
PacketFence

PacketFence Network Devices Configuration Guide

PacketFence v15.0.0

Version 15.0.0 - October 2025

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1. About this Guide

This guide covers network device configuration for VLAN enforcement and access control with PacketFence. It provides device-specific configuration instructions for over 80 supported network vendors including managed switches, wireless controllers, and wireless access points. The guide covers 802.1X authentication, MAC authentication bypass, VLAN assignment, RADIUS configuration, and SNMP integration with various network equipment manufacturers.

Find the latest version at https://packetfence.org/documentation/

1.1. Other Guides

Clustering Guide

Comprehensive guide for setting up active/active clustering environments with HAProxy load balancing, Keepalived for high availability, and Galera database clustering. Includes advanced configuration for layer-3 clusters and troubleshooting cluster synchronization issues.

Developer's Guide

Technical documentation for customizing PacketFence including REST API usage, captive portal theming and functionality modifications, SNMP module development, supporting new network equipment, and application code customizations. Essential for integrators and developers extending PacketFence.

Installation Guide

Complete installation and configuration guide covering standalone deployments, system requirements, network planning, authentication integration (Active Directory, LDAP, RADIUS), certificate management, and initial system setup. Includes troubleshooting and advanced configuration topics.

Upgrade Guide

Step-by-step upgrade procedures with version-specific compatibility changes, manual configuration migration steps, database schema updates, and critical upgrade notes. Includes troubleshooting for common upgrade issues and rollback procedures.

1.2. Other sources of information

PacketFence News

Release announcements with detailed feature descriptions, performance improvements, security updates, and comprehensive bug fix listings organized by PacketFence version.

PacketFence Users Mailing List

Community support forum for installation help, configuration questions, troubleshooting assistance, and best practices discussions. Active community of users and developers providing peer-to-peer support.

PacketFence Announcements

Public announcements including new releases, security warnings and important updates

regarding PacketFence. Low-traffic list for staying informed about major PacketFence developments.

PacketFence Development

Discussion of PacketFence development including feature requests, architectural discussions, patch submissions and development coordination. For developers contributing to PacketFence core.

Package and release tarballs include the PacketFence guide files.

2. Important Notes

2.1. Inline enforcement support

Inline enforcement does not require this guide, except for RADIUS inline. RADIUS inline uses a flat layer-2 network on PacketFence's inline interface with no other gateway for Internet access.

Use this technique when network hardware does not support VLAN enforcement.

2.2. RADIUS accounting

Enabling RADIUS accounting on network devices significantly increases database size and may cause performance issues. Use RADIUS accounting only if absolutely required.

2.3. Supported Network Devices

PacketFence supports numerous wireless and wired network equipment from various vendors running different versions. For accurate information without duplication, refer to our website https://packetfence.org/about.html#/material

This page lists enforcement modes supported by all tested equipment.

3. Switch configuration

3.1. Assumptions

Network infrastructure assumptions for this configuration:

- PacketFence fully configured with FreeRADIUS running (for 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

3.2. 3COM

3.2.1. 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
```

3.2.2. 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.

3.2.3. 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

3.2.4. NJ220

This switch does not support port-security.

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

3.3. Alcatel

3.3.1. 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
```

3.3.2. 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
```

3.4. AlliedTelesis

3.4.1. 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
```

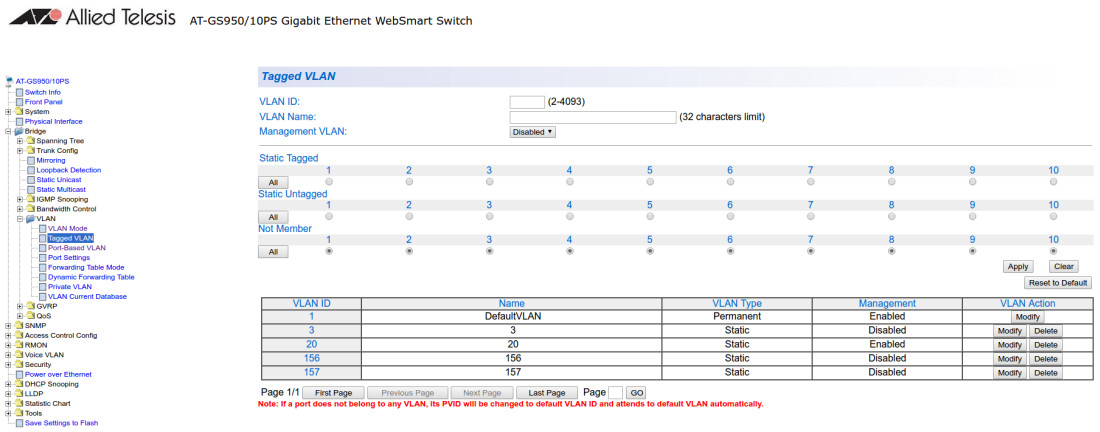
3.4.2. GS950

PacketFence supports the GS950 switch using :

