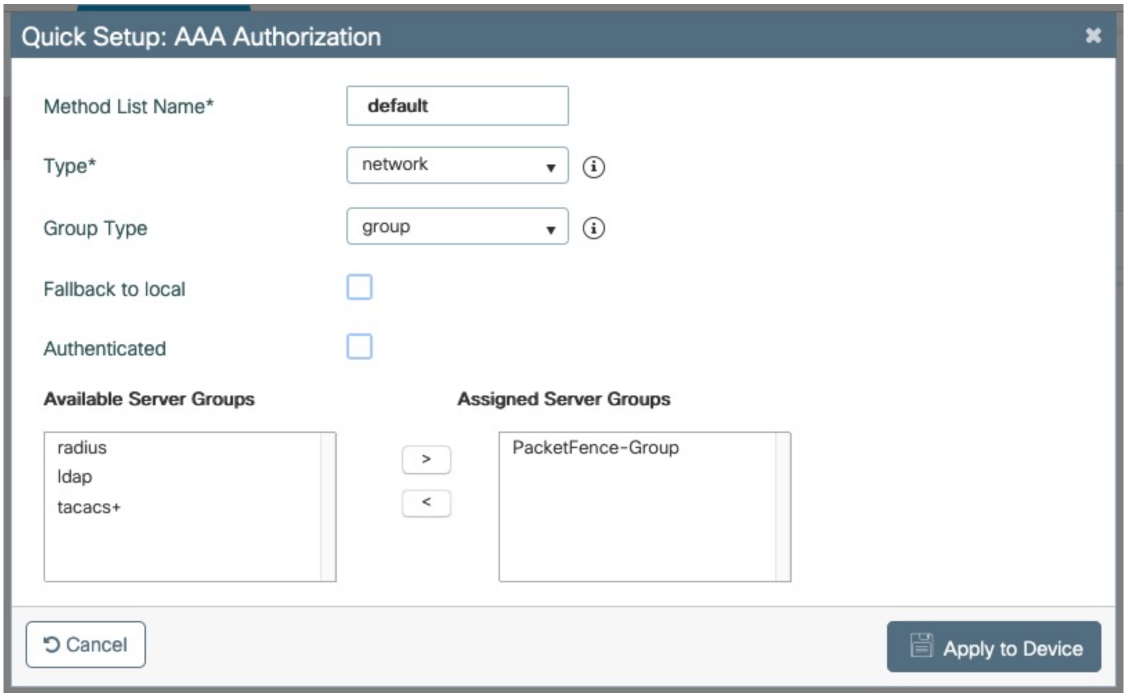
Available Server Groups

radius
ldap
tacacs+

Assigned Server Groups

PacketFence-Group

Go to Configuration → Security → AAA → AAA Method List → Authorization, click add


Quick Setup: AAA Authorization

Method List Name* default

Type* network

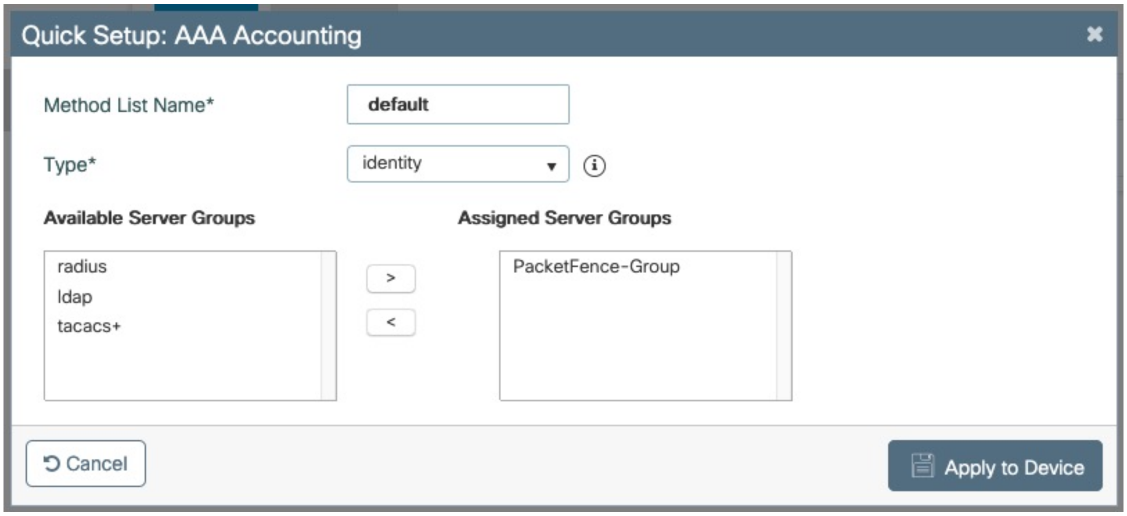
Group Type group

Fallback to local □

Authenticated □

Available Server Groups	Assigned Server Groups
radius ldap tacacs+	PacketFence-Group

Go to Configuration → Security → AAA → AAA Method List → Accounting, click add


Quick Setup: AAA Accounting

Method List Name* default

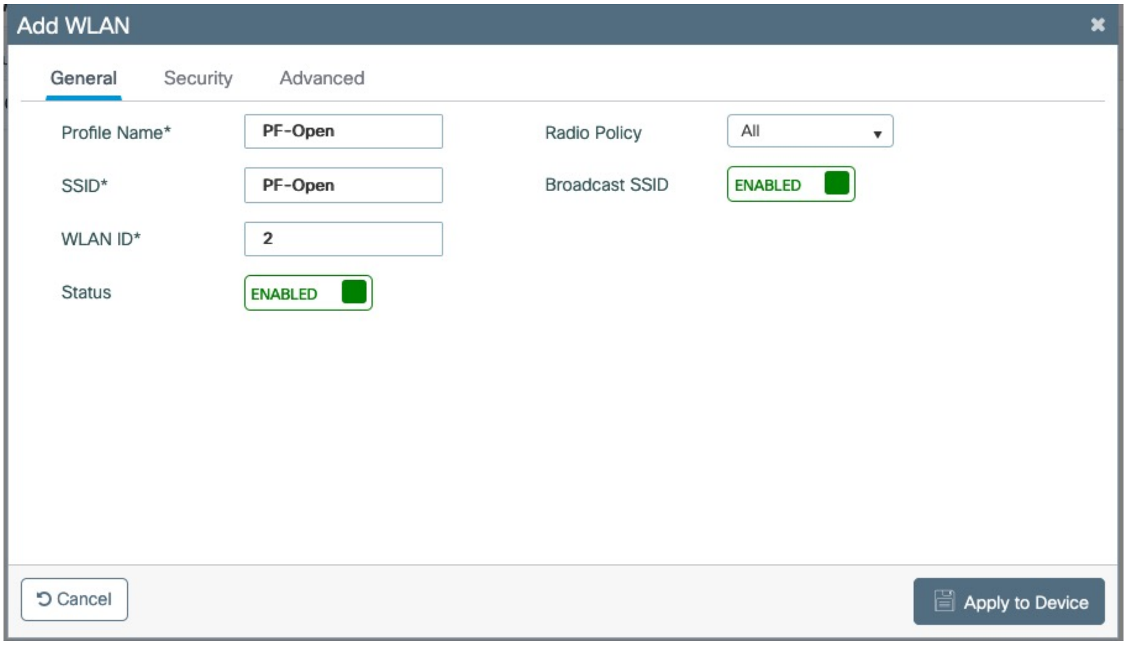
Type* identity

Available Server Groups	Assigned Server Groups
radius ldap tacacs+	PacketFence-Group

Create WLANs

PF-Open SSID

Go to Configuration → Tags & Profiles → WLANs, click add



Add WLAN

Profile Name* PF-Open

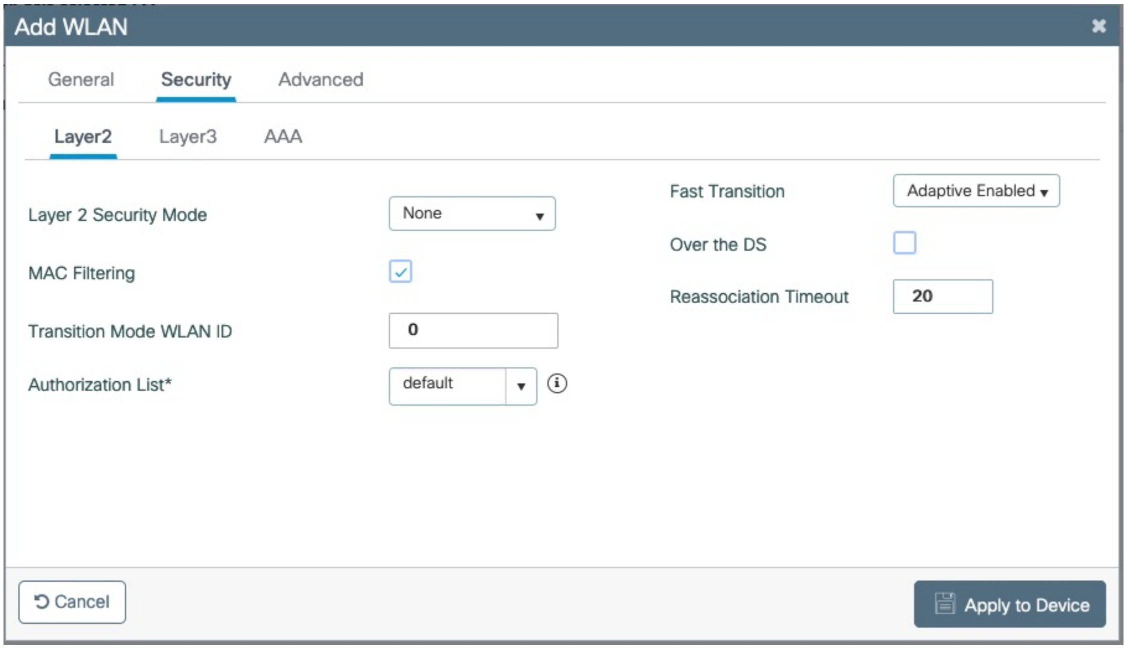
SSID* PF-Open

WLAN ID* 2

Status ENABLED

Radio Policy All

Broadcast SSID ENABLED



Add WLAN

Layer 2 Security Mode None

MAC Filtering ☑

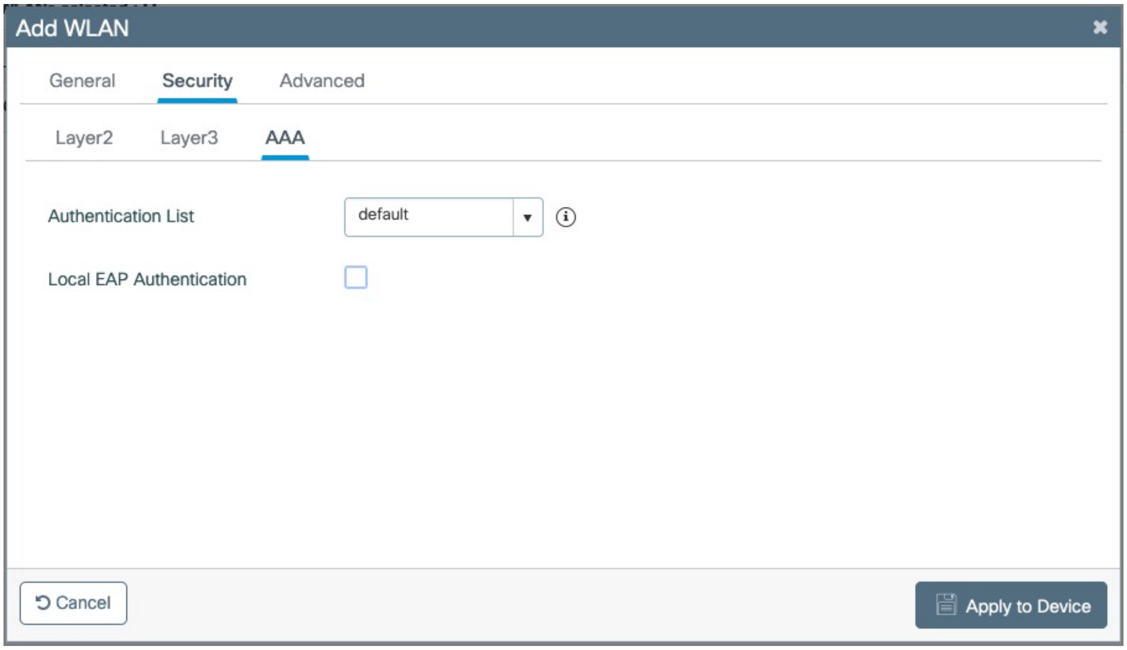
Transition Mode WLAN ID 0

Authorization List* default

Fast Transition Adaptive Enabled

Over the DS □

Reassociation Timeout 20

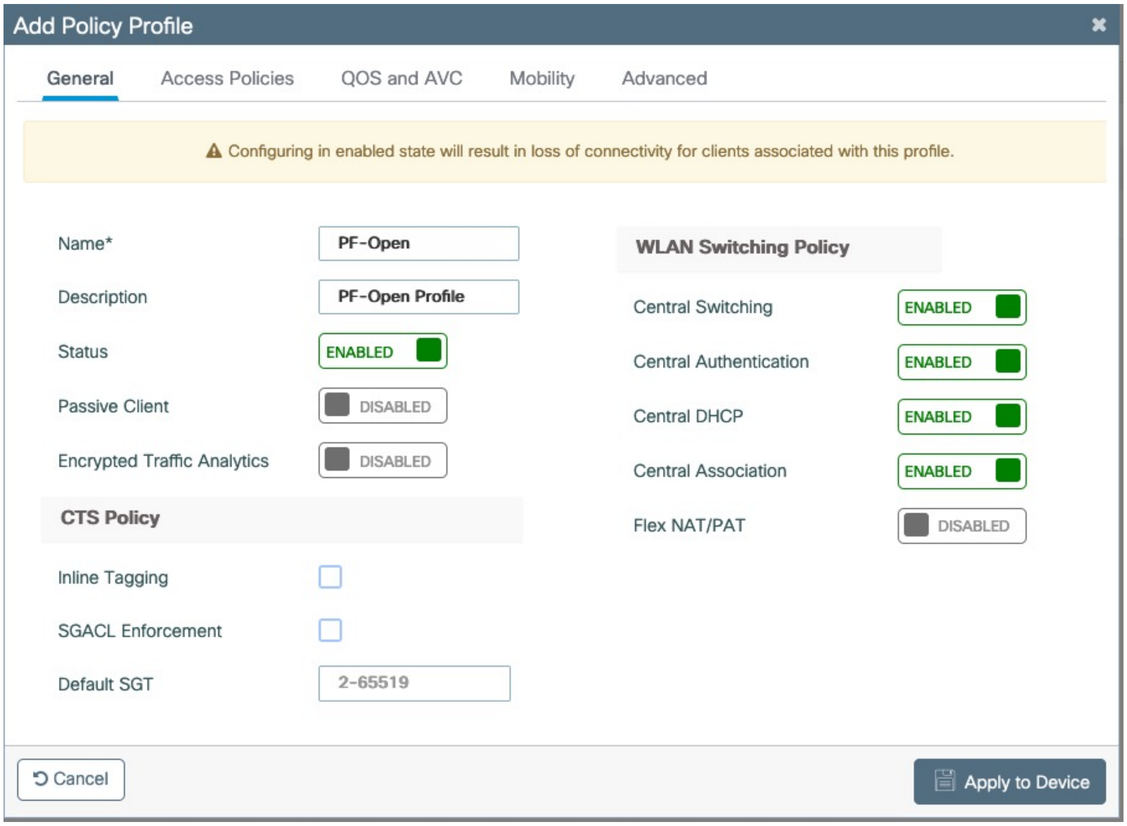


Authentication List: default

Local EAP Authentication: □

Create Policy Profiles PF-Open

Go to Configuration → Tags & Profiles → Policy, click add



⚠ Configuring in enabled state will result in loss of connectivity for clients associated with this profile.

Name*: PF-Open

Description: PF-Open Profile

Status: ENABLED

Passive Client: DISABLED

Encrypted Traffic Analytics: DISABLED

CTS Policy

Inline Tagging: □

SGACL Enforcement: □

Default SGT: 2-65519

WLAN Switching Policy

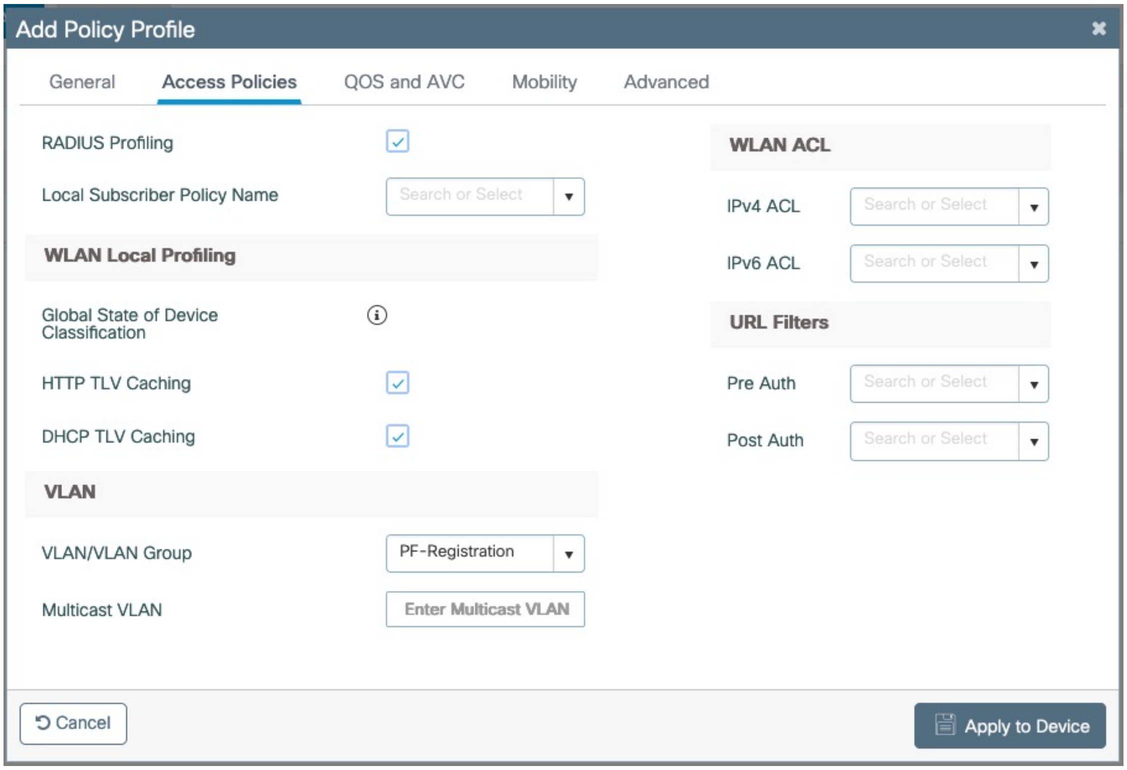
Central Switching: ENABLED

Central Authentication: ENABLED

Central DHCP: ENABLED

Central Association: ENABLED

Flex NAT/PAT: DISABLED



Add Policy Profile

General | Access Policies | QOS and AVC | Mobility | Advanced

RADIUS Profiling ☑

Local Subscriber Policy Name: Search or Select

WLAN Local Profiling

Global State of Device Classification ⓘ

HTTP TLV Caching ☑

DHCP TLV Caching ☑

VLAN

VLAN/VLAN Group: PF-Registration

Multicast VLAN: Enter Multicast VLAN

WLAN ACL

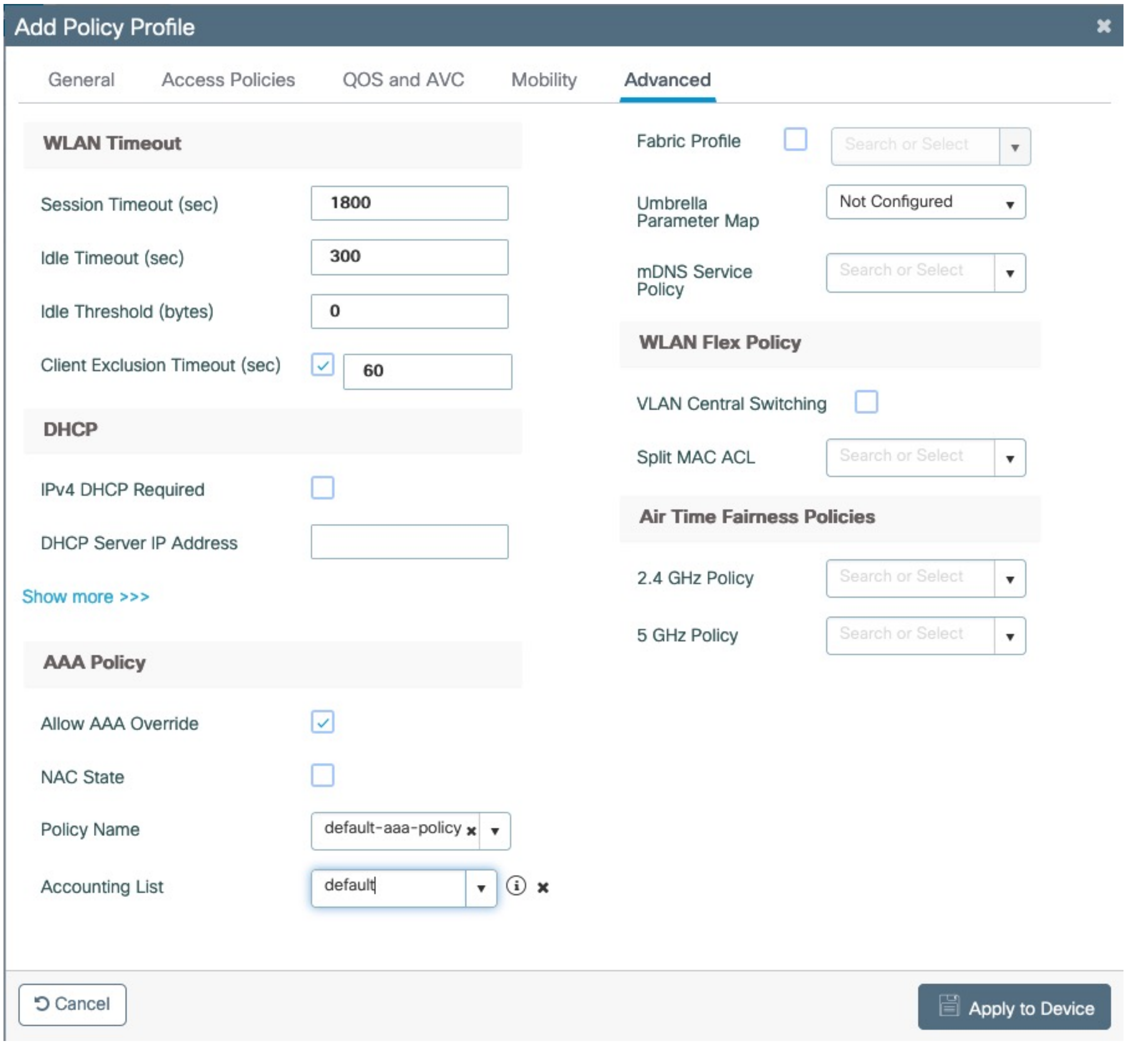
IPv4 ACL: Search or Select

IPv6 ACL: Search or Select

URL Filters

Pre Auth: Search or Select

Post Auth: Search or Select



Add Policy Profile

WLAN Timeout

Session Timeout (sec): 1800

Idle Timeout (sec): 300

Idle Threshold (bytes): 0

Client Exclusion Timeout (sec): ☑ 60

DHCP

IPv4 DHCP Required: □

DHCP Server IP Address:

Show more >>>

AAA Policy

Allow AAA Override: ☑

NAC State: □

Policy Name: default-aaa-policy

Accounting List: default

Fabric Profile: □ Search or Select

Umbrella Parameter Map: Not Configured

mDNS Service Policy: Search or Select

WLAN Flex Policy

VLAN Central Switching: □

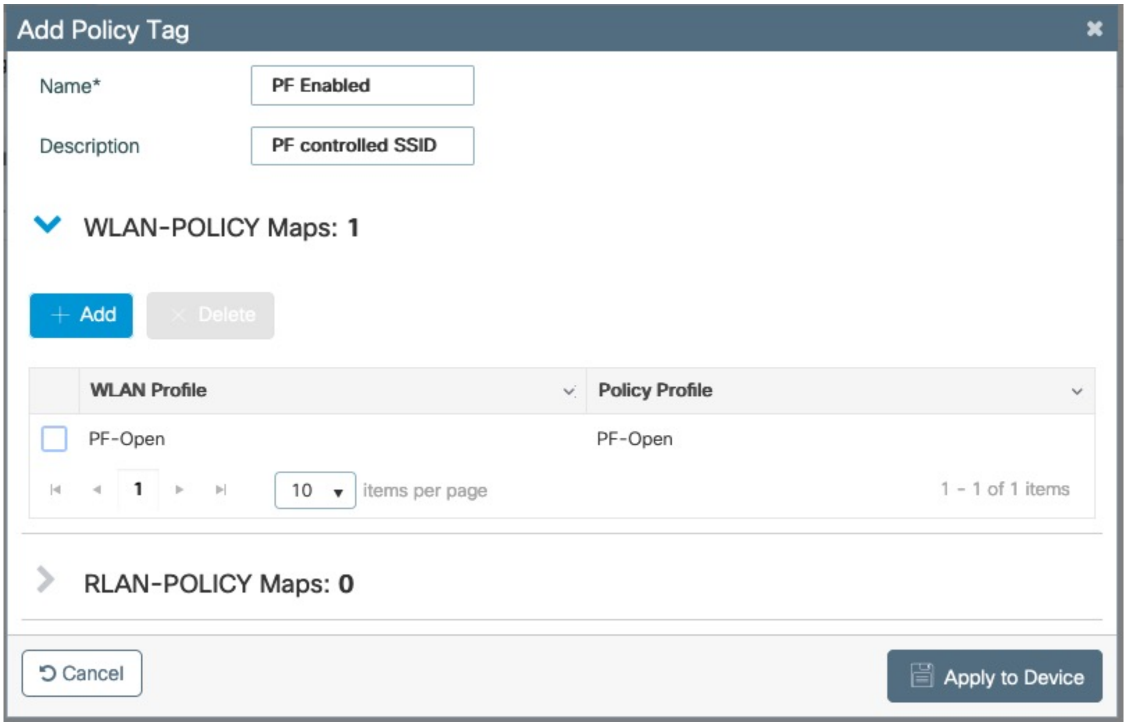
Split MAC ACL: Search or Select

Air Time Fairness Policies

2.4 GHz Policy: Search or Select

5 GHz Policy: Search or Select

Go to Configuration → Tags & Profiles → Tags, under Policy click add



Add Policy Tag

Name* PF Enabled

Description PF controlled SSID

WLAN-POLICY Maps: 1

	WLAN Profile	Policy Profile
□	PF-Open	PF-Open

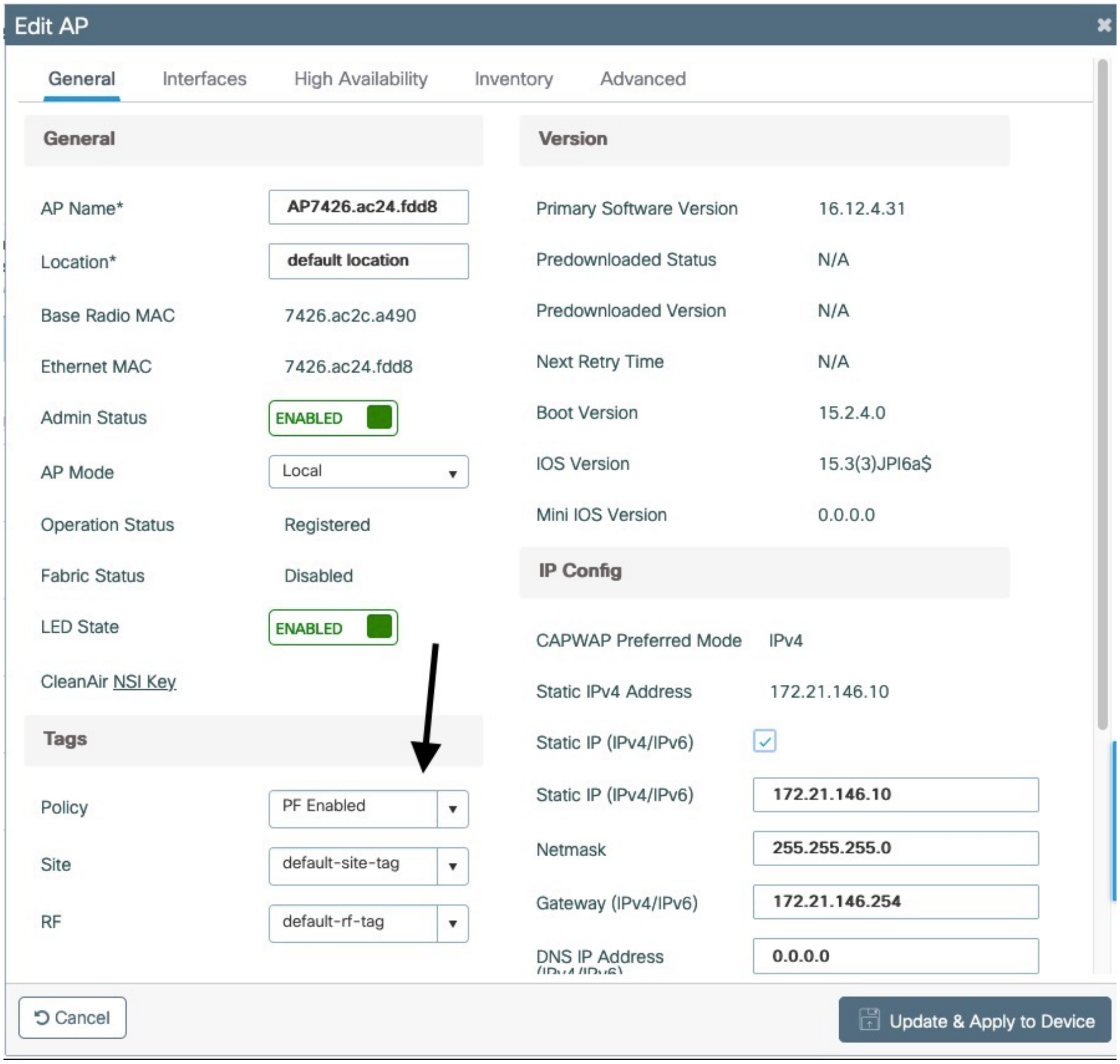
1 10 items per page 1 - 1 of 1 items

RLAN-POLICY Maps: 0

Go to Configuration → Wireless → Access Points

Click on the AP Name or MAC address

Under General → Tags, Select 'PF Enabled'



General

AP Name*	AP7426.ac24.fdd8
Location*	default location
Base Radio MAC	7426.ac2c.a490
Ethernet MAC	7426.ac24.fdd8
Admin Status	ENABLED
AP Mode	Local
Operation Status	Registered
Fabric Status	Disabled
LED State	ENABLED
CleanAir NSI Key	

Tags

Policy	PF Enabled
Site	default-site-tag
RF	default-rf-tag

Version

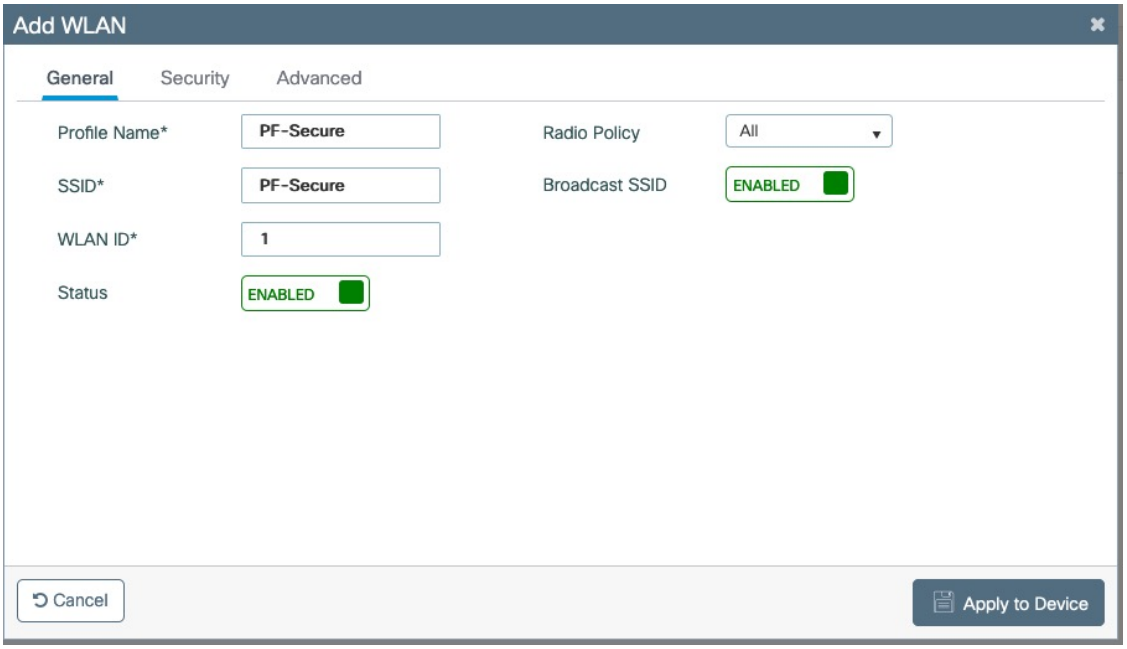
Primary Software Version	16.12.4.31
Predownloaded Status	N/A
Predownloaded Version	N/A
Next Retry Time	N/A
Boot Version	15.2.4.0
IOS Version	15.3(3)JPI6a$
Mini IOS Version	0.0.0.0

IP Config

CAPWAP Preferred Mode	IPv4
Static IPv4 Address	172.21.146.10
Static IP (IPv4/IPv6)	☑
Static IP (IPv4/IPv6)	172.21.146.10
Netmask	255.255.255.0
Gateway (IPv4/IPv6)	172.21.146.254
DNS IP Address (IPv4/IPv6)	0.0.0.0

PF-Secure SSID

Go to Configuration → Tags & Profiles → WLANs, click add



Profile Name* PF-Secure

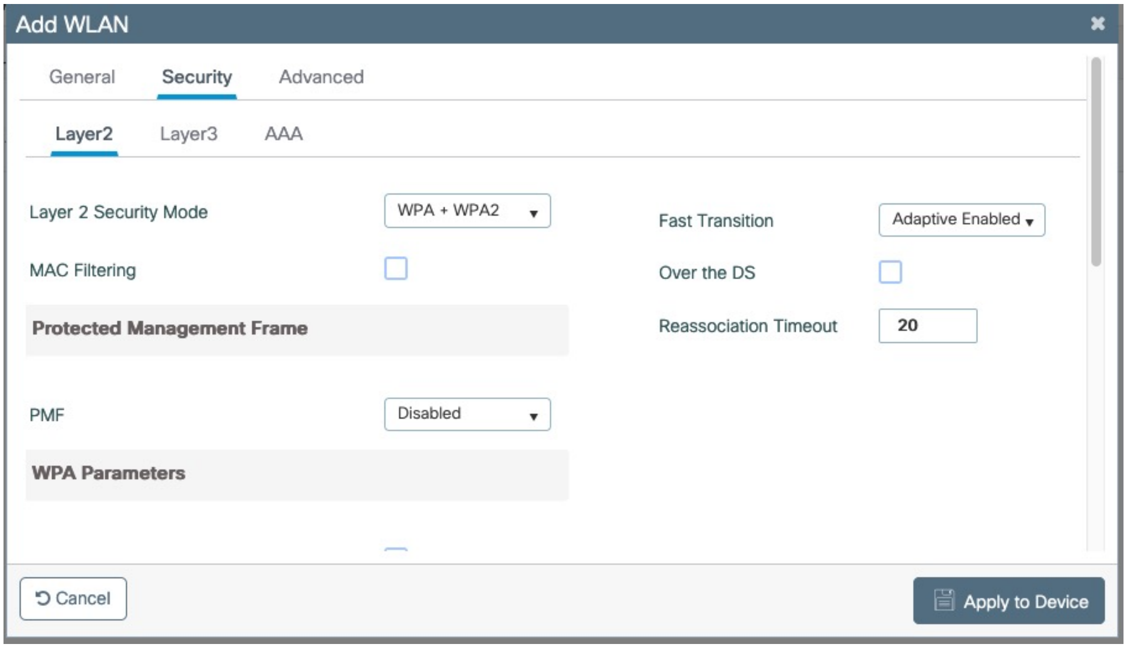
SSID* PF-Secure

WLAN ID* 1

Status ENABLED

Radio Policy All

Broadcast SSID ENABLED



Layer 2 Security Mode WPA + WPA2

MAC Filtering □

Protected Management Frame

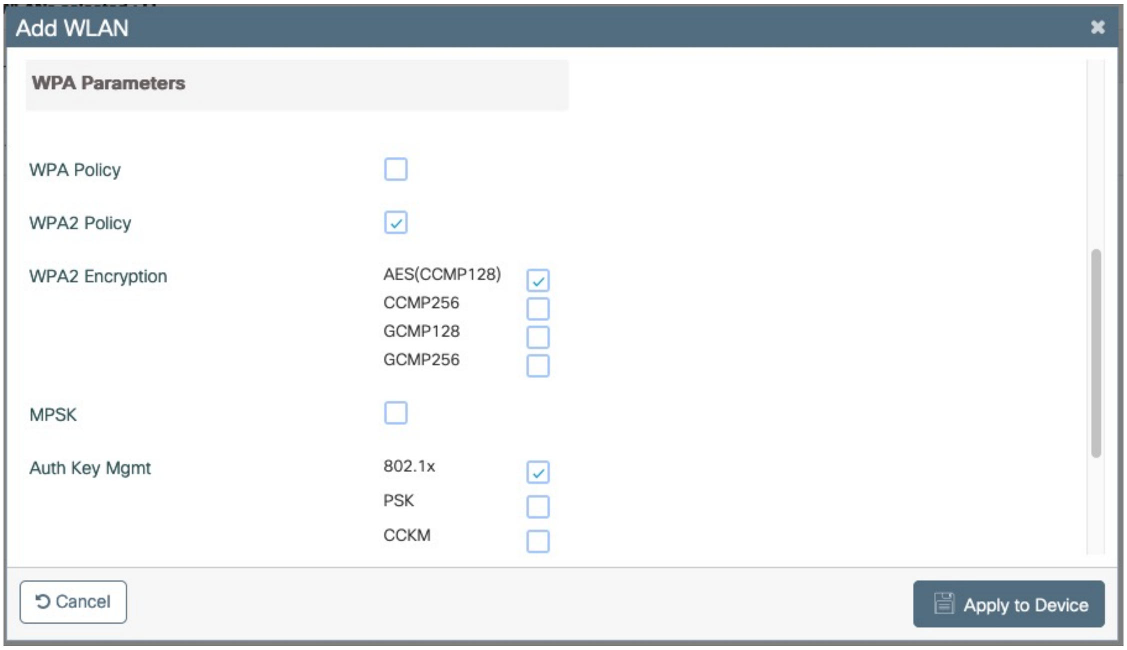
PMF Disabled

WPA Parameters

Fast Transition Adaptive Enabled

Over the DS □

Reassociation Timeout 20



WPA Parameters

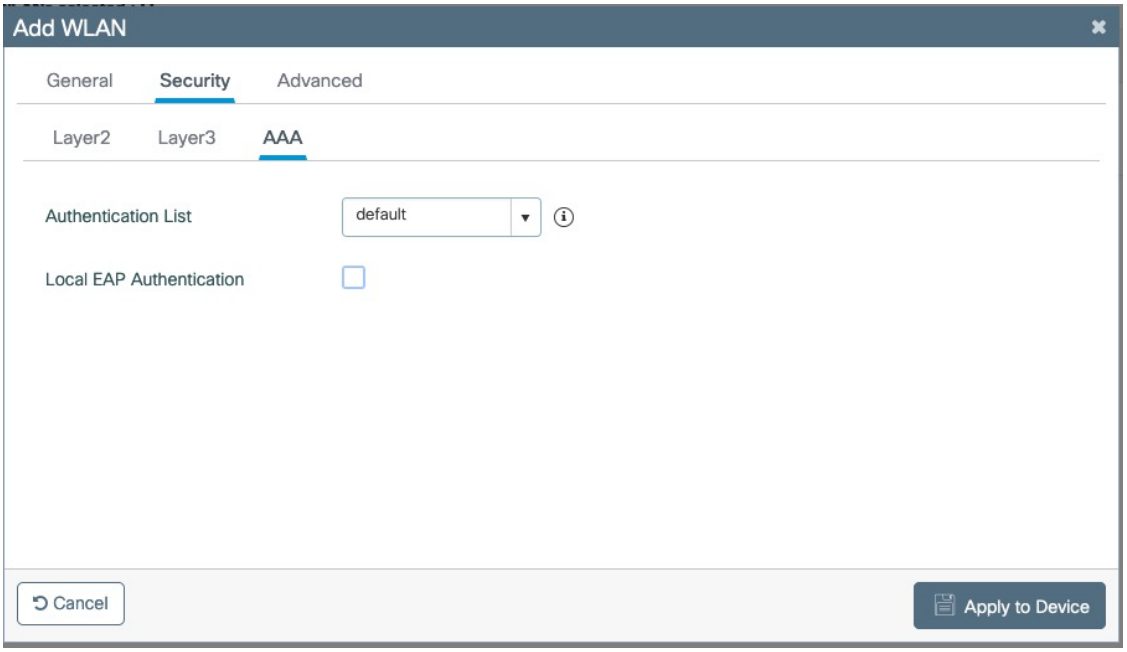
WPA Policy ☐

WPA2 Policy ☑

WPA2 Encryption: AES(CCMP128) ☑ CCMP256 ☐ GCMP128 ☐ GCMP256 ☐

MPSK ☐

Auth Key Mgmt: 802.1x ☑ PSK ☐ CCKM ☐

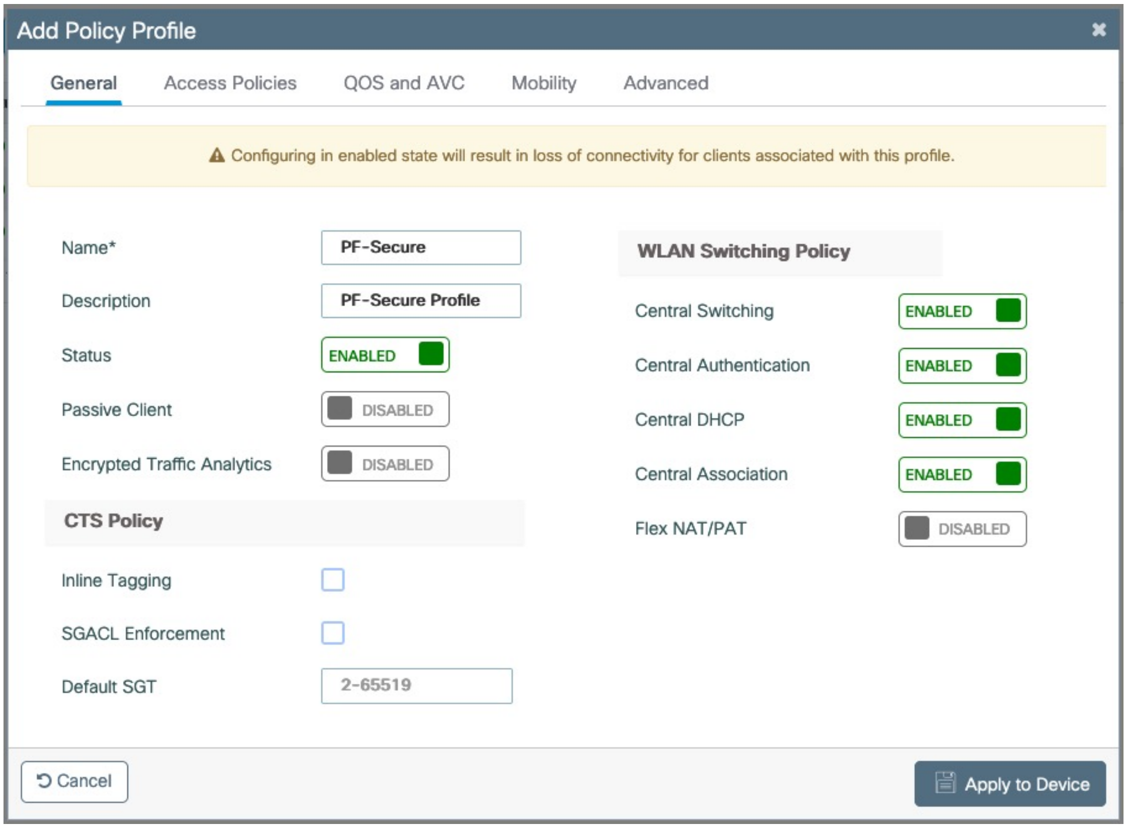


Authentication List: default

Local EAP Authentication ☐

Create Policy Profiles PF-Secure

Go to Configuration → Tags & Profiles → Policy, click add



⚠ Configuring in enabled state will result in loss of connectivity for clients associated with this profile.