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

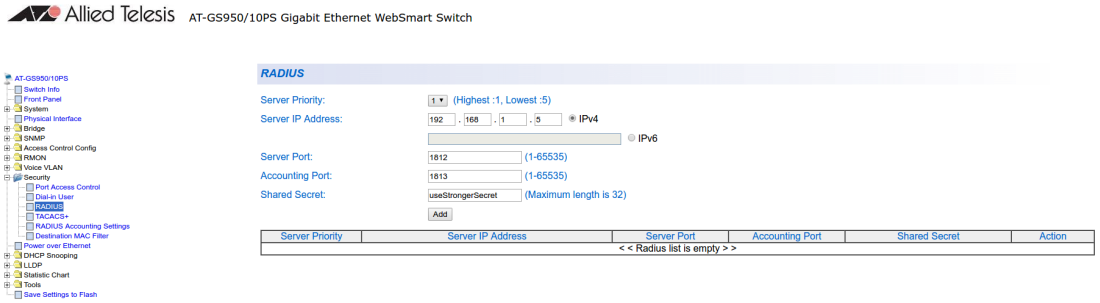
Global configuration

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

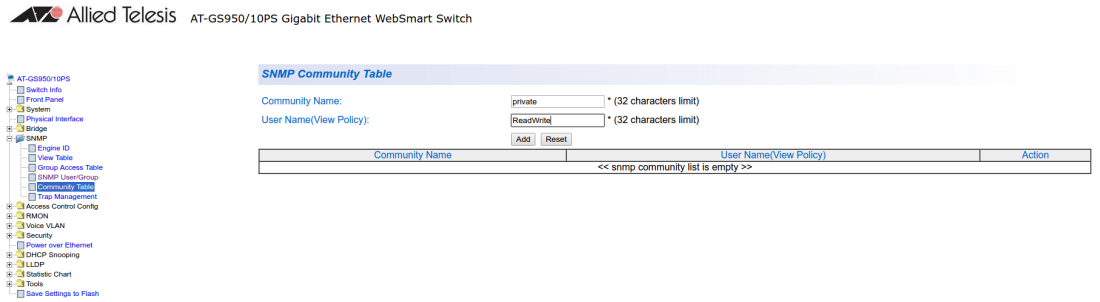


Note that they only need to be tagged on the trunk and don't need any specific configuration for the dynamic VLAN assignment here.

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



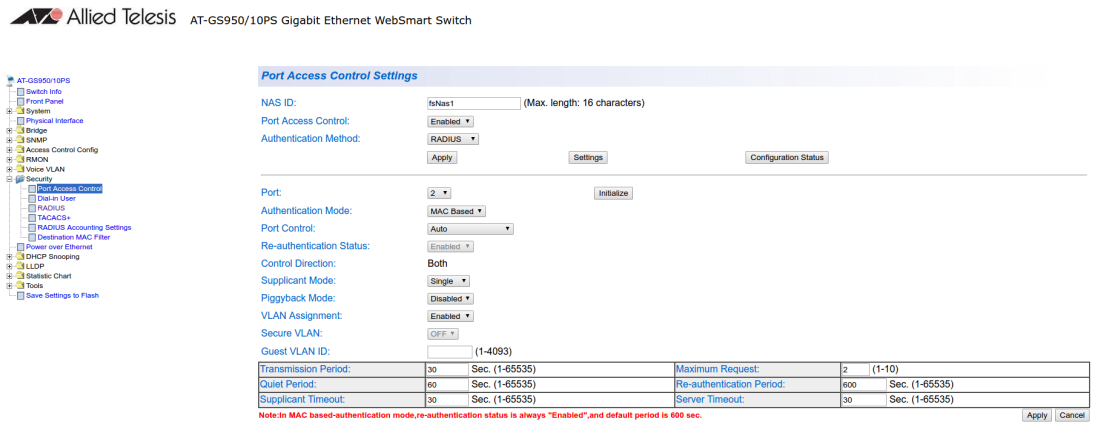
Next, configure an SNMP community (*SNMP* → *Community Table*)



MAC authentication

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

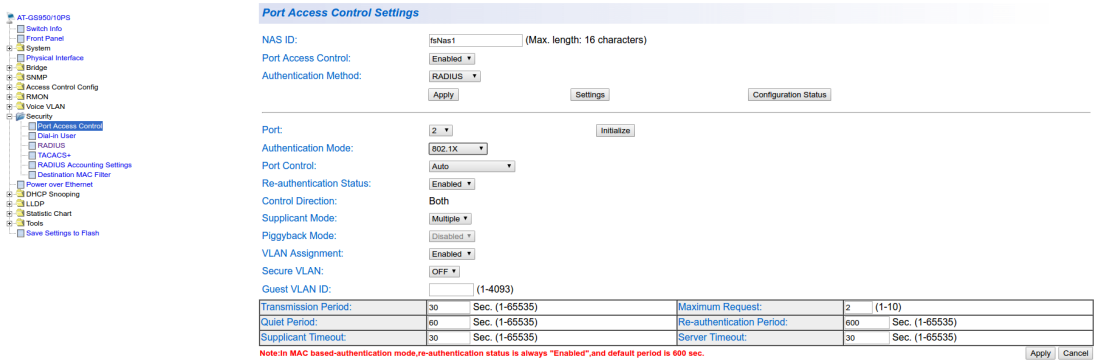
- Authentication Mode: MAC Based
- Port Control: Auto
- Supplicant Mode: Single
- VLAN Assignment: Enabled



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



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
```

3.5. Amer

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

- linkUp/linkDown

Don't forget to update the startup config!

3.5.1. 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

3.6. Aruba

3.6.1. 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.

3.7. 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.

3.7.1. 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-custom.conf.inc` (more information available on Installation → Advanced Topics → Iptables).

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
```