Name* PF-Secure

Description PF-Secure Profile

Status ENABLED

Passive Client DISABLED

Encrypted Traffic Analytics DISABLED

CTS Policy

Inline Tagging □

SGACL Enforcement □

Default SGT 2-65519

WLAN Switching Policy

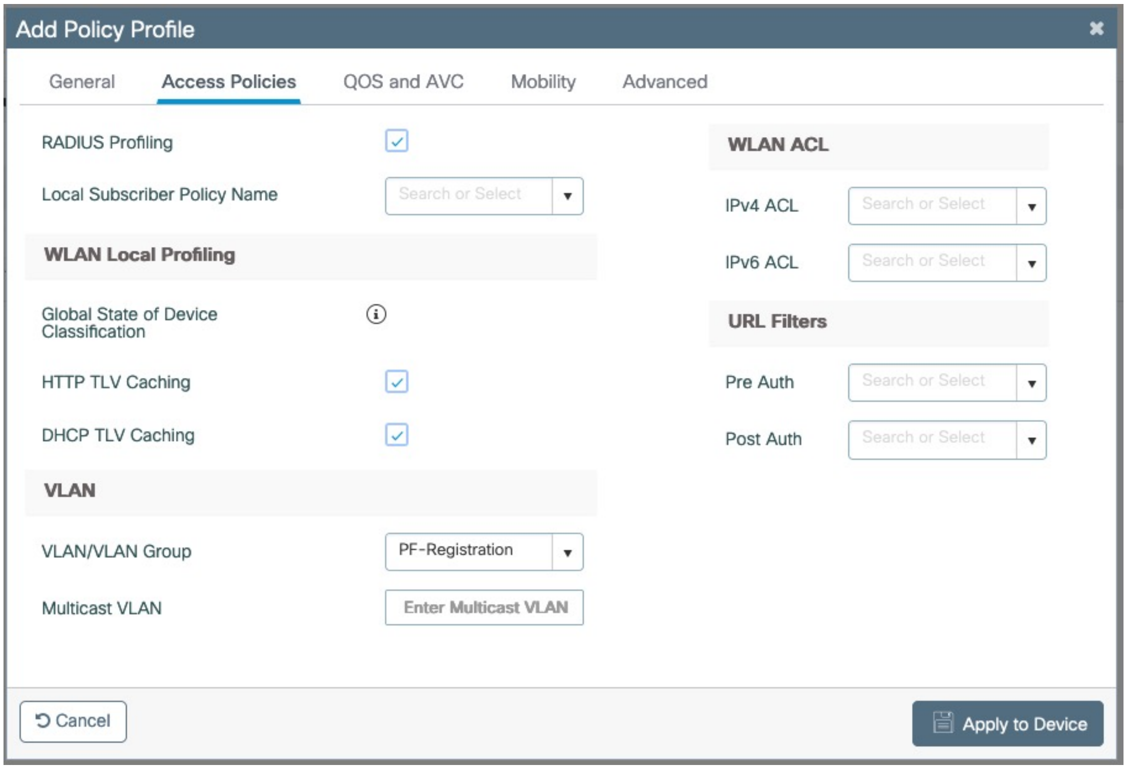
Central Switching ENABLED

Central Authentication ENABLED

Central DHCP ENABLED

Central Association ENABLED

Flex NAT/PAT DISABLED



RADIUS Profiling ☑

Local Subscriber Policy Name Search or Select

WLAN Local Profiling

Global State of Device Classification ⓘ

HTTP TLV Caching ☑

DHCP TLV Caching ☑

VLAN

VLAN/VLAN Group PF-Registration

Multicast VLAN Enter Multicast VLAN

WLAN ACL

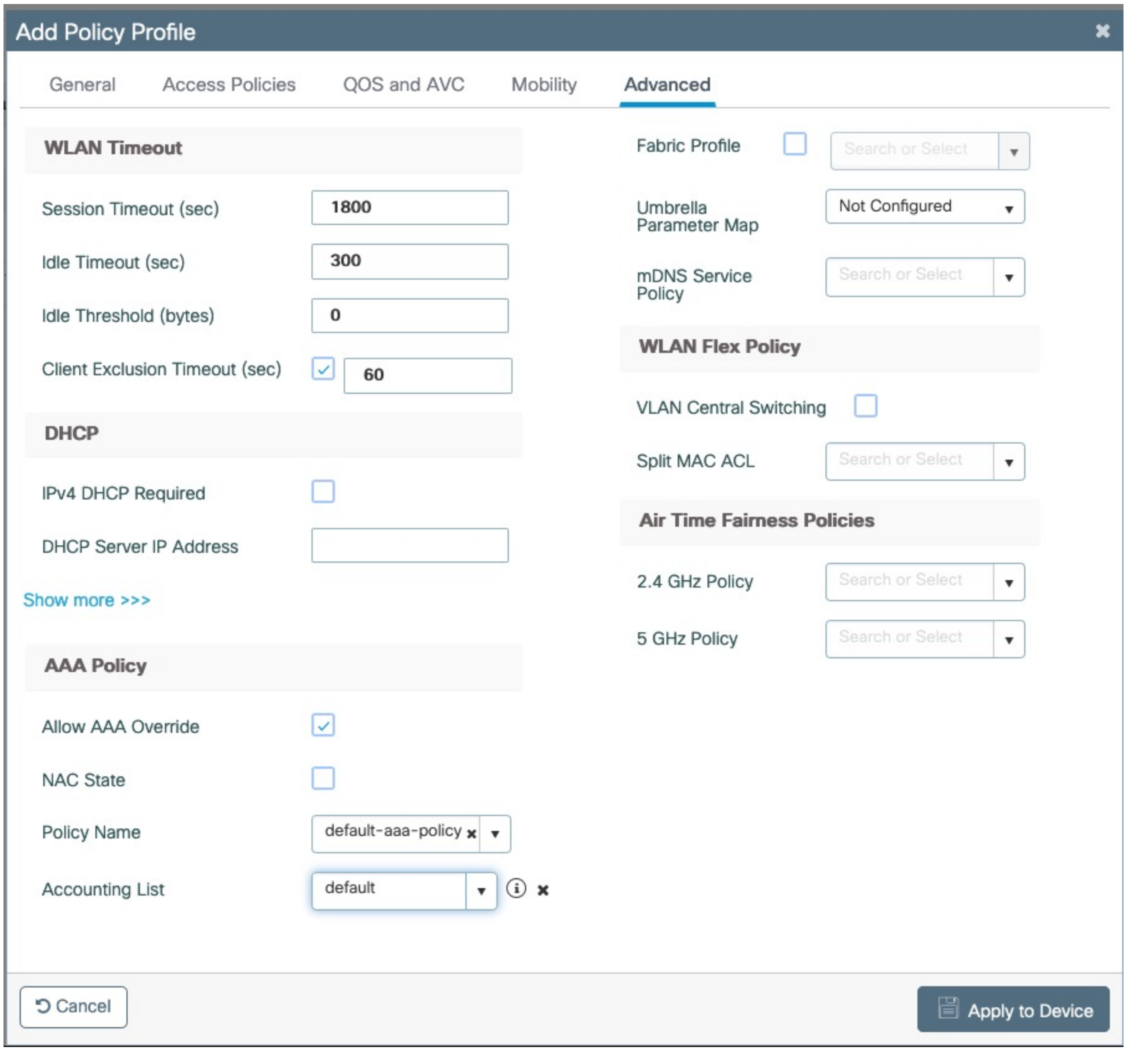
IPv4 ACL Search or Select

IPv6 ACL Search or Select

URL Filters

Pre Auth Search or Select

Post Auth Search or Select



WLAN Timeout

Session Timeout (sec) 1800

Idle Timeout (sec) 300

Idle Threshold (bytes) 0

Client Exclusion Timeout (sec) ☑ 60

DHCP

IPv4 DHCP Required □

DHCP Server IP Address

Show more >>>

AAA Policy

Allow AAA Override ☑

NAC State □

Policy Name default-aaa-policy

Accounting List default

Fabric Profile □ Search or Select

Umbrella Parameter Map Not Configured

mDNS Service Policy Search or Select

WLAN Flex Policy

VLAN Central Switching □

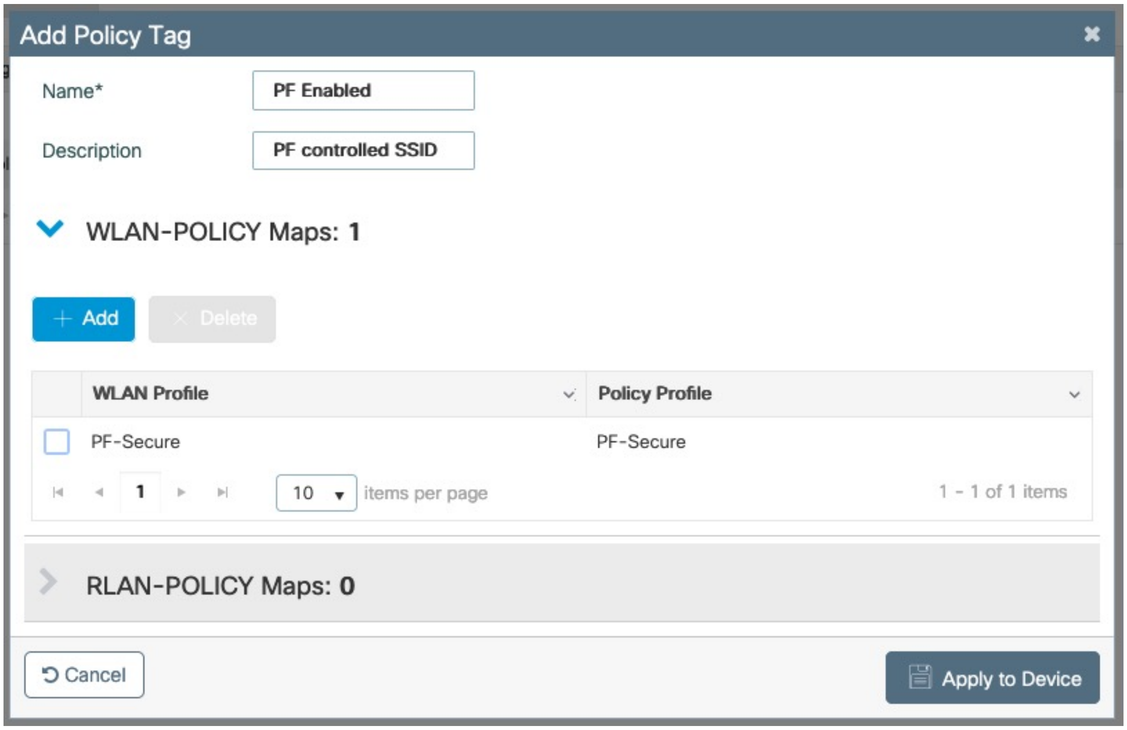
Split MAC ACL Search or Select

Air Time Fairness Policies

2.4 GHz Policy Search or Select

5 GHz Policy Search or Select

Go to Configuration → Tags & Profiles → Tags, under Policy click add


Add Policy Tag

Name*: PF Enabled

Description: PF controlled SSID

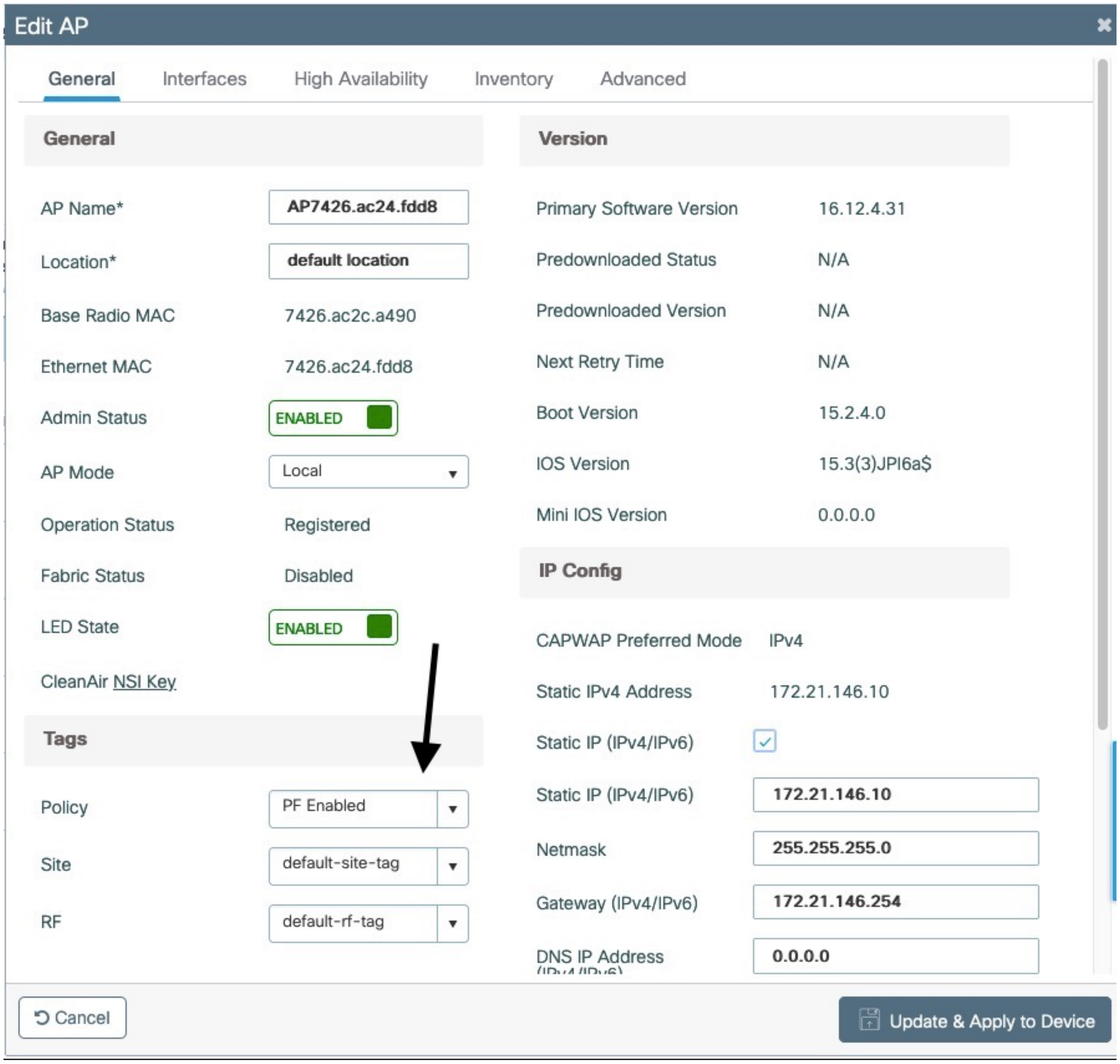
WLAN-POLICY Maps: 1

	WLAN Profile	Policy Profile
□	PF-Secure	PF-Secure

Go to Configuration → Wireless → Access Points

Click on the AP Name or MAC address

Under General → Tags, Select 'PF Enabled'



Edit AP

General

AP Name*: AP7426.ac24.fdd8

Location*: default location

Base Radio MAC: 7426.ac2c.a490

Ethernet MAC: 7426.ac24.fdd8

Admin Status: ENABLED

AP Mode: Local

Operation Status: Registered

Fabric Status: Disabled

LED State: ENABLED

CleanAir NSI Key

Tags

Policy: PF Enabled

Site: default-site-tag

RF: default-rf-tag

Version

Primary Software Version: 16.12.4.31

Predownloaded Status: N/A

Predownloaded Version: N/A

Next Retry Time: N/A

Boot Version: 15.2.4.0

IOS Version: 15.3(3)JPI6a$

Mini IOS Version: 0.0.0.0

IP Config

CAPWAP Preferred Mode: IPv4

Static IPv4 Address: 172.21.146.10

Static IP (IPv4/IPv6): ☑

Static IP (IPv4/IPv6): 172.21.146.10

Netmask: 255.255.255.0

Gateway (IPv4/IPv6): 172.21.146.254

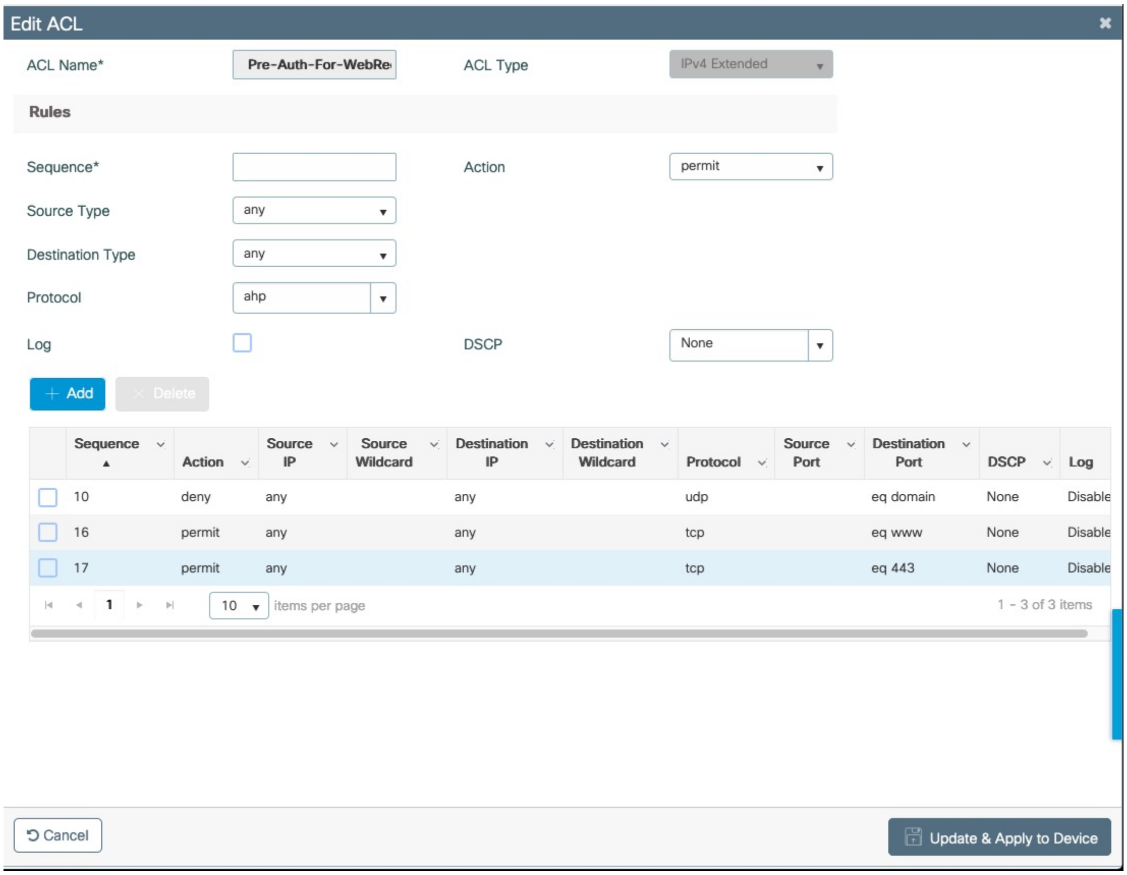
DNS IP Address (IPv4/IPv6): 0.0.0.0

PF-WebAuth SSID

Create Redirect ACL for Guest Web authentication:

Go to Configuration → Security → ACL, click add

```
Use ACL Name: Pre-Auth-For-WebRedirect
For ACL Type, select IPv4 Extended
```



ACL Name* Pre-Auth-For-WebRe

ACL Type IPv4 Extended

Rules

Sequence*

Action permit

Source Type any

Destination Type any

Protocol ahp

Log □

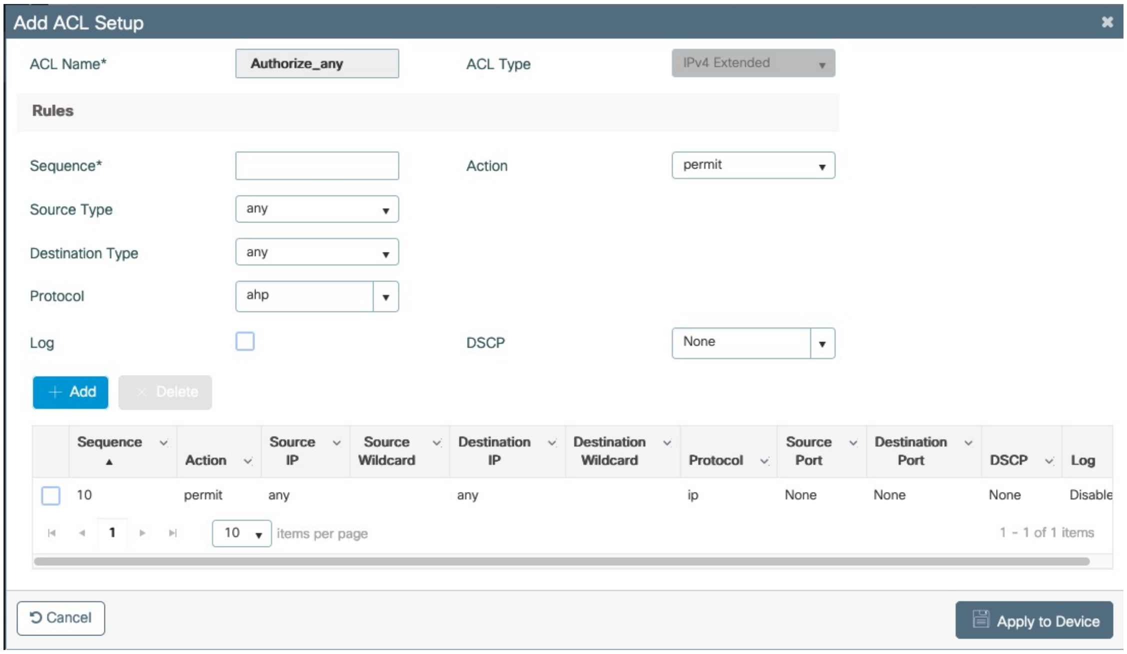
DSCP None

	Sequence	Action	Source IP	Source Wildcard	Destination IP	Destination Wildcard	Protocol	Source Port	Destination Port	DSCP	Log
□	10	deny	any		any		udp		eq domain	None	Disable
□	16	permit	any		any		tcp		eq www	None	Disable
□	17	permit	any		any		tcp		eq 443	None	Disable

1 | 10 items per page | 1 - 3 of 3 items

Go to Configuration → Security → ACL, click add

```
Use ACL Name: Authorize_any
For ACL Type, select IPv4 Extended
```



Add ACL Setup

ACL Name*: Authorize_any

ACL Type: IPv4 Extended

Rules

Sequence*:

Action: permit

Source Type: any

Destination Type: any

Protocol: ahp

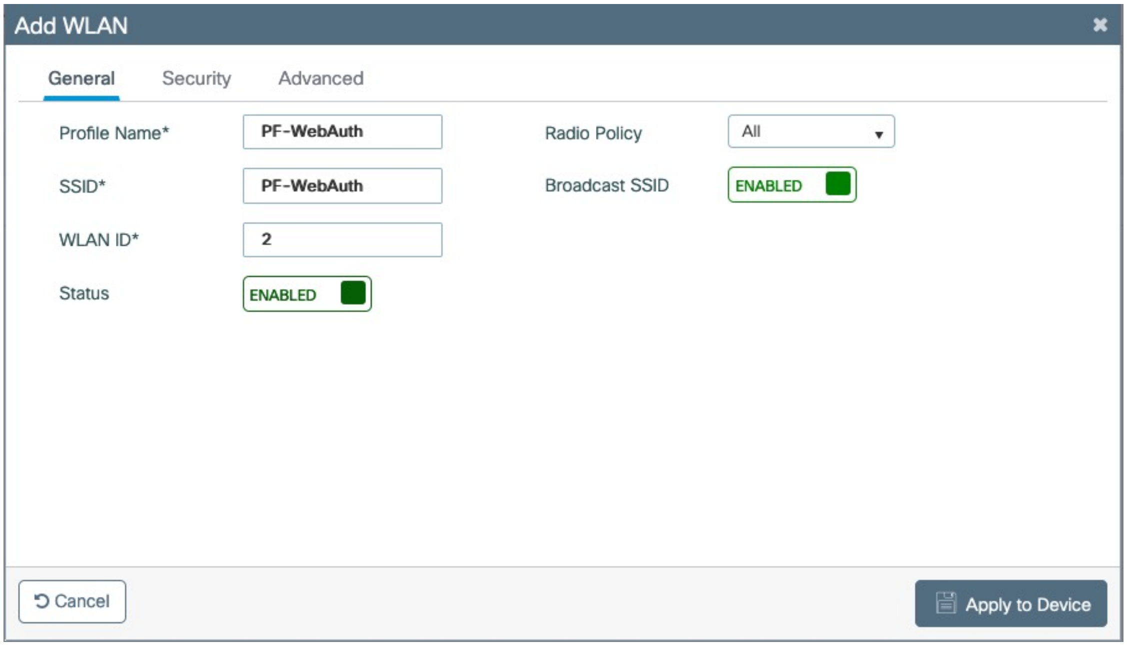
Log: □

DSCP: None

	Sequence	Action	Source IP	Source Wildcard	Destination IP	Destination Wildcard	Protocol	Source Port	Destination Port	DSCP	Log
□	10	permit	any		any		ip	None	None	None	Disable

PF-WebAuth SSID creation

Go to Configuration → Tags & Profiles → WLANs, click add



Add WLAN

Profile Name*: PF-WebAuth

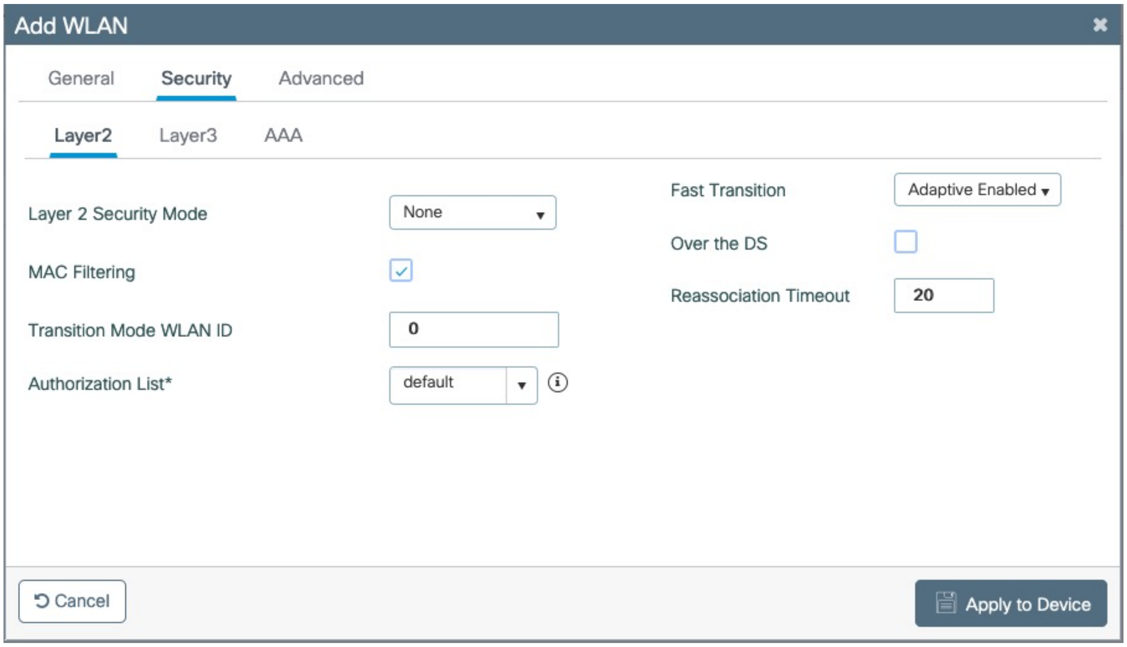
SSID*: PF-WebAuth

WLAN ID*: 2

Status: ENABLED

Radio Policy: All

Broadcast SSID: ENABLED



Layer 2 Security Mode: None

MAC Filtering: ☑

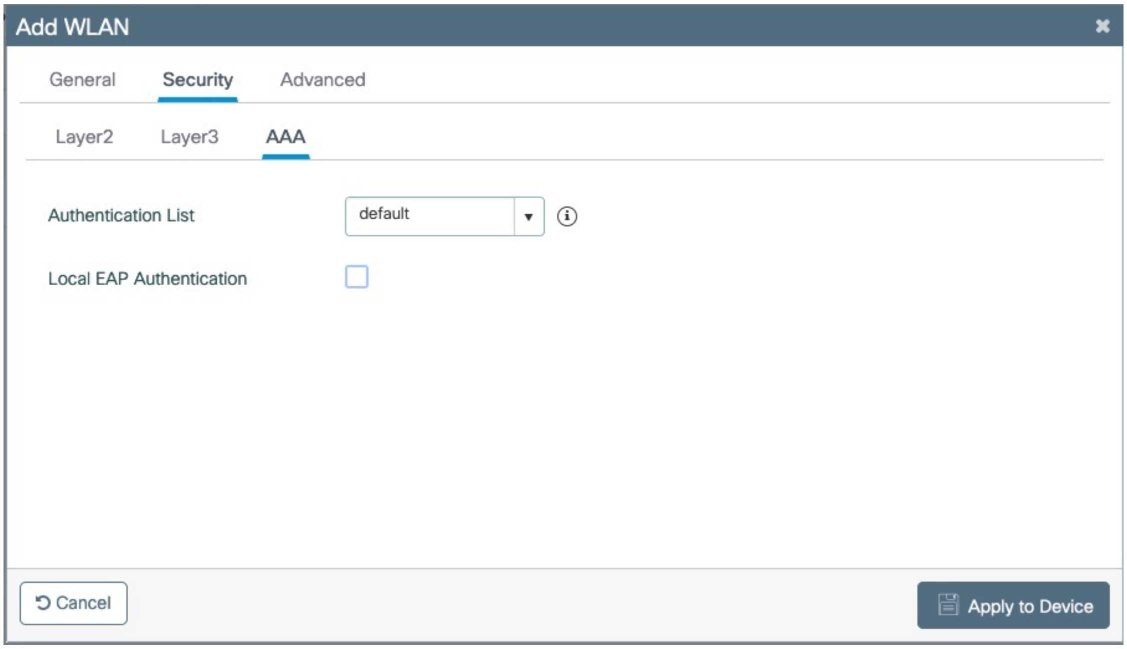
Transition Mode WLAN ID: 0

Authorization List*: default

Fast Transition: Adaptive Enabled

Over the DS: □

Reassociation Timeout: 20

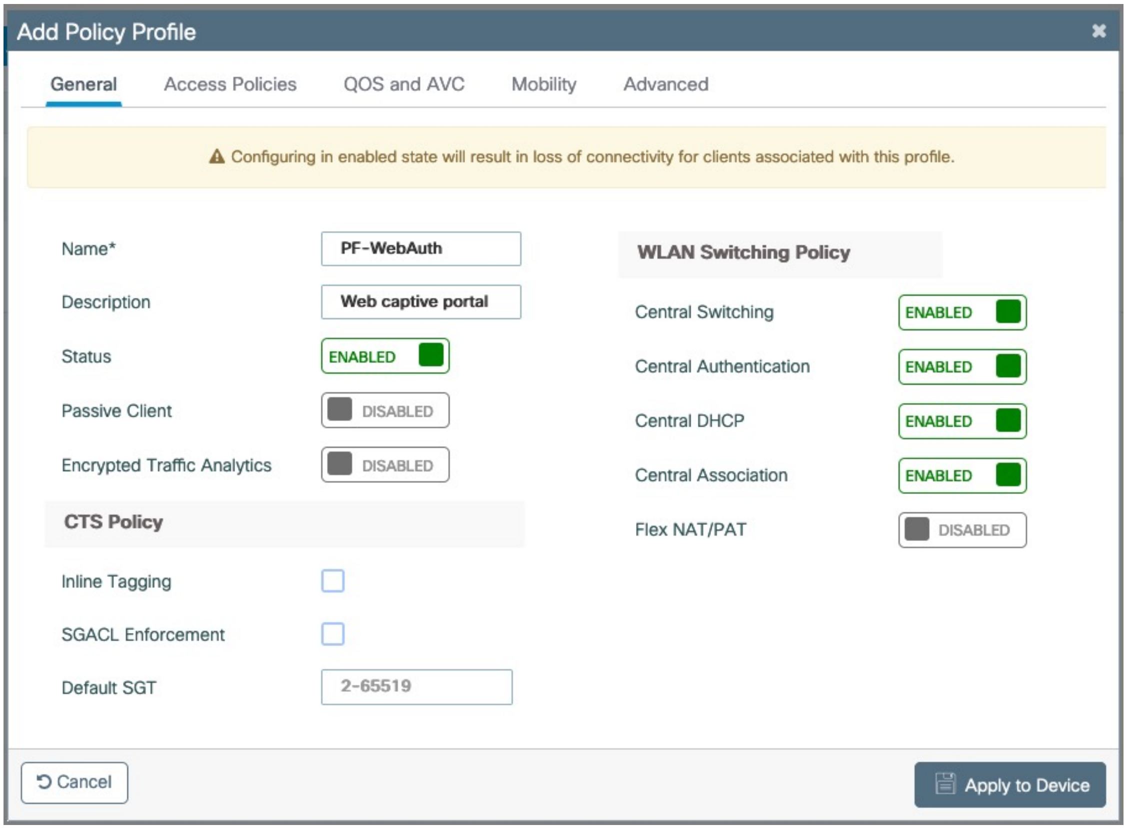


Authentication List: default

Local EAP Authentication: □

Create Policy Profiles PF-WebAuth

Go to Configuration → Tags & Profiles → Policy, click add



⚠ Configuring in enabled state will result in loss of connectivity for clients associated with this profile.

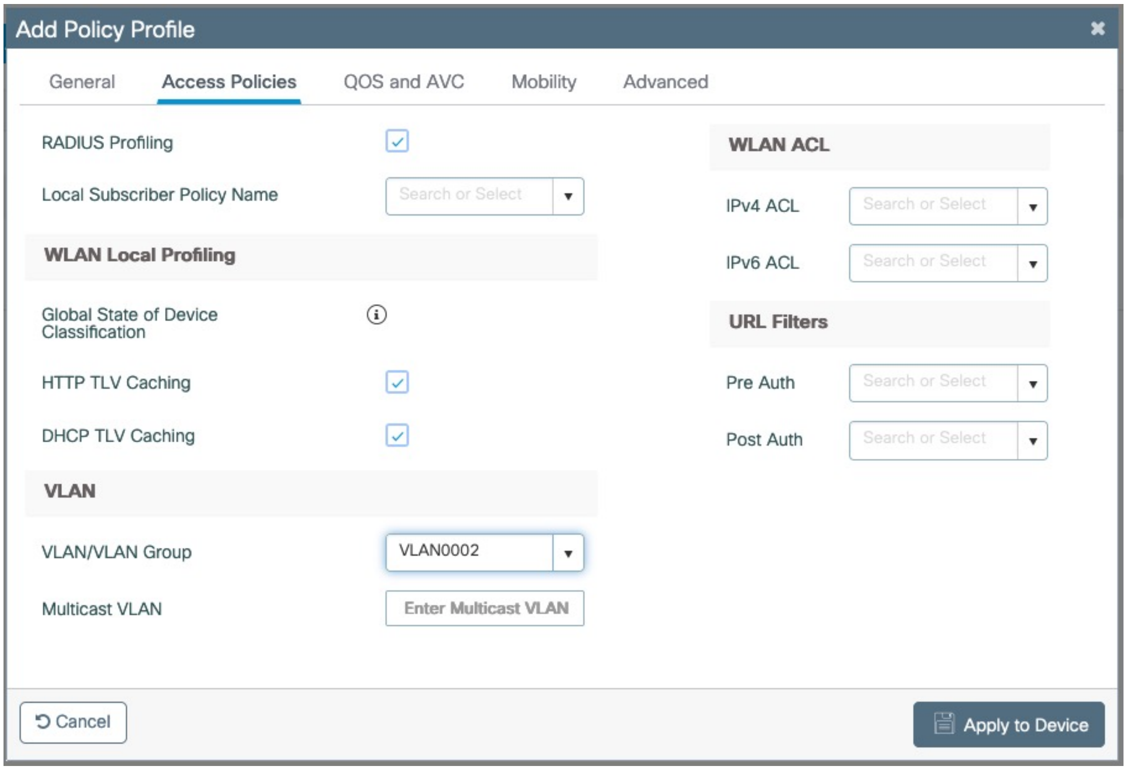
Name*	PF-WebAuth
Description	Web captive portal
Status	ENABLED
Passive Client	DISABLED
Encrypted Traffic Analytics	DISABLED

CTS Policy

Inline Tagging	□
SGACL Enforcement	□
Default SGT	2-65519

WLAN Switching Policy

Central Switching	ENABLED
Central Authentication	ENABLED
Central DHCP	ENABLED
Central Association	ENABLED
Flex NAT/PAT	DISABLED



RADIUS Profiling	☑
Local Subscriber Policy Name	Search or Select

WLAN Local Profiling

Global State of Device Classification	ⓘ
HTTP TLV Caching	☑
DHCP TLV Caching	☑

VLAN

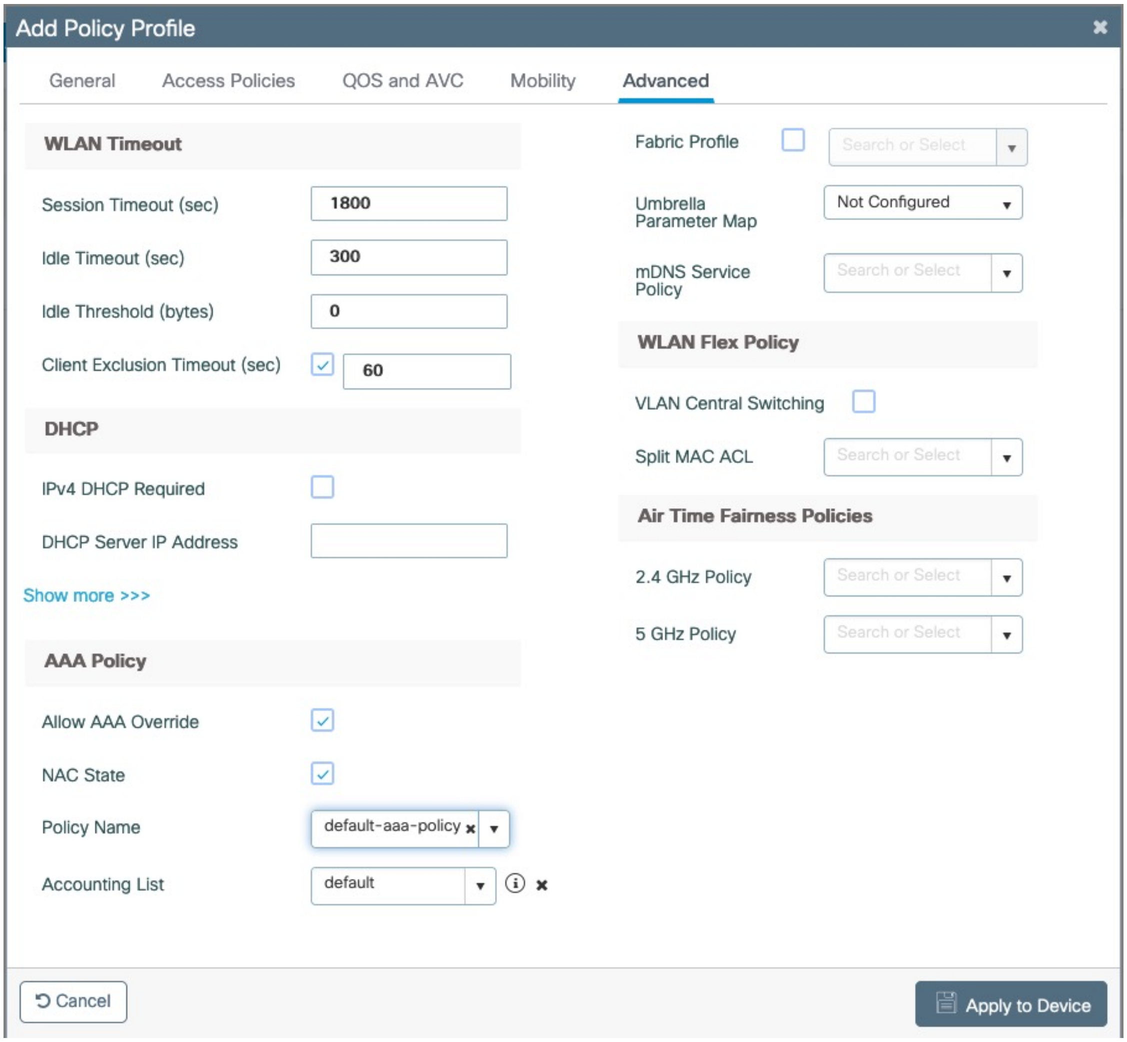
VLAN/VLAN Group	VLAN0002
Multicast VLAN	Enter Multicast VLAN

WLAN ACL

IPv4 ACL	Search or Select
IPv6 ACL	Search or Select

URL Filters

Pre Auth	Search or Select
Post Auth	Search or Select



Add Policy Profile

General | Access Policies | QOS and AVC | Mobility | **Advanced**

WLAN Timeout

Session Timeout (sec): 1800

Idle Timeout (sec): 300

Idle Threshold (bytes): 0

Client Exclusion Timeout (sec): ☑ 60

DHCP

IPv4 DHCP Required: □

DHCP Server IP Address:

Show more >>>

AAA Policy

Allow AAA Override: ☑

NAC State: ☑

Policy Name: default-aaa-policy

Accounting List: default

Fabric Profile: □ Search or Select

Umbrella Parameter Map: Not Configured

mDNS Service Policy: Search or Select

WLAN Flex Policy

VLAN Central Switching: □

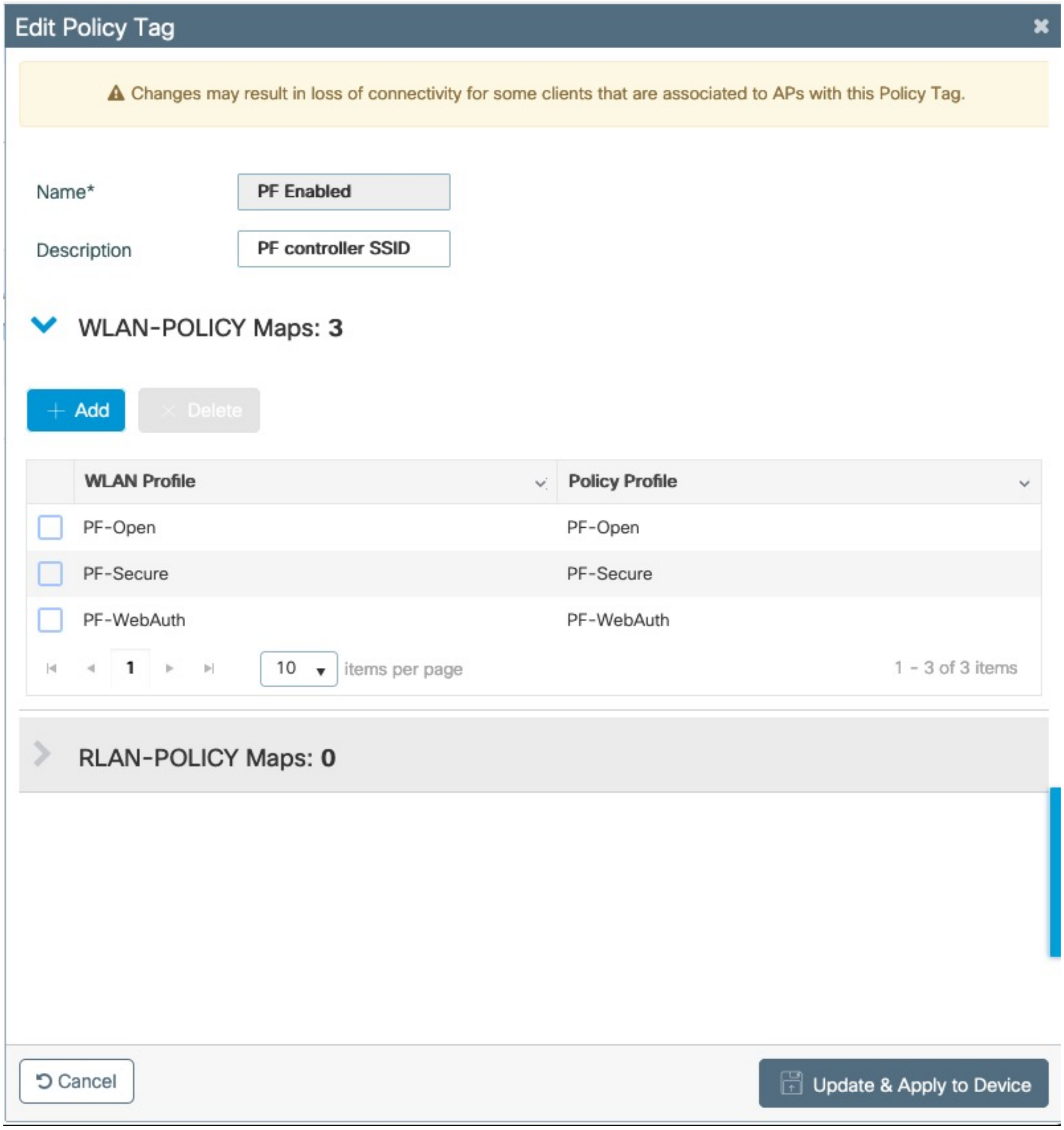
Split MAC ACL: Search or Select

Air Time Fairness Policies

2.4 GHz Policy: Search or Select

5 GHz Policy: Search or Select

Go to Configuration → Tags & Profiles → Tags, under Policy click add



⚠ Changes may result in loss of connectivity for some clients that are associated to APs with this Policy Tag.

Name* PF Enabled

Description PF controller SSID

WLAN-POLICY Maps: 3

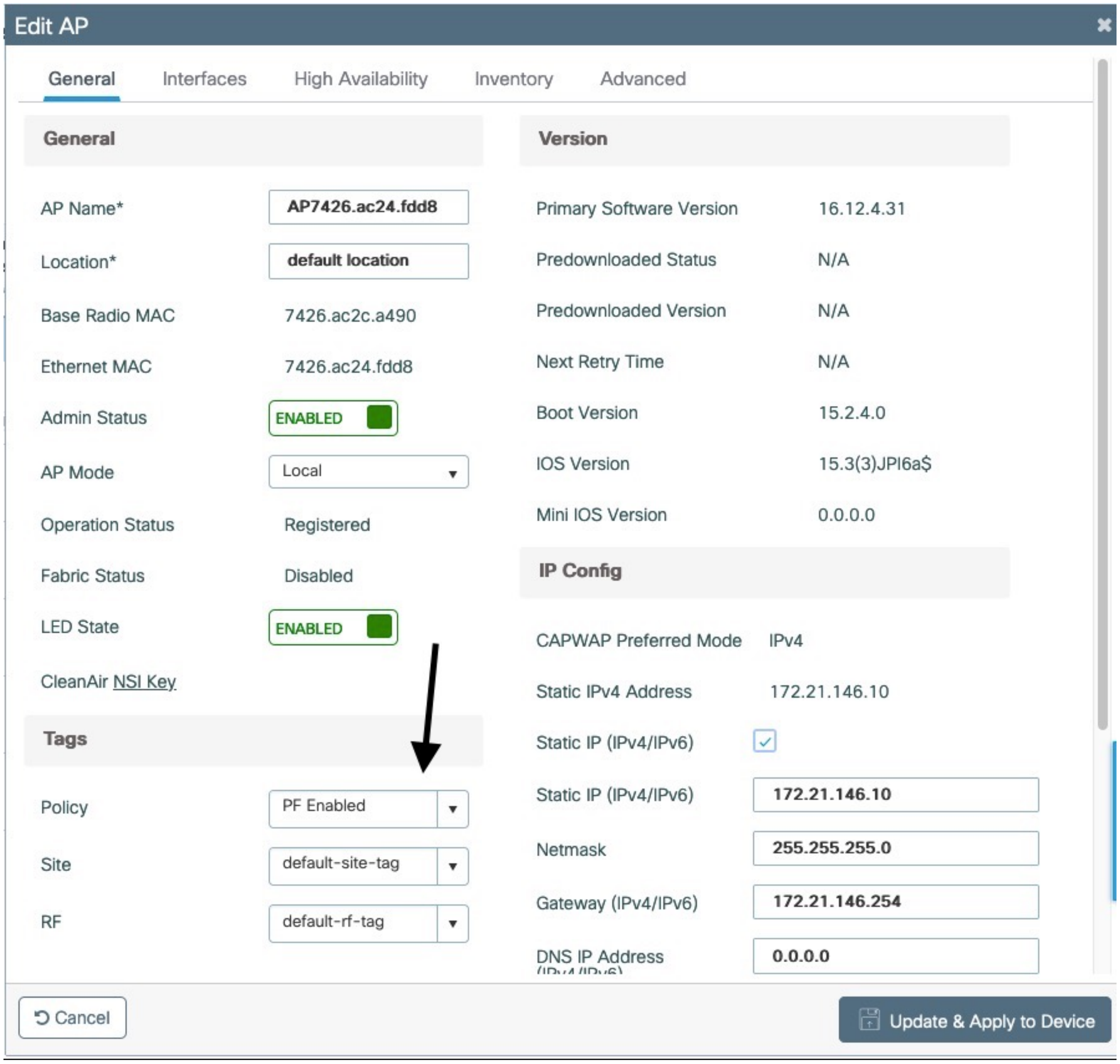
WLAN Profile	Policy Profile
□ PF-Open	PF-Open
□ PF-Secure	PF-Secure
□ PF-WebAuth	PF-WebAuth

RLAN-POLICY Maps: 0

Go to Configuration → Wireless → Access Points

Click on the AP Name or MAC address

Under General → Tags, Select 'PF Enabled'



Edit AP

General

AP Name*	AP7426.ac24.fdd8
Location*	default location
Base Radio MAC	7426.ac2c.a490
Ethernet MAC	7426.ac24.fdd8
Admin Status	ENABLED
AP Mode	Local
Operation Status	Registered
Fabric Status	Disabled
LED State	ENABLED
CleanAir NSI Key	

Tags

Policy	PF Enabled
Site	default-site-tag
RF	default-rf-tag

Version

Primary Software Version	16.12.4.31
Predownloaded Status	N/A
Predownloaded Version	N/A
Next Retry Time	N/A
Boot Version	15.2.4.0
IOS Version	15.3(3)JPI6a$
Mini IOS Version	0.0.0.0

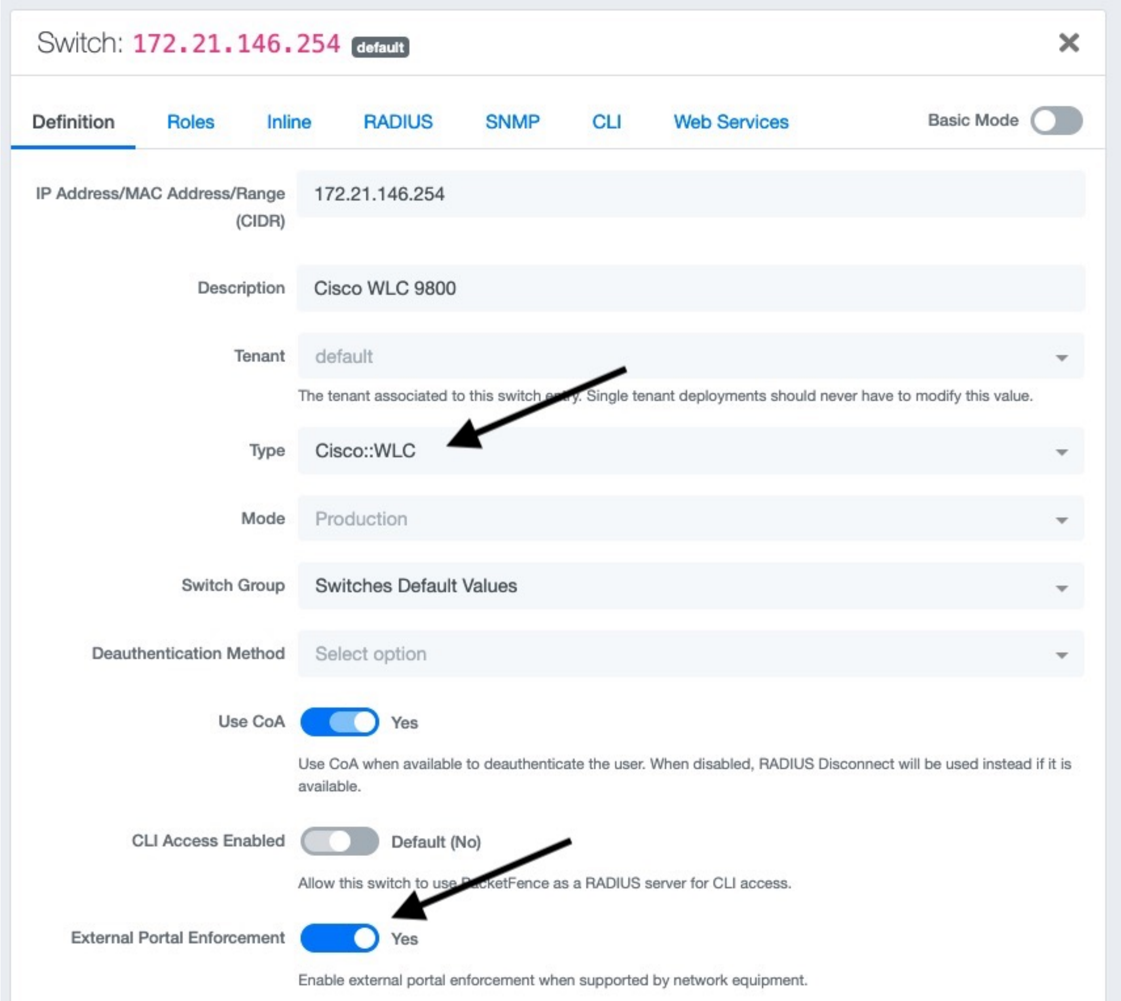
IP Config

CAPWAP Preferred Mode	IPv4
Static IPv4 Address	172.21.146.10
Static IP (IPv4/IPv6)	☑
Static IP (IPv4/IPv6)	172.21.146.10
Netmask	255.255.255.0
Gateway (IPv4/IPv6)	172.21.146.254
DNS IP Address (IPv4/IPv6)	0.0.0.0

PacketFence switch configuration

Now you will to create a new switch in PacketFence

Go to Configuration → Policies and Access Control → Switches → New Switch → default



Switch: 172.21.146.254 default

IP Address/MAC Address/Range (CIDR): 172.21.146.254

Description: Cisco WLC 9800

Tenant: default

The tenant associated to this switch entry. Single tenant deployments should never have to modify this value.

Type: Cisco::WLC

Mode: Production

Switch Group: Switches Default Values

Deauthentication Method: Select option

Use CoA: Yes

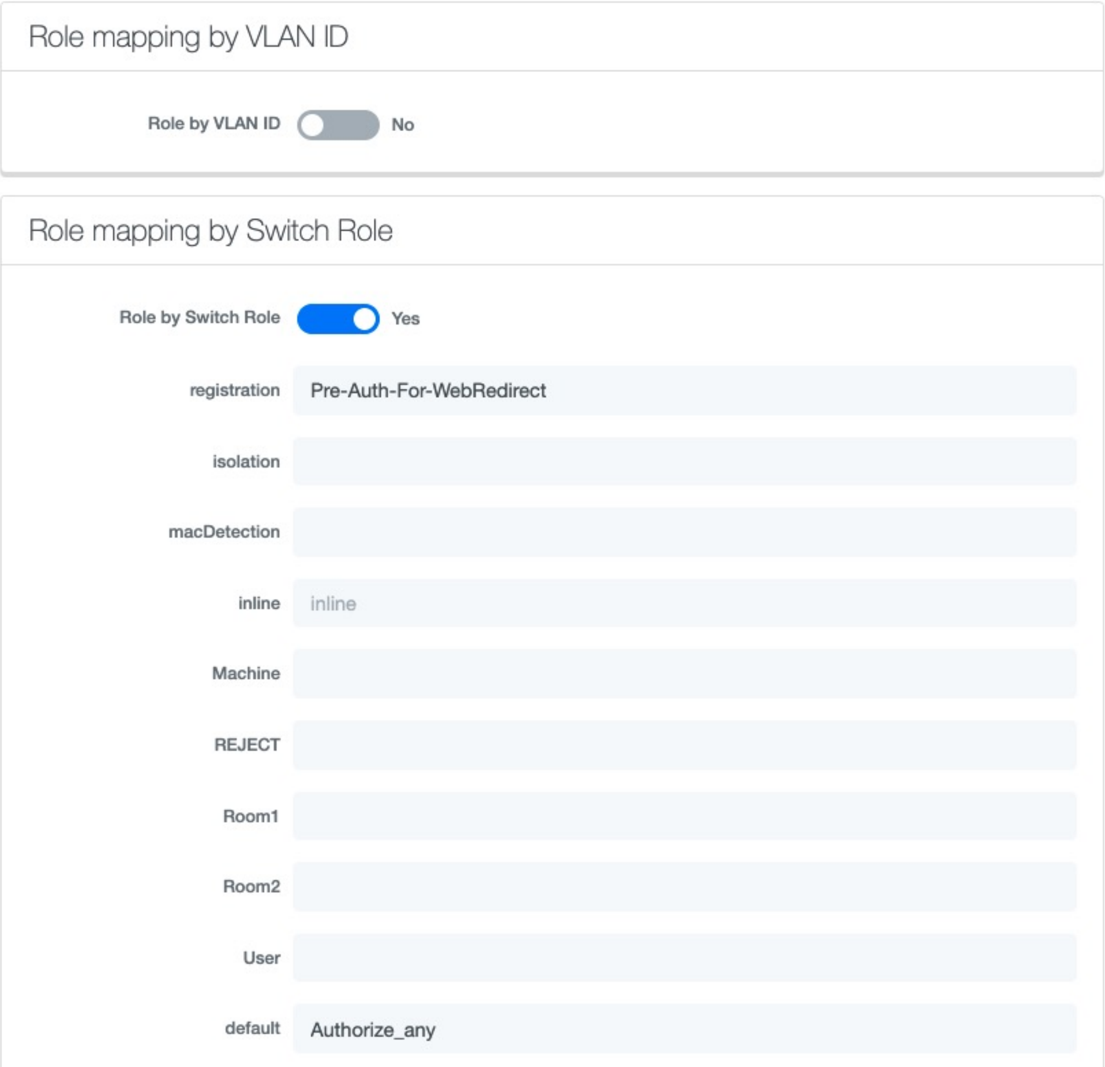
Use CoA when available to deauthenticate the user. When disabled, RADIUS Disconnect will be used instead if it is available.

CLI Access Enabled: Default (No)

Allow this switch to use PacketFence as a RADIUS server for CLI access.

External Portal Enforcement: Yes

Enable external portal enforcement when supported by network equipment.



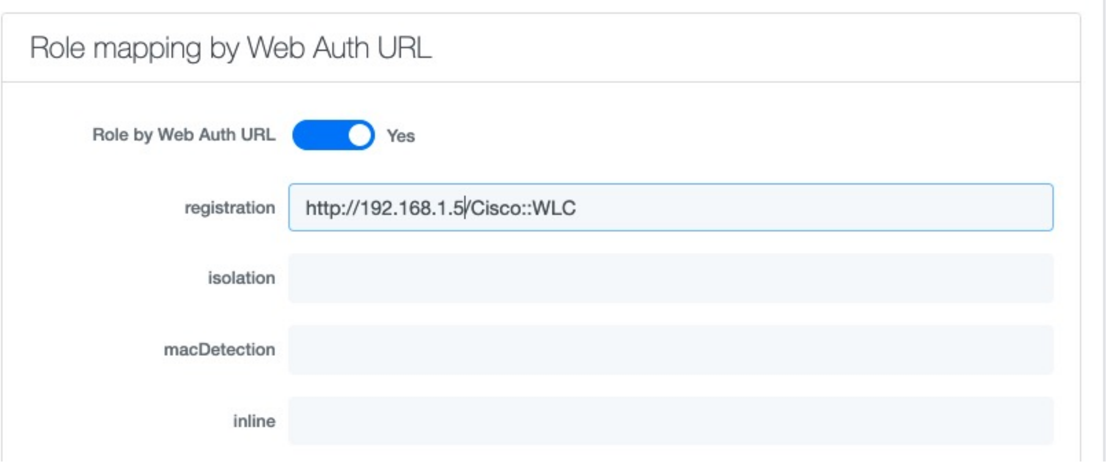
Role mapping by VLAN ID

Role by VLAN ID: No

Role mapping by Switch Role

Role by Switch Role: Yes

registration	Pre-Auth-For-WebRedirect
isolation	
macDetection	
inline	inline
Machine	
REJECT	
Room1	
Room2	
User	
default	Authorize_any



Role mapping by Web Auth URL

Role by Web Auth URL: Yes

registration	http://192.168.1.5/Cisco::WLC
isolation	
macDetection	
inline	

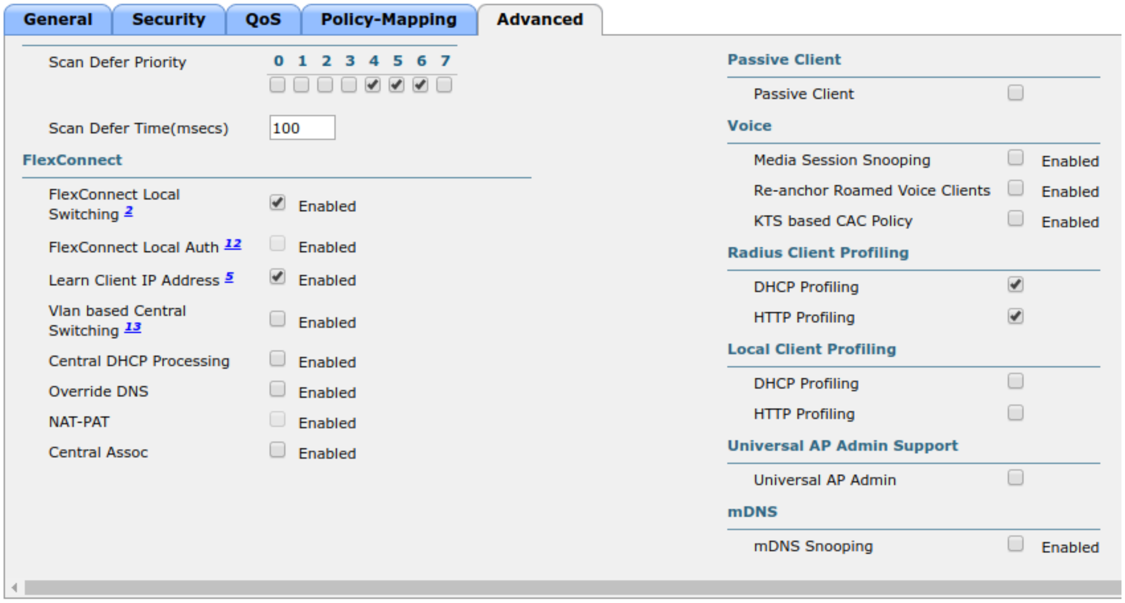
6.11.6. Troubleshooting ignored RADIUS replies

In the event the WLC ignores the RADIUS replies from PacketFence (you receive multiple requests but access is never granted), validate the following elements :

- RADIUS secret is properly configured in PacketFence and the WLC controller.
- The SSL certificate used by PacketFence is not expired.

6.11.7. Device Sensor

When using a Cisco WLC, you can enable device sensor by making sure the configuration looks like the following screenshot:



Scan Defer Priority 0 □ 1 □ 2 □ 3 □ 4 ☑ 5 ☑ 6 ☑ 7 □

Scan Defer Time(msecs) 100

FlexConnect

FlexConnect Local Switching 2 ☑ Enabled

FlexConnect Local Auth 12 □ Enabled

Learn Client IP Address 5 ☑ Enabled

Vlan based Central Switching 13 □ Enabled

Central DHCP Processing □ Enabled

Override DNS □ Enabled

NAT-PAT □ Enabled

Central Assoc □ Enabled

Passive Client

Passive Client □

Voice

Media Session Snooping □ Enabled

Re-anchor Roamed Voice Clients □ Enabled

KTS based CAC Policy □ Enabled

Radius Client Profiling

DHCP Profiling ☑

HTTP Profiling ☑

Local Client Profiling

DHCP Profiling □

HTTP Profiling □

Universal AP Admin Support

Universal AP Admin □

mDNS

mDNS Snooping □ Enabled

NOTE Please refer to the wired configuration of Cisco equipment to learn more about device sensor.

6.12. CoovaChilli

This section has been created in order to help setting up a consumer grade access point running CoovaChilli integration with PacketFence to use UAM capabilities along with PacketFence feature set.

6.12.1. Assumptions

- You have a CoovaChilli capable access point running LEDE/OpenWRT, on which CoovaChilli is installed (CoovaChilli installation is not covered in this guide);
- A working PacketFence server, a CoovaChilli capable access point, and Internet is functional;
- A PacketFence WebAuth enforcement setup will be deployed;

6.12.2. Access Point and CoovaChilli Configuration

We go ahead and start by configuring the access point and CoovaChilli running on it.

These instructions assume that CoovaChilli is installed on the access point. If it’s not, we suggest you search relevant information on the Internet to install CoovaChilli as there are too many network equipment vendors that support CoovaChilli to accurately document this step here.

These instructions also assume that you have an SSID configured on the access point. Assumption is also made that the network interface / bridge is configured and assigned for the given SSID.

You should also make sure to have a default route properly configured on the access point (so that it can access the Internet) and that DNS resolution is working.

Also note that changes on the OpenWRT access point are done using SSH shell access.

Please note that any interface name reference might be different from one equipment vendor to an other.

Configure chilli

chilli configuration might differ from one equipment vendor to an other one. Just make sure to follow these configuration guidelines and you should be all-set.

- chilli configuration file can be found under

```
/etc/config/chilli
```

- Edit the following parameters to integrate with PacketFence

```
option disabled 1       This should be commented out so that chilli is
marked as enabled
option dns1             Set this to a working DNS server (this will be used
by hotspot clients)
option dns2             Set this to a working DNS server (this will be used
by hotspot clients)
option ipup             /etc/chilli/up.sh (Depending on the package, the
script path might need to be adjusted)
option ipdown           /etc/chilli/down.sh (Depending on the package, the
script path might need to be adjusted)
option radiusserver1    PacketFence management IP
option radiusserver2    PacketFence management IP
option radiussecret     The RADIUS secret that will be used between chilli
and PacketFence
option radiusnasid      Access-point IP address
option dhcpif           The network interface / bridge assigned to the SSID
(Hotspot clients network)
option uamserver        http://PACKETFENCE_MANAGEMENT_IP/CoovaChilli
option ssid             SSID name
option nasip            Access-point IP address
option coaport          3799
```

A startup script might be required depending on the equipment vendor. Again, a quick documentation search on the Internet might be the best solution to find the best one

Once set up, you might want to activate chilli at boot (by using the startup script) and finally, reboot the AP.

6.12.3. PacketFence Configuration for CoovaChilli Integration

Having a working PacketFence installation and a configured LEDE / OpenWRT access point running CoovaChilli, the last step is PacketFence configuration for CoovaChilli integration.

To do so, login to the PacketFence web administration interface if it is not already done.

Switch configuration

Click on the 'Configuration' tab and select the 'Switches' menu option under the 'NETWORK' section on the left hand side.

On the bottom of the page, click the 'Add switch to group' button then select the 'default' to bring up the 'New Switch' configuration modal window.

'Definition' tab

- **IP**: Access-point IP address
- **Type**: CoovaChilli
- **Mode**: Production
- **External Portal Enforcement**: Checked

'RADIUS' tab

- **Secret Passphrase**: The RADIUS secret configured in the previous step

Click 'Save'

Portal configuration

It is required to disable HTTPS redirection by clicking the 'Configuration' tab and then the 'Captive portal' menu option on the left hand side. Make sure 'Secure redirect' is unchecked.

6.13. D-Link

6.13.1. DWL Access-Points and DWS 3026

NOTE To be contributed...

6.14. Extreme Networks

6.14.1. Access points AP305C (managed by Extreme Cloud IQ Controller)

In such deployment, PacketFence communicates directly with the access points using RADIUS. The Extreme Cloud IQ controller is only used to configure access points in a central place.

Web authentication

Extreme Cloud IQ Controller

On the Extreme Cloud IQ Controller, there should already be two built-in IP Firewall policies:

- Redirect-only policy: this policy must have "redirect" rules
- Internet-access-only policy

On the Extreme Cloud IQ Controller, create two user profiles:

- Registration
  - VLAN: 5
  - Firewall rules: Enabled
  - IP Firewall Name: Redirect-only policy
  - Redirect URL: http://192.168.1.5/Extreme::AP
- Guest
  - VLAN: 5
  - Firewall rules: Enabled
  - IP Firewall Name: Internet-access-only policy

Still, on the Extreme Cloud IQ Controller, create a wireless network with the following configuration:

- SSID Authentication: Open
  - Enable Captive Web Portal: No
- MAC Authentication tab
  - Enable MAC authentication: Yes
  - Authentication protocol: CHAP
  - Authenticate via RADIUS server
    - Create a RADIUS group with an External RADIUS Server
      - Permit Dynamic Change Of Authorization Messages (RFC 3576): Enabled
  - User access settings
    - Apply a different user profile to various clients and user groups: Enabled
      - Allow user profile assignment using RADIUS attributes in addition to the three tunnel RADIUS attributes: Enabled
        - Standard RADIUS Attribute: Filter-Id

Under User access settings, you need to create following rules:

Table 1. User Access Settings rules

User profile name	VLAN/VLAN Group	Assignment rules
Registration	5	If Filter-ID equals "Registration"
Guest	5	If Filter-ID equals "Guest"

PacketFence

Create a switch with following configuration:

- Definition tab
  - Identifier: subnet of your Extreme AP
  - External portal enforcement: Yes
  - Deauthentication method: RADIUS
- Roles tab
  - Role by Switch Role: Yes
    - registration: Registration
    - guest: Guest

6.15. Extricom

6.15.1. EXSW Wireless Switches (Controllers)

In order to have the Extricom controller working with PacketFence, you need to define two ESSID definition, one for the "public" network, and one for the "secure" network. This can be done under a very short time period since Extricom supports RADIUS assigned VLANs out of the box.

You first need to configure you RADIUS server. This is done under the: *WLAN Settings → RADIUS* tab. Enter the PacketFence RADIUS server information. For the ESSID configuration. in the administration UI, go to *WLAN Settings → ESSID definitions*. Create the profiles per the following:

Public SSID

- MAC Authentication must be ticked
- Encryption method needs to be set to None
- Select PacketFence as the MAC Authentication RADIUS server (previously added)

Secure SSID

- Encryption method needs to be set to WPA Enterprise/WPA2 Enterprise
- AES only needs to be selected
- Select PacketFence as the RADIUS server (previously added)

The final step is to enable SNMP Agent and SNMP Traps on the controller. This is done under the following tab in the administrative UI: *Advanced → SNMP*.

6.16. Fortinet FortiGate

This section shows how to configure a 802.1X SSID on a Fortigate 50E running on FortiOS 5.4.

You will need to have the CLI access on the Fortigate to do the configuration.

6.16.1. RADIUS

```
FGT50E # config user radius
FGT50E (radius) # edit packetfence
new entry 'packetfence' added
FGT50E (packetfence) # set server 192.168.1.5
FGT50E (packetfence) # set secret useStrongerSecret
FGT50E (packetfence) # set nas-ip 192.168.1.1
FGT50E (packetfence) # set radius-coa enable
FGT50E (packetfence) # config accounting-server
FGT50E (accounting-server) # edit 1
new entry '1' added
FGT50E (1) # set status enable
FGT50E (1) # set server 192.168.1.5
FGT50E (1) # set secret useStrongerSecret
FGT50E (1) # end
FGT50E (packetfence) # end
```

6.16.2. 802.1X SSID

```
FGT50E #config wireless-controller vap
FGT50E (vap) # edit PF-Secure
new entry 'PF-Secure' added
FGT50E (PF-Secure) # edit "PF-Secure"
FGT50E (PF-Secure) # set vdom "root"
FGT50E (PF-Secure) # set ssid "PF-Secure"
FGT50E (PF-Secure) # set security wpa2-only-enterprise
FGT50E (PF-Secure) # set auth radius
FGT50E (PF-Secure) # set radius-server "packetfence"
FGT50E (PF-Secure) # set schedule "always"
FGT50E (PF-Secure) # set local-bridging enable
FGT50E (PF-Secure) # set dynamic-vlan enable
FGT50E (PF-Secure) # end
```

6.17. Hostapd

6.17.1. Introduction

This section will provide an example for the configuration of an open SSID (not encrypted) and a secure SSID (802.1X). You will need to install wpad and hostapd. These two SSIDs will do RADIUS authentication against PacketFence. You can not have both SSID configured on the same access point at the same time, there is a limitation with the DAE server.

6.17.2. Assumptions

- You have a configured PacketFence environment with working test equipment
- The management IP of PacketFence will be 192.168.1.10 and has s3cr3t as its RADIUS shared secret
- You have an access point with OpenWrt Chaos Calmer 15.05 installed

6.17.3. Quick installation

Packages Installation

You can install the packages from the web interface of OpenWrt.

Go to **System → Software**

First update the repos by clicking the button Update lists if it’s not up to date.

Then you will have to install the packages of Hostapd and wpad.

Go to the tab 'Available packages' and then search for the package hostapd into the 'Filter:' field.

Click Install the hostapd-common package, the actual version is 2015-03-25-1.

Do the same process for the wpad package version 2015-03-25-1.

NOTE — You will need the packages hostapd-common and wpad if they are not installed by default.

Dynamic VLAN Configuration

Connect using SSH to the AP and create the file : /etc/config/hostapd.vlan

```
*          wlan0.#
```

Hostapd Configuration

You will need to modify the hostapd script that comes with the package that we previously installed.

Connect using SSH to the AP and run these commands:

```
cd /lib/netifd/
mv hostapd.sh hostapd.sh.old
opkg install curl
curl --insecure  https://github.com/inverse-
inc/packetfence/tree/devel/addons/hostapd/hostapd-15.05.sh >  hostapd.sh
wifi
```

Configure the SSIDs

To configure the PF-Open SSID, we will edit the file /etc/config/wireless:

```
# Definition of the radio
config wifi-device 'radio0'
        option type 'mac80211'
        option channel '11'
        option hwmode '11g'
        option path 'pci0000:00/0000:00:00.0'
        option htmode 'HT20'

# Configuration of the Open SSID
        option device 'radio0'
        option mode 'ap'
        option vlan_file '/etc/config/hostapd.vlan'
        option vlan_tagged_interface 'eth0'
        option vlan_naming '0'
        option dynamic_vlan '2'
        option auth_port '1812'
        option auth_server '192.168.1.10'
        option auth_secret 's3cr3t'
        option acct_port '1813'
        option acct_server '192.168.1.10'
        option acct_secret 's3cr3t'
        option dae_port '3799'
        option dae_client '192.168.1.10'
        option dae_secret 's3cr3t'
        option nasid 'Lobby'
        option encryption 'none'
        option ssid 'OpenWRT-Open'
```

Configure the PF-Secure SSID:

```
# Definition of the radio
config wifi-device 'radio0'
        option type 'mac80211'
        option channel '11'
        option hwmode '11g'
        option path 'pci0000:00/0000:00:00.0'
        option htmode 'HT20'

config wifi-iface
        option device 'radio0'
        option mode 'ap'
        option vlan_file '/etc/config/hostapd.vlan'
        option vlan_tagged_interface 'eth0'
        option vlan_naming '0'
        option dynamic_vlan '2'
        option auth_port '1812'
        option auth_server '192.168.1.10'
        option auth_secret 's3cr3t'
        option acct_port '1813'
        option acct_server '192.168.1.10'
        option acct_secret 's3cr3t'
        option dae_port '3799'
        option dae_client '192.168.1.10'
        option dae_secret 's3cr3t'
        option nasid 'Lobby'
        option encryption 'wpa2'
        option ssid 'OpenWRT-Secure'
```

In order to apply this configuration, when you are connected using SSH on the AP, run the command 'wifi'. It will reload the configuration and broadcast the SSID. If you want to debug, you can use the command 'logread'.

NOTE It’s known that you can’t put 2 SSIDs with the same dae server at the same time. The deauthentication will not work on the second SSID.

PacketFence Configuration

Log in to the PacketFence administration web page and go under **Configuration → Policies and Access Control → Switches → Add switch**.

Definition:

- **IP Address/MAC Address/Range (CIDR)**: IP of your access point
- **Type**: Hostapd
- **Mode**: production
- **Deauthentication Method**: RADIUS
- **Dynamic Uplinks**: Checked

Roles:

- **Role by VLAN ID**: Checked
- **Registration**: Your registration VLAN ID
- **Isolation**: Your isolation VLAN ID

RADIUS:

- **Secret Passphrase**: s3cr3t

Save this configuration by clicking the 'Save' button.

Troubleshoot

There are few things you can do/check to see if your configuration is working.

To check the wireless configuration: uci show wireless or cat /etc/config/wireless

To check if your configuration (depend on the equipment) is correctly set into the Hostapd configuration file: cat /var/run/hostapd-phy0.conf

6.18. Huawei

6.18.1. AC6605 Controller

PacketFence supports this controller with the following technologies:

- Wireless 802.1X
- Wireless MAC Authentication

Controller configuration

Setup NTP server:

```
<AC>system-view
[AC] ntp-service unicast-server 208.69.56.110
```

Setup the radius server (@IP of PacketFence) authentication + accounting:

NOTE In this configuration I will use the ip address of the VIP of PacketFence: 192.168.1.2; Registration VLAN : 145, Isolation VLAN : 146

```
<AC>system-view
[AC] radius-server template radius_packetfence
[AC-radius-radius_packetfence] radius-server authentication 192.168.1.2 1812
weight 80
[AC-radius-radius_packetfence] radius-server accounting 192.168.1.2 1813 weight
80
[AC-radius-radius_packetfence] radius-server shared-key cipher s3cr3t
[AC-radius-radius_packetfence] undo radius-server user-name domain-included
[AC-radius-radius_packetfence] quit
[AC] radius-server authorization 192.168.1.2 shared-key cipher s3cr3t server-
group radius_packetfence
[AC] aaa
[AC-aaa] authentication-scheme radius_packetfence
[AC-aaa-authen-radius_packetfence] authentication-mode radius
[AC-aaa-authen-radius_packetfence] quit
[AC-aaa] accounting-scheme radius_packetfence
[AC-aaa-accounting-radius_packetfence] accounting-mode radius
[AC-aaa-accounting-radius_packetfence] quit
```

```
[AC-aaa] domain your.domain.com
[AC-aaa-domain-your.domain.com] authentication-scheme radius_packetfence
```

```
[AC-aaa-domain-your.domain.com] accounting-scheme radius_packetfence
[AC-aaa-domain-your.domain.com] radius-server radius_packetfence
[AC-aaa-domain-your.domain.com] quit
[AC-aaa] quit
```

Create an Secure dot1x SSID

Activate the dotx globally:

```
<AC>system-view
[AC] dot1x enable
```

Create your secure dot1x ssid:

Configure WLAN-ESS 0 interfaces:

```
[AC] interface Wlan-Ess 0
[AC-Wlan-Ess0] port hybrid untagged vlan 145 to 146
[AC-Wlan-Ess0] dot1x enable
[AC-Wlan-Ess0] dot1x authentication-method eap
[AC-Wlan-Ess0] permit-domain name your.domain.com
[AC-Wlan-Ess0] force-domain name your.domain.com
[AC-Wlan-Ess0] default-domain your.domain.com
[AC-Wlan-Ess0] quit
```

Configure AP parameters:

Configure radios for APs:

```
[AC] wlan
[AC-wlan-view] wmm-profile name huawei-ap
[AC-wlan-wmm-prof-huawei-ap] quit
[AC-wlan-view] radio-profile name huawei-ap
[AC-wlan-radio-prof-huawei-ap] radio-type 80211gn
[AC-wlan-radio-prof-huawei-ap] wmm-profile name huawei-ap
[AC-wlan-radio-prof-huawei-ap] quit
[AC-wlan-view] ap 1 radio 0
[AC-wlan-radio-1/0] radio-profile name huawei-ap
Warning: Modify the Radio type may cause some parameters of Radio resume defaul
t value, are you sure to continue?[Y/N]: y
[AC-wlan-radio-1/0] quit
```

Configure a security profile named huawei-ap. Set the security policy to WPA authentication, authentication method to 802.1X+PEAP, and encryption mode to CCMP:

```
[AC-wlan-view] security-profile name huawei-ap-wpa2
[AC-wlan-sec-prof-huawei-ap-wpa2] security-policy wpa2
[AC-wlan-sec-prof-huawei-ap-wpa2] wpa-wpa2 authentication-method dot1x
encryption-method ccmp
[AC-wlan-sec-prof-huawei-ap-wpa2] quit
```

Configure a traffic profile:

```
[AC-wlan-view] traffic-profile name huawei-ap
[AC-wlan-wmm-traffic-huawei-ap] quit
```

Configure service sets for APs, and set the data forwarding mode to direct forwarding:

The direct forwarding mode is used by default.

```
[AC-wlan-view] service-set name PacketFence-dot1x
[AC-wlan-service-set-PacketFence-dot1x] ssid PacketFence-Secure
[AC-wlan-service-set-PacketFence-dot1x] wlan-ess 0
[AC-wlan-service-set-PacketFence-dot1x] service-vlan 1
[AC-wlan-service-set-PacketFence-dot1x] security-profile name huawei-ap-wpa2
[AC-wlan-service-set-PacketFence-dot1x] traffic-profile name huawei-ap
[AC-wlan-service-set-PacketFence-dot1x] forward-mode tunnel
[AC-wlan-service-set-PacketFence-dot1x] quit
```

Configure VAPs and deliver configurations to the APs:

```
[AC-wlan-view] ap 1 radio 0
[AC-wlan-radio-1/0] service-set name PacketFence-dot1x
[AC-wlan-radio-1/0] quit
[AC-wlan-view] commit ap 1
```

Create your Open ssid

Activate the mac-auth globally:

```
<AC>system-view
[AC] mac-authen
[AC] mac-authen username macaddress format with-hyphen
[AC] mac-authen domain your.domain.com
```

Create your Open ssid:

Configure WLAN-ESS 1 interfaces:

```
[AC] interface Wlan-Ess 1
[AC-Wlan-Ess1] port hybrid untagged vlan 145 to 146
[AC-Wlan-Ess1] mac-authen
[AC-Wlan-Ess1] mac-authen username macaddress format without-hyphen
[AC-Wlan-Ess1] permit-domain name your.domain.com
[AC-Wlan-Ess1] force-domain name your.domain.com
[AC-Wlan-Ess1] default-domain your.domain.com
[AC-Wlan-Ess1] quit
```

Configure AP parameters:

Configure a security profile named huawei-ap-wep. Set the security policy to WEP authentication.

```
[AC]wlan
[AC-wlan-view] security-profile name huawei-ap-wep
[AC-wlan-sec-prof-huawei-ap-wep] security-policy wep
[AC-wlan-sec-prof-huawei-ap-wep] quit
```

Configure service sets for APs, and set the data forwarding mode to direct forwarding:

The direct forwarding mode is used by default.

```
[AC-wlan-view] service-set name PacketFence-WEP
[AC-wlan-service-set-PacketFence-WEP] ssid PacketFence-Open
[AC-wlan-service-set-PacketFence-WEP] wlan-ess 1
[AC-wlan-service-set-PacketFence-WEP] service-vlan 1
[AC-wlan-service-set-PacketFence-WEP] security-profile name huawei-ap-wep
[AC-wlan-service-set-PacketFence-WEP] traffic-profile name huawei-ap (already
created before)
[AC-wlan-service-set-PacketFence-WEP] forward-mode tunnel
[AC-wlan-service-set-PacketFence-WEP] quit
```

Configure VAPs and deliver configurations to the APs:

```
[AC-wlan-view] ap 1 radio 0
[AC-wlan-radio-1/0] service-set name PacketFence-WEP
[AC-wlan-radio-1/0] quit
[AC-wlan-view] commit ap 1
```

6.19. Meraki

To add the AP on PacketFence use the internal IP of the AP.