3.8. Brocade

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

3.8.1. 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
```

3.8.2. 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

3.8.3. 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

3.9. Cisco

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

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

Ensure LLDP or CDP notification is configured on all VoIP ports.

Recent models support more secure features:

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

Use most secure feature available for the switch model in this order:

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

3.9.1. 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

3.9.2. Cisco IOS

Switch module for Cisco IOS versions before 12.2(46)SE. Supports PortSecurity with/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

3.9.3. 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

3.9.4. 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 the admin interface 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

3.9.5. 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 <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 the 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 the 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

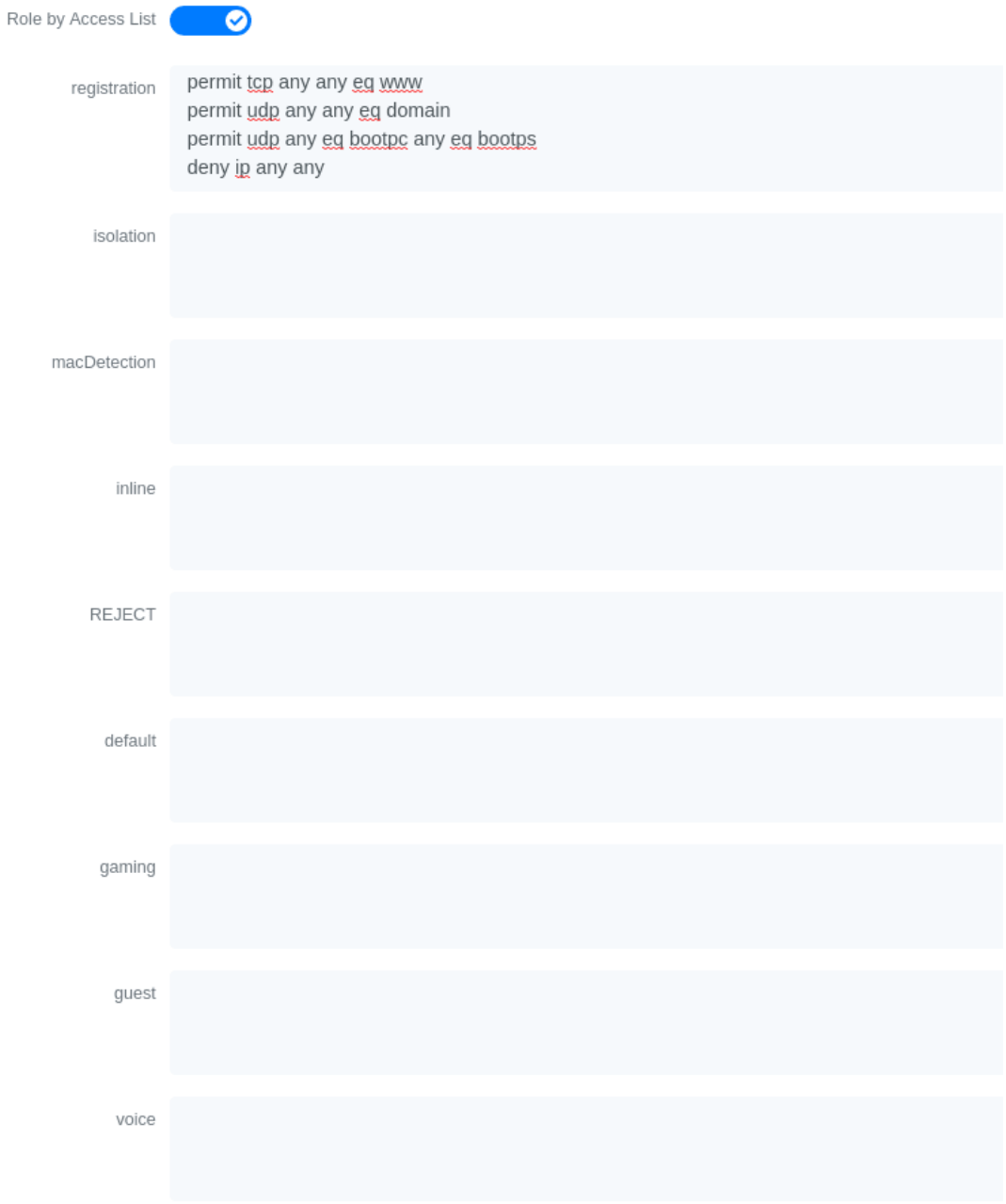
interface GigabitEthernetx/y/z ... ip access-group Auth-Default-ACL in ...

Before continuing, configure the 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.

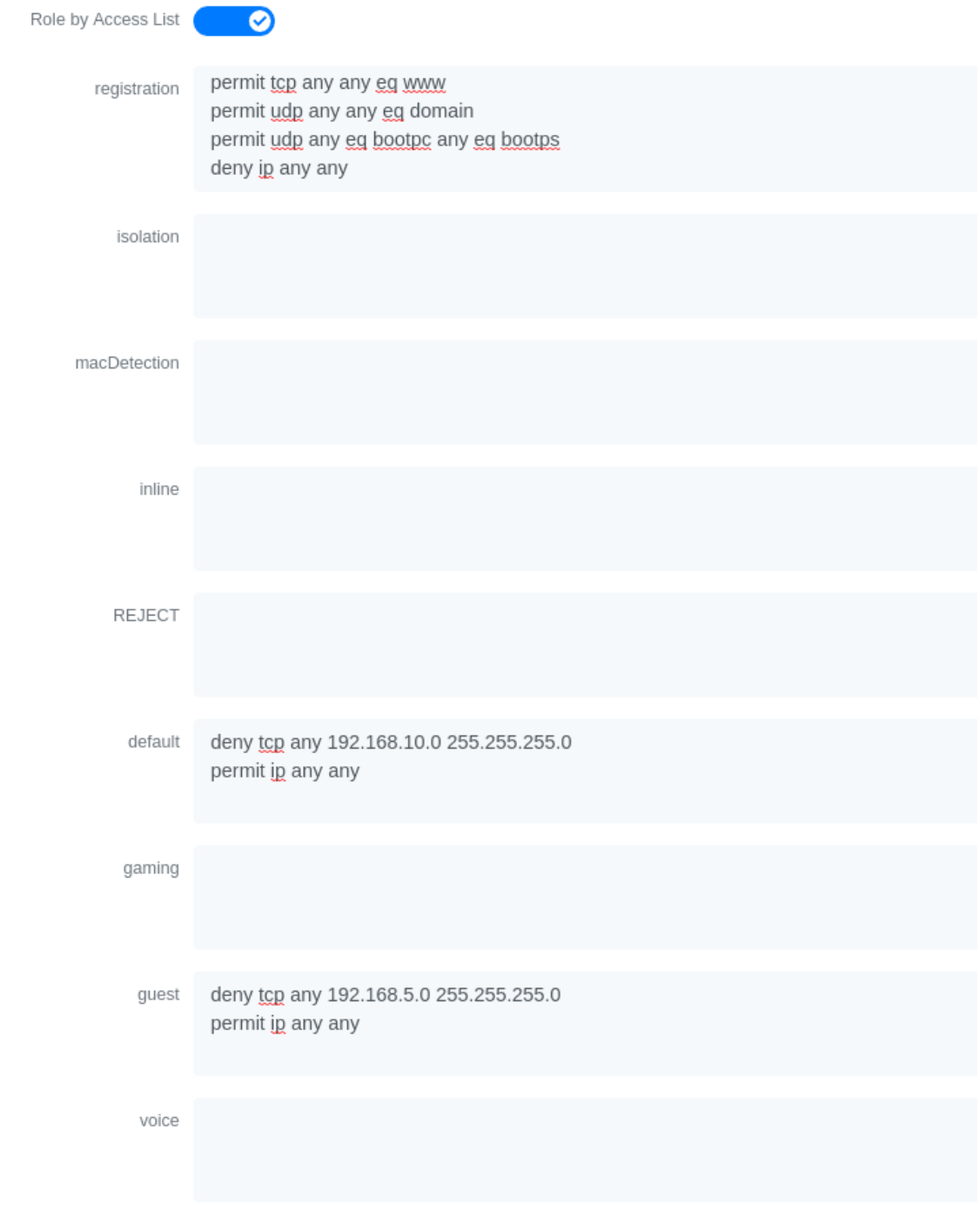
For example if you want the users that are in the registration VLAN to only use HTTP, HTTPS, DNS and DHCP you can configure this ACL in the registration category.



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

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

You can prevent communications between both networks using these access lists

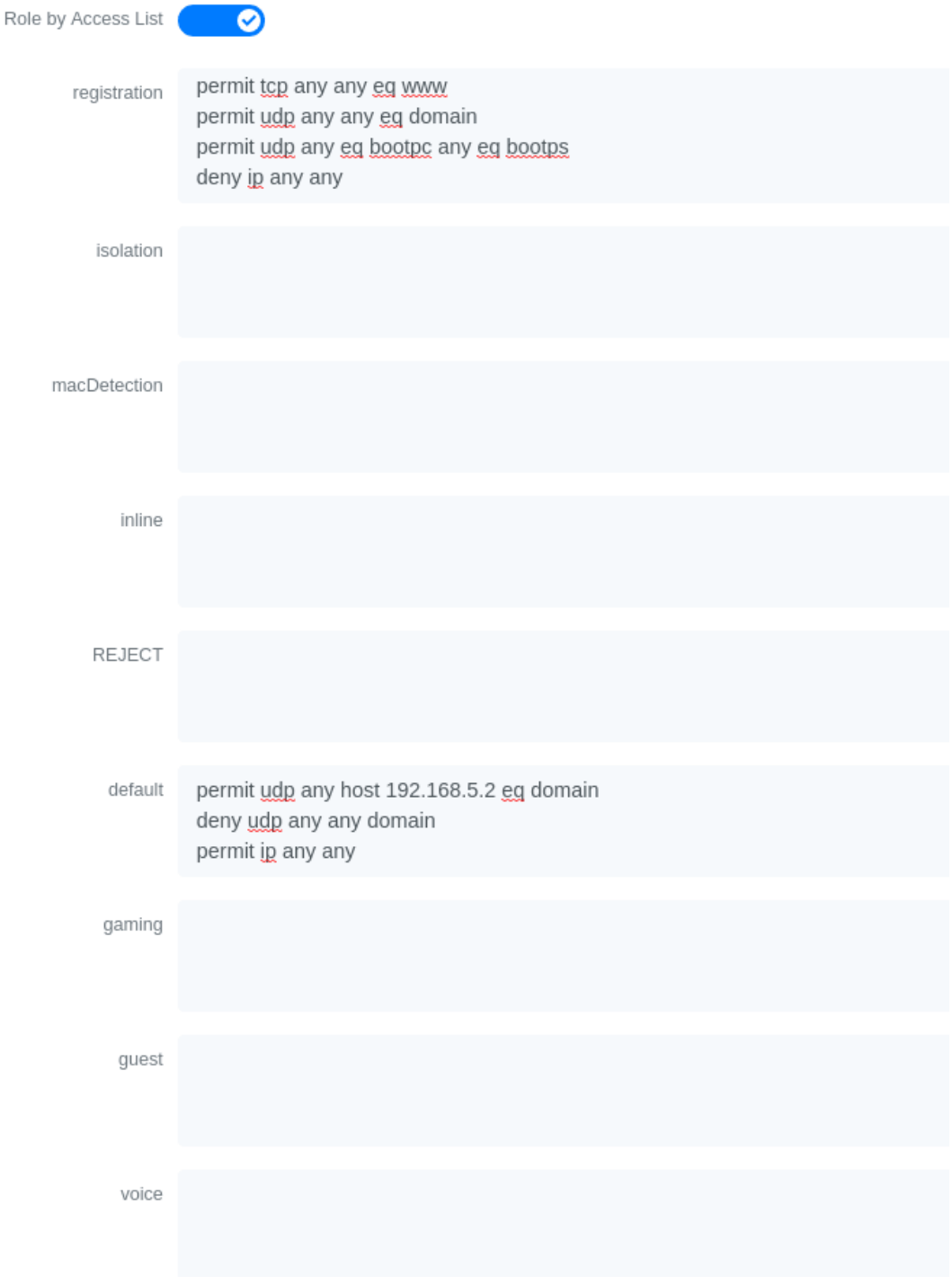


Could also only prevent the guest users from using shared directories

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 could restrict the users to use only the DNS server where 192.168.5.2 is the DNS server



3.9.6. 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 <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 the 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 the 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
```

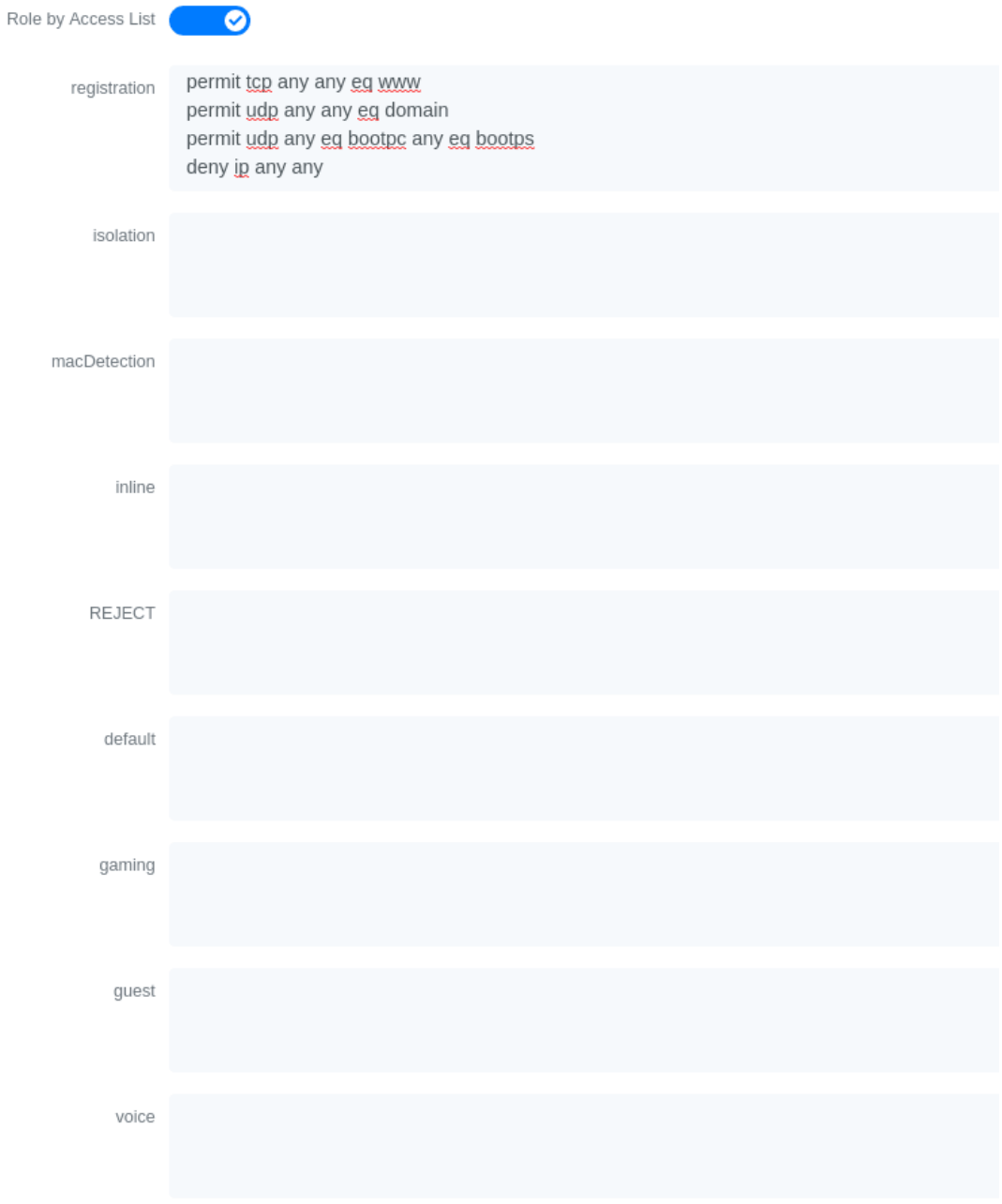
```
interface GigabitEthernetx/y/z
 ...
 ip access-group Auth-Default-ACL in
 ...
```