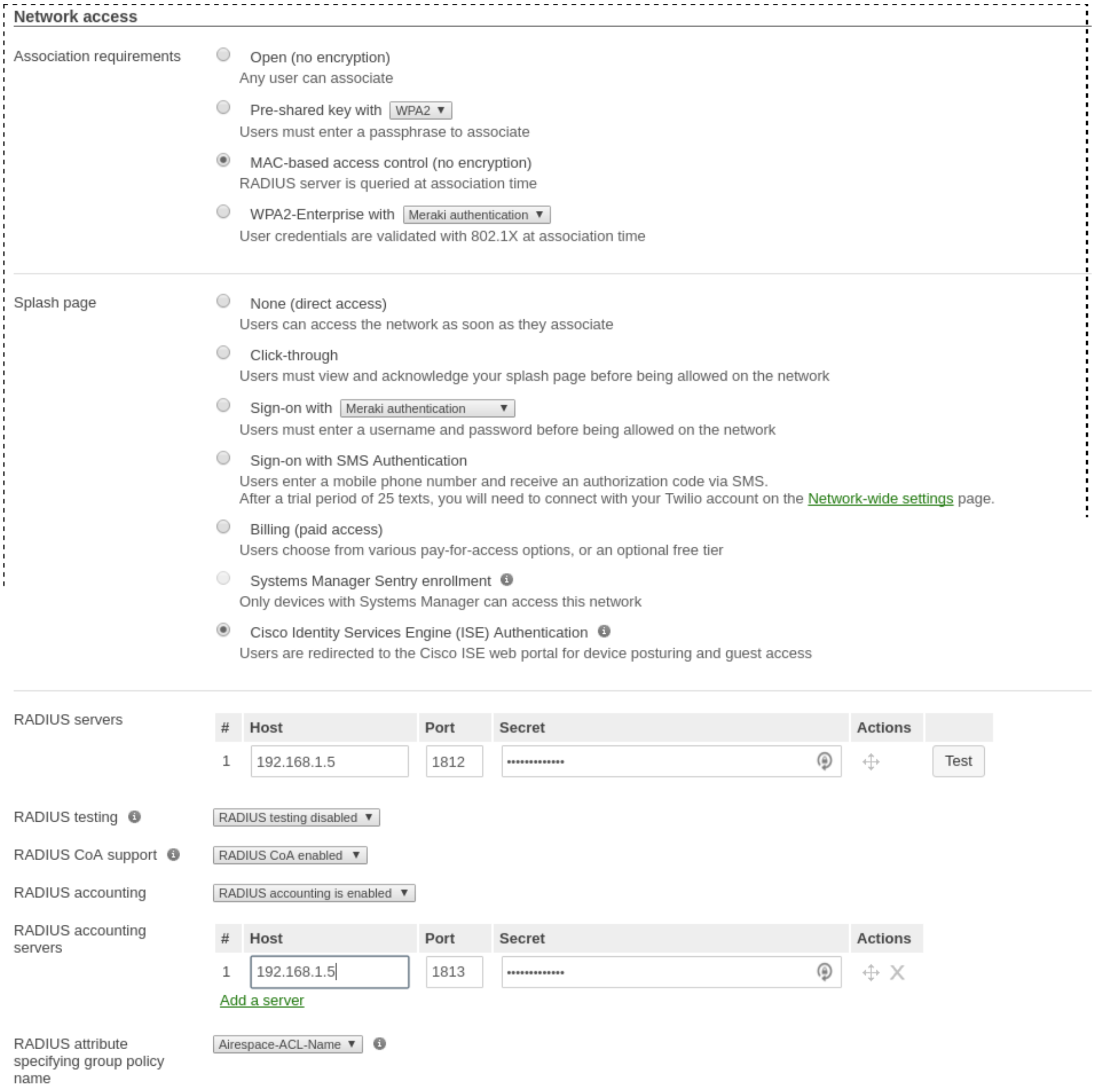
The 'Disconnect port' field must be set to '1700'.

6.19.1. WebAuth

In this section, we will cover the configuration of the Meraki controller to use Web authentication.

NOTE While using the WebAuth mode on the Meraki controller, you need to use "Role mapping by Switch Role" and "Role by Web Auth URL" in the tab 'Roles' from the switch configuration.

Configure your SSID as shown below:



Network access

Association requirements

○ Open (no encryption)
Any user can associate

○ Pre-shared key with [WPA2 ▼]
Users must enter a passphrase to associate

● MAC-based access control (no encryption)
RADIUS server is queried at association time

○ WPA2-Enterprise with [Meraki authentication ▼]
User credentials are validated with 802.1X at association time

Splash page

○ None (direct access)
Users can access the network as soon as they associate

○ Click-through
Users must view and acknowledge your splash page before being allowed on the network

○ Sign-on with [Meraki authentication ▼]
Users must enter a username and password before being allowed on the network

○ Sign-on with SMS Authentication
Users enter a mobile phone number and receive an authorization code via SMS.
After a trial period of 25 texts, you will need to connect with your Twilio account on the Network-wide settings page.

○ Billing (paid access)
Users choose from various pay-for-access options, or an optional free tier

○ Systems Manager Sentry enrollment
Only devices with Systems Manager can access this network

● Cisco Identity Services Engine (ISE) Authentication
Users are redirected to the Cisco ISE web portal for device posturing and guest access

RADIUS servers

#	Host	Port	Secret	Actions	
1	192.168.1.5	1812	•••••••••••••		Test

RADIUS testing: [RADIUS testing disabled ▼]

RADIUS CoA support: [RADIUS CoA enabled ▼]

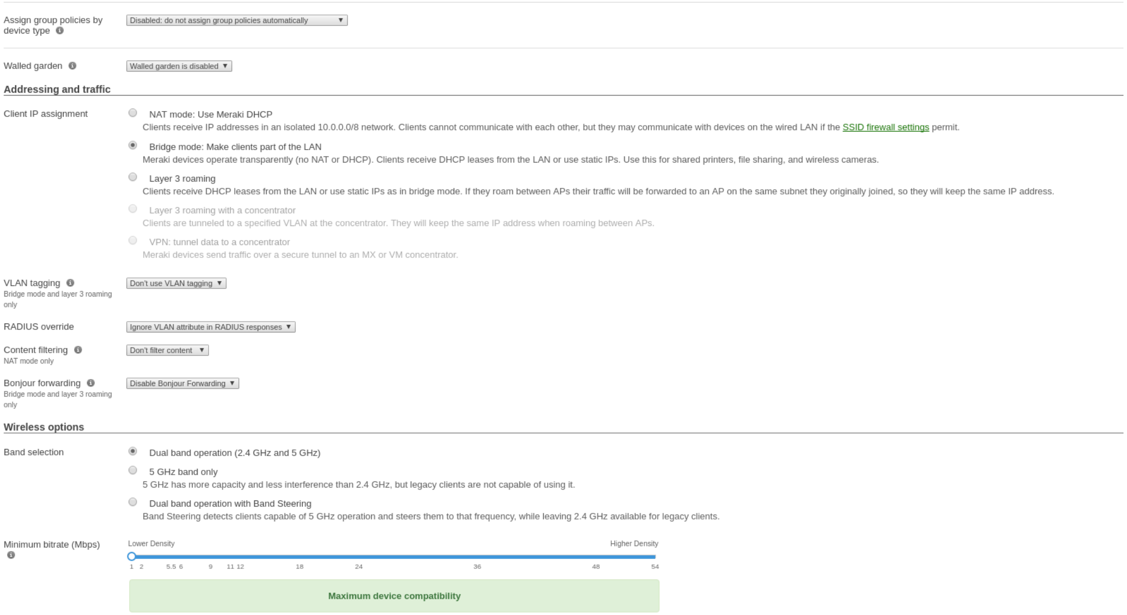
RADIUS accounting: [RADIUS accounting is enabled ▼]

RADIUS accounting servers

#	Host	Port	Secret	Actions
1	192.168.1.5	1813	•••••••••••••	

Add a server

RADIUS attribute specifying group policy name: [Airespace-ACL-Name ▼]



Assign group policies by device type: Disabled: do not assign group policies automatically ▼

Walled garden: Walled garden is disabled ▼

Addressing and traffic

Client IP assignment

○ NAT mode: Use Meraki DHCP
Clients receive IP addresses in an isolated 10.0.0.0/8 network. Clients cannot communicate with each other, but they may communicate with devices on the wired LAN if the SSID firewall settings permit.

● Bridge mode: Make clients part of the LAN
Meraki devices operate transparently (no NAT or DHCP). Clients receive DHCP leases from the LAN or use static IPs. Use this for shared printers, file sharing, and wireless cameras.

○ Layer 3 roaming
Clients receive DHCP leases from the LAN or use static IPs as in bridge mode. If they roam between APs their traffic will be forwarded to an AP on the same subnet they originally joined, so they will keep the same IP address.

○ Layer 3 roaming with a concentrator
Clients are tunneled to a specified VLAN at the concentrator. They will keep the same IP address when roaming between APs.

○ VPN: tunnel data to a concentrator
Meraki devices send traffic over a secure tunnel to an MX or VM concentrator.

VLAN tagging (Bridge mode and layer 3 roaming only): Don't use VLAN tagging ▼

RADIUS override: Ignore VLAN attribute in RADIUS responses ▼

Content filtering (NAT mode only): Don't filter content ▼

Bonjour forwarding (Bridge mode and layer 3 roaming only): Disable Bonjour Forwarding ▼

Wireless options

Band selection

● Dual band operation (2.4 GHz and 5 GHz)

○ 5 GHz band only
5 GHz has more capacity and less interference than 2.4 GHz, but legacy clients are not capable of using it.

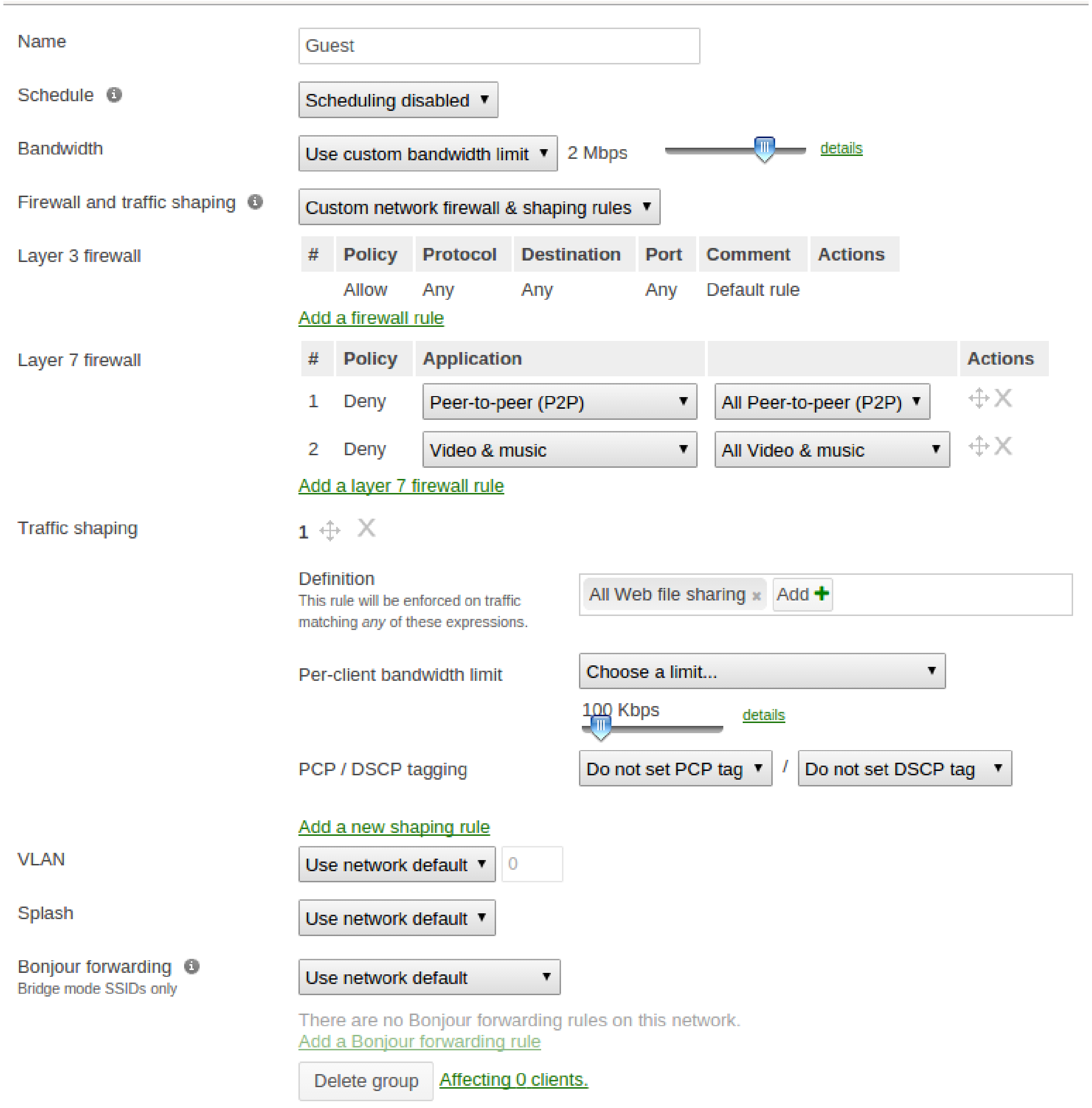
○ Dual band operation with Band Steering
Band Steering detects clients capable of 5 GHz operation and steers them to that frequency, while leaving 2.4 GHz available for legacy clients.

Minimum bitrate (Mbps): 1

NOTE It is mandatory that you use the Airespace-ACL-Name as "RADIUS attribute specifying group policy name".

The switch module to use for this configuration is "Meraki cloud controller V2".

Next, configure the roles for the devices on your network. Go in 'Network-wide→Group policies', then you will be able to create policies that can be configured as roles in the switch configuration of PacketFence. Creation of the policy `Guest`:



Name: Guest

Schedule: Scheduling disabled ▼

Bandwidth: Use custom bandwidth limit ▼ 2 Mbps details

Firewall and traffic shaping: Custom network firewall & shaping rules ▼

Layer 3 firewall

#	Policy	Protocol	Destination	Port	Comment	Actions
	Allow	Any	Any	Any	Default rule	

Add a firewall rule

Layer 7 firewall

#	Policy	Application		Actions
1	Deny	Peer-to-peer (P2P) ▼	All Peer-to-peer (P2P) ▼	✣ X
2	Deny	Video & music ▼	All Video & music ▼	✣ X

Add a layer 7 firewall rule

Traffic shaping: 1 ✣ X

Definition
This rule will be enforced on traffic matching *any* of these expressions.
All Web file sharing × Add ✚

Per-client bandwidth limit: Choose a limit... ▼
100 Kbps details

PCP / DSCP tagging: Do not set PCP tag ▼ / Do not set DSCP tag ▼

Add a new shaping rule

VLAN: Use network default ▼ 0

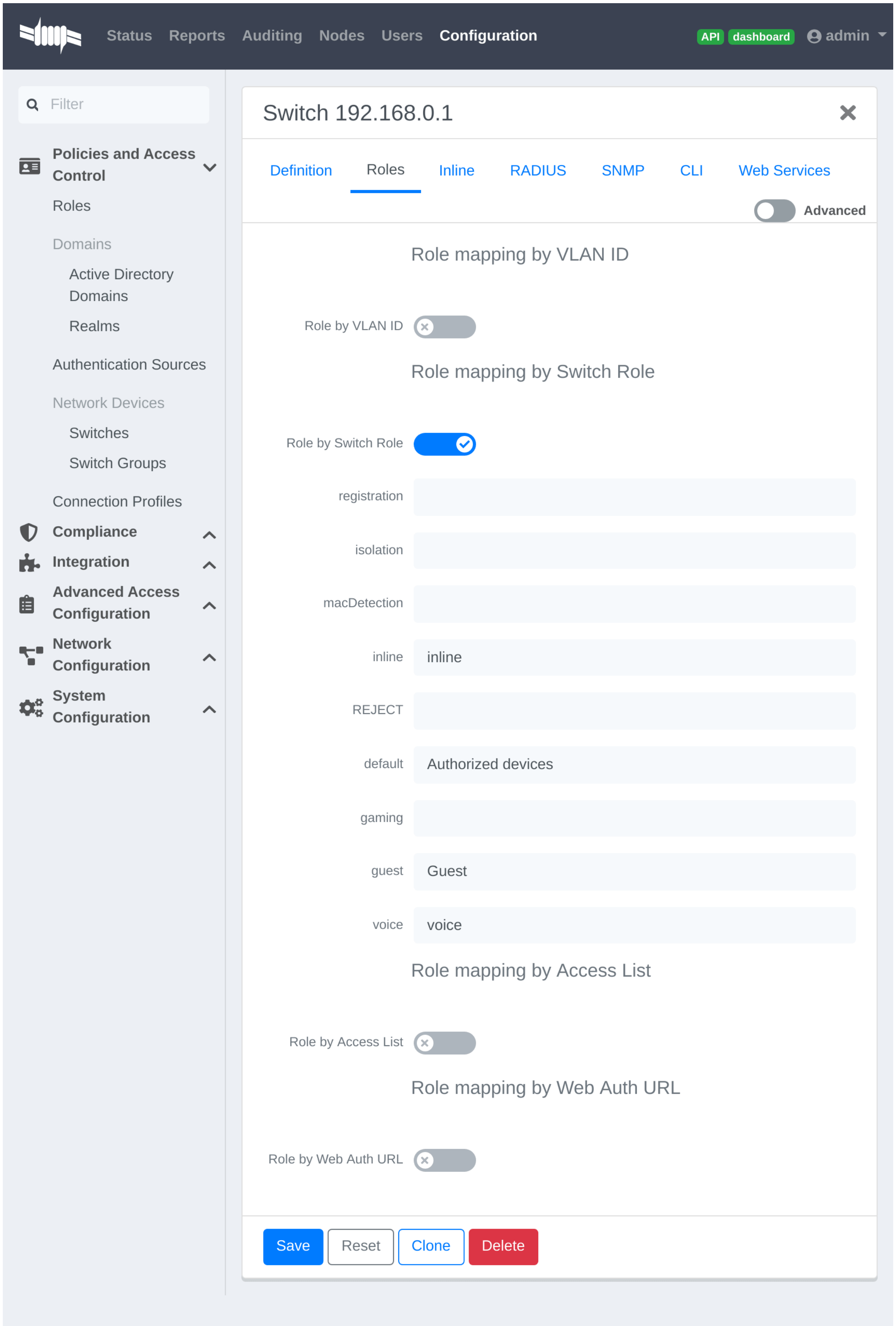
Splash: Use network default ▼

Bonjour forwarding
Bridge mode SSIDs only
Use network default ▼

There are no Bonjour forwarding rules on this network.
Add a Bonjour forwarding rule

Delete group Affecting 0 clients.

Your configuration for the tab "Roles" in PacketFence will look like the following:



Switch 192.168.0.1

Role mapping by VLAN ID

Role by VLAN ID: off

Role mapping by Switch Role

Role by Switch Role: ✓

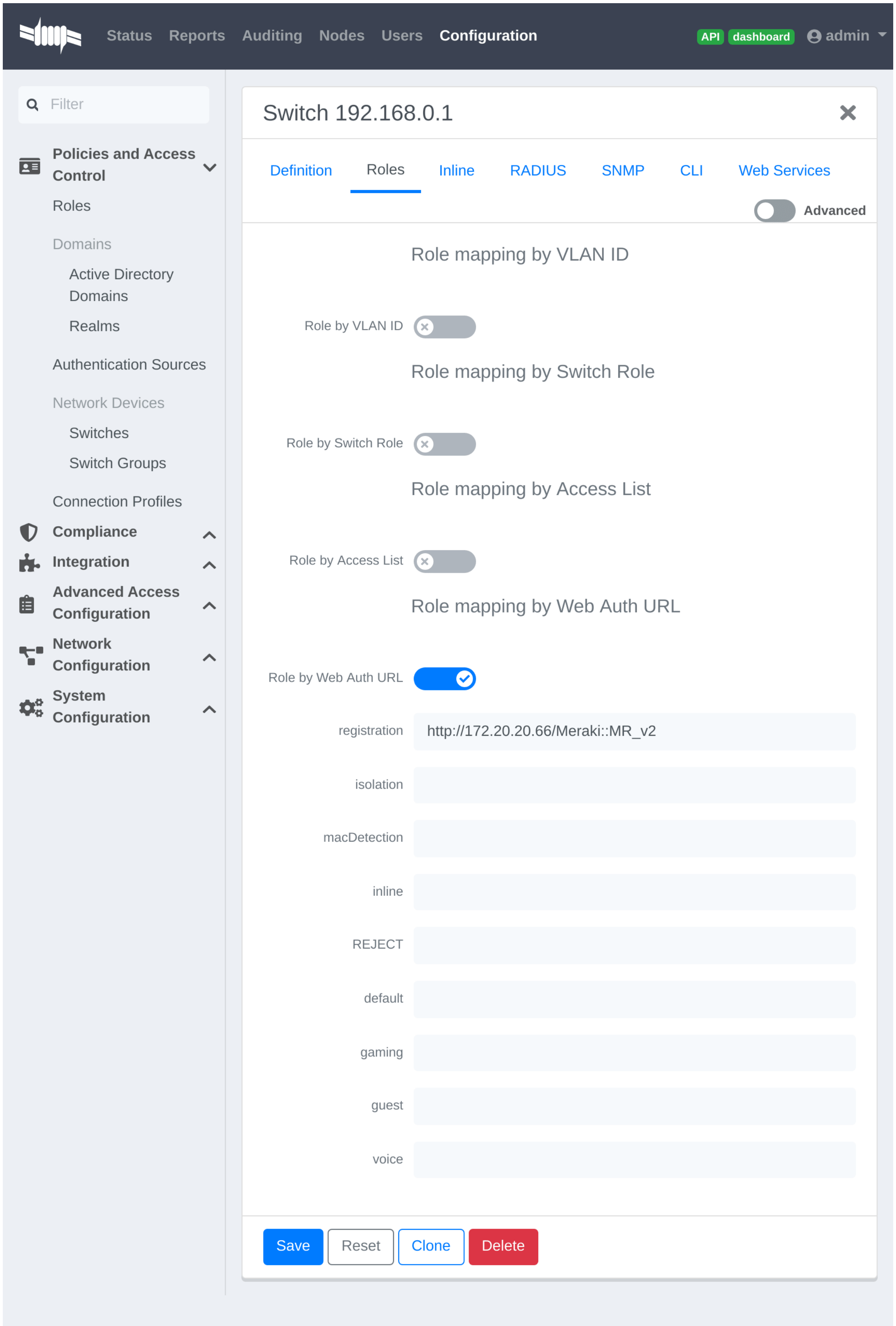
registration	
isolation	
macDetection	
inline	inline
REJECT	
default	Authorized devices
gaming	
guest	Guest
voice	voice

Role mapping by Access List

Role by Access List: off

Role mapping by Web Auth URL

Role by Web Auth URL: off



Switch 192.168.0.1

Role mapping by VLAN ID

Role by VLAN ID: off

Role mapping by Switch Role

Role by Switch Role: off

Role mapping by Access List

Role by Access List: off

Role mapping by Web Auth URL

Role by Web Auth URL: on

registration: http://172.20.20.66/Meraki::MR_v2

isolation:

macDetection:

inline:

REJECT:

default:

gaming:

guest:

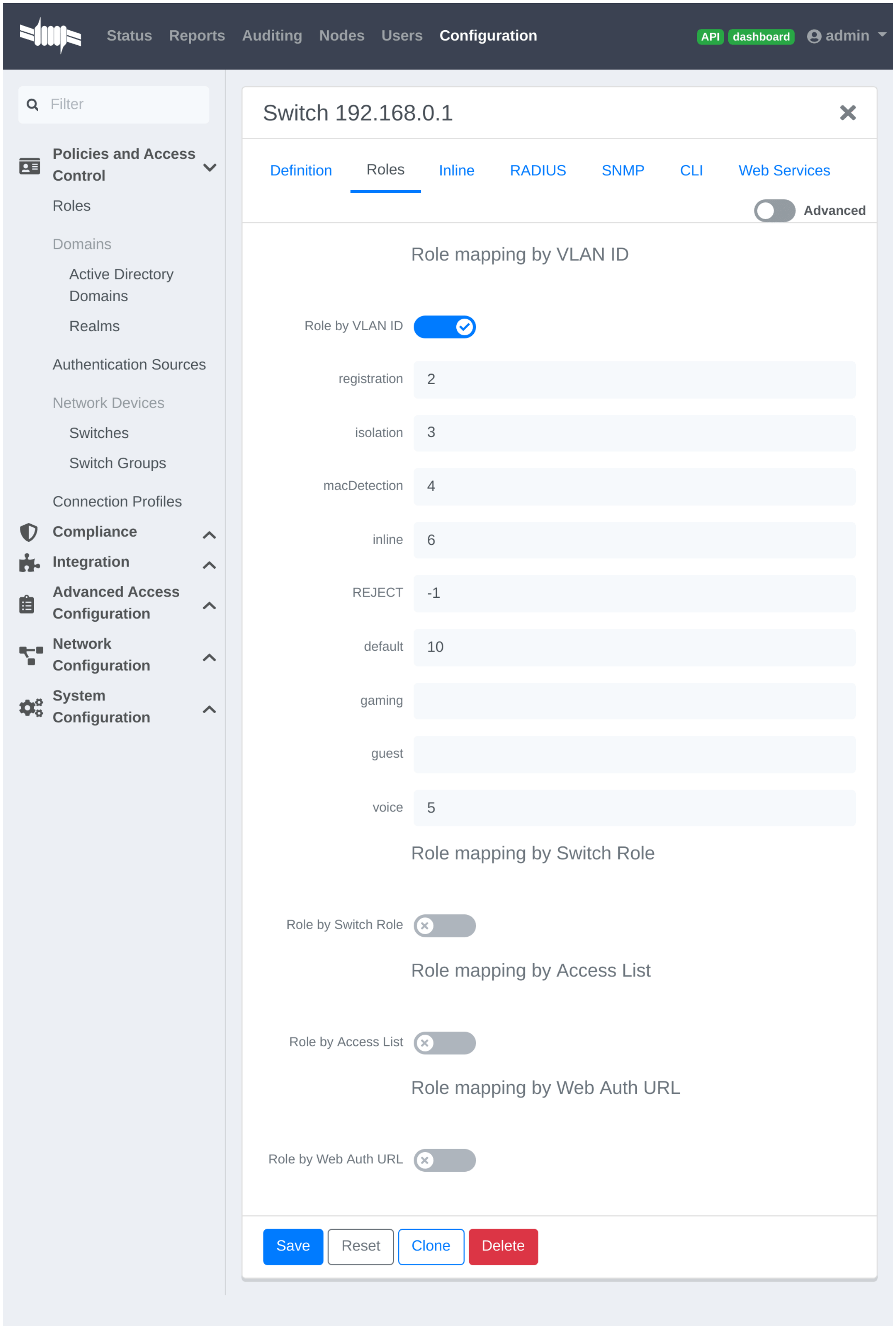
voice:

URL in registration field should be in the form: 'http://<your_captive_portal_ip>/Meraki::MR_v2'

6.19.2. VLAN enforcement

This section will cover how to configure the Meraki WiFI controller to use with VLAN enforcement, use the configuration in the section `WebAuth` for the SSID.

In the configuration of PacketFence, use "Role by VLAN ID" and fill your VLANs matching roles.



Switch 192.168.0.1

Role mapping by VLAN ID

Role by VLAN ID	✓
registration	2
isolation	3
macDetection	4
inline	6
REJECT	-1
default	10
gaming	
guest	
voice	5

Role mapping by Switch Role

Role by Switch Role ☒

Role mapping by Access List

Role by Access List ☒

Role mapping by Web Auth URL

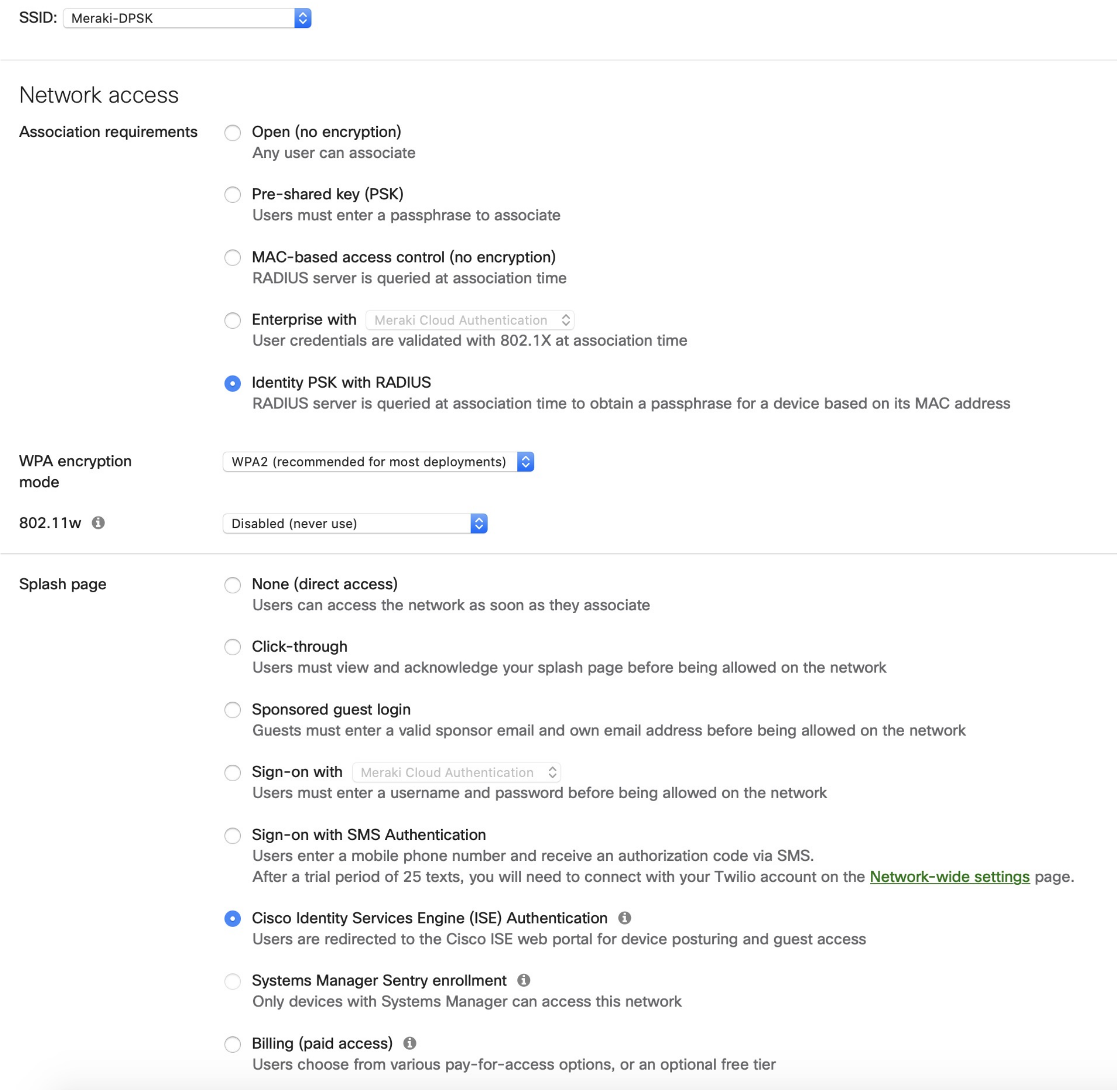
Role by Web Auth URL ☒

6.19.3. Dynamic PSK (Pre-Shared Key)

This section will cover how to configure the Meraki WiFI controller to use with Dynamic PSK with PacketFence.

You will be able to attribute one PSK per user to use on every device they want. There is a common key to connect to a given PSK secured SSID to register and you will have an option to provision your device with that configuration on Windows, Apple and Android devices.

Create the SSID



SSID: Meraki-DPSK

Network access

Association requirements

○ Open (no encryption)
Any user can associate

○ Pre-shared key (PSK)
Users must enter a passphrase to associate

○ MAC-based access control (no encryption)
RADIUS server is queried at association time

○ Enterprise with Meraki Cloud Authentication
User credentials are validated with 802.1X at association time

● Identity PSK with RADIUS
RADIUS server is queried at association time to obtain a passphrase for a device based on its MAC address

WPA encryption mode: WPA2 (recommended for most deployments)

802.11w: Disabled (never use)

Splash page

○ None (direct access)
Users can access the network as soon as they associate

○ Click-through
Users must view and acknowledge your splash page before being allowed on the network

○ Sponsored guest login
Guests must enter a valid sponsor email and own email address before being allowed on the network

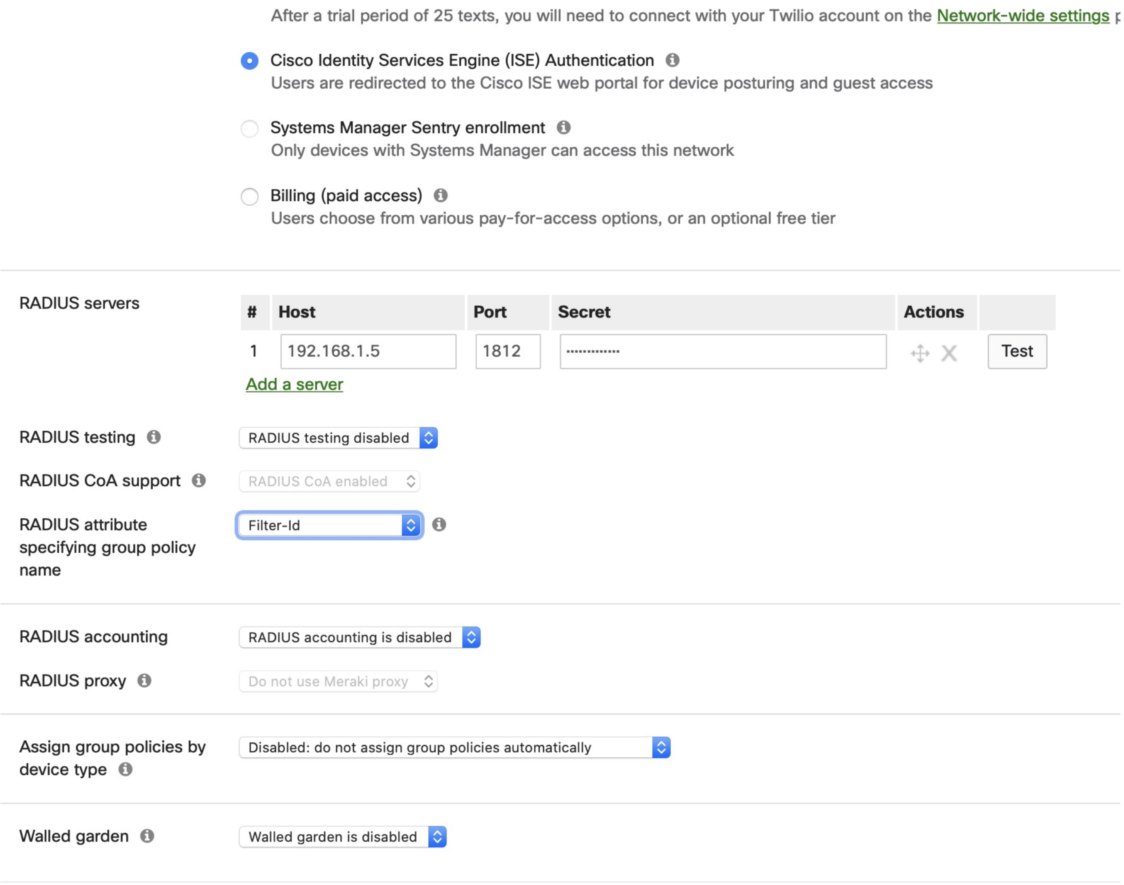
○ Sign-on with Meraki Cloud Authentication
Users must enter a username and password before being allowed on the network

○ Sign-on with SMS Authentication
Users enter a mobile phone number and receive an authorization code via SMS.
After a trial period of 25 texts, you will need to connect with your Twilio account on the Network-wide settings page.

● Cisco Identity Services Engine (ISE) Authentication
Users are redirected to the Cisco ISE web portal for device posturing and guest access

○ Systems Manager Sentry enrollment
Only devices with Systems Manager can access this network

○ Billing (paid access)
Users choose from various pay-for-access options, or an optional free tier



After a trial period of 25 texts, you will need to connect with your Twilio account on the Network-wide settings p

● Cisco Identity Services Engine (ISE) Authentication
Users are redirected to the Cisco ISE web portal for device posturing and guest access

○ Systems Manager Sentry enrollment
Only devices with Systems Manager can access this network

○ Billing (paid access)
Users choose from various pay-for-access options, or an optional free tier

RADIUS servers

#	Host	Port	Secret	Actions	
1	192.168.1.5	1812	•••••••••••••		Test

Add a server

RADIUS testing: RADIUS testing disabled

RADIUS CoA support: RADIUS CoA enabled

RADIUS attribute specifying group policy name: Filter-Id

RADIUS accounting: RADIUS accounting is disabled

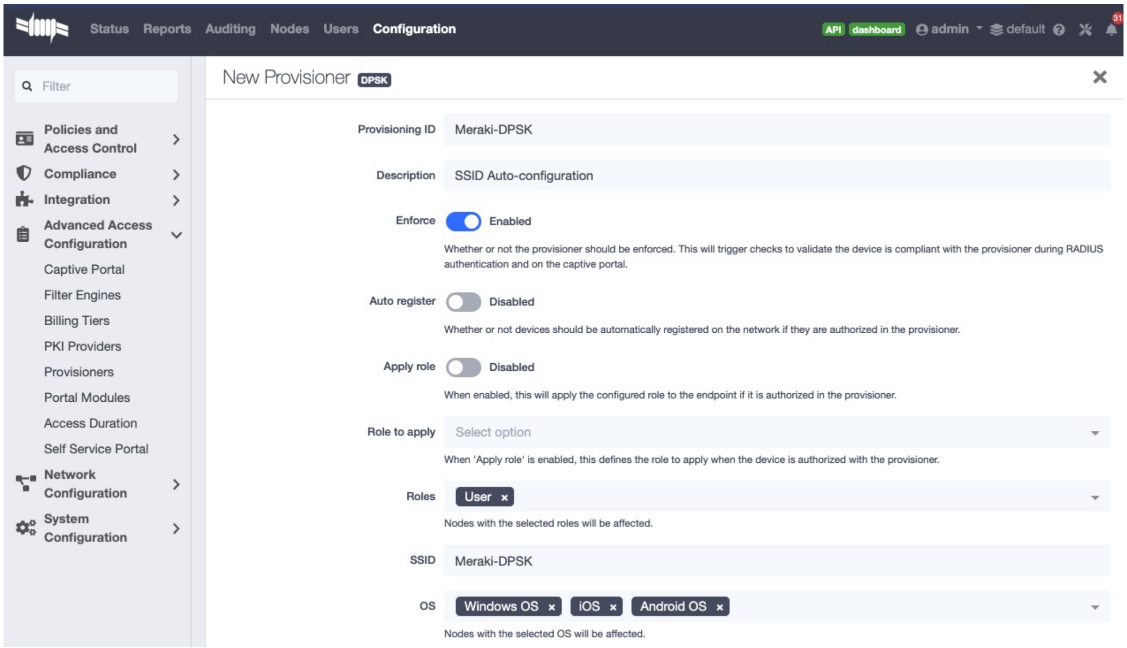
RADIUS proxy: Do not use Meraki proxy

Assign group policies by device type: Disabled: do not assign group policies automatically

Walled garden: Walled garden is disabled

Provioner configuration

Go to Configuration > Advanced Access Configuration > Provisioner > New provisioner > DPSK



New Provisioner DPSK

Provisioning ID: Meraki-DPSK

Description: SSID Auto-configuration

Enforce: Enabled
Whether or not the provisioner should be enforced. This will trigger checks to validate the device is compliant with the provisioner during RADIUS authentication and on the captive portal.

Auto register: Disabled
Whether or not devices should be automatically registered on the network if they are authorized in the provisioner.

Apply role: Disabled
When enabled, this will apply the configured role to the endpoint if it is authorized in the provisioner.

Role to apply: Select option
When 'Apply role' is enabled, this defines the role to apply when the device is authorized with the provisioner.