Before continuing, configure the 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.

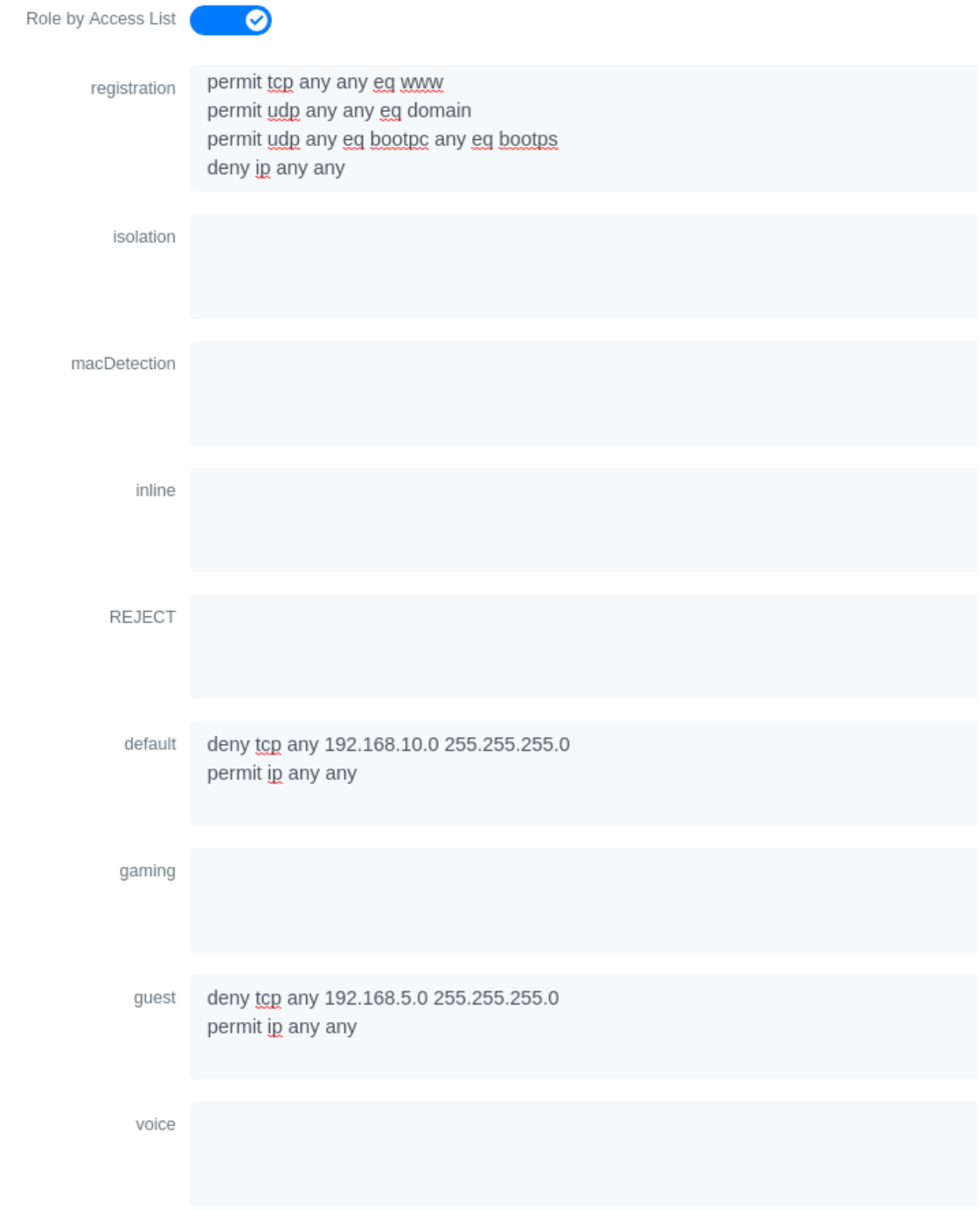


Now if for example, the normal users are placed in the 'default' category and the guests in the 'guest' category.

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

uses the network 192.168.10.0/24.

You can prevent communications between both networks using these access lists

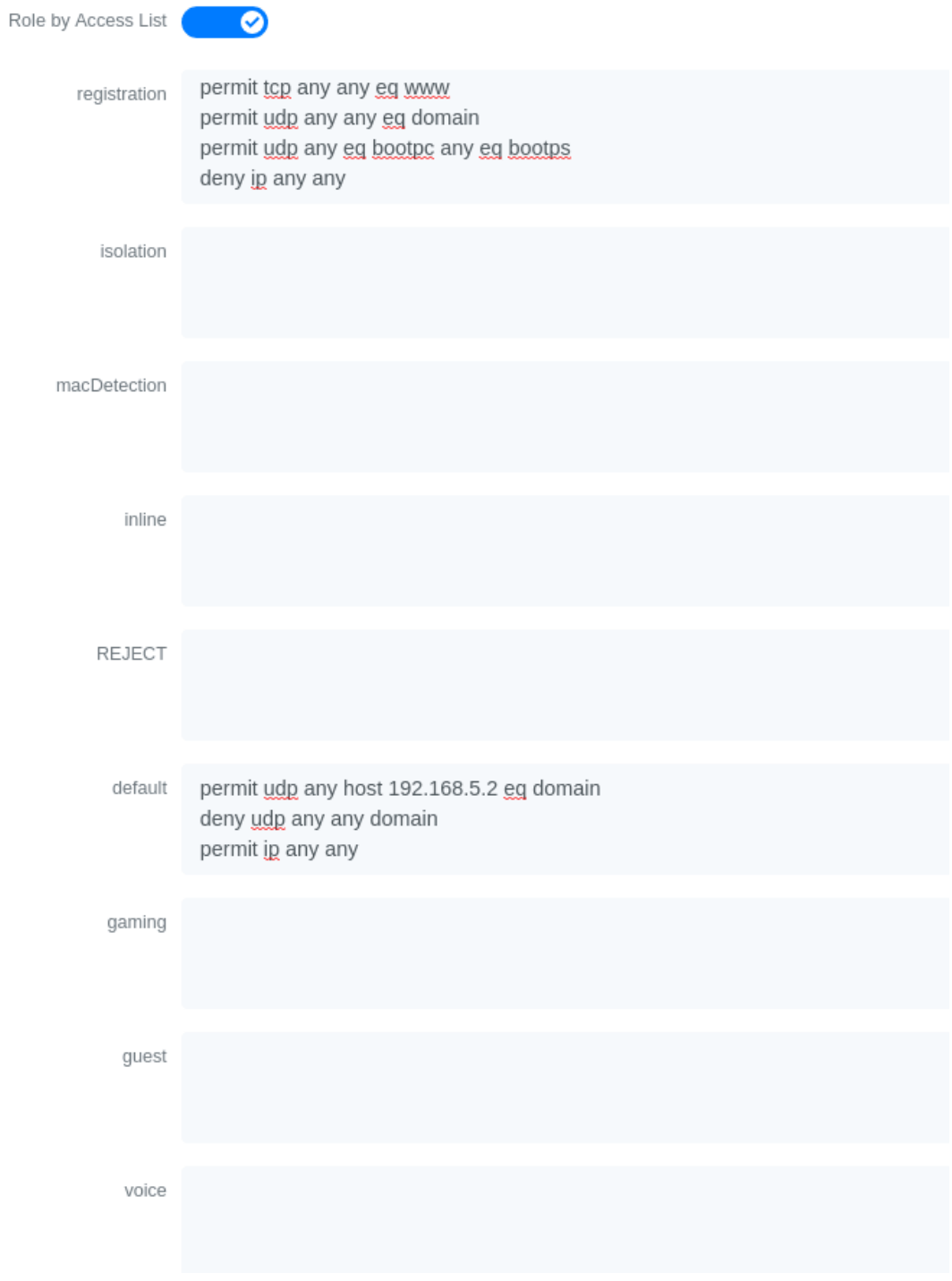


Could also only prevent the guest users from using shared directories

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 could restrict the users to use only the DNS server where 192.168.5.2 is the DNS server



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
```

3.9.7. 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
- ...

3.9.8. 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 3.4E (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
```

3.9.9. 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
```

3.9.10. 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.

3.10. Cisco Small Business (SMB)

Cisco Small Business switches support MAC authentication (MAB), 802.1X, and VoIP. Both technologies can be combined on the same switchport.

VoIP activation requires no switch configuration; configure voice VLAN in PacketFence switch configuration and enable VoIP there. Phones must send untagged traffic when connected to PacketFence-enabled ports. Do not enable voice VLAN capabilities on switch as they may conflict with PacketFence authorization attributes.

3.10.1. Global configuration

CAUTION | Configure local account or RADIUS server for management before executing these steps to maintain switch login access.

Define RADIUS server pointing 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
```

3.10.2. MAC Authentication

Configure MAC authentication 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
```

3.10.3. 802.1X with MAB

Configure 802.1X with MAC authentication fallback 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
```

Configure switch in PacketFence with 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`

3.10.4. 802.1X commands

```
show dot1x
show dot1x users
```

3.11. 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!