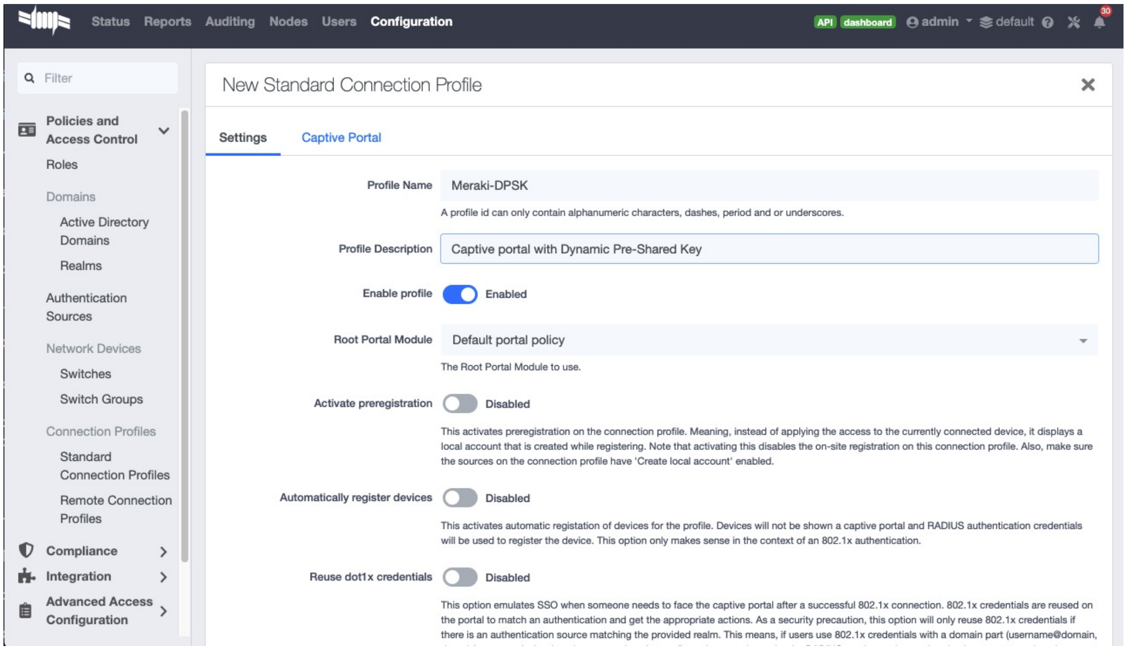
Roles: User
Nodes with the selected roles will be affected.

SSID: Meraki-DPSK

OS: Windows OS, iOS, Android OS
Nodes with the selected OS will be affected.

Connection profile configuration

Go to Configuration > Policies and Access Control > Connection Profiles > New Connection Profile



New Standard Connection Profile

Profile Name: Meraki-DPSK

A profile id can only contain alphanumeric characters, dashes, period and or underscores.

Profile Description: Captive portal with Dynamic Pre-Shared Key

Enable profile: Enabled

Root Portal Module: Default portal policy

The Root Portal Module to use.

Activate preregistration: Disabled

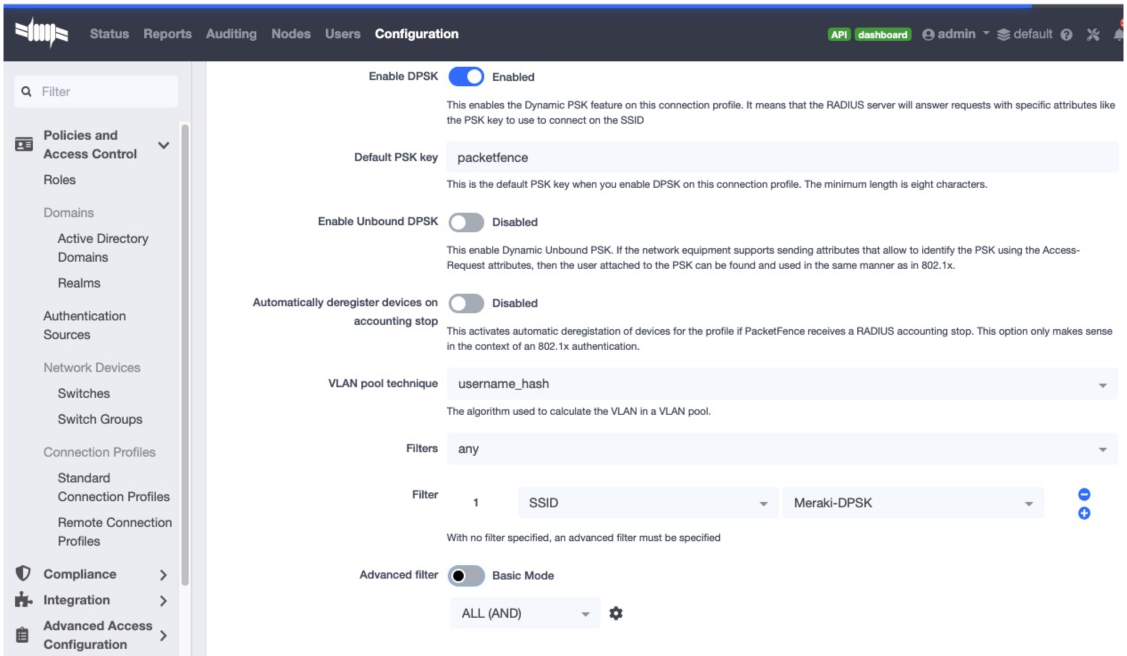
This activates preregistration on the connection profile. Meaning, instead of applying the access to the currently connected device, it displays a local account that is created while registering. Note that activating this disables the on-site registration on this connection profile. Also, make sure the sources on the connection profile have 'Create local account' enabled.

Automatically register devices: Disabled

This activates automatic registation of devices for the profile. Devices will not be shown a captive portal and RADIUS authentication credentials will be used to register the device. This option only makes sense in the context of an 802.1x authentication.

Reuse dot1x credentials: Disabled

This option emulates SSO when someone needs to face the captive portal after a successful 802.1x connection. 802.1x credentials are reused on the portal to match an authentication and get the appropriate actions. As a security precaution, this option will only reuse 802.1x credentials if there is an authentication source matching the provided realm. This means, if users use 802.1x credentials with a domain part (username@domain,



Enable DPSK: Enabled

This enables the Dynamic PSK feature on this connection profile. It means that the RADIUS server will answer requests with specific attributes like the PSK key to use to connect on the SSID

Default PSK key: packetfence

This is the default PSK key when you enable DPSK on this connection profile. The minimum length is eight characters.

Enable Unbound DPSK: Disabled

This enable Dynamic Unbound PSK. If the network equipment supports sending attributes that allow to identify the PSK using the Access-Request attributes, then the user attached to the PSK can be found and used in the same manner as in 802.1x.

Automatically deregister devices on accounting stop: Disabled

This activates automatic deregistation of devices for the profile if PacketFence receives a RADIUS accounting stop. This option only makes sense in the context of an 802.1x authentication.

VLAN pool technique: username_hash

The algorithm used to calculate the VLAN in a VLAN pool.

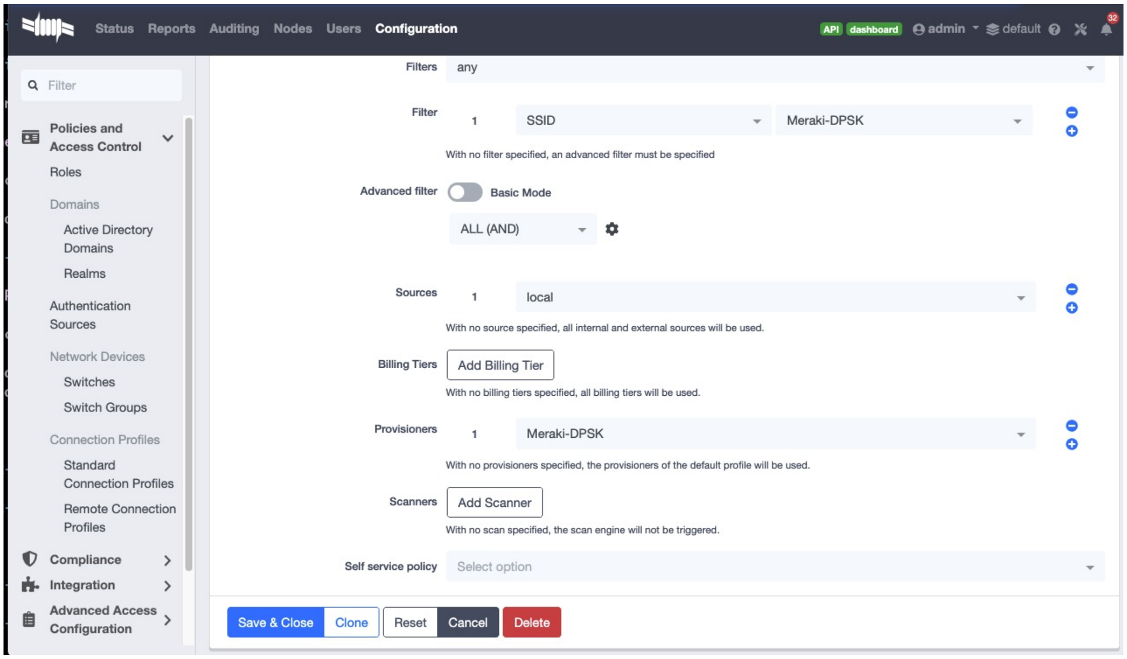
Filters: any

Filter: 1 SSID Meraki-DPSK

With no filter specified, an advanced filter must be specified

Advanced filter: Basic Mode

ALL (AND)



Filters: any

Filter: 1 SSID Meraki-DPSK

With no filter specified, an advanced filter must be specified

Advanced filter: Basic Mode

ALL (AND)

Sources: 1 local

With no source specified, all internal and external sources will be used.

Billing Tiers: Add Billing Tier

With no billing tiers specified, all billing tiers will be used.

Provisioners: 1 Meraki-DPSK

With no provisioners specified, the provisioners of the default profile will be used.

Scanners: Add Scanner

With no scan specified, the scan engine will not be triggered.

Self service policy: Select option

Switch MS220-8

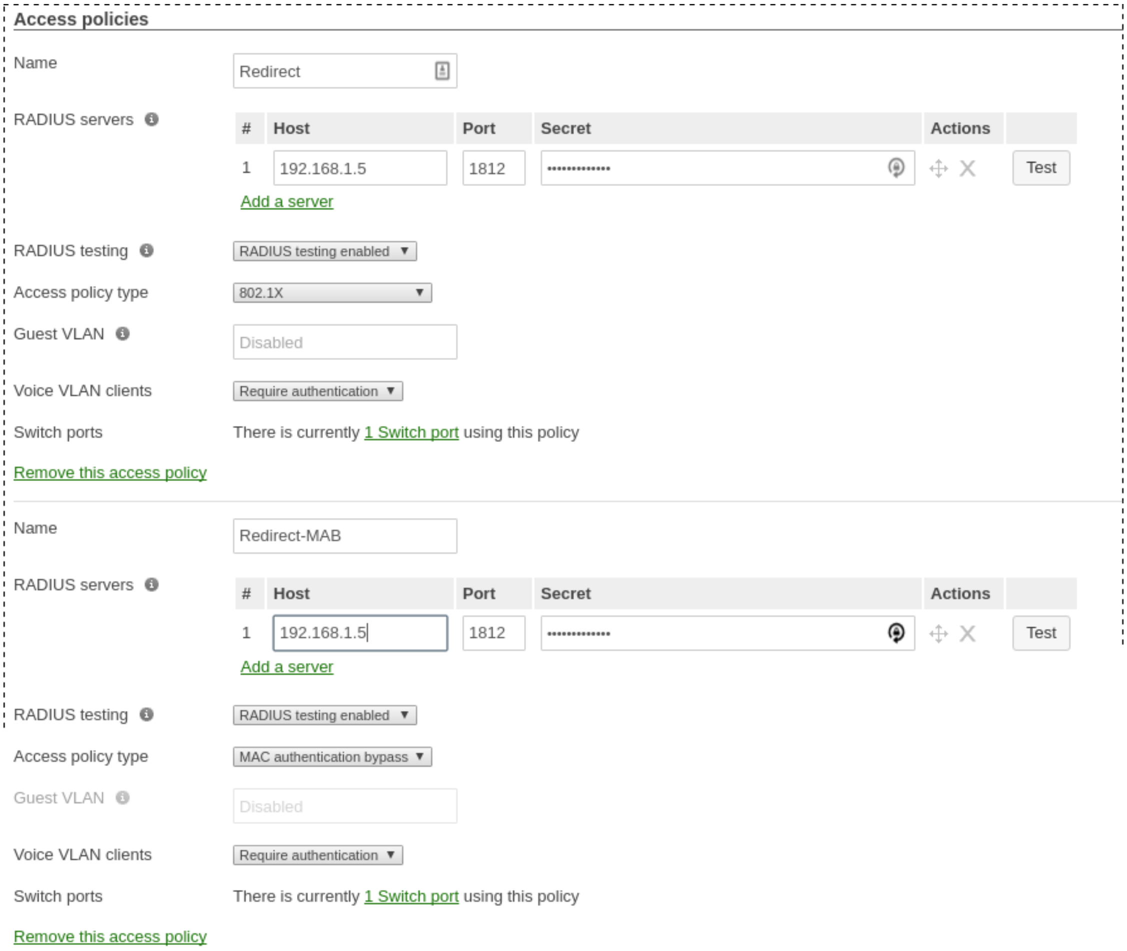
NOTE

You should already have one port setup as Uplink, using a mode trunk, with at least your Registration and Production VLAN allowed on it.

The Meraki switch offer configuration for VLAN enforcement only.

You will need to access the Meraki dashboard to configure your switch. When you reach it you will need first to create a policy. You can create a "MAC authentication bypass" or a "802.1X" policy. Depending if you want to authenticate user via dot1x or MAB. You cannot combine both neither use a fallback mode on the same port, each port with a policy applied will be exclusive to MAB or dot1x.

To access the policy creation go to 'Switch→Access policies' in the Meraki dashboard menu. From there create a new policy, use the example below to create your policy.



Access policies

Name: Redirect

RADIUS servers

#	Host	Port	Secret	Actions	
1	192.168.1.5	1812	•••••••••••••		Test

Add a server

RADIUS testing: RADIUS testing enabled ▼

Access policy type: 802.1X ▼

Guest VLAN: Disabled

Voice VLAN clients: Require authentication ▼

Switch ports: There is currently 1 Switch port using this policy

Remove this access policy

Name: Redirect-MAB

RADIUS servers

#	Host	Port	Secret	Actions	
1	192.168.1.5	1812	•••••••••••••		Test

Add a server

RADIUS testing: RADIUS testing enabled ▼

Access policy type: MAC authentication bypass ▼

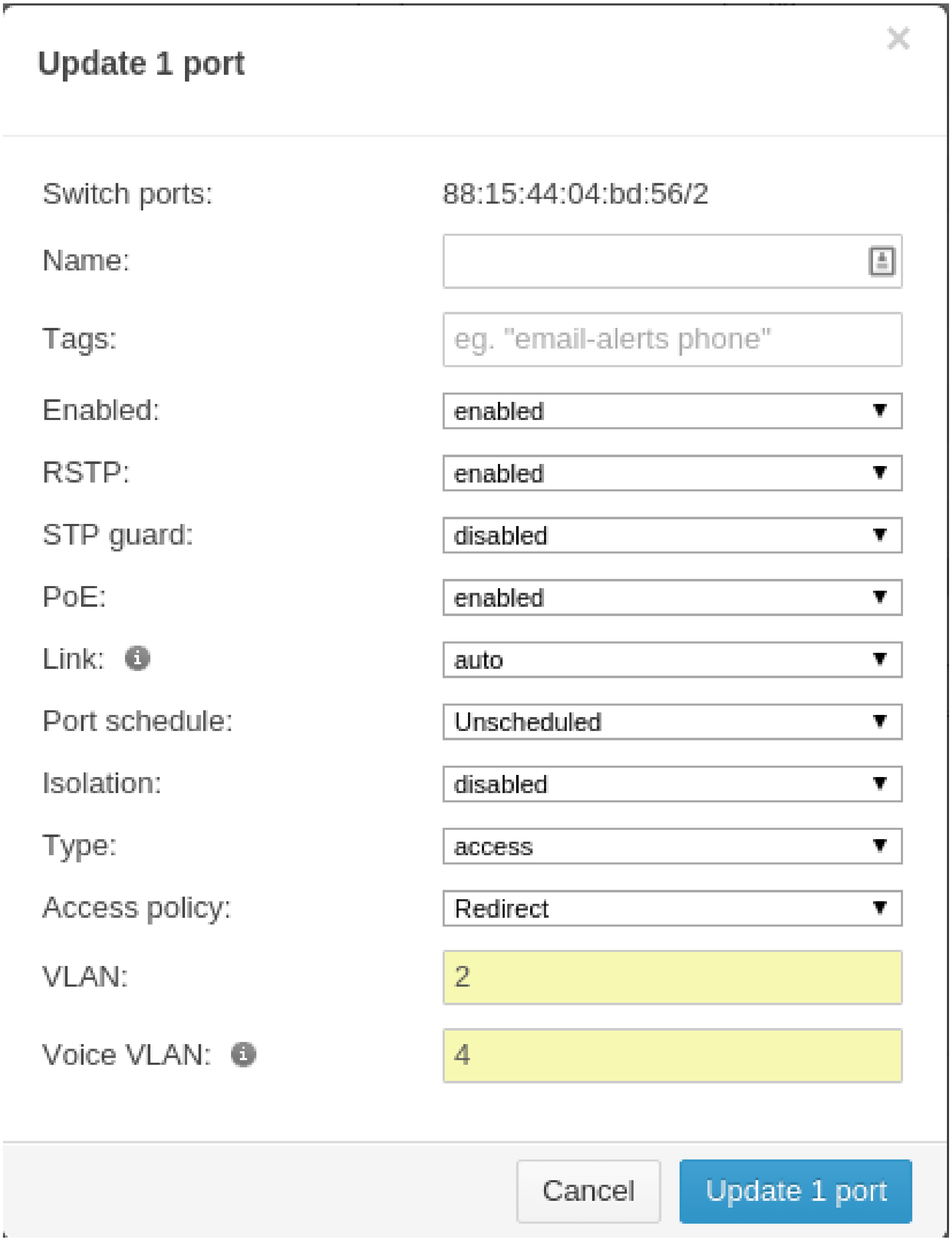
Guest VLAN: Disabled

Voice VLAN clients: Require authentication ▼

Switch ports: There is currently 1 Switch port using this policy

Remove this access policy

You now need to apply one of your policies to ports. To do so, go to 'Switch→Switch ports' and chose your options. To add a policy you created earlier, select it in the drop down list in `Access policy`. You need to configure the port in "mode access", the default access VLAN is not important if your VLANs are properly configured on PacketFence.



Update 1 port

Switch ports:	88:15:44:04:bd:56/2
Name:	
Tags:	eg. "email-alerts phone"
Enabled:	enabled
RSTP:	enabled
STP guard:	disabled
PoE:	enabled
Link:	auto
Port schedule:	Unscheduled
Isolation:	disabled
Type:	access
Access policy:	Redirect
VLAN:	2
Voice VLAN:	4

RADSEC

It is possible to use RADSEC between Meraki and PacketFence in order to perform RADIUS over TCP and encrypted using TLS. Before performing the steps outlined in this section, make sure you have a working SSID using normal unencrypted RADIUS by following the steps in the sections above

Then, in order to enable RADSEC, go in your SSID configuration and under 'RADIUS proxy', select 'Use Meraki proxy' and save the settings.

After saving, check the RADSEC checkbox and save your settings.

Now, on your PacketFence server, you must add the Meraki CA root to the trusted Certificate Authorities of FreeRADIUS when performing RADSEC. You should download the Meraki CA certificate from here http://changeme.com/meraki-root.crt and append it to the content of /usr/local/pf/raddb/certs/ca.pem on your PacketFence server.

Next, restart radiusd to reload the CA certificates using:

```
# /usr/local/pf/bin/pfcmd service radiusd restart
```

NOTE

RADSEC is done over port 2083 so make sure your server is available via a public IP address for this port and allows connections from your Meraki cloud controller. Refer to the Meraki documentation for details.

6.20. Mikrotik

PacketFence supports MikroTik's RouterOS to provide wireless 802.1X (WPA2-Enterprise and MAC-based authentication) as well as wired 802.1X (EAPoL (Extensible Authentication Protocol over LAN)).

MikroTik has supported wireless 802.1X RADIUS disconnect for 2+ years, but this is not available for wired 802.1X (dot1x).

This configuration has been tested on a variety of MikroTik devices, including RB433AH, hAP ac, hAP ac lite, RB1100, RB3011 and various CCR devices. MikroTik provide free software updates ('/system package update install' and then '/sys routerboard upgrade' after booting new RouterOS).

Default MikroTik de-auth method has been changed to RADIUS, instead of SSH. Change 'my $default = $SNMP::RADIUS;' back to 'my $default = $SNMP::SSH;' if you want to continue using SSH as the de-authentication method.

EAPoL (802.1X) wired authentication has been available since v6.46 (Dec 2019) with MAB fallback being stable in v6.48.3.

PS: Don't forget to use the pf account to ssh on the Access Point, to receive the ssh key, if you switch back to using SSH.

WPA2-EAP (WPA2 Enterprise) 802.1X SSID with MAC-based authentication on WPA2-PSK SSID

In this example the 2.4 and 5 GHz radios are configured to provide wireless 802.1X with a virtual AP being added to provide MAC-based authentication on a WPA2-PSK SSID where the password is disclosed as part of the SSID. Although the Pre-Shared Key (PSK) is published each wireless client's connection would still be encrypted with a dynamically generated key.

First we create the SSIDs and virtual AP for the second SSID:

```
/interface wireless security-profiles
  add authentication-types=wpa2-eap disable-pmkid=yes interim-update=15m
management-protection=allowed mode=dynamic-keys name=radius-eap \
    radius-eap-accounting=yes supplicant-identity=""
  add authentication-types=wpa2-psk disable-pmkid=yes eap-methods="" interim-
update=15m management-protection=allowed mode=dynamic-keys name=\
    radius-mac radius-mac-accounting=yes radius-mac-authentication=yes
supplicant-identity="" wpa2-pre-shared-key="internet"
/interface wireless
  set [ find default-name=wlan1 ] band=2ghz-b/g/n channel-width=20mhz
country="south africa" disabled=no frequency=auto mode=ap-bridge name=\
    "wlan1 - 2.4 GHz - ACME WiFi" security-profile=radius-eap skip-dfs-
channels=all ssid="ACME WiFi" station-roaming=enabled vlan-id=3999 \
    vlan-mode=use-tag wireless-protocol=802.11 wps-mode=disabled
  add disabled=no master-interface="wlan1 - 2.4 GHz - ACME WiFi" multicast-
helper=full name="wlan1 - 2.4 GHz - ACME Guest" \
    security-profile=radius-mac ssid="ACME Guest (pw: internet)" station-
roaming=enabled vlan-id=3999 vlan-mode=use-tag wps-mode=disabled
  set [ find default-name=wlan2 ] band=5ghz-a/n/ac channel-width=20/40/80mhz-
Ceee country="south africa" disabled=no frequency=auto mode=ap-bridge \
    name="wlan2 - 5 GHz - ACME WiFi" security-profile=radius-eap skip-dfs-
channels=all ssid="ACME WiFi" station-roaming=enabled vlan-id=3999 \
    vlan-mode=use-tag wireless-protocol=802.11 wps-mode=disabled
  add disabled=no master-interface="wlan2 - 5 GHz - ACME WiFi" multicast-
helper=full name="wlan2 - 5 GHz - ACME Guest" \
    security-profile=radius-mac ssid="ACME Guest (pw: internet)" station-
roaming=enabled vlan-id=3999 vlan-mode=use-tag wps-mode=disabled
PS: VLAN 3999 is purposefully bogus, to ensure no access without VLAN
assignment in the RADIUS response.
```

Next we create a VLAN filtering bridge:

```
/interface bridge
  add name=bridge vlan-filtering=yes
/interface bridge port
  add bridge=bridge interface="wlan1 - 2.4 GHz - ACME WiFi"
  add bridge=bridge interface="wlan2 - 5 GHz - ACME WiFi"
  add bridge=bridge interface="wlan1 - 2.4 GHz - ACME Guest"
  add bridge=bridge interface="wlan2 - 5 GHz - ACME Guest"
/interface bridge vlan
  add bridge=bridge tagged="bridge,wlan1 - 2.4 GHz - ACME WiFi,wlan2 - 5 GHz -
ACME WiFi,wlan1 - 2.4 GHz - ACME Guest,wlan2 - 5 GHz - ACME Guest" vlan-ids=52
  add bridge=bridge tagged="bridge,wlan1 - 2.4 GHz - ACME WiFi,wlan2 - 5 GHz -
ACME WiFi,wlan1 - 2.4 GHz - ACME Guest,wlan2 - 5 GHz - ACME Guest" vlan-ids=666
  add bridge=bridge tagged="bridge,wlan1 - 2.4 GHz - ACME WiFi,wlan2 - 5 GHz -
ACME WiFi,wlan1 - 2.4 GHz - ACME Guest,wlan2 - 5 GHz - ACME Guest" vlan-ids=667
```

Next we create the VLANs and assign IPs:

```
/interface vlan
  add comment=”Guest WiFi:” interface=bridge name=vlan52 vlan-id=52
  add comment=”PacketFence - Registration:” interface=bridge name=vlan666 vlan-
id=666
  add comment=”PacketFence - Isolation:” interface=bridge name=vlan667 vlan-
id=667
/ip address
  add address=172.16.20.1/24 interface=bridge
  add address=10.239.239.1/24 interface=vlan52
  add address=192.168.10.225/28 interface=vlan666
  add address=192.168.10.241/28 interface=vlan667
PS: 172.16.20.1 is essentially assigned to VLAN 1 (untagged)
```

Last settings on the MikroTik defines PacketFence as the RADIUS server and filters traffic on Guest, Registration and Isolation networks:

```
/radius
  add address=172.16.5.17 comment=packetfence: secret=useStrongerSecret
service=wireless src-address=172.16.20.1 timeout=1s
/radius incoming
  set accept=yes
/ip dhcp-relay
  add dhcp-server=172.31.31.1 disabled=no interface=vlan666 local-
address=192.168.10.225 add-relay-info=yes name=”PacketFence - Registration”
  add dhcp-server=172.31.31.129 disabled=no interface=vlan667 local-
address=192.168.10.241 add-relay-info=yes name=”PacketFence - Isolation”
/ip firewall address-list
  add address=10.0.0.0/8 list=local
  add address=172.16.0.0/12 list=local
  add address=192.168.0.0/16 list=local
/ip firewall filter
  add action=reject chain=forward comment=”Limit WiFi - Guest:” dst-
address=!41.1.1.1 dst-address-list=local in-interface=vlan52
  add action=reject chain=forward comment=”Limit PacketFence - Registration:”
dst-address=!172.31.31.1 in-interface=vlan666
  add action=reject chain=forward comment=”Limit PacketFence - Isolation:” dst-
address=!172.31.31.129 in-interface=vlan667
PS: Use 'src-address' to originate requests from an IP other than the one
associated with the interface that routes towards PacketFence.
    172.31.31.1 is PacketFence’s routed registration network IP and
172.31.31.129 is the routed Isolation IP.
```

PacketFence switch configuration:

```
/usr/local/pf/conf/switches.conf
  [default]
  guestVlan=52
  registrationVlan=666
  isolationVlan=667
  always_trigger=1
  _
  [group MikroTik]
  description=Default MikroTik Settings
  deauthMethod=RADIUS
  type=Mikrotik
  uplink_dynamic=0
  useCoA=N
  _
  [100.127.255.10]
  description=ACME - Home Office - Bar
  group=MikroTik
  radiusSecret=useStrongerSecret
```

6.20.1. Wired 802.1X with MAB (MAC authentication bypass)

MikroTik calls this dot1x and is documented in more detail here: https://help.mikrotik.com/docs/display/ROS/Dot1X

The configuration requires a VLAN filtering bridge with Spanning Tree Protocol enabled. New bridges by default have RSTP (Rapid Spanning Tree Protocol) enabled, so you can follow similar steps as above for wireless 802.1X.

Set the PacketFence RADIUS server to be used for dot1x:

```
/radius
  add address=172.16.5.17 comment=packetfence: secret=useStrongerSecret
service=dot1x src-address=172.16.20.1 timeout=1s
```

Add the ethernet ports to the bridge:

```
/interface bridge port
  add bridge=bridge interface=ether2
  add bridge=bridge interface=ether3
  add bridge=bridge interface=ether4
  add bridge=bridge interface=ether5
PS: We use ether1 as our uplink, so we exclude it from the bridge.
```

Lastly we enable 802.1X for those interfaces, with MAB fallback:

```
/interface dot1x server
  add auth-types=dot1x,mac-auth interface=ether2 interim-update=15m
  add auth-types=dot1x,mac-auth interface=ether3 interim-update=15m
  add auth-types=dot1x,mac-auth interface=ether4 interim-update=15m
  add auth-types=dot1x,mac-auth interface=ether5 interim-update=15m
```

6.20.2. Open SSID

In this setup we use the interface ether5 for the bridge (Trunk interface) and ether1 as the management interface.

Configure your access point with the following configuration:

```
/interface wireless
# managed by CAPsMAN
# channel: 5180/20-Ce/an(17dBm), SSID: OPEN, local forwarding
set [ find default-name=wlan1 ] band=5ghz-a/n channel-width=20/40mhz-Ce
disabled=no l2mtu=1600 mode=ap-bridge ssid=MikroTik-05A64D
/interface ethernet
set [ find default-name=ether1 ] name=ether1-gateway
set [ find default-name=ether2 ] name=ether2-master-local
set [ find default-name=ether3 ] master-port=ether2-master-local name=ether3-
slave-local
set [ find default-name=ether4 ] master-port=ether2-master-local name=ether4-
slave-local
set [ find default-name=ether5 ] name=ether5-master-local
/interface vlan
add interface=BR-CAPS l2mtu=1594 name=default vlan-id=1
add interface=BR-CAPS l2mtu=1594 name=isolation vlan-id=3
add interface=BR-CAPS l2mtu=1594 name=registration vlan-id=2
/caps-man datapath
add bridge=BR-CAPS client-to-client-forwarding=yes local-forwarding=yes
name=datapath1
/caps-man interface
#
add arp=enabled configuration.mode=ap configuration.ssid=OPEN
datapath=datapath1 disabled=no l2mtu=1600 mac-address=\
    D4:CA:6D:05:A6:4D master-interface=none mtu=1500 name=cap1 radio-
mac=D4:CA:6D:05:A6:4D
/caps-man aaa
set interim-update=5m
/caps-man access-list
add action=query-radius interface=cap1 radius-accounting=yes signal-range=-
120..120 time=0s-1d,sun,mon,tue,wed,thu,fri,sat
/caps-man manager
set enabled=yes
/interface bridge port
```

```
add bridge=bridge-local interface=ether2-master-local
add bridge=bridge-local interface=ether1-gateway
add bridge=BR-CAPS interface=ether5-master-local
/interface wireless cap
set bridge=BR-CAPS discovery-interfaces=BR-CAPS enabled=yes interfaces=wlan1
/ip accounting
set enabled=yes
/radius
add address=192.168.1.5 secret=useStrongerSecret service=wireless
/radius incoming
set accept=yes
```

6.20.3. Webauth

You can use webauth (external captive portal) on Mikrotik APs. In order to do so, you will have to activate the hotspot feature in the AP configuration as well as modify the redirection template so that it points to PacketFence.

First, you must establish an FTP connection to your access point and replace the content of `hotspot/login.html` with the following:

```
<html>
<head><title>...</title></head>
<body>
$(if chap-id)
<noscript>
<center><b>JavaScript required. Enable JavaScript to continue.</b></center>
</noscript>
$(endif)
<center>If you are not redirected in a few seconds, click 'continue' below<br>
<form name="redirect" action="http://192.168.1.5/Mikrotik" method="get">
  <input type="hidden" name="mac" value="$(mac)">
  <input type="hidden" name="ip" value="$(ip)">
  <input type="hidden" name="username" value="$(username)">
  <input type="hidden" name="link-login" value="$(link-login)">
  <input type="hidden" name="link-orig" value="$(link-orig)">
  <input type="hidden" name="error" value="$(error)">
  <input type="hidden" name="chap-id" value="$(chap-id)">
  <input type="hidden" name="chap-challenge" value="$(chap-challenge)">
  <input type="hidden" name="link-login-only" value="$(link-login-only)">
  <input type="hidden" name="link-orig-esc" value="$(link-orig-esc)">
  <input type="hidden" name="mac-esc" value="$(mac-esc)">
  <input type="hidden" name="ap-id" value="AP_IP_ADDRESS_HERE">
  <input type="submit" value="continue">
</form>
<script language="JavaScript">
<!--
   document.redirect.submit();
```

```
//-->
</script></center>
</body>
</html>
```

Next, in the `login.html` you have just uploaded, make sure you change `AP_IP_ADDRESS_HERE` by the management IP address of your access point and `192.168.1.5` by the IP address of your PacketFence captive portal.

Now, you must configure the hotspot feature on your AP. This configuration is done on top of an existing SSID you have previously configured which is on interface `wlan1`. Adjust the interface name if needed.

```
/ip hotspot
setup
```

```
hotspot interface: wlan1
```

```
local address of network: 10.5.50.1/24
masquerade network: yes
```

Set pool for HotSpot addresses

```
address pool of network: 10.5.50.2-10.5.50.254
```

Select hotspot SSL certificate

```
select certificate: none
```

Select SMTP server

```
ip address of smtp server: 0.0.0.0
```

Setup DNS configuration

```
dns servers: 8.8.8.8
```

DNS name of local hotspot server

```
dns name: myhotspot
```

Create local hotspot user

```
name of local hotspot user: admin
password for the user:
```

Next, you need to allow access to the PacketFence portal in the hotspot access list. Change `192.168.1.5` with the IP address you pointed to in `login.html`

```
/ip hotspot walled-garden
add dst-host=192.168.1.5
add src-address=192.168.1.5
```

```
/ip hotspot walled-garden ip
add action=accept disabled=no dst-host=192.168.1.5
add action=accept disabled=no src-address=192.168.1.5
```

Now, you will also need to configure the hotspot to point to your PacketFence RADIUS server:

```
/radius
add address=192.168.1.5 secret=useStrongerSecret service=hotspot
```

```
/ip hotspot profile
add hotspot-address=10.5.50.1 name=hsprof1 use-radius=yes
```

Next, you need to configure PacketFence to use webauth for this Access Point using the following `switches.conf` configuration. Change `AP_IP_ADDRESS_HERE` by the IP address you've put in login.html.

```
[AP_IP_ADDRESS_HERE]
VlanMap=Y
RoleMap=N
mode=production
ExternalPortalEnforcement=Y
type=Mikrotik
radiusSecret=useStrongerSecret
registrationVlan=-1
```

6.21. HP

6.21.1. ProCurve Controller MSM710

```
To be contributed...
```

6.22. Meru

6.22.1. Meru Controllers (MC)

In this section, we cover the basic configuration of the Meru wireless controller for PacketFence via the web GUI.

Disable PMK Caching

If you are running a WPA2 SSID, you may need to disable PMK caching in order to avoid deauthentication issues. This is true if you are running AP 300s using any 5.0 versions including 5.0-87, or any versions below 4.0-160.

Here are the commands to run to disable the PMK caching at the AP level. First, login the AP, and run this command to see which radios are broadcasting your SSID. vap display

Second, disable the PMK caching on those radios. radio pmkid radio00 disable

You can also add those commands to the AP bootscript. Contact your Meru support representative for that part.

VLAN Definition

Here, we create our PacketFence VLANs for client use. Go to *Configuration → Wired → VLAN*, and select Add.

- VLAN Name is the human readable name (ie. RegistrationVLAN)
- Tag is the VLAN ID
- Fast Ethernet Interface Index refers to the controller's ethernet interface
- IP Address – An IP address for this controller on this VLAN
- Netmask – Network mask for this VLAN
- IP Address of the default gateway – Wired IP router for this VLAN
- Set the Override Default DHCP server flag to off
- Leave the DHCP server IP address and the DHCP relay Pass-Through to default

Click **OK** to add the VLAN.

AAA Authentication Server

Here, we create our PacketFence RADIUS server for use. Under *Configuration → Security → Radius*, select **Add**.

- Give the RADIUS Profile a name
- Write a description of the profile

- Give the RADIUS IP, RADIUS Secret and the RADIUS authentication port
- Select Colon for the MAC address delimiter
- Select MAC Address as the password type

Click **OK** to add the RADIUS profile.

AAA Accounting Server

Here, we create our PacketFence RADIUS server for use. Under *Configuration* → *Security* → *Radius*, select **Add**.

- Give the RADIUS Profile a name
- Write a description of the profile
- Give the RADIUS IP, RADIUS Secret and the RADIUS accounting port
- Select Colon for the MAC address delimiter
- Select MAC Address as the password type

Click **OK** to add the RADIUS accounting profile.

AAA Profiles – Open SSID

Here, we create our wireless security profiles for use. Under *Configuration* → *Security* → *Profile*, select **Add**.

- Give the security profile a name
- Select Clear as the L2 Modes Allowed
- Leave Data Encrypt empty
- Disable the Captive Portal
- Enable the Mac Filtering

Click **OK** to save the profile.

MAC Filtering

When using the OpenSSID, you need to activate the mac filtering. Under *Configuration* → *Mac Filtering*:

- Set ACL Environment State to Permit list enabled
- Select your RADIUS profile

AAA Profiles – Secure SSID

Here, we create our wireless security profiles for use. Under *Configuration* → *Security* → *Profile*, select **Add**.

- Give the security profile a name
- Select WPA2 as the L2 Modes Allowed
- Select CCMP-AES for Data Encrypt
- Select your PacketFence RADIUS Authentication Profile

- Disable the Captive Portal
- Enable the 802.1X network initiation
- Leave the Mac Filtering to off

Click **OK** to save the profile.

WLAN SSIDs

Here, we create our SSID and tie it to a security profile. Under *Configuration → Wireless → ESS*, select **Add**.

- Give the ESS profile a name, and enable it
- Write an SSID name
- Select your security profile name previously created
- Select your PacketFence RADIUS Accounting Profile (if you want to do accounting)
- Enable the SSID Broadcast
- Make the new AP to join the ESS
- Set the tunnel interface type to RADIUS and Configured VLAN
- Select the registration VLAN for the VLAN Name

Click **OK** to create the SSID. Repeat those steps for the open and secure SSID by choosing the right security profile.

WLAN SSIDs – Adding to access point

Here, we tie our SSIDs to access points. Under *Configuration → Wireless → ESS*, select the SSID you want to add to your aps. Then, select the **ESS-AP Table**, and click **Add**.

- Select the AP ID from the drop down list
- Click **OK** to associate the SSID with this AP

Roles (Per-User Firewall)

Since PacketFence 3.3.0, we now support roles (per-user firewall rules) for the Meru hardware. To add firewall rules, go in *Configuration → QoS System Settings → QoS and Firewall Rules*. When you add a rule, you have to pay attention to two things:

- The rule is applied to the controller physical interface right away, so make sure you are not too wide on your ACL to lock you out!
- The rules are grouped using the Firewall Filter ID (We will use this ID for the roles)

So, since the matching is done using the Firewall Filter ID configuration field, your roles line in switches.conf would look like :

```
roles=Guests=1;Staff=2
```

NOTE You need to have the **Per-User Firewall** license in order to benefit this feature.

6.23. Mojo Networks

PacketFence supports SSIDs configured with 802.1X and Web Authentication

6.23.1. Create the RADIUS Profile

First, create a RADIUS Profile for PacketFence.

- Login to the https://dashboard.mojonetworks.com
- Go to **Wireless Manager**
- Then click on *Configuration* → *Device Configuration* → *RADIUS Profiles* → *Add a RADIUS Profile*

```
Profile Name: NAME_OF_PROFILE_FOR_PACKETFENCE
IP Address: IP_OF_PACKETFENCE
Authentication Port: 1812
Accounting Port: 1813
Shared Secret: useStrongerSecret
```

Click on 'Save'.

6.23.2. Configure the SSID:

802.1X Secure

- Login to the https://dashboard.mojonetworks.com
- Go to **Wireless Manager**
- Then click on *Configuration* → *Device Configuration* → *SSID Profiles* → *Add a new Profile* → *WLAN*

NOTE (Leave the default configuration for the other settings)

```
Profile Name: PF-Secure-802.1X
SSID: PF-Secure
Security: WPA2; 802.1X
NAS ID: %m-%s
Dynamic VLANs: Enable VLAN Pool 1,2,4,5 (All VLANs that you will use)
Called-Station-ID: %m-%s
COA: Checked
```

```
RADIUS Authentication
 Primary Authentication Server: PacketFence RADIUS profile created above.
```

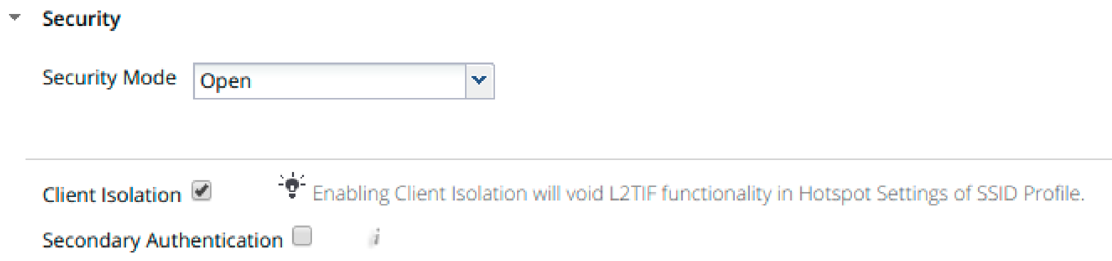
```
RADIUS Accounting Server Details
 Primary Accounting Server: PacketFence RADIUS profile created above.
```

Click the 'Save' button to save the PF-Secure SSID configuration.

Web Authentication

To enable the external captive portal, go to the **SSID Profiles** page in **Device Configuration**. Add a new Wi-Fi profile with the following attributes:

```
Profile Name: Name of the new profile
SSID: Name of your SSID
Security: Open
```



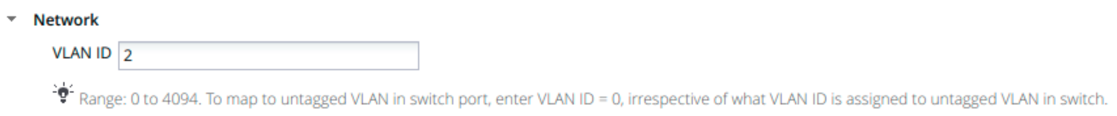
▾ Security

Security Mode: Open

Client Isolation ☑ Enabling Client Isolation will void L2TIF functionality in Hotspot Settings of SSID Profile.

Secondary Authentication □

```
Network: VLAN ID for clients
```

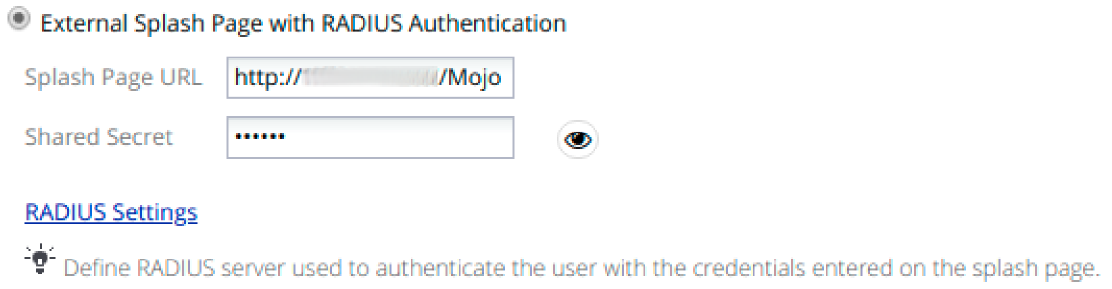


▾ Network

VLAN ID: 2

Range: 0 to 4094. To map to untagged VLAN in switch port, enter VLAN ID = 0, irrespective of what VLAN ID is assigned to untagged VLAN in switch.

```
Captive Portal: select and fill in External Splash Page with RADIUS
Authentication with “http://IP_OR_HOSTNAME_OF_PACKETFENCE/Mojo” and the RADIUS
shared secret. Click on *RADIUS Settings* to select PacketFence as
authentication and accounting server.
```



● External Splash Page with RADIUS Authentication

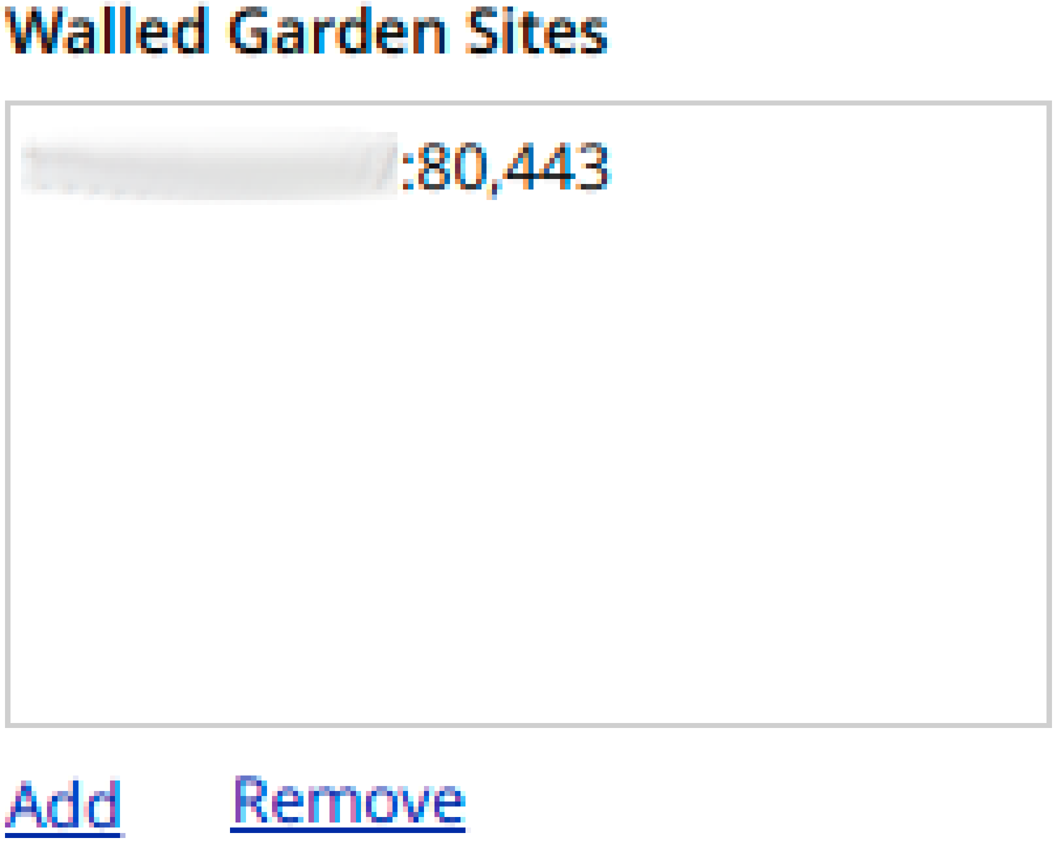
Splash Page URL: http://[redacted]/Mojo

Shared Secret: ••••••

RADIUS Settings

Define RADIUS server used to authenticate the user with the credentials entered on the splash page.

```
On the right, add the IP address or hostname of PacketFence to the Walled
Garden Sites.
```



Walled Garden Sites

[redacted]:80,443

Save the newly created profile.

6.23.3. Broadcast the SSID on the Access Point:

- Go to *Configuration* → *Device Template* → *System Template*
- Then *Radio Settings* → *Define settings for model* → *Chose your AP model*
- Finally *Radio 1 - 2x2 b/g/n Configuration* → *Add SSID Profile* → *Select your SSID profile previously created(802.1X or Web authentication profile)* → *Ok*

Click the 'Save' button to broadcast the PF-Secure SSID.

6.23.4. Configure the Mojo Networks AP in PacketFence:

802.1X

Add a Switch with the IP address of the Access Point (AP) with the following configuration:

- Go to *Configuration* → *Network* → *Switches* → *Add switch to group* → *Default*

```
Definition:
 IP Address/MAC Address/Range (CIDR): Local IP of the AP
 Description: Mojo Networks Access Point
 Type: Mojo Networks AP
 Mode: Production
 Switch Group: None
 Deauthentication Method: RADIUS
 Use CoA: Checked
```

```
Roles:
 Role by VLAN ID: Checked
 registration: 2
 isolation: 3
 guest: 5
 default: 1
```

```
NOTE: Role by VLAN ID remain the only category checked.
```

```
Radius:
 Secret Passphrase: useStrongerSecret
```

Web Authentication

Add a switch with the IP address fo the Access Point (AP) with the following configuration:

- Go to *Configuration* → *Network* → *Switches* → *Add switch to group* → *Default*

```
Definition:
 IP Address/MAC Address/Range (CIDR): Local IP of the AP
 Description: Mojo Networks Access Point
 Type: Mojo Networks AP
 Mode: Production
 Switch Group: None
 Deauthentication Method: RADIUS
 Use CoA: Checked
```

```
Roles:
 Uncheck Role by VLAN ID
```

```
Radius:
 Secret Passphrase: useStrongerSecret
```

Click the 'Save' button to save the AP configuration.

IMPORTANT

Clone the newly created switch and enter **192.0.2.254** or the MAC address of the AP.

6.24. Motorola

In order to have the Motorola RFS controller working with PacketFence, you need to define two Wireless LANs definition, one for the "public" network, and one for the "secure" network.

6.24.1. WiNG (Firmware >= 5.0)

AAA Policy (RADIUS server)

First, we need to build the AAA Policy. Under *Configuration → Wireless → AAA Policy*, click on the **Add** button at the bottom right. Configure the RADIUS profile like the following:

- Host: Choose IP Address in the drop down, and put the RADIUS server (PF) IP
- Insert a RADIUS secret passphrase
- Select "Through Wireless Controller" Request Mode

CAUTION — Since we are using RADIUS Dynamic Authorization, we need to enable the RADIUS accounting. Under the RADIUS accounting tab, click the Add button at the bottom right, and insert the proper values.

Open SSID

Under *Configuration → Wireless → Wireless LANs*, click on the **Add** button at the bottom right. Under Basic Configuration:

- Profile Name : Give a convenient name
- SSID: This is the ESSID name
- Ensure that the WLAN Status is set to enable
- Select Single VLAN as VLAN assignment technique
- Ensure that "Allow RADIUS Override" is selected

Security configuration:

- Select MAC as authentication type
- Select your AAA Policy previously created
- Ensure that you selected Open as the Encryption

Accounting configuration:

- Make sure you select "Enable RADIUS Accounting"
- Select the previously configured AAA Policy

Advanced configuration:

- Make sure you select RADIUS Dynamic Authorization

Secure SSID

Under *Configuration → Wireless → Wireless LANs*, click on the **Add** button at the bottom right. Under Basic Configuration:

- Profile Name : Give a convenient name
- SSID: This is the ESSID name
- Ensure that the WLAN Status is set to enable
- Select Single VLAN as VLAN assignment technique
- Ensure that "Allow RADIUS Override" is selected

Security configuration:

- Select EAP as authentication type
- Select your AAA Policy previously created
- Ensure that you selected WPA/WPA2-TKIP as the Encryption
- Unselect everything under Fast Roaming (Disable caching)

Accounting configuration:

- Make sure you select "Enable RADIUS Accounting"
- Select the previously configured AAA Policy

Advanced configuration:

- Make sure you select RADIUS Dynamic Authorization

Profile (WLAN Mapping)

You have multiple options here. Either, you create a general AP profile, and you assign it to your Aps, or you modify the AP device configuration to map the WLAN to the radio interfaces. For the purpose of this document, we will modify the general profile. Under *Profiles → default-apXXX* (where XXX is your AP model), in *Interface → Radios*, edit the existing radios settings. Go to the **WLAN Mapping** tab, select the two SSIDs and click on the **<<** button.

Profile (Management)

Here, we can configure our SNMP community strings. Located in *Configuration → Management → Management Policy*. Again, you can modify the default one, or you can create a brand new Policy.

VLANs

You need to ensure that the uplink interface of the controller is configured as a trunk, and that all the necessary VLANs are created on the device. This is configured under *Device → rfsXXXX-MAC* (where XXXX is your controller series, and MAC is the latest 3 octets of its mac address). Edit the device configuration, and go to *Interface → Ethernet Ports*. Ensure that the up1 interface is set as trunk, with all the allowed VLANs. Next, create the VLAN under *Interface → Virtual Interfaces*.

Roles (Per-User Firewall)

Since PacketFence 3.3.0, we now support roles for the Motorola hardware using WiNGS 5.x. To add roles, go in *Configuration → Security → Wireless Client Roles*. First create a global policy that will contain your roles. Next, create your Roles by clicking on the **Add** button on the bottom right. It is important to configure the Group Configuration line properly by setting the string name that we will use in the RADIUS packet. For example, for a Guests Role, you can put **Group Configuration Exact Guests**, and for a Staff Roles, you can put **Group Configuration Exact Staff**. In the roles configuration in switches.conf, you would have something like :

```
roles=CategoryGuests=Guests;CategoryStaff=Staff
```

Finally, don’t forget to configure the appropriate firewall rules for your Roles! Make sure also to commit the configuration upon your changes.

NOTE — You need to have an **Advanced Security** license to enable the Per-User Firewall feature.

WIPS

In order to enable the WIPS functionality on the Motorola, you need to follow this procedure. The steps have been done using the CLI.

First, Create a wips-policy:

```
wips-policy Rogue-AP
history-throttle-duration 86400
event ap-anomaly airjack
event ap-anomaly null-probe-response
event ap-anomaly asleap
event ap-anomaly ad-hoc-violation
event ap-anomaly ap-ssid-broadcast-in-beacon
event ap-anomaly impersonation-attack
ap-detection
```

Next, create an event policy:

```
event-system-policy PF-WIDS
event wips wips-event syslog off snmp on forward-to-switch off email off
```

Next, create or adjust your management policy to configure the SNMP traps. Here is an example policy, please note the two last lines:

```
management-policy default
no http server
https server
ssh
user admin password 1
e4c93663e3356787d451312eeb8d4704ef09f2331a20133764c3dc3121f13a5b role superuser
access all
user operator password 1
7c9b1fbb2ed7d5bb50dba0b563eac722b0676b45fed726d3e4e563b0c87d236d role monitor
access all
no snmp-server manager v3
snmp-server community public ro
snmp-server community private rw
```

```
snmp-server user snmpoperator v3 encrypted des auth md5 0 operator
snmp-server user snmptrap v3 encrypted des auth md5 0 motorola
snmp-server user snmpmanager v3 encrypted des auth md5 0 motorola
snmp-server enable traps
snmp-server host 10.0.0.100 v2c 162
```

You then need to tell your controller to use the event policy:

```
rfs6000 5C-0E-8B-17-F2-E3
...
use event-system-policy PF-WIDS
```

Finally, you need to configure a radio interface on your AP to act as a sensor. Here is an example configuration for a dual-radio AP650:

```
ap650 00-23-68-86-EB-BC
use profile default-ap650
use rf-domain default
hostname ap650-86EBBC
country-code ca
use wips-policy Rogue-AP
interface radio1
rf-mode sensor
channel smart
power smart
data-rates default
no preamble-short
radio-share-mode off
interface radio2
...
```

6.24.2. Older Firmwares (< 5.0)

Option for Public Wireless LAN

- Check the Dynamic Assignment check-box
- Select "MAC Authentication" under Authentication
- Click "Config..." choose the Colon delimiter format
- Un-check all encryption options
- Under RADIUS put in PacketFence’s RADIUS Server information

Option for Secure Wireless LAN

- Check the Dynamic Assignment check-box
- Select "802.1X EAP" under Authentication
- Check WPA/WPA2-TKIP encryption option

- Under RADIUS put in PacketFence’s RADIUS Server information

SNMP Global configuration

Add the two Read-Only and Read-Write users under *Management Access* → *SNMP Access*.

6.25. Ruckus

AAA Servers

We need to define the RADIUS and RADIUS accounting (mandatory):

Under *Configuration* → *AAA Servers*, click on the **Create New** button. Enter the proper configuration:

- Enter a server name
- Select either RADIUS or RADIUS accounting as the type
- Use PAP as the Auth Method
- Enter the IP address, and shared secret.
- Hit OK

Repeat the steps for the RADIUS and RADIUS accounting types. We need 1 definition for each otherwise RADIUS dynamic authorization won’t work.

WLAN Definitions

Under *Configuration* → *WLAN*, click on the **Create New** button. Enter the proper configuration:

Open SSID

- Enter a Name/SSID
- Select **Standard Usage** as the Type
- Select **MAC Address** as the authentication type
- Select **Open** as the encryption method
- Select the proper RADIUS server as the authentication server
- Select the proper RADIUS server as the accounting server

NOTE

The Open SSID does **NOT** support dynamic VLAN assignments on older versions of ZoneDirector (Firmware 9.3.0.0.83) but newer versions (Firmware 9.10.0.0.218 or newer) do support it.

Secure SSID

- Enter a Name/SSID
- Select **Standard Usage** as the Type
- Select **WPA2** as the authentication type
- Select **AES** as the encryption method
- Select the proper RADIUS server as the authentication server
- Select the proper RADIUS server as the accounting server

- Check the **Enable Dynamic VLAN** checkbox

WIPS

To enable the WIPS feature of the Ruckus in order to send SNMP traps to PacketFence, the setup is fairly simple.

First, configure the controller to send the traps to PacketFence. Under *Configure* → *System* → *Network Management* → *SNMP Trap*:

*Select "Enable SNMP Trap" *Put the PacketFence Management IP in the Trap Server IP field

NOTE The traps will arrive with the "public" community string

Next, you need to configure the Alarm Settings. Under *Configure* → *Alarm Settings*, make sure the following are selected:

*Rogue AP Detected *SSID-Spoofing AP Detected *MAC-Spoofing AP Detected *LAN Rogue AP Detected

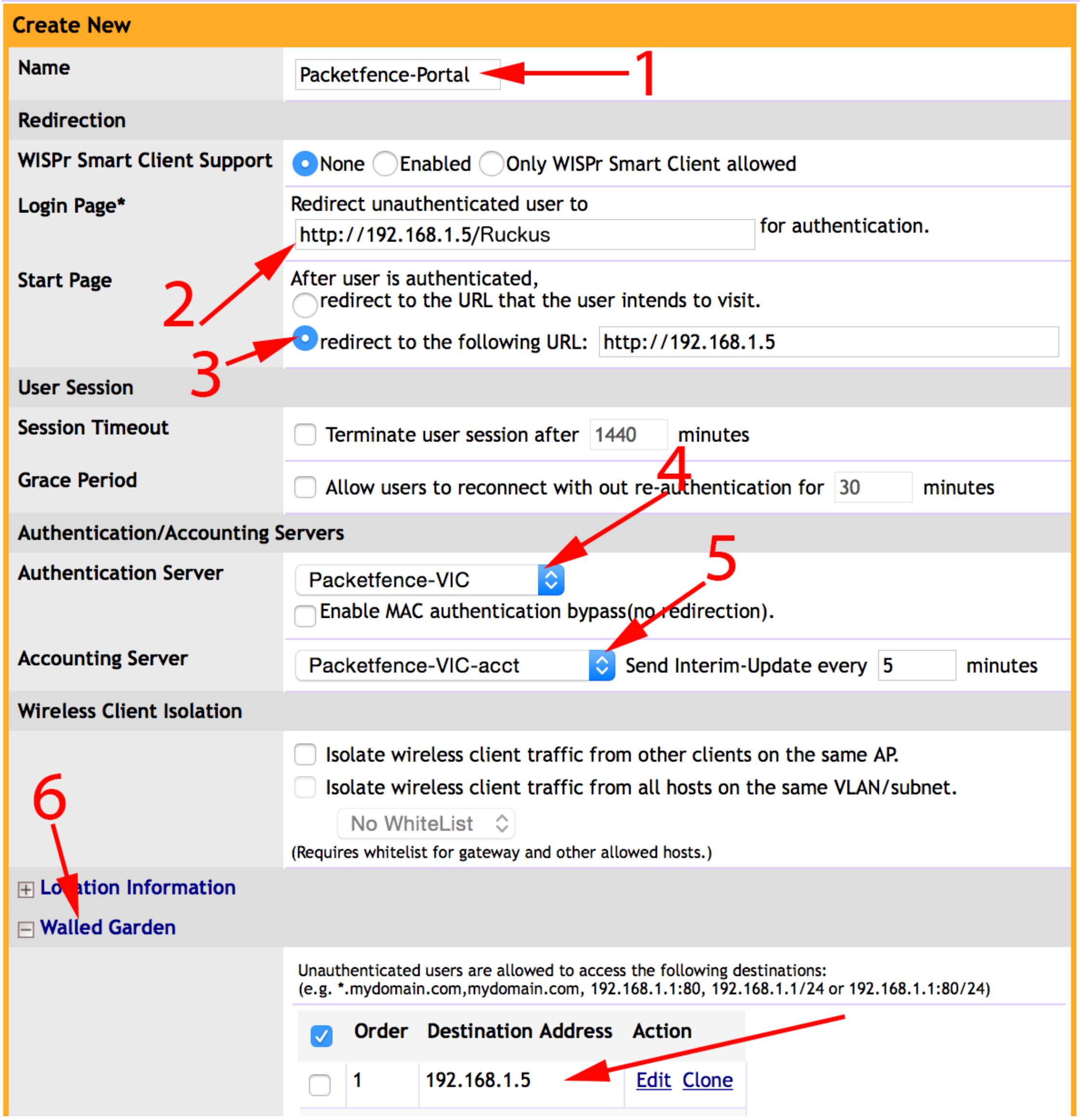
Finally, enable the WIPS feature on the controller. Under *Configure* → *WIPS* → *Intrusion Detection and Prevention*, make sure both box are selected, click Apply.

6.25.1. Web Authentication

In order to use PacketFence as an external captive portal for web authentication, you will need to configure first your RADIUS authentication and accounting server (see steps above).

Hotspot configuration

Configure the Hotspot service profile to redirect devices to your PacketFence portal. Go on the ZoneDirector administration web page to the section *Configure→Hotspot Services→Create New*



Create New

Name: Packetfence-Portal

Redirection

WISPr Smart Client Support: ● None ○ Enabled ○ Only WISPr Smart Client allowed

Login Page*: Redirect unauthenticated user to http://192.168.1.5/Ruckus for authentication.

Start Page: After user is authenticated,
○ redirect to the URL that the user intends to visit.
● redirect to the following URL: http://192.168.1.5

User Session

Session Timeout: □ Terminate user session after 1440 minutes

Grace Period: □ Allow users to reconnect with out re-authentication for 30 minutes

Authentication/Accounting Servers

Authentication Server: Packetfence-VIC
□ Enable MAC authentication bypass(no redirection).

Accounting Server: Packetfence-VIC-acct Send Interim-Update every 5 minutes

Wireless Client Isolation

□ Isolate wireless client traffic from other clients on the same AP.
□ Isolate wireless client traffic from all hosts on the same VLAN/subnet.
No WhiteList
(Requires whitelist for gateway and other allowed hosts.)

⊞ Location Information

⊟ Walled Garden

Unauthenticated users are allowed to access the following destinations:
(e.g. *.mydomain.com,mydomain.com, 192.168.1.1:80, 192.168.1.1/24 or 192.168.1.1:80/24)

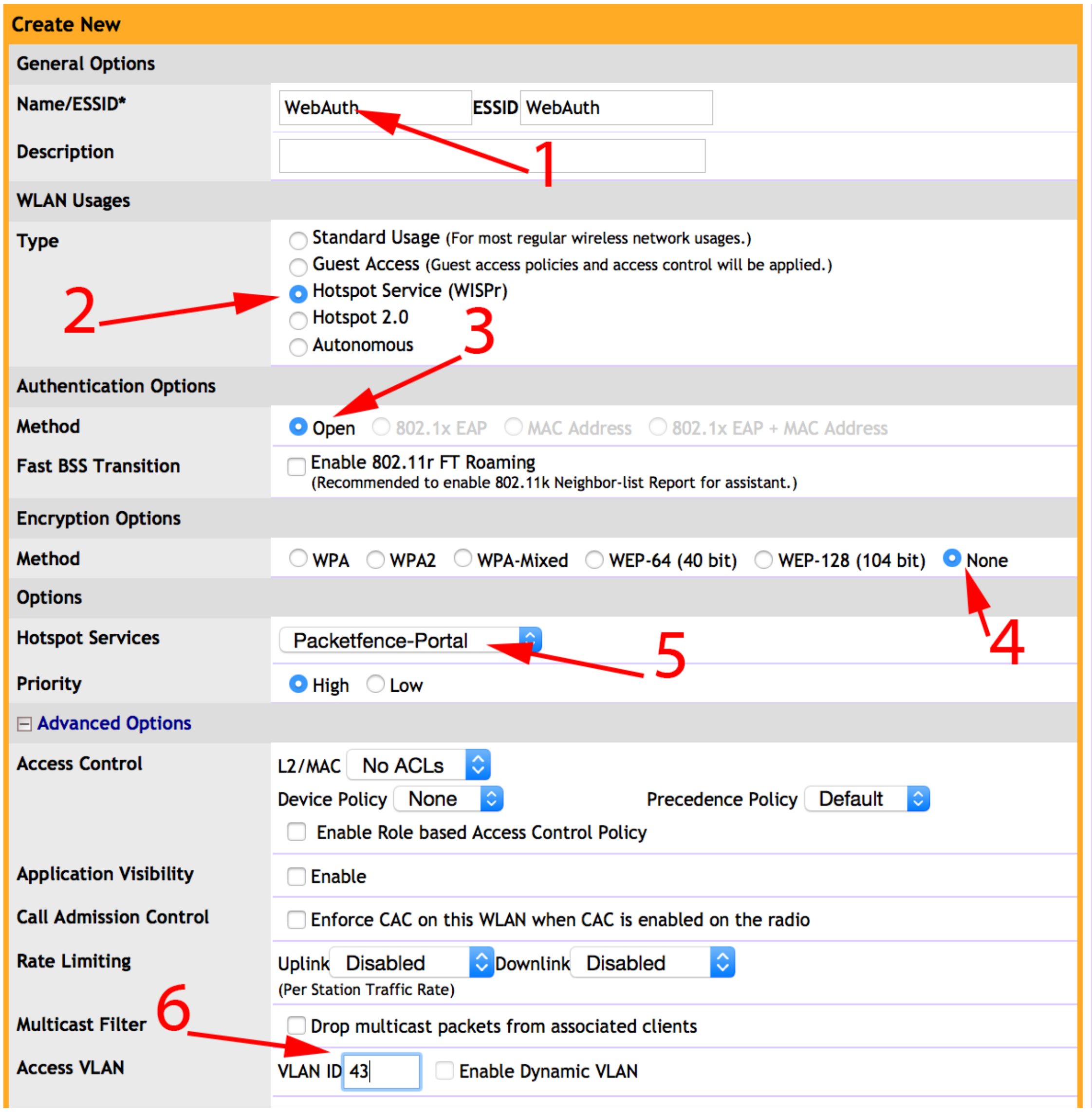
☑	Order	Destination Address	Action
□	1	192.168.1.5	Edit Clone

```
1 - Name of your Hotspot service
2 - Login Page: Url of PacketFence portal interface (http://192.168.1.5/Ruckus)
3 - Start Page: redirect to the following URL: http://192.168.1.5
4 - Authentication Server: Select the PacketFence authentication RADIUS server
(default port 1812)
5 - Accounting Server: Select the PacketFence accounting RADIUS server (default
1813)
6 - Click on the Walled Garden and authorize the IP of PacketFence management
interface
```

Save your configuration.

WLAN configuration

Go to *Configure* → *WLANs* → *WLANs* → *Create New*



Create New

General Options	
Name/ESSID*	WebAuth **ESSID** WebAuth
Description	
WLAN Usages	
Type	○ Standard Usage (For most regular wireless network usages.) ○ Guest Access (Guest access policies and access control will be applied.) ● Hotspot Service (WISPr) ○ Hotspot 2.0 ○ Autonomous
Authentication Options	
Method	● Open ○ 802.1x EAP ○ MAC Address ○ 802.1x EAP + MAC Address
Fast BSS Transition	□ Enable 802.11r FT Roaming (Recommended to enable 802.11k Neighbor-list Report for assistant.)
Encryption Options	
Method	○ WPA ○ WPA2 ○ WPA-Mixed ○ WEP-64 (40 bit) ○ WEP-128 (104 bit) ● None
Options	
Hotspot Services	Packetfence-Portal
Priority	● High ○ Low
⊟ **Advanced Options**	
Access Control	L2/MAC No ACLs Device Policy None Precedence Policy Default □ Enable Role based Access Control Policy
Application Visibility	□ Enable
Call Admission Control	□ Enforce CAC on this WLAN when CAC is enabled on the radio
Rate Limiting	Uplink Disabled Downlink Disabled (Per Station Traffic Rate)
Multicast Filter	□ Drop multicast packets from associated clients
Access VLAN	VLAN ID 43 □ Enable Dynamic VLAN

```
1 - Name of your SSID
2 - Type: Hotspot Service (WISPr)
3 - Authentication Method: Open
4 - Encryption Method: None
5 - Hotspot Services: Your hotspot service name that you configured
6 - Access VLAN: The VLAN ID that should be assigned to devices after
authentication
```

Save your configuration.

PacketFence configuration

On the ZoneDirector configuration in PacketFence, you will need to specify -1 as the registration VLAN in order to display the captive portal to the end device.

You will need to deactivate the force secure redirect on the captive portal under *Configuration → Captive Portal → Secure redirect → Unchecked*

The captive portal needs to listen on the management interface, so you will need to add the portal daemon to the management interface under *Configuration → Interfaces → Management Interface*

Example:

```
[interface eth0]
ip=192.168.1.5
type=management,portal
mask=255.255.255.0
```

To apply the configuration, restart PacketFence using the following command: `service packetfence restart`

6.25.2. Ruckus Roles

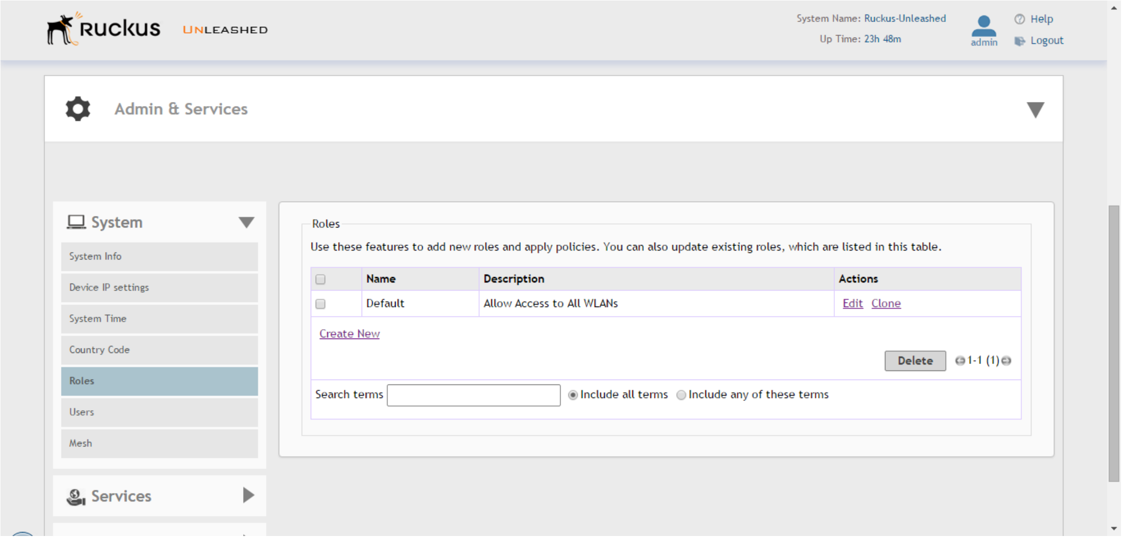
Roles Configuration

Ruckus allows you to define roles. These roles link all users to the internal WLAN and permit access to all WLAN by default. You can still limit access to certain WLAN. Additionally, these roles can be used to apply per-user rate-limits and ACLs in newer versions of the Zone Director firmware, specifying also advanced options like Application Recognition Policies, URL filtering profiles, Etc.

To create a new user Role:

```
1 - Go to _Admin & Services -> System -> Roles_. The Roles page appears,
displaying a Default role in the Roles table.
2 - Click Create New.
3 - Enter a Name and a short Description for this role.
4 - Choose the options for this role from the following:
   Group Attributes: Fill in this field only if you are creating a user role
based on Group attributes extracted from an Active Directory server. Enter the
User Group name here. Active Directory/LDAP users with the same group
attributes are automatically mapped to this user role.
   Allow All WLANs: You have two options: (1) Allow Access to all WLANs, or (2)
Specify WLAN Access. If you select the second option, you must specify the
WLANs by clicking the check box next to each one.
```

The images below show the steps needed for Ruckus Unleashed.



System Name: Ruckus-Unleashed
Up Time: 23h 48m

Admin & Services

System

- System Info
- Device IP settings
- System Time
- Country Code
- Roles
- Users
- Mesh

Services

Roles

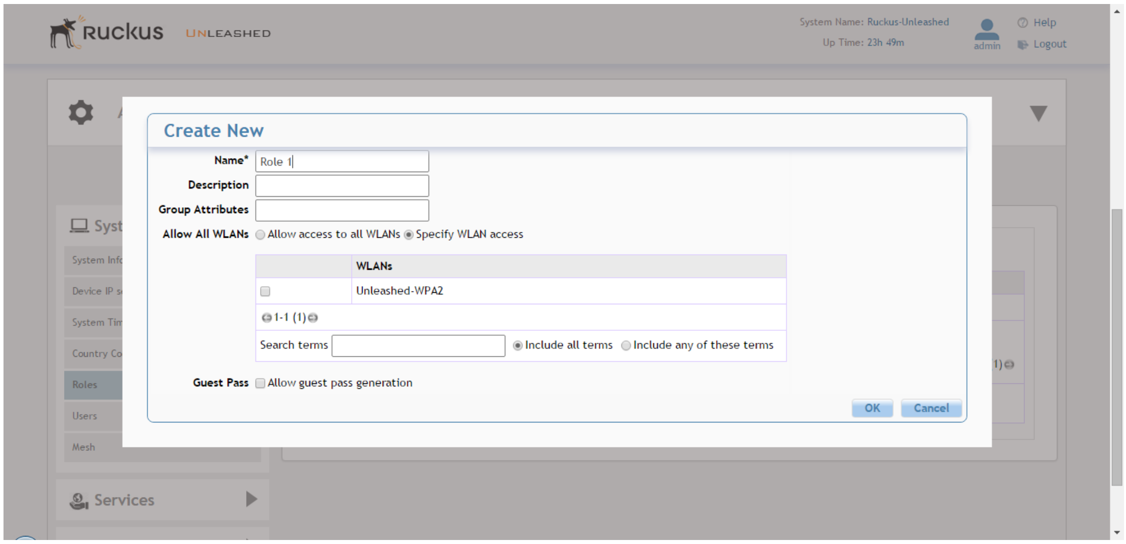
Use these features to add new roles and apply policies. You can also update existing roles, which are listed in this table.

☐	Name	Description	Actions
☐	Default	Allow Access to All WLANs	Edit Clone

Create New

Delete 1-1 (1)

Search terms ● Include all terms ○ Include any of these terms



System Name: Ruckus-Unleashed
Up Time: 23h 49m

Create New

Name* Role 1

Description

Group Attributes

Allow All WLANs ○ Allow access to all WLANs ● Specify WLAN access

	WLANs
☐	Unleashed-WPA2

1-1 (1)

Search terms ● Include all terms ○ Include any of these terms

Guest Pass ☐ Allow guest pass generation

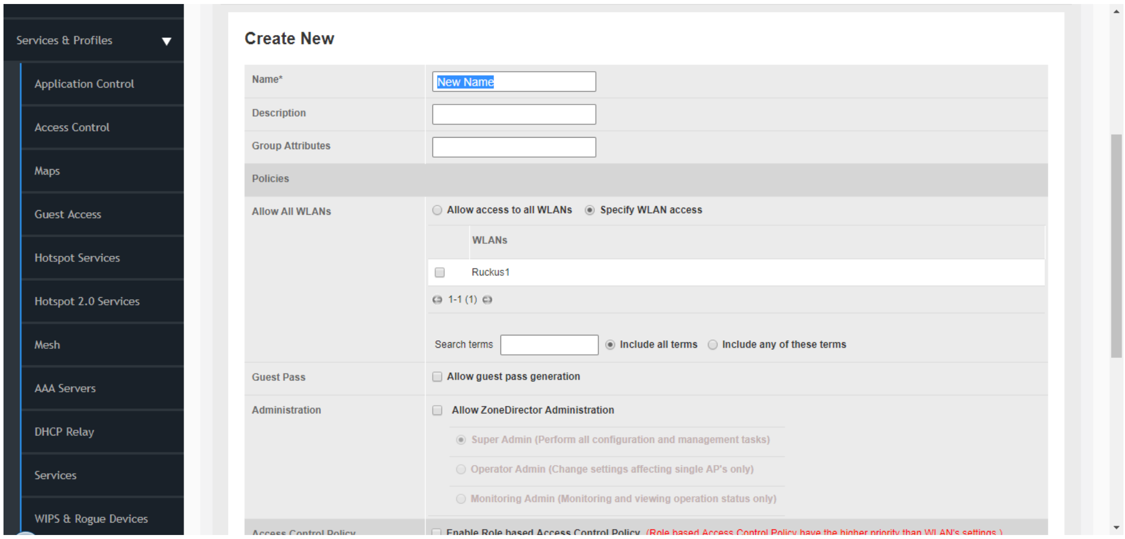
OK Cancel

If using ZoneDirector, then the steps are very similar as shown below:

To create a new user Role:

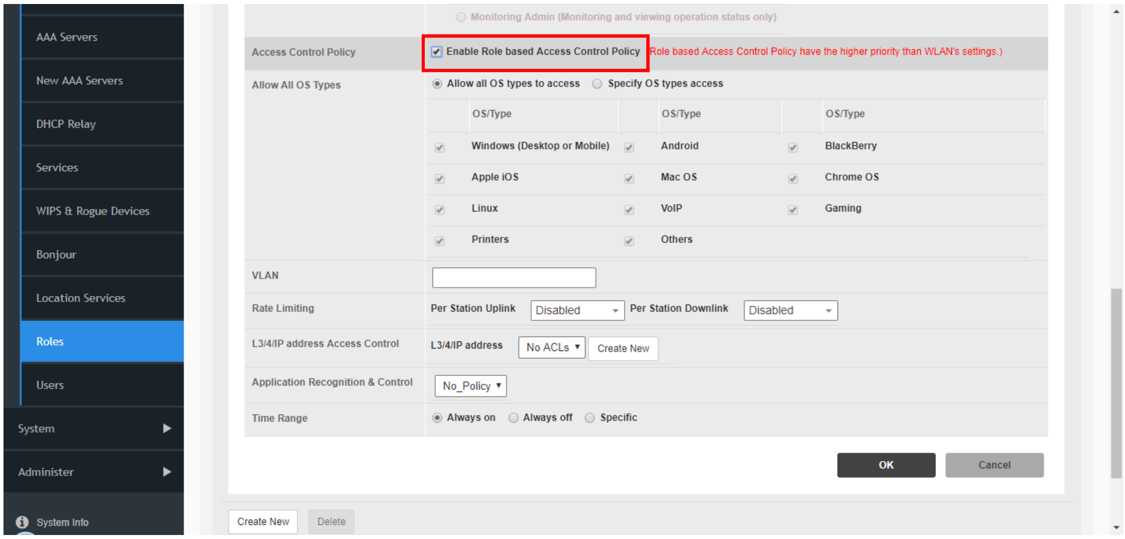
```
1 - Go to _Services & Profiles -> Roles_. The Roles and Policies page appears,
displaying a Default role in the Roles table.
2 - Click Create New.
3 - Enter a Name and a short Description for this role.
4 - Choose the options for this role from the following:
   Group Attributes: Fill in this field only if you are creating a user role
based on Group attributes extracted from an Active Directory server.
   Enter the User Group name here. Active Directory/LDAP users with the same
group attributes are automatically mapped to this user role.
   Allow All WLANs: You have two options: (1) Allow Access to all WLANs, or (2)
Specify WLAN Access. If you select the second option, you
   must specify the WLANs by clicking the check box next to each one. Don't
```

```
enable the "Guest Pass"  or "Administration" options as these
   allow users with the given Roles to get administrative access to the
ZoneDirector console.
5 - Additionally, you can enable the "Role Based Access Control Policy" option
which is the most interesting one from PacketFence's point of view,
   since this allows specific PF roles to receive specific ACLs, Different rate
limits, thus further enhancing the value of Packetfence.
6 - Looking at the RBAC Policy options one can define the following:
   OS type: Limit access based on operating system/device type.
   VLAN: Assign a VLAN ID to this role. (This can be overriden directly from
PacketFence if using the _Role by VLAN ID_ option)
   Rate Limiting: Limit per-station uplink and downlink speeds.
   L3/L4/IP address ACL: Apply a Layer 3/Layer 4/IP address ACL to this role.
   Application Recognition & Control: Apply an application policy to this role.
   Time Range: Limit the time range during which this role will be allowed to
access the WLAN.
7 - Finally, if using the RBAC feature in ZoneDirector, make sure to enable the
RBAC functionality for the WLAN created before:
   To do this, edit the WLAN, expand the Advanced Options, and enable the check
box next to Enable Role Based Access Control Policy in the Access Control
section.
```



Create New

Name*	New Name
Description	
Group Attributes	
Policies	
Allow All WLANs	○ Allow access to all WLANs ● Specify WLAN access WLANs □ Ruckus1 1-1 (1) Search terms ● Include all terms ○ Include any of these terms
Guest Pass	□ Allow guest pass generation
Administration	□ Allow ZoneDirector Administration ● Super Admin (Perform all configuration and management tasks) ○ Operator Admin (Change settings affecting single AP's only) ○ Monitoring Admin (Monitoring and viewing operation status only)
Access Control Policy	□ Enable Role based Access Control Policy (Role based Access Control Policy have the higher priority than WLAN's settings.)



○ Monitoring Admin (Monitoring and viewing operation status only)

Access Control Policy: ☑ Enable Role based Access Control Policy Role based Access Control Policy have the higher priority than WLAN's settings.)

Allow All OS Types: ● Allow all OS types to access ○ Specify OS types access

	OS/Type		OS/Type		OS/Type
☑	Windows (Desktop or Mobile)	☑	Android	☑	BlackBerry
☑	Apple iOS	☑	Mac OS	☑	Chrome OS
☑	Linux	☑	VoIP	☑	Gaming
☑	Printers	☑	Others		

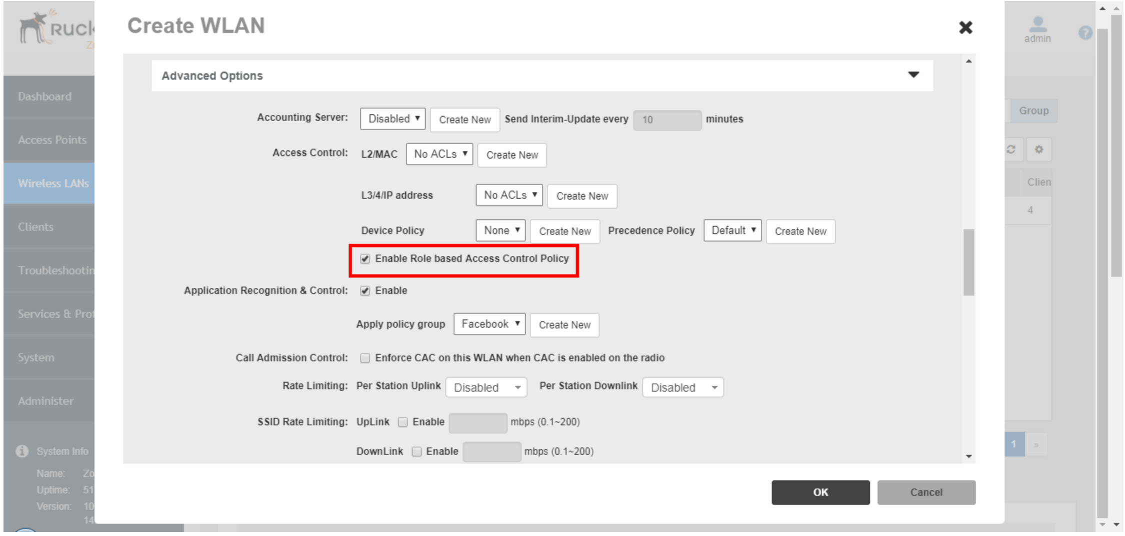
VLAN:

Rate Limiting: Per Station Uplink: Disabled Per Station Downlink: Disabled

L3/4/IP address Access Control: L3/4/IP address: No ACLs

Application Recognition & Control: No_Policy

Time Range: ● Always on ○ Always off ○ Specific



Create WLAN

Advanced Options

Accounting Server: Disabled Send Interim-Update every 10 minutes

Access Control: L2/MAC: No ACLs

L3/4/IP address: No ACLs

Device Policy: None Precedence Policy: Default

☑ Enable Role based Access Control Policy

Application Recognition & Control: ☑ Enable

Apply policy group: Facebook

Call Admission Control: ☐ Enforce CAC on this WLAN when CAC is enabled on the radio

Rate Limiting: Per Station Uplink: Disabled Per Station Downlink: Disabled

SSID Rate Limiting: UpLink ☐ Enable mbps (0.1~200)

DownLink ☐ Enable mbps (0.1~200)

PacketFence Configuration

On the PacketFence side you need to use *role by switch role* and add the same name as in the *Group Attribute* you created on the Ruckus side.