3.11.1. DES3526 / 3550

Global config settings

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

On each interface:

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

3.11.2. 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
```

3.12. 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**.

3.12.1. 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
```

3.12.2. 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
```

3.12.3. 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
```

3.12.4. 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
```

3.12.5. N1500 Series (FW >= 6.8)

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
```

3.12.6. 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
```

3.13. Edge core

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

PacketFence also supports MAC authentication on the Edge-corE 4510

3.13.1. 3526XA and 3528M

Global config settings

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

3.13.2. 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
!
```

3.14. 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!

3.14.1. 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.

3.14.2. 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

3.14.3. 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

3.14.4. 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

3.15. 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!

3.15.1. 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.

3.15.2. Extreme EXOS v30.x

This switch version module is designed for Extreme switch series utilizing Extreme versions v30.x Note: "EXOS v30.x" module is tailored for the switch series operating on Extreme versions v30.x. Furthermore, it inherits all functionalities from the existing "EXOS" module, making all the configurations below applicable to EXOS v30.x.

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>
```

<portlist> = ports to secure (individual port or port-range with 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>
```

<portlist> = ports to secure (individual port or port-range with 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
```

3.15.3. 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

Assign switch-defined policies via PacketFence.

Define switch policy:

```
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
```

Enable 'Role by Switch Role' in PacketFence switch configuration; assign policies to roles. Policies returned in Filter-Id attribute.

Use 'Extreme EXOS' switch type for 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
```

Enable 'External Portal Enforcement' and 'Role by Switch Role' in PacketFence switch configuration. Set 'registration' role to 'Unregistered'.

Use 'Extreme EXOS' switch type for this feature.

RADIUS authentication for CLI access

Configure RADIUS server IP as primary server and switch IP as client-ip. Specify 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
```

3.16. Fortinet FortiSwitch

This section shows how to configure RADIUS, MAC Authentication, and 802.1X on a FortiSwitch running FortiSwitchOS 7.x.

CLI access to the FortiSwitch is required for this configuration.

3.16.1. RADIUS

Define an IPv4 RADIUS server using the CLI:

```
config user radius
  edit <name>
    set addr-mode ipv4
    set server <IPv4_address>
```

```
    set source-ip <ipv4_address>
    set radius-port <radius_port_num>
    set secret <server_password>
    set auth-type {auto | chap | ms_chap | ms_chap_v2 | pap}
    set nas-ip <IPv4_address>
    set all-usergroup {enable | disable}
    set link-monitor {enable | disable}
    set link-monitor-interval <5-120 seconds>
  end
end
```

3.16.2. Port Security Global Settings

Using the CLI:

```
config switch global
  config port-security
    set link-down-auth {no-action | set-unauth}
    set mab-reauth {enable | disable}
    set max-reauth-attempt <0-15>
    set reauth-period <0-1440>
  end
```

NOTE | Changes to global settings only take effect when new 802.1X/MAB sessions are created.

3.16.3. MAB

FortiSwitchOS 7.2.3+ supports MAB-only authentication. In this mode, the FortiSwitch performs MAB authentication without EAP authentication. EAP packets are not sent. Enable MAB-only authentication:

Switch Interface Configuration

```
config switch interface
  edit interface_name
    config port-security
      set port-security-mode {802.1X | 802.1X-mac-based}
      set mac-auth-bypass enable
      set auth-order MAB
    end
  next
end
```

3.16.4. 802.1X

FortiSwitchOS 7.0+ supports 802.1X client mobility between ports without deleting the 802.1X session. For example, an 802.1X client PC connected through an IP phone to port1 can move to a third-party switch connected to port2 without session deletion.

This feature is available for 802.1X port-based authentication, 802.1X MAC-based authentication, MAB enabled or disabled, and EAP pass-through mode enabled or disabled.

Switch Interface Configuration

Configure 802.1X settings on an interface:

Using the CLI (for FSR-124D, 200 Series, FS-4xxE, 500 Series, FS-1024D, FS-1024E, FS-T1024E, FS-1048E, and FS-3032E):

```
config switch interface
  edit <port>
    config port-security
      set allow-mac-move-to {disable | enable}
      set eap-egress-tagged {disable | enable}
      set port-security-mode {none | 802.1X | 802.1X-mac-based}
        set framevid-apply {disable | enable}
        set auth-fail-vlan {enable | disable}
        set auth-fail-vlanid <vlanid>
        set auth-priority {MAB-dot1x | dot1x-MAB | legacy}
        set authserver-timeout-period <3-15>
        set authserver-timeout-vlan {enable | disable}
        set authserver-timeout-vlanid <1-4094>
        set eap-passthru {enable | disable}
        set guest-auth-delay <integer>
        set guest-vlan {enable | disable}
        set guest-vlanid <vlanid>
        set mac-auth-bypass {enable | disable}
        set open-auth {enable | disable}
        set radius-timeout-overwrite {enable | disable}
      end
      set security-groups <security-group-name>
    end
```

Using the CLI (for FS-124F, FS-124F-POE, FS-124F-FPOE, FS-148F, FS-148F-POE, and FS-148F-FPOE):

```
config switch global
  config port-security
   set allow-mac-move {disable | enable}
  end
end
```