When a device connects to the SSID, PacketFence will return a VLAN identifier and a RuckusUserGroup attribute and if the role is allowed on the WLAN then the device will be authorized on the WLAN. Additionally, if RBAC is in use, the specific upstream/downstream rate limits, L2/L3 ACLS and Application Recognition Policies will be applied to the specific user, having the possibility of, for instance, giving different user Roles different access speeds. In case that the role is not allowed on the WLAN then the device will not be allowed to connect.

6.26. Ruckus SmartZone

Ruckus SmartZone is extremely flexible and allows for very different deployment scenarios, with the controller being an "on-premise" appliance managing a single tenant as well as a cloud-hosted solution where multiple tenants can share a single SmartZone instance by using its "managed partner domains" capabilities (For SmartZone-Highscale). As such, when it comes to AAA capabilities, the RADIUS connection between Ruckus and PacketFence supports two modes of operation: PROXY mode and non-PROXY mode.

In Proxy Mode, all RADIUS connections are done between SmartZone and PacketFence. In this mode, the RADIUS interface supports the use of *Disconnect* and *CoA* messages sent from PacketFence (the RADIUS server) to SmartZone (The RADIUS client). If proxy mode is used, it is highly recommended to have SmartZone deployed locally in the LAN together with PacketFence as otherwise, it might be needed to open specific ports (RADIUS COA/Disconnect ports) for PacketFence to be able to reach SmartZone if SmartZone is in a cloud scenario. Additionally, this would also mandate PacketFence to be hosted behind a static public IP, which is not always the case for certain business ISPs, as this IP would need to be configured in SmartZone as the target RADIUS IP.

In non-PROXY mode, though, the AP can send the RADIUS Access Request directly to PacketFence. This allows for SmartZone to be hosted in a public cloud. In this case, though, only an immediate response to the Access Request message can be issued by PacketFence and accepted by the AP. As clients can be roaming betwen APs, RADIUS CoA or Disconnect messages are not supported since the client might no longer be connected to the targetted AP. In this case, PacketFence must rely insted in the WISPr web services to trigger a disconnection / VLAN move after authentication.

In short, if you’re hosting a SmartZone appliance (physical or virtual) inside your LAN and PacketFence and SmartZone can talk directly without extraneous port-maps, use the PROXY mode for RADIUS as its much simpler. But if using a shared or external SmartZone server while keeping PacketFence local to your LAN, then you’ll probably have to opt for the NON-PROXY mode.

6.26.1. Webauth

6.26.2. SmartZone configuration

First, you will need to define your RADIUS server in *Configuration → Service and Profiles → Authentication*. In newer versions (at least Firmware 3.6) make sure to select the proper RADIUS model (proxy or non-proxy according to your deployment details as described above)

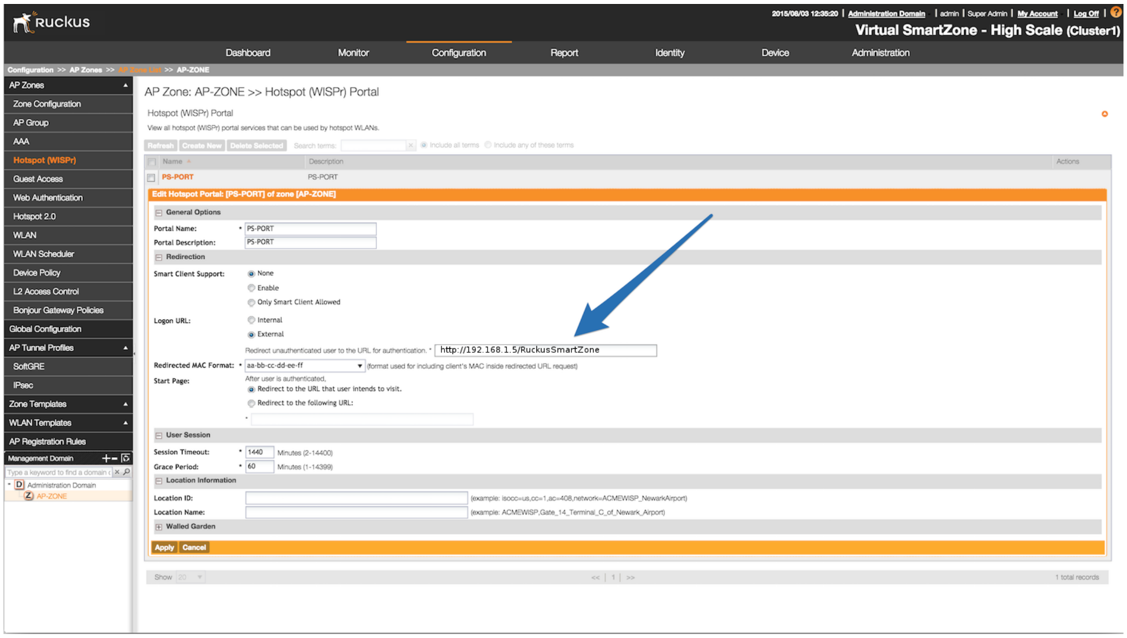
Create your server using the following information (where 192.168.1.5 is the IP address of your PacketFence management interface):

- 'IP Address:' 192.168.1.5
- 'Port': 1812
- 'Secret': useStrongerSecret

Then, in *Configuration → Service and Profiles → Accounting*, create a server with the following information:

- 'IP Address:' 192.168.1.5
- 'Port': 1813
- 'Secret': useStrongerSecret

After, create a Hotspot in *Configuration → AP Zones → Your Zone → Hotspot WISPr → Create New*. Adjust 192.168.1.5 to the IP address of your portal.



AP Zone: AP-ZONE >> Hotspot (WISPr) Portal

Hotspot (WISPr) Portal

View all hotspot (WISPr) portal services that can be used by hotspot WLANs.

Search terms: ● Include all terms ○ Include any of these terms

Name	Description	Actions
PS-PORT	PS-PORT	

Edit Hotspot Portal: [PS-PORT] of zone [AP-ZONE]

General Options

Portal Name: * PS-PORT

Portal Description: PS-PORT

Redirection

Smart Client Support: ● None ○ Enable ○ Only Smart Client Allowed

Logon URL: ○ Internal ● External

Redirect unauthenticated user to the URL for authentication. * http://192.168.1.5/RuckusSmartZone

Redirected MAC Format: * aa-bb-cc-dd-ee-ff (format used for including client's MAC inside redirected URL request)

Start Page: After user is authenticated, ● Redirect to the URL that user intends to visit. ○ Redirect to the following URL:

User Session

Session Timeout: * 1440 Minutes (2-14400)

Grace Period: * 60 Minutes (1-14399)

Location Information

Location ID: (example: isocc=us,cc=1,ac=408,network=ACMEWISP_NewarkAirport)

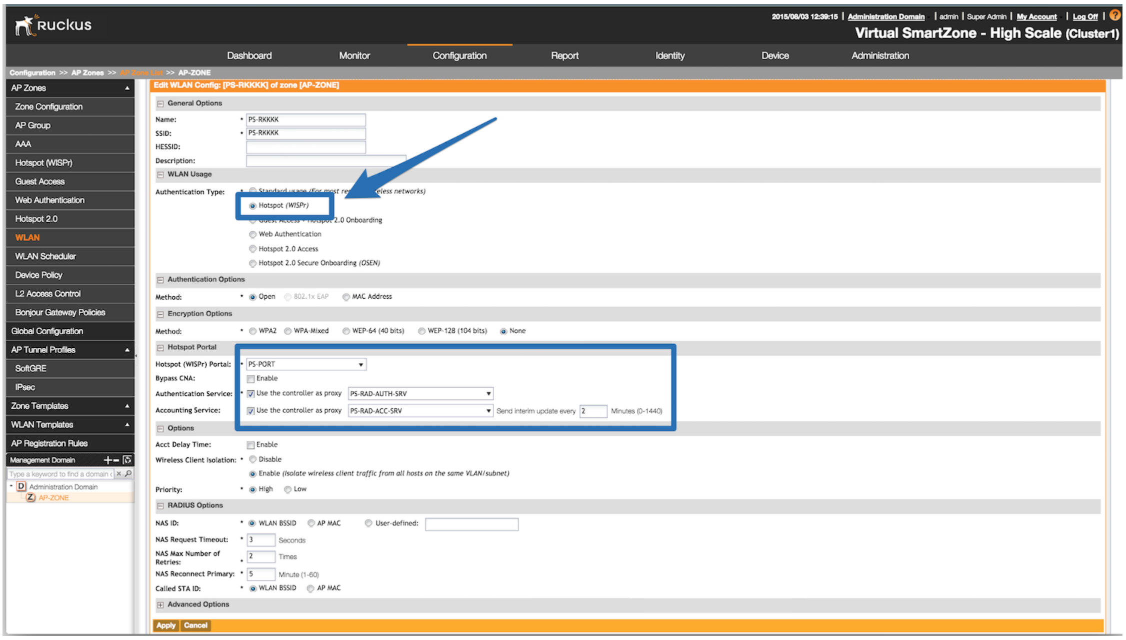
Location Name: (example: ACMEWISP,Gate_14_Terminal_C_of_Newark_Airport)

Walled Garden

Show 20 << | 1 | >> 1 total records

Then, still on this page, in the 'Walled Gardens', make sure you add the portal IP address in this list.

Next, you will need to configure your WLAN to use the Hotspot authentication and point it to PacketFence. Also ensure you set 'Use the controller as a proxy'.



Edit WLAN Config: [PS-RKKKK] of zone [AP-ZONE]

General Options

Name: * PS-RKKKK

SSID: * PS-RKKKK

HESSID:

Description:

WLAN Usage

Authentication Type: * ○ Standard usage (For most regular wireless networks) ● Hotspot (WISPr) ○ Guest Access + Hotspot 2.0 Onboarding ○ Web Authentication ○ Hotspot 2.0 Access ○ Hotspot 2.0 Secure Onboarding (OSEN)

Authentication Options

Method: * ● Open ○ 802.1x EAP ○ MAC Address

Encryption Options

Method: * ○ WPA2 ○ WPA-Mixed ○ WEP-64 (40 bits) ○ WEP-128 (104 bits) ● None

Hotspot Portal

Hotspot (WISPr) Portal: * PS-PORT

Bypass CNA: □ Enable

Authentication Service: * ☑ Use the controller as proxy PS-RAD-AUTH-SRV

Accounting Service: ☑ Use the controller as proxy PS-RAD-ACC-SRV Send interim update every 2 Minutes (0-1440)

Options

Acct Delay Time: □ Enable

Wireless Client Isolation: * ○ Disable ● Enable (Isolate wireless client traffic from all hosts on the same VLAN/subnet)

Priority: * ● High ○ Low

RADIUS Options

NAS ID: * ● WLAN BSSID ○ AP MAC ○ User-defined:

NAS Request Timeout: * 3 Seconds

NAS Max Number of Retries: * 2 Times

NAS Reconnect Primary: * 5 Minute (1-60)

Called STA ID: * ● WLAN BSSID ○ AP MAC

Advanced Options

Now, you should configure the Northbound API of the SmartZone so PacketFence can communicate with it. In order to do so, go in *Configuration → System → Northbound Portal Interface* (Can be called "WISPr Northbound Interfaces" in newer versions of SmartZone) and set the 'Password' and save it. Keep the password closeby as it will be required for the PacketFence configuration. In this example, it will be `passwordForNorthboundAPI`. In case you're using a SmartZone High-scale, you can define a northbound username/password for each Managed Domain so that each of your customers can have their own credentials. In this case, define both a username and password and keep both closeby.

In order to receive the information not encrypted in the URL, you will need to connect on the Ruckus SmartZone controller using SSH and do the following command:

```
no encrypt-mac-ip
```

6.26.3. PacketFence configuration

In PacketFence, add a new switch in *Configuration → Switches* with the following configuration:

- **Definition → External Portal Enforcement** should be enabled
- **Definition → Type**: `Ruckus SmartZone Wireless Controller`
- **Definition → Mode**: `production`
- **Definition → Controller IP Address**: `IP address of SmartZone controller`
- **Roles → Role by VLAN ID** should be enabled
- **Roles → registration VLAN**: `-1`
- **Roles → Role by Switch Role** can be optionally enabled (see below)
- **RADIUS → Secret passphrase**: `useStrongerSecret`
- **Web Services → Username**: `usernameForNorthboundAPI`
- **Web Services → Password**: `passwordForNorthboundAPI`

The Web Services Username is optional and only needed if using the "Managed Partner Domains" feature of SmartZone with multiple different Northbound API credentials (one per SmartZone domain). Additionally, for troubleshooting purposes, one can define the *Web Services → Transport* to HTTP instead of the default HTTPS so as to simplify troubleshooting by capturing the traffic between PacketFence and SmartZone.

6.26.4. Mac Authentication

For MAC authentication you have two options. Using SmartZone as a *proxy RADIUS server* (where all RADIUS requests are sent between the SmartZone controller and PacketFence directly) and *non-radius RADIUS* where the APs send RADIUS messages directly to PacketFence. This non-proxy scenario is useful when both the APs and PacketFence are "inside the LAN" but the SmartZone controller is in the WAN (for example, hosted in a commercial cloud provider). In this case, direct communication between SmartZone and PacketFence might not be possible as the WAN IP for PacketFence might be dynamic.

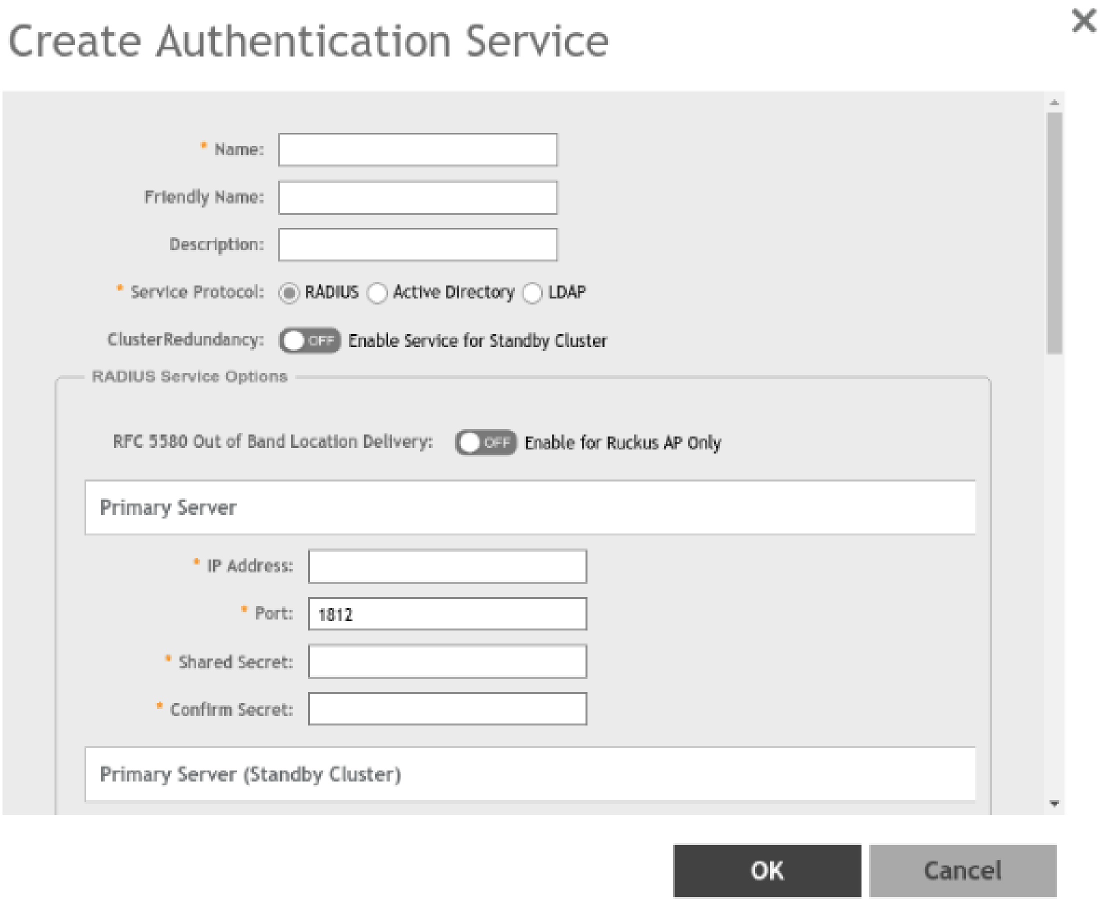
6.26.5. PROXY mode

6.26.6. SmartZone configuration

First, you will need to define your RADIUS server in *Service and Profiles → Authentication*. Then select the "Proxy (SZ Authenticator)" tab and then select the zone for which you want to create the AAA server.

Create your server using the following information (where 192.168.1.5 is the IP address of your PacketFence management interface):

- 'Name' : PacketFence-Auth
- 'Service Protocol': RADIUS
- 'IP Address:' 192.168.1.5
- 'Port': 1812
- 'Secret': useStrongerSecret



Create Authentication Service

* Name:

Friendly Name:

Description:

* Service Protocol: ● RADIUS ○ Active Directory ○ LDAP

ClusterRedundancy: OFF Enable Service for Standby Cluster

RADIUS Service Options

RFC 5580 Out of Band Location Delivery: OFF Enable for Ruckus AP Only

Primary Server

* IP Address:

* Port: 1812

* Shared Secret:

* Confirm Secret:

Primary Server (Standby Cluster)

Then, in *Service and Profiles* → *Accounting*. Then select the "Proxy" tab and then select the zone for which you want to create the AAA server. Create the server using the information below:

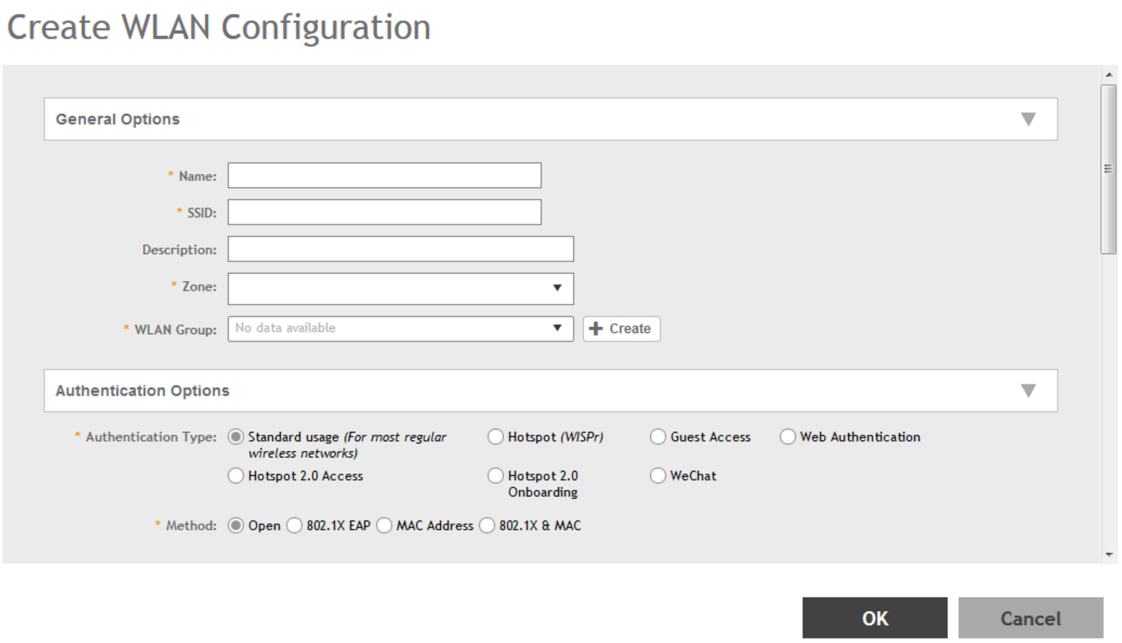
- 'Name' : PacketFence-Acct
- 'IP Address:' 192.168.1.5
- 'Port': 1813
- 'Secret': useStrongerSecret

Give both authentication and accounting services an easily identifiable name such as "PacketFence-Auth" and "Packerfence-Acct". This names are purely for identification purposes only.

You can now create an SSID with OPEN/MAC athentication.

In the *Wireless LANs* top level menu , from the System tree hierarchy, select the Zone where you want to create a WLAN and then click *Create*.

Enter the *name* and *SSID*, then for *Authentication Type* select "Standard Usage" and for *Method* select "MAC Address".



Create WLAN Configuration

General Options

* Name:

* SSID:

Description:

* Zone:

* WLAN Group: No data available

Authentication Options

* Authentication Type: ● Standard usage *(For most regular wireless networks)* ○ Hotspot *(WISPr)* ○ Guest Access ○ Web Authentication ○ Hotspot 2.0 Access ○ Hotspot 2.0 Onboarding ○ WeChat

* Method: ● Open ○ 802.1X EAP ○ MAC Address ○ 802.1X & MAC

The rest of the authentication options can be left "as-is" (The default *MAC Address Format* of "aabbccddeeff" should work fine)

For the *Authentication & Accounting Service* enable the "Use controller as proxy" checkbox for both Authentication and Accounting and select the previously created Authentication and Accounting profiles. (PacketFence-Auth and PacketFence-Acct respectively if you used the names suggested above)

Finally in the *Advanced Options* section, under *Access VLAN* section, make sure to enable the *Enable Dynamic VLAN (AAA Override)* checkbox is enabled so that the client receives a VLAN assigned by PacketFence.

6.26.7. PacketFence configuration

In PacketFence, add a new switch in *Configuration* → *Switches* with the following configuration:

- **Definition → External Portal Enforcement** should NOT be enabled
- **Definition → Type**: `Ruckus SmartZone Wireless Controller`
- **Definition → Mode**: `production`
- **Definition → Use CoA**: Can be enabled
- **Definition → Controller IP Address**: IP address of SmartZone controller
- **Definition → CoA Port**: `3799`
- **Roles → Role by VLAN ID** should be enabled
- **Roles → registration VLAN**: Your registration VLAN ID
- **Roles → isolation VLAN**: Your isolation VLAN ID
- **Roles → Role by Switch Role** can be optionally enabled (see below)

- RADIUS → Secret passphrase: `useStrongerSecret`

6.26.8. Non-PROXY mode

For non-proxy MAC authentication, repeat the same configuration as for PROXY mode but create the Authentication and Accounting servers under the "Non-Proxy (AP Authenticator)" menu. Additionally, configure the "WISPr northbound credentials" as for the Webauth section. Only the username / password is required, no other configuration is needed (portals, etc)

6.26.9. PacketFence configuration

In PacketFence, add a new switch in *Configuration* → *Switches* with the following configuration:

- **Definition → External Portal Enforcement** should NOT be enabled
- **Definition → Type**: `Ruckus SmartZone Wireless Controller`
- **Definition → Mode**: `production`
- **Definition → Deauthentication Method**: `HTTPS`
- **Definition → Controller IP Address**: IP address of SmartZone controller
- **Roles → Role by VLAN ID** should be enabled
- **Roles → registration VLAN**: Your registration VLAN ID
- **Roles → isolation VLAN**: Your isolation VLAN ID
- **Roles → Role by Switch Role** can be optionally enabled (see below)
- **RADIUS → Secret passphrase**: `useStrongerSecret`
- **Web Services → Transport**: `HTTPS`
- **Web Services → Username**: `usernameForNorthboundAPI`
- **Web Services → Password**: `passwordForNorthboundAPI`

During troubleshooting, you can change the Deauth method and Web Services Transport to HTTP instead of HTTPS can capture the traffic destined to the SmartZone's IP on port 9080 to inspect the WISPr API calls if needed.

For NON-PROXY Auth mode when using MAC-Authenticatin we need to set the "Deauthentication Method" to HTTP or HTTPS since this will force the disconnect message to be sent using the Northbound WISPr API instead of RADIUS Disconnect / CoA. If the *Deauthentication Method* is not set, then the code will try to use RADIUS by default and fail to disconnect the user.

6.26.10. Ruckus Roles

Roles Configuration

Ruckus SmartZone allows you to define roles for RBAC purposes. They can be used to apply per-user rate-limits and ACLs in newer versions of the SmartZone firmware, specifying also advanced options like Application Recognition Policies, URL filtering profiles, (Firwewall profiles)

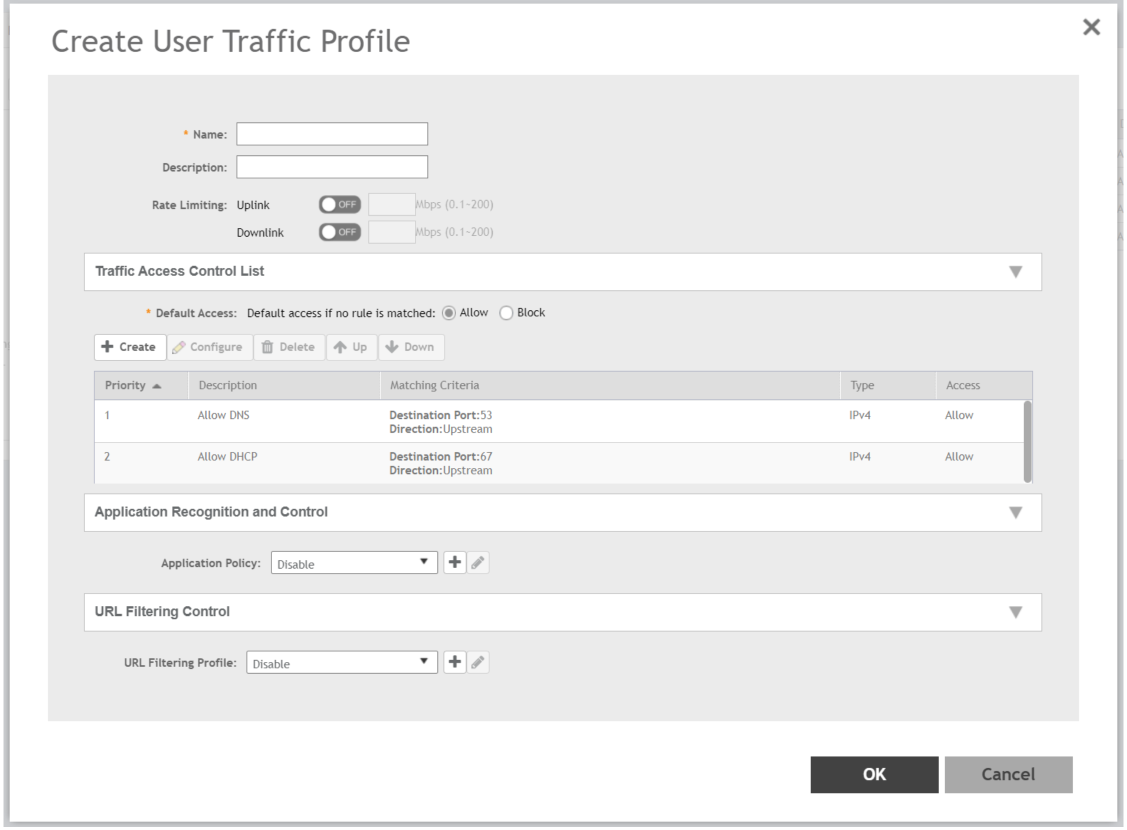
To create and be able to use the role, we need to perform several steps:

```
1 - Create a _User Traffic Profile_
```

```
2 - Create a matching _User Role_
3 - Reference the User Role in the RADIUS Authentication server
```

The detailed steps are as follow:

Go to *Services & Profiles* → *Access Control* on the left menu and then click on the *User Traffic* tab. On this page, optionally select a Domain/Zone, click the "Create" button and give the new UTP name. Define any additional parameters such as Uplink/Downlink rate limits, define any ACLs you might want for that role and also select, if needed, an Application Recognition and Control policy and URL Filtering Control policies.



Create User Traffic Profile

* Name:

Description:

Rate Limiting: Uplink OFF Mbps (0.1-200)

Downlink OFF Mbps (0.1-200)

Traffic Access Control List

* Default Access: Default access if no rule is matched: ● Allow ○ Block

Priority	Description	Matching Criteria	Type	Access
1	Allow DNS	Destination Port:53 Direction:Upstream	IPv4	Allow
2	Allow DHCP	Destination Port:67 Direction:Upstream	IPv4	Allow

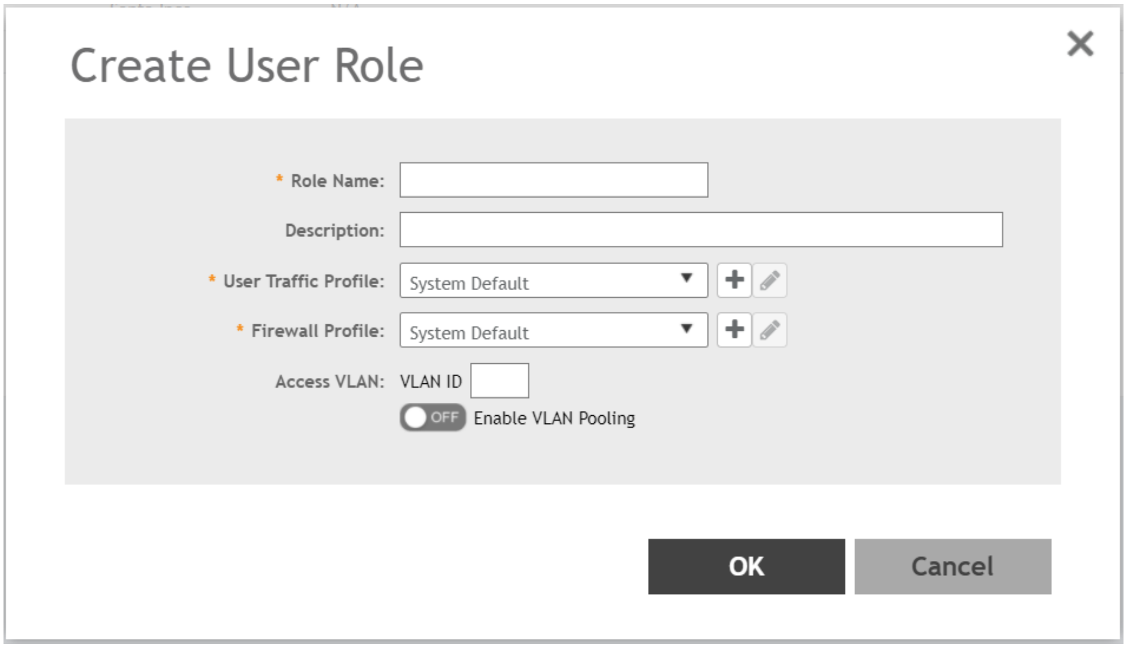
Application Recognition and Control

Application Policy: Disable

URL Filtering Control

URL Filtering Profile: Disable

Next, go to *Clients* → *Users & Roles* menu and select the *User Roles* tab. On this page, optionally select a Domain/Zone, click the "Create" button and give the new User Role a name. This name is purely for identification only and its not the RADIUS attribute. You can choose any meaningful name. You should also select the User Traffic Profile defined in the previous step as well as, optionallu, a Firewall Profile.


Create User Role

* Role Name:

Description:

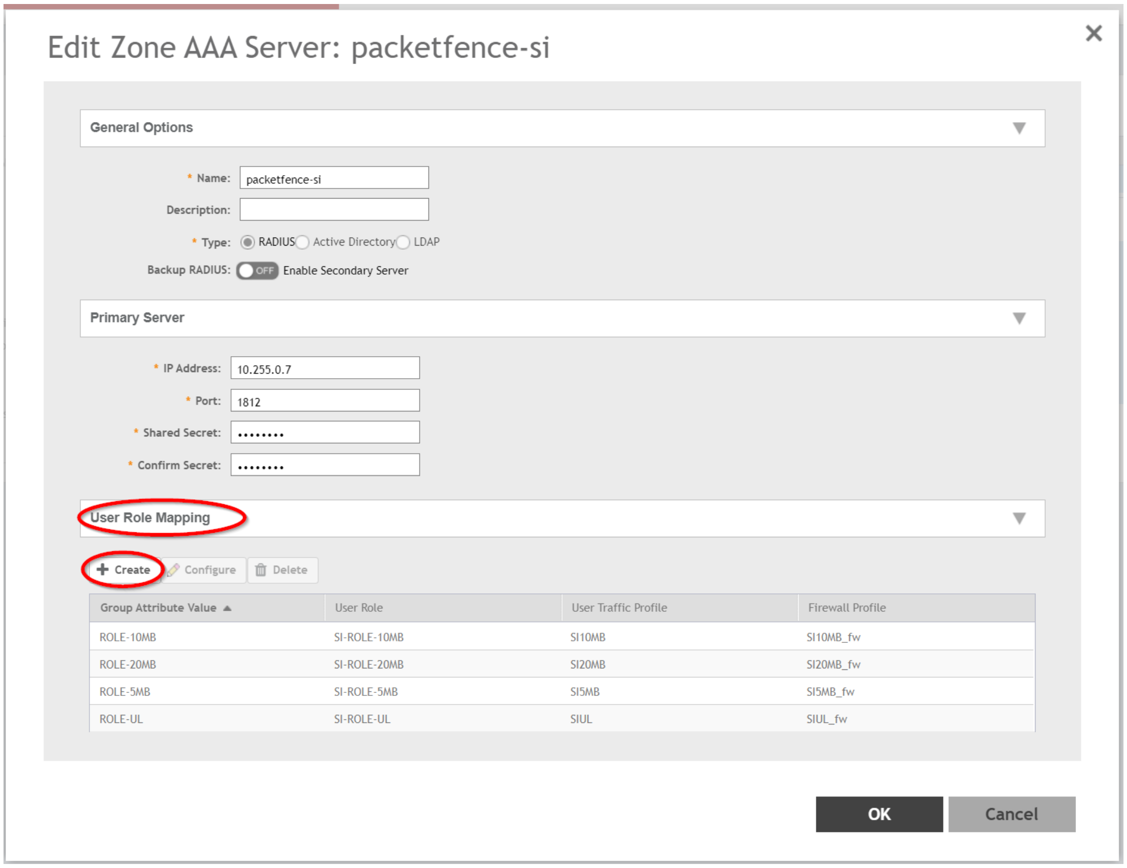
* User Traffic Profile: System Default

* Firewall Profile: System Default

Access VLAN: VLAN ID

OFF Enable VLAN Pooling

Finally, under *Configuration* → *Service and Profiles* → *Authentication*, select the RADIUS server created previously (Either in Proxy or NON-Proxy mode). Then, under the *User Role Mapping* section, click on *Create*.


Edit Zone AAA Server: packetfence-si

General Options

* Name: packetfence-si

Description:

* Type: ● RADIUS ○ Active Directory ○ LDAP

Backup RADIUS: OFF Enable Secondary Server

Primary Server

* IP Address: 10.255.0.7

* Port: 1812

* Shared Secret: ••••••••

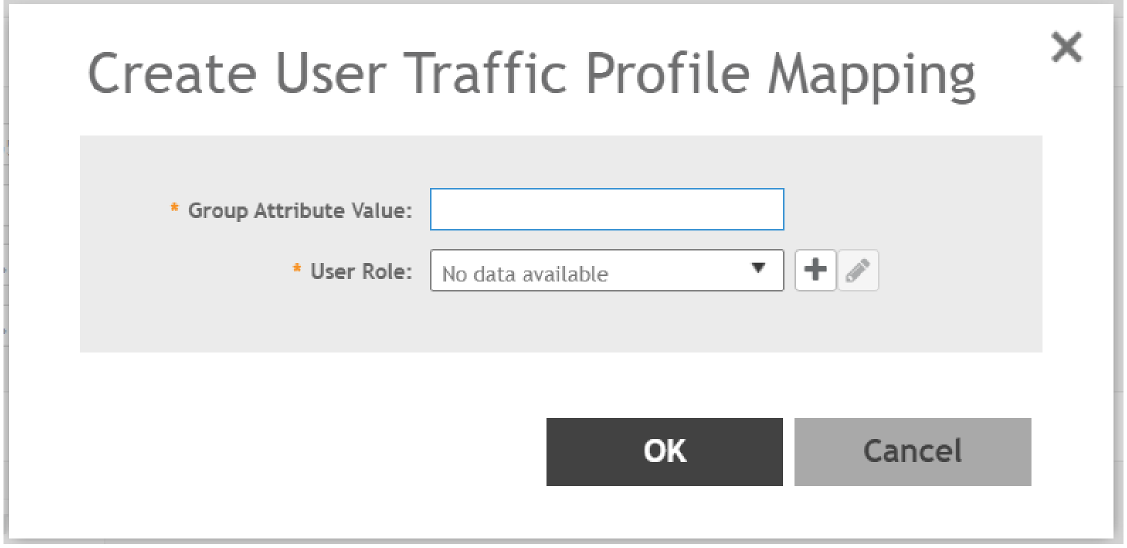
* Confirm Secret: ••••••••

User Role Mapping

Group Attribute Value ▲	User Role	User Traffic Profile	Firewall Profile
ROLE-10MB	SI-ROLE-10MB	SI10MB	SI10MB_fw
ROLE-20MB	SI-ROLE-20MB	SI20MB	SI20MB_fw
ROLE-5MB	SI-ROLE-5MB	SI5MB	SI5MB_fw
ROLE-UL	SI-ROLE-UL	SIUL	SIUL_fw

A new window will open where we can create a "User Traffic Profile Mapping". Under *Group*

Attribute Value enter the string that will be sent from PacketFence (Configured under the Switch configuration in the "Role by Switch Role" section). This string must match between PacketFence and SmartZone and is the string sent in the RADIUS reply under the Ruckus-User-Group VSA. Then, under the "User Role", select the previously created User Role.


Create User Traffic Profile Mapping

* Group Attribute Value:

* User Role: No data available

Repeat all the steps above for as many different roles as needed. Keep in mind that you can define different roles on SmartZone than those on PacketFence. For example, on SmartZone you might have roles calles "10Mbps", "20Mbps" and so one (related to the specific rate limits assigned to the users) and then in PacketFence, assign the "10Mbps" SmartZone role to the "Students" and "Guests" PacketFence Roles, and the "20Mbps" SZ role to "Faculty" and "IT" PF roles.

PacketFence Configuration

On the PacketFence side you need to use *role by switch role* and add the same name as in the *Group Attribute* you created on the Ruckus side.

So when a device connects to the SSID, PacketFence will return a VLAN identifier and a RuckusUserGroup attribute and the device will be authorized on the WLAN on the specific VLAN. Additionally, if RBAC is in use, the specific upstream/downstream rate limits, L2/L3 ACLS and Application Recognition Policies will be applied to the specific user, having the possibility of, for instance, giving different user Roles different access speeds.

6.27. Trapeze

In order to have the Trapeze controller working with PacketFence, you need to define the RADIUS configuration and the proper service profiles.

RADIUS configuration

```
set radius server PF address 192.168.1.5 timeout 5 retransmit 3 deadtime 0 key
secret
set server group PF-RADIUS members PF
```

Service Profiles

Here we define two service profiles, one for the open SSID (PacketFence-Public) and one for the WPA2-Enterprise SSID (PacketFence-Secure):

```
set service-profile PF-Open ssid-name PacketFence-Public
set service-profile PF-Open ssid-type clear
set service-profile PF-Open auth-fallthru last-resort
set service-profile PF-Open cipher-tkip enable
set service-profile PF-Open auth-dot1x disable
set service-profile PF-Open 11n mode-na required
set service-profile PF-Open attr vlan-name WLAN_REG

set service-profile PF-Secure ssid-name PacketFence-Secure
set service-profile PF-Secure cipher-tkip enable
set service-profile PF-Secure cipher-ccmp enable
set service-profile PF-Secure wpa-ie enable
set service-profile PF-Secure rsn-ie enable
set service-profile PF-Secure 11n mode-na required
set service-profile PF-Secure attr vlan-name Wlan

set radio-profile default service-profile PacketFence-Public
set radio-profile default service-profile PacketFence-Secure
```

AAA configuration

Finally, we need to tie the service profiles with the proper AAA configuration.

```
set accounting dot1x ssid PacketFence-Secure ** start-stop PF-RADIUS
set accounting mac ssid PacketFence-Public * start-stop PF-RADIUS
set authentication mac ssid PacketFence-Public * PF-RADIUS
set authentication dot1x ssid PacketFence-Secure ** pass-through PF-RADIUS
```

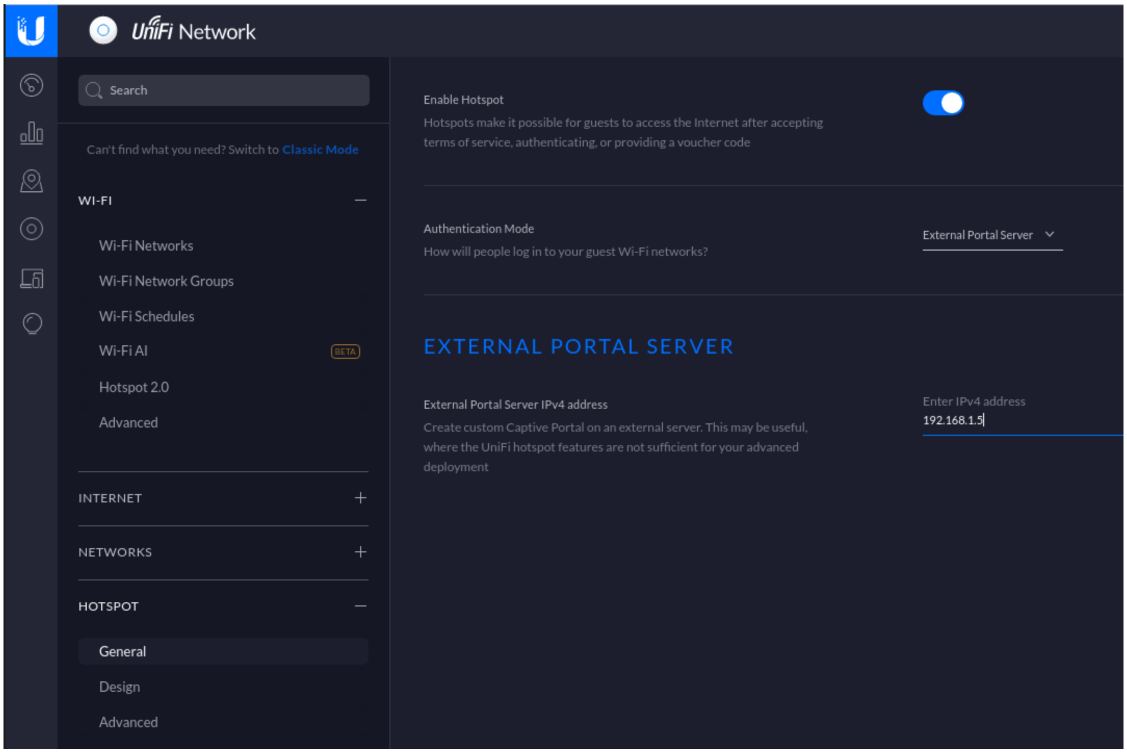
6.28. Ubiquiti

6.28.1. Web Authentication

Unifi side

In order to configure web authentication (external captive-portal) on Ubiquiti access points, you must have access to a Unifi controller and your APs must be connected to it.

First, you must configure the guest policy. Go in *Settings* → *hotspot* → *general* and configure it as shown below:



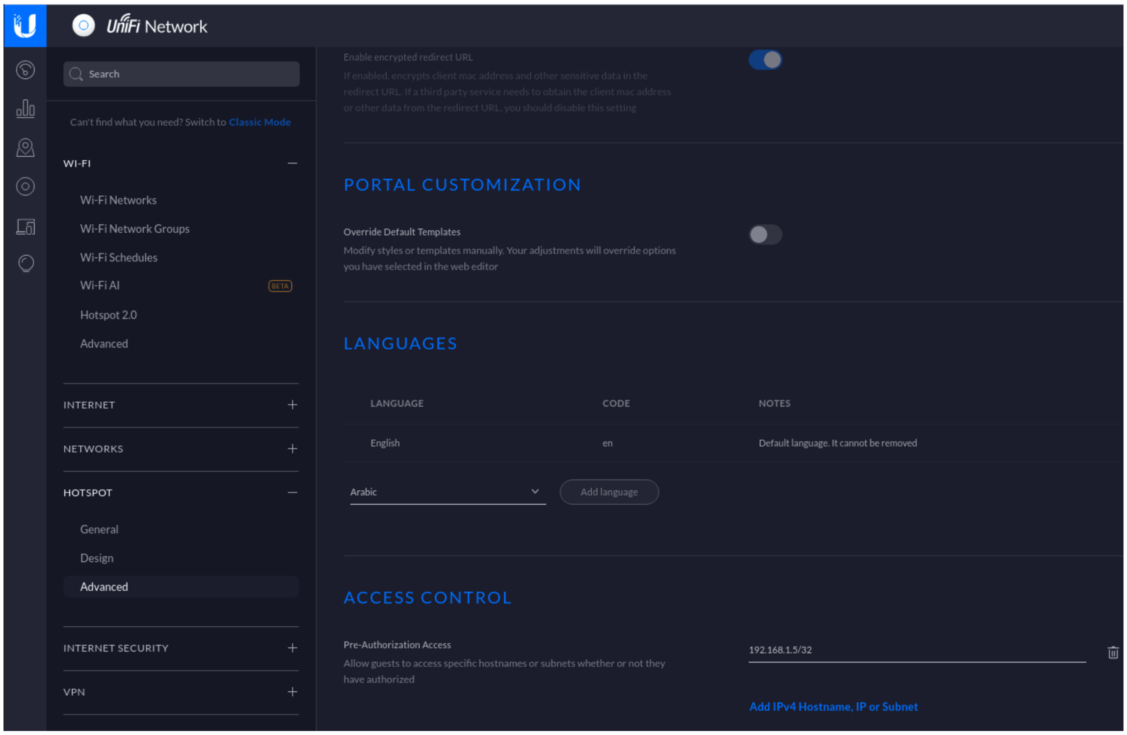
Enable Hotspot
Hotspots make it possible for guests to access the Internet after accepting terms of service, authenticating, or providing a voucher code

Authentication Mode
How will people log in to your guest Wi-Fi networks?
External Portal Server

EXTERNAL PORTAL SERVER

External Portal Server IPv4 address
Create custom Captive Portal on an external server. This may be useful, where the UniFi hotspot features are not sufficient for your advanced deployment
Enter IPv4 address
192.168.1.5

Next, you must allow the device to reach the portal. Go in *Settings* → *hotspot* → *advanced* and configure it as shown below:



Enable encrypted redirect URL
If enabled, encrypts client mac address and other sensitive data in the redirect URL. If a third party service needs to obtain the client mac address or other data from the redirect URL, you should disable this setting

PORTAL CUSTOMIZATION

Override Default Templates
Modify styles or templates manually. Your adjustments will override options you have selected in the web editor

LANGUAGES

LANGUAGE	CODE	NOTES
English	en	Default language. It cannot be removed

Arabic

ACCESS CONTROL

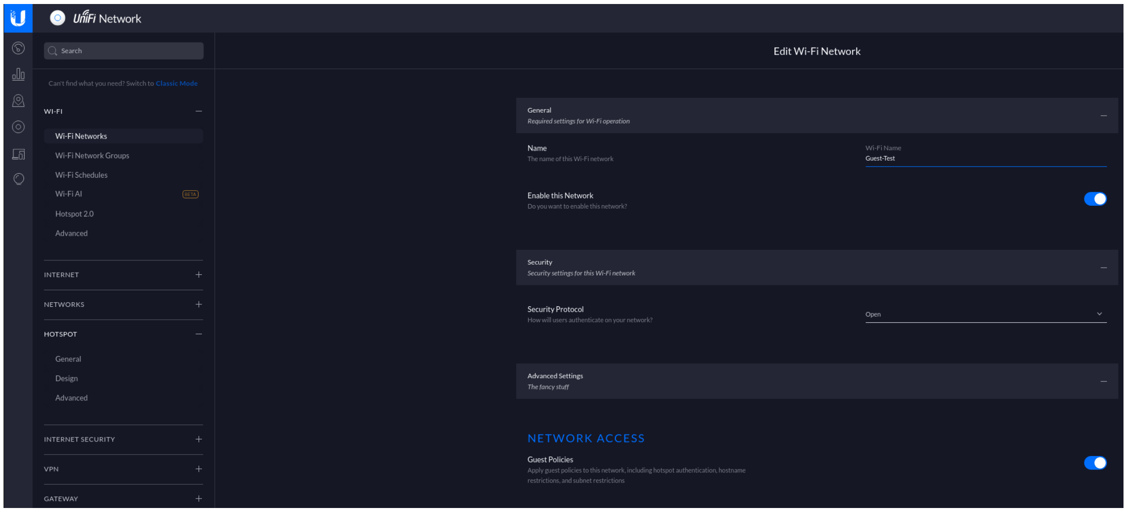
Pre-Authorization Access
Allow guests to access specific hostnames or subnets whether or not they have authorized
192.168.1.5/32

Make sure you enabled *Enable Guest Portal*, and that you've set *External portal server*.

You also need to enter the IP address of a portal enabled interface on the PacketFence server in

Custom Portal. Then in the *ACCESS CONTROL* section, add that same IP address to the *Pre-Authorization Access*

Then, still in the settings, create or edit a new SSID with the following settings:



Edit Wi-Fi Network

General
Required settings for Wi-Fi operation

Name
The name of this Wi-Fi network
Wi-Fi Name: Guest-Test

Enable this Network
Do you want to enable this network?
●

Security
Security settings for this Wi-Fi network

Security Protocol
How will users authenticate on your network?
Open

Advanced Settings
The fancy stuff

NETWORK ACCESS

Guest Policies
Apply guest policies to this network, including hotspot authentication, hostname restrictions, and subnet restrictions
●

You need to ensure STUN protocol is allowed between access points and controller so that controller gets instant notifications from access points. That's important to have a correct deauthentication mechanism.

PacketFence side

You have two choices to define the APs in PacketFence, by ip address (or range) or by MAC addresses.

By IP address:

If you decide to define the AP by ip then you will need to define the controller as a switch and define the Controller IP and Webservices information (Transport/Username/Password) in his configuration.

Then once done, restart pfcron service and run that to fill the PacketFence cache:

```
/usr/local/pf/bin/pfcmd pfcron ubiquiti_ap_mac_to_ip
```

And verify that you have an entry for each AP

```
/usr/local/pf/bin/pfcmd cache switch_distributed list
```

By MAC address:

Once this is done, you will need to define all your APs MAC addresses in the PacketFence switches with a configuration similar to this:

```
[00:11:22:33:44:55]
```

```
description=Ubiquiti AP
ExternalPortalEnforcement=Y
type=Ubiquiti::Unifi
controllerIp=1.2.3.4
wsTransport=HTTPS
wsUser=admin
wsPwd=admin
```

Where :

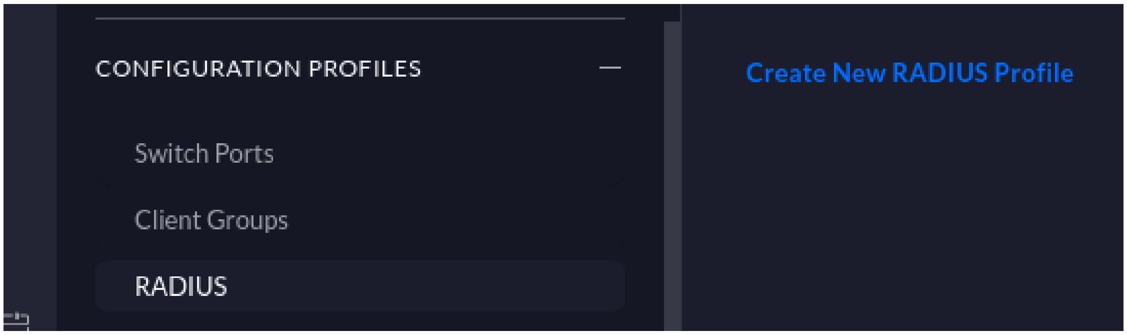
- **wsTransport** is the protocol used to connect to port 8443 of the Unifi controller and should be HTTPS. This is configured in the 'Web Services' tab of the switch.
- **wsUser** is a valid administrator username on your Unifi controller. This is configured in the 'Web Services' tab of the switch.
- **wsPwd** is the password that is associated to the wsUser. This is configured in the 'Web Services' tab of the switch.
- **controllerIp** is the IP address of your Unifi controller. This is configured in the 'Definition' tab of the switch.

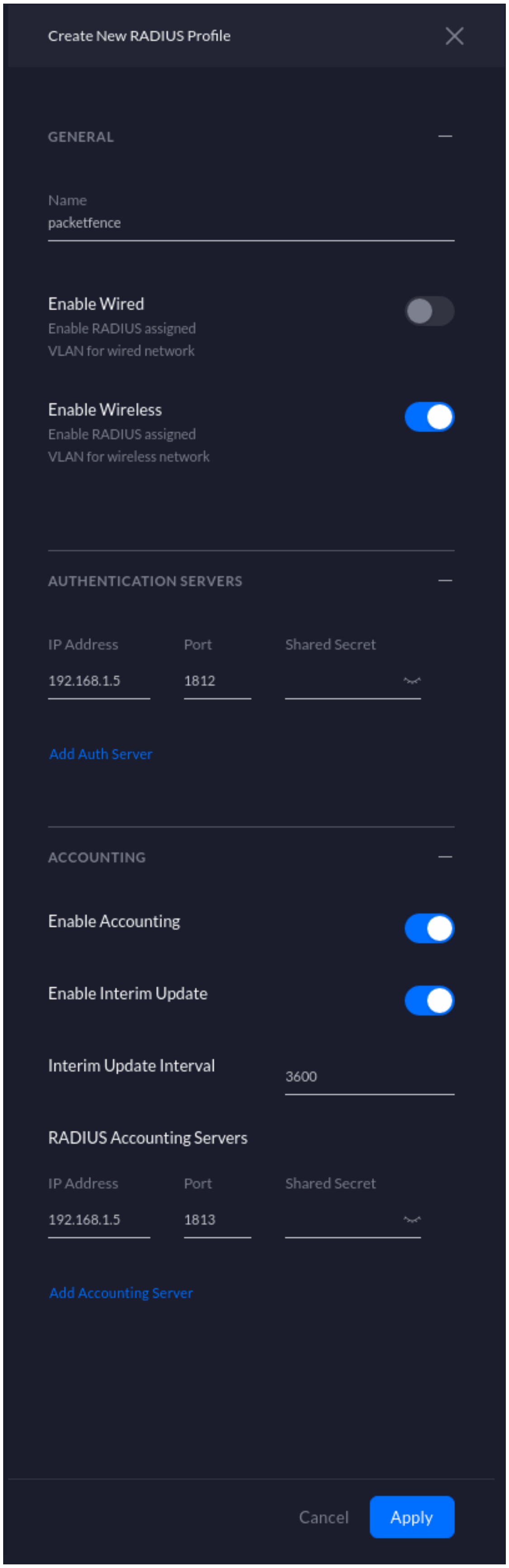
6.28.2. VLAN Enforcement

In order to configure VLAN enforcement on the Unifi controller, you need first to configure a RADIUS profile, then a secure wireless network.

Important : You cannot reuse a VLAN ID for dynamic VLAN if it is set as a static value for another SSID on the same AP. So, if you have a SSID set to use VLAN 10, you cannot use VLAN ID 10 for RADIUS controlled VLAN users as those users will not get an IP address.

AAA Configuration





Create New RADIUS Profile

GENERAL

Name: packetfence

Enable Wired: off
Enable RADIUS assigned VLAN for wired network

Enable Wireless: on
Enable RADIUS assigned VLAN for wireless network

AUTHENTICATION SERVERS

IP Address	Port	Shared Secret
192.168.1.5	1812	

ACCOUNTING

Enable Accounting: on

Enable Interim Update: on

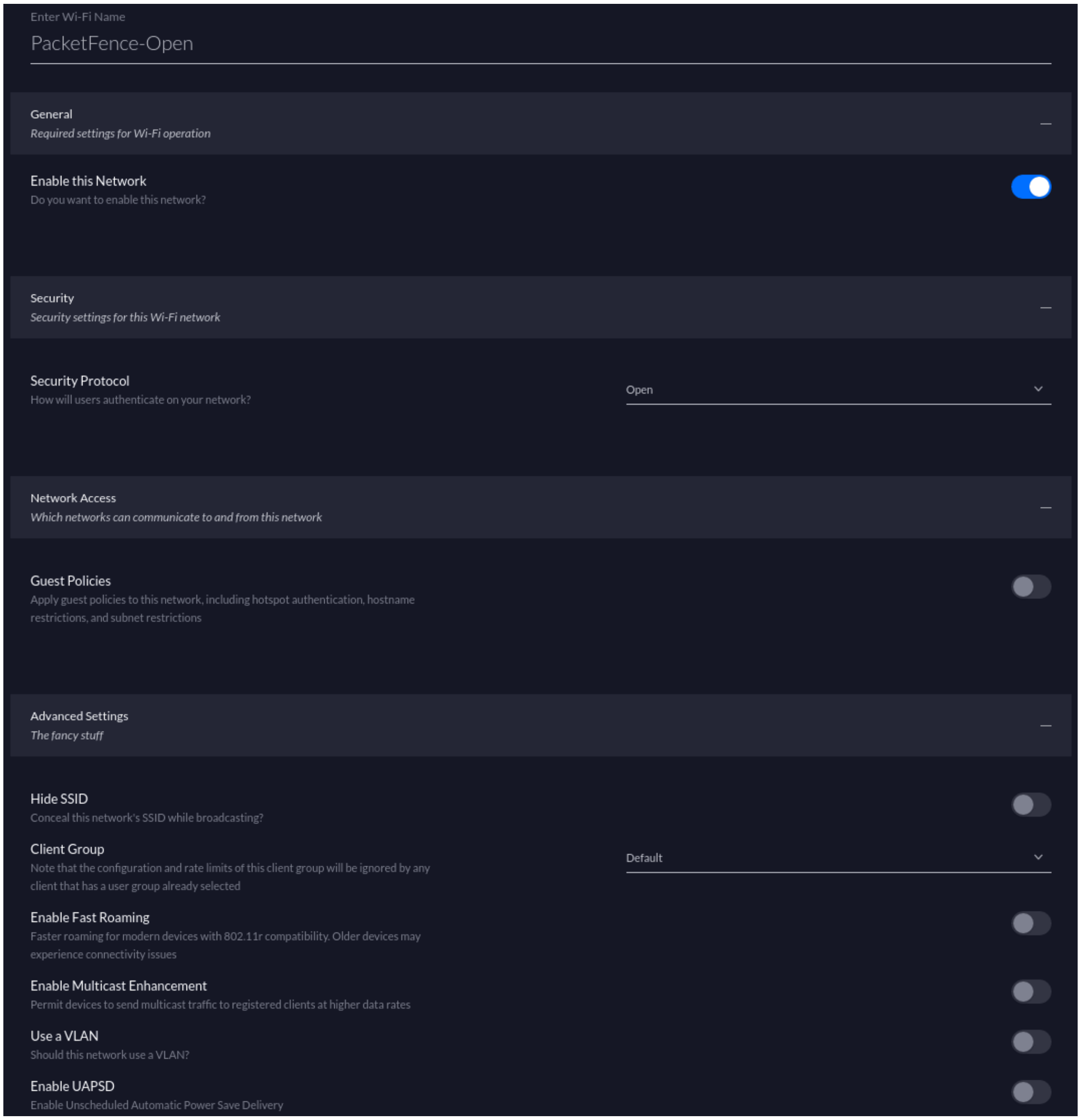
Interim Update Interval: 3600

RADIUS Accounting Servers

IP Address	Port	Shared Secret
192.168.1.5	1813	

Open SSID

Create a open profile:



Enter Wi-Fi Name

PacketFence-Open

General

Required settings for Wi-Fi operation

Enable this Network: on

Do you want to enable this network?

Security

Security settings for this Wi-Fi network

Security Protocol: Open

How will users authenticate on your network?

Network Access

Which networks can communicate to and from this network

Guest Policies: off

Apply guest policies to this network, including hotspot authentication, hostname restrictions, and subnet restrictions

Advanced Settings

The fancy stuff

Hide SSID: off

Conceal this network's SSID while broadcasting?

Client Group: Default

Note that the configuration and rate limits of this client group will be ignored by any client that has a user group already selected

Enable Fast Roaming: off

Faster roaming for modern devices with 802.11r compatibility. Older devices may experience connectivity issues

Enable Multicast Enhancement: off

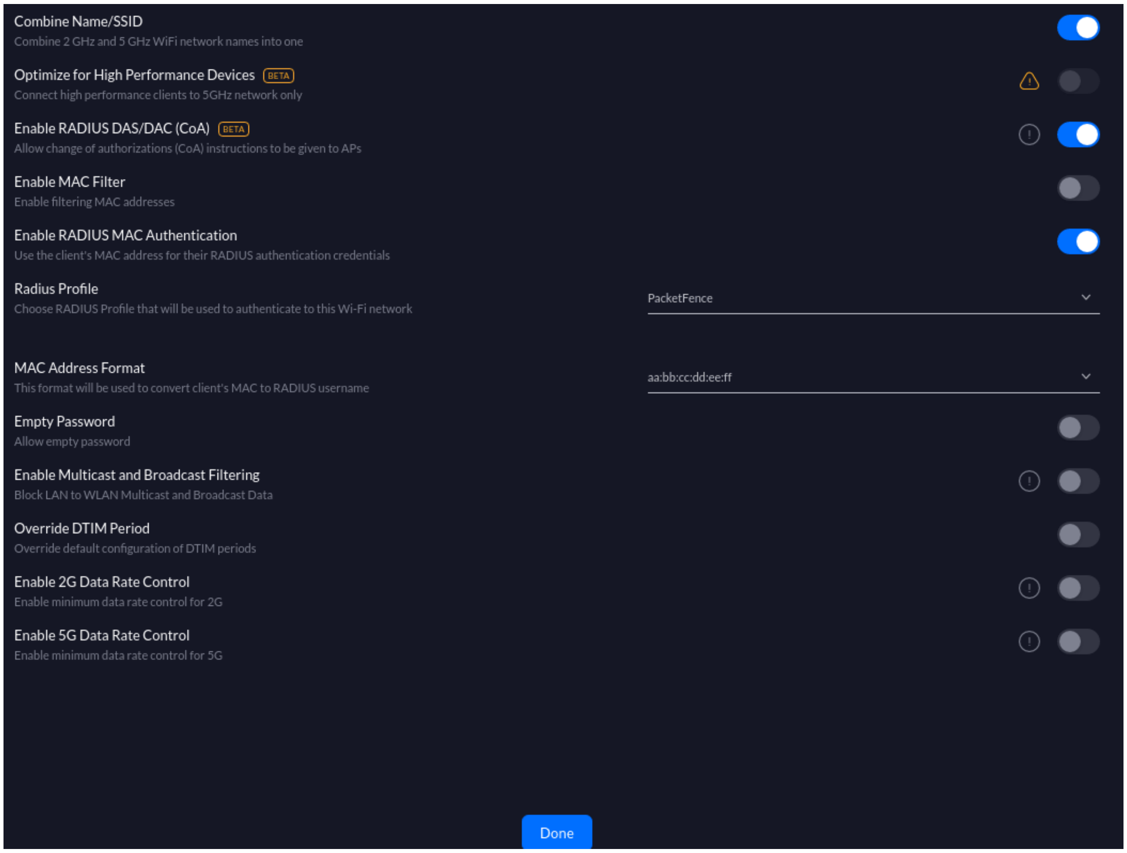
Permit devices to send multicast traffic to registered clients at higher data rates

Use a VLAN: off

Should this network use a VLAN?

Enable UAPSD: off

Enable Unscheduled Automatic Power Save Delivery



Combine Name/SSID
Combine 2 GHz and 5 GHz WiFi network names into one

Optimize for High Performance Devices BETA
Connect high performance clients to 5GHz network only

Enable RADIUS DAS/DAC (CoA) BETA
Allow change of authorizations (CoA) instructions to be given to APs

Enable MAC Filter
Enable filtering MAC addresses

Enable RADIUS MAC Authentication
Use the client's MAC address for their RADIUS authentication credentials

Radius Profile: PacketFence
Choose RADIUS Profile that will be used to authenticate to this Wi-Fi network

MAC Address Format: aa:bb:cc:dd:ee:ff
This format will be used to convert client's MAC to RADIUS username

Empty Password
Allow empty password

Enable Multicast and Broadcast Filtering
Block LAN to WLAN Multicast and Broadcast Data

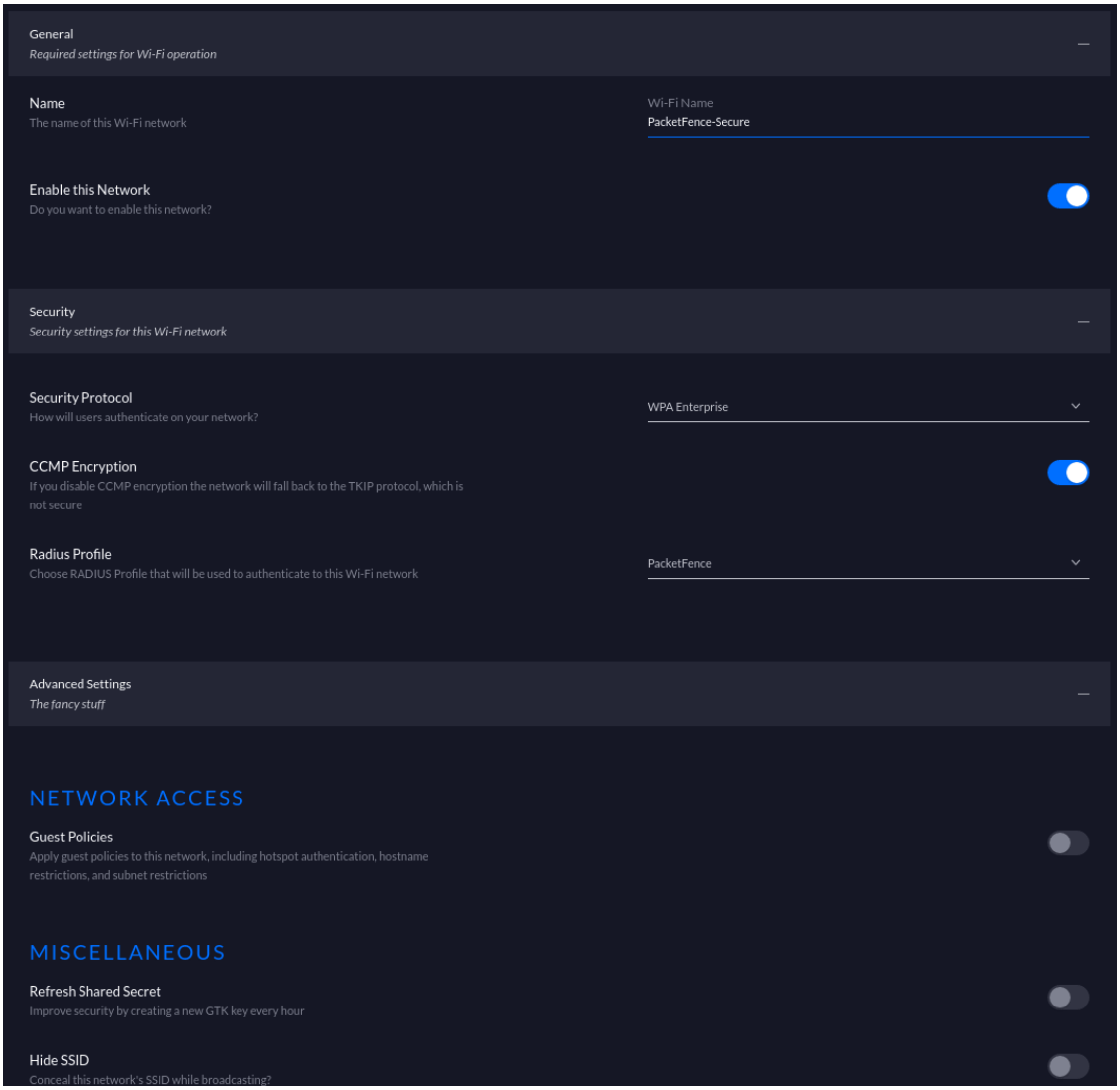
Override DTIM Period
Override default configuration of DTIM periods

Enable 2G Data Rate Control
Enable minimum data rate control for 2G

Enable 5G Data Rate Control
Enable minimum data rate control for 5G

Secure SSID

Create a secured profile:



General

Required settings for Wi-Fi operation

Name

The name of this Wi-Fi network

Wi-Fi Name: PacketFence-Secure

Enable this Network

Do you want to enable this network? ●

Security

Security settings for this Wi-Fi network

Security Protocol

How will users authenticate on your network?

WPA Enterprise

CCMP Encryption

If you disable CCMP encryption the network will fall back to the TKIP protocol, which is not secure ●

Radius Profile

Choose RADIUS Profile that will be used to authenticate to this Wi-Fi network

PacketFence

Advanced Settings

The fancy stuff

NETWORK ACCESS

Guest Policies

Apply guest policies to this network, including hotspot authentication, hostname restrictions, and subnet restrictions ○

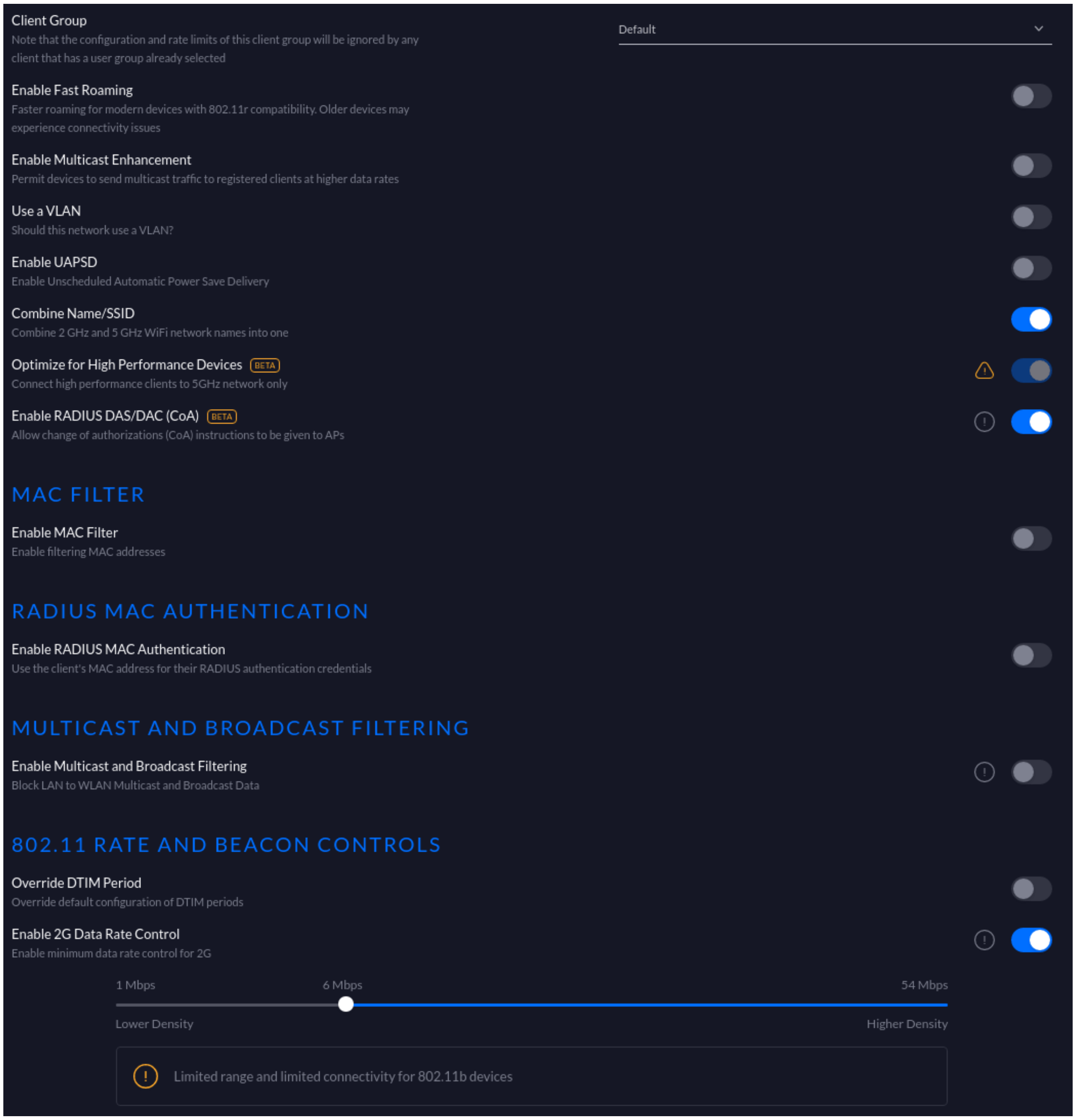
MISCELLANEOUS

Refresh Shared Secret

Improve security by creating a new GTK key every hour ○

Hide SSID

Conceal this network's SSID while broadcasting? ○



Client Group
Note that the configuration and rate limits of this client group will be ignored by any client that has a user group already selected
Default

Enable Fast Roaming
Faster roaming for modern devices with 802.11r compatibility. Older devices may experience connectivity issues

Enable Multicast Enhancement
Permit devices to send multicast traffic to registered clients at higher data rates

Use a VLAN
Should this network use a VLAN?

Enable UAPSD
Enable Unscheduled Automatic Power Save Delivery

Combine Name/SSID
Combine 2 GHz and 5 GHz WiFi network names into one

Optimize for High Performance Devices BETA
Connect high performance clients to 5GHz network only

Enable RADIUS DAS/DAC (CoA) BETA
Allow change of authorizations (CoA) instructions to be given to APs

MAC FILTER

Enable MAC Filter
Enable filtering MAC addresses

RADIUS MAC AUTHENTICATION

Enable RADIUS MAC Authentication
Use the client's MAC address for their RADIUS authentication credentials

MULTICAST AND BROADCAST FILTERING

Enable Multicast and Broadcast Filtering
Block LAN to WLAN Multicast and Broadcast Data

802.11 RATE AND BEACON CONTROLS

Override DTIM Period
Override default configuration of DTIM periods

Enable 2G Data Rate Control
Enable minimum data rate control for 2G

Limited range and limited connectivity for 802.11b devices

CoA Support

CoA support has been introduced in the new version of the controller (Tested on 5.13.10), so on access reevaluation if you selected RADIUS as disconnect method then PacketFence will try a CoA.

6.29. Xirrus

6.29.1. Xirrus WiFi Arrays

Xirrus Access Points can be configured to work with PacketFence quickly since Xirrus supports RADIUS assigned VLANs out of the box.

First, RADIUS server configuration. Set the RADIUS server to be PacketFence's IP:

```
radius-server  ! (global settings)
  !
  external
    primary     server 192.168.1.5
    primary     secret useStrongerSecret
    !
    accounting
      primary   server 192.168.1.5
      primary   secret useStrongerSecret
    exit
  exit
exit
```

Enable SNMP Agent on the access point:

```
snmp
  !
  v2
    community read-write public
    community read-only public
  exit
  !
exit
```

Finally, don't forget to create the SSID you want and the proper bindings with the LAN. Open SSID should be configured to perform MAC Authentication and Secure SSID should be configured to perform 802.1X (WPA-Enterprise or WPA2-Enterprise).

External portal SSID

- Set **Encryption / Authentication** to None / Open
- Then check the WPR checkbox
- Then in in the section Web Page Redirect Configuration set **Server** to External Login
- Set the **Redirect URL** to http://192.168.1.5/Xirrus
- Set the **Redirect Secret** to any passphrase of your choice
- In the **RADIUS Configuration** section set the RADIUS server to point to your PacketFence server

[1] Be careful to change the secret key to a much stronger one. A 16 character random secret with digits, upper case and lower case characters is recommended.

7. VPN Configuration

7.1. Cisco ASA

7.1.1. AnyConnect

PacketFence supports Cisco ASA VPN with AnyConnect.

You can force VPN users to authenticate first on the captive portal and based on the role of the device allow it and/or set dynamic ACL.

In this example we assume that the Cisco ASA have 2 interfaces, one Management (192.168.2.1) where the VPN is activated and another one Registration (192.168.1.6) that is facing the PacketFence server (192.168.1.5).

Before trying to configure PacketFence with the Cisco ASA first be sure that when you connect with AnyConnect and when the VPN is up that your device is able to reach Internet.

```
ip local pool VPN_POOL 192.168.255.10-192.168.255.254 mask 255.255.255.0
!
interface GigabitEthernet0/0
 nameif MANAGEMENT
 security-level 0
 ip address 192.168.2.1 255.255.255.0
!
interface GigabitEthernet0/1
 nameif Registration
 security-level 0
 ip address 192.168.1.5 255.255.0.0
!
same-security-traffic permit inter-interface
same-security-traffic permit intra-interface
!
object network NETWORK_OBJ_192.168.255.0_24
 subnet 192.168.255.0 255.255.255.0
access-list redirect extended deny udp any any eq domain
access-list redirect extended deny ip any host 192.168.1.5
access-list redirect extended deny icmp any any
access-list redirect extended permit tcp any any eq www
access-list redirect extended permit tcp any any eq https
!
route MANAGEMENT 0.0.0.0 0.0.0.0 192.168.2.254 1
!
aaa-server PacketFence protocol radius
```

```
 authorize-only
 interim-accounting-update periodic 1
 merge-dacl before-avpair
 dynamic-authorization
aaa-server PacketFence (Registration) host 192.168.1.5
 timeout 5
 key useStrongerSecret
 authentication-port 1812
 accounting-port 1813
!
http server enable
http 192.168.0.0 255.255.0.0 MANAGEMENT
!
webvpn
 enable MANAGEMENT
 anyconnect image disk0:/anyconnect-win-4.0.00051-k9.pkg 8
 anyconnect image disk0:/anyconnect-linux-64-4.0.00051-k9.pkg 9
 anyconnect image disk0:/anyconnect-macosx-i386-4.0.00051-k9.pkg 10
 anyconnect profiles VPN_client_profile disk0:/VPN_client_profile.xml
 anyconnect enable
 tunnel-group-list enable
 cache
  disable
 error-recovery disable
group-policy GroupPolicy_VPN internal
group-policy GroupPolicy_VPN attributes
 dns-server value 1.1.1.1
 vpn-tunnel-protocol ikev2 ssl-client
 split-tunnel-policy tunnelall
 split-tunnel-network-list none
 default-domain value acme.com
 webvpn
  anyconnect profiles value VPN_client_profile type user
tunnel-group VPN type remote-access
tunnel-group VPN general-attributes
 address-pool (MANAGEMENT) VPN_POOL
 address-pool VPN_POOL
 authentication-server-group PacketFence
 accounting-server-group PacketFence
 default-group-policy GroupPolicy_VPN
tunnel-group VPN webvpn-attributes
 group-alias VPN enable
```

7.2. OpenVPN

PacketFence support OpenVPN with PAP authentication.

7.2.1. OpenVPN server configuration

In this section we will cover the OpenVPN installation on a Debian 11 machine and how to configure it.

```
apt install libgcrypt20-dev openvpn easy-rsa
```

```
mkdir -p /etc/openvpn/server/certs
cd /etc/openvpn/server/certs
openssl genrsa -out ca.key 2048
openssl req -new -x509 -days 3650 -key ca.key -out ca.crt
openssl genrsa -out vpn.key 2048
openssl req -new -key vpn.key -out vpn.csr
openssl x509 -req -in vpn.csr -out vpn.crt -CA ca.crt -CAkey ca.key
-CAcreateserial -days 365
openssl dhparam -out dh2048.pem 2048
```

Edit the server.conf file and paste this following content:

```
vim /etc/openvpn/server.conf
```

```
port 443
proto tcp4
dev tun
server 10.11.0.0 255.255.255.0
ca /etc/openvpn/server/certs/ca.crt
cert /etc/openvpn/server/certs/vpn.crt
key /etc/openvpn/server/certs/vpn.key
dh /etc/openvpn/server/certs/dh2048.pem
plugin /etc/openvpn/radiusplugin.so /etc/openvpn/radiusplugin.cnf
persist-key
persist-tun
keepalive 10 60
reneg-sec 0
comp-lzo
tun-mtu 1468
tun-mtu-extra 32
mssfix 1400
push ”persist-key”
push ”persist-tun”
push ”redirect-gateway def1”
push ”dhcp-option DNS 8.8.8.8”
push ”dhcp-option DNS 8.8.4.4”
status /etc/openvpn/443.log
```

```
verb 3
verify-client-cert none
```

Next you need to compile the radius extention for openvpn:

```
wget https://github.com/ValdikSS/openvpn-
radiusplugin/archive/refs/heads/master.zip
unzip master.zip
cd openvpn-radiusplugin-master
```

Then apply this patch:

```
diff -ruN openvpn-radiusplugin-master.orig/Config.cpp openvpn-radiusplugin-
master/Config.cpp
--- openvpn-radiusplugin-master.orig/Config.cpp 2015-12-23 08:07:19.000000000
-0500
+++ openvpn-radiusplugin-master/Config.cpp      2021-11-09 11:17:21.759139003
-0500
@@ -240,6 +240,14 @@
                                                          this-
>clientcertnotrequired=true;
                                                  }
                                          }
+                                         if (param == ”verify-client-cert”)
+                                         {
+                                                 this->deletechars(&line);
+                                                 if (line == ”verify-client-
certoptional” || line == ”verify-client-certnone”)
+                                                 {
+                                                         this-
>clientcertnotrequired=true;
+                                                 }
+                                         }
                                          if (param == ”username-as-common-
name”)
                                          {
                                                  this->deletechars(&line);
```

Compile the plugin:

```
make
cp radiusplugin.so /etc/openvpn/
```

Then edit the radiusplugin.cnf file:

```
vim /etc/openvpn/radiusplugin.cnf
```

```
NAS-Identifier=OpenVpn
Service-Type=5
Framed-Protocol=1
NAS-Port-Type=5
NAS-IP-Address=192.168.0.6
OpenVPNConfig=/etc/openvpn/server.conf
overwriteccfiles=true
useauthcontrolfile=true
useclientconnectdeferfile=true
nonfatalaccounting=false
defacctinteriminterval=0
```

```
server
{
        acctport=1813
        authport=1815
        name=192.168.0.5
        retry=1
        wait=30
        sharedsecret=secret
}
```

7.2.2. PacketFence configuration

On the PacketFence side the only thing you need to do is to create a new switch as type OpenVPN with the ip address 192.168.0.6 and with the shared secret 'secret'. And enable "CLI Access Enabled" in the switch too to enable the radius-cli to start.

8. Firewall Configuration

8.1. Palo Alto firewall

8.1.1. Palo Alto (PAN-OS) web admin access

You can manage administrator access (through web admin) to Palo Alto firewalls using RADIUS.

Palo Alto

You can follow Palo Alto official documentation with following adjustments to integrate with PacketFence:

- Administrator Use only: `enabled`
- Authentication Protocol: `PAP`
- Retrieve user group from RADIUS: `disabled`. You need to speficy `all` in the Allow List of the authentication profile.

At some point, you will need to configure two admin role profiles (which are preconfigured in PacketFence):

- `read_only_role`: you need to adjust permissions to provide read only access to firewall configuration
- `read_write_role`: you need to adjust permissions to provide read-write access to firewall configuration

PacketFence

You need to declare your Palo Alto firewall as a switch with:

- Management IP address of firewall as `Identifier`
- Palo Alto PAN-OS (template based) as `Type`
- CLI/VPN Access enabled: `Yes`

Troubleshooting

On Palo Alto, you can see how RADIUS replies are handled using *Monitor* → *Logs* → *System*

9. Additional Information

For more information, please consult the mailing archives or post your questions to it. For details, see:

- packetfence-announce@lists.sourceforge.net: Public announcements (new releases, security warnings etc.) regarding PacketFence
- packetfence-devel@lists.sourceforge.net: Discussion of PacketFence development
- packetfence-users@lists.sourceforge.net: User and usage discussions

10. Commercial Support and Contact Information

For any questions or comments, do not hesitate to contact us by writing an email to: support@inverse.ca.

Inverse (https://inverse.ca) offers professional services around PacketFence to help organizations deploy the solution, customize, migrate versions or from another system, performance tuning or aligning with best practices.

Hourly rates or support packages are offered to best suit your needs.

Please visit https://inverse.ca/ for details.

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