```
config switch interface
  edit <port>
    config port-security
      set eap-egress-tagged {disable | enable}
      set port-security-mode {none | 802.1X | 802.1X-mac-based}
        set framevid-apply {disable | enable}
        set auth-fail-vlan {enable | disable}
        set auth-fail-vlanid <vlanid>
        set auth-priority {MAB-dot1x | dot1x-MAB | legacy}
        set authserver-timeout-period <3-15>
        set authserver-timeout-vlan {enable | disable}
        set authserver-timeout-vlanid <1-4094>
        set eap-passthru {enable | disable}
        set guest-auth-delay <integer>
        set guest-vlan {enable | disable}
        set guest-vlanid <vlanid>
        set mac-auth-bypass {enable | disable}
        set open-auth {enable | disable}
        set radius-timeout-overwrite {enable | disable}
      end
      set security-groups <security-group-name>
    end
```

Viewing 802.1X Details

Show diagnostics for one or all ports using the CLI:

```
diagnose switch 802-1x status [<port>]
```

For example:

```
diagnose switch 802-1x status port3
```

```
port3: Mode: mac-based (mac-by-pass enable)
Link: Link up
Port State: authorized: ( )
Dynamic Allowed Vlan list: 101
Dynamic Untagged Vlan list: 101
EAP pass-through : Enable
Auth Order : MAB-dot1x
Auth Priority : Legacy
EAP egress-frame-tagged : Enable
EAP auto-untagged-vlans : Enable
Allow MAC Move : Disable
```

```
Dynamic Access Control List : Disable
Quarantine VLAN (4093) detection : Enable
Native Vlan : 101
Allowed Vlan list: 1-200
Untagged Vlan list: 101
Guest VLAN :
Auth-Fail Vlan :
AuthServer-Timeout Vlan :
```

```
       Switch sessions 1/240, Local port sessions:1/20
Client MAC Type Traffic-Vlan Dynamic-Vlan
f0:4d:a2:be:a3:31 802.1x 101 101
```

```
Sessions info:
f0:4d:a2:be:a3:31 Type=802.1x,TTLS,state=AUTHENTICATED,etime=0,eap_cnt=9
params:reAuth=60
user="local-RADIUS",security_grp="radiusgrp",fortinet_grp="Radius_Admins"
```

Clearing Authorized Sessions

Clear authorized sessions for an interface:

```
execute 802-1x clear interface {internal | <port_name>}
```

Example:

```
execute 802-1x clear interface port3
```

Clear an authorized session by MAC address:

```
execute 802-1x clear mac <MAC_address>
```

Example:

```
execute 802-1x clear mac 00:21:cc:d2:76:72
```

3.17. Foundry

3.17.1. 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.

3.18. H3C

3.18.1. 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.

3.18.2. 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
```

3.19. HP

3.19.1. HPE 1910 Serie

HP 1910 Series uses 3Com OS with most configuration done via GUI.

VLAN creation:

- Go to **Network** > **VLAN**
- Click *Create* tab
- Create 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.

3.19.2. E4800G and E5500G Switch series

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

3.20. 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`.

3.20.1. 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.

3.20.2. 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.

3.20.3. 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)

3.20.4. 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)

3.20.5. 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 admin interface, go to *Configuration → Policies and Access Control → Network Devices → 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:

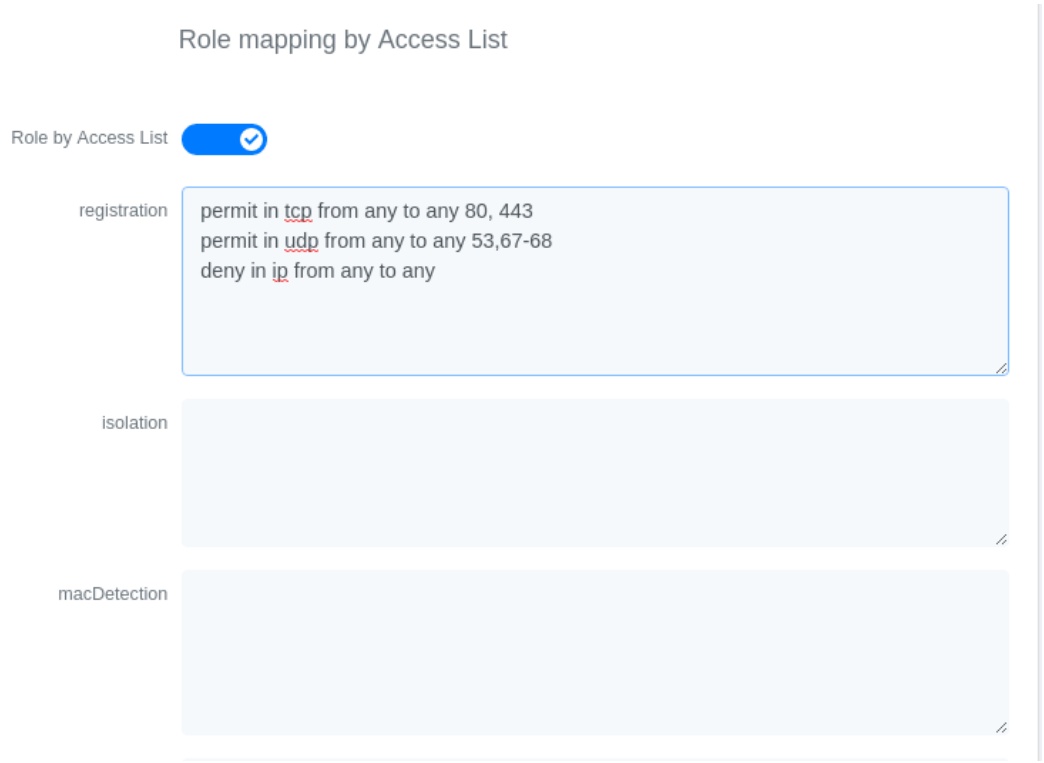
```
aaa port-access mac-based <port-list>
```

- 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.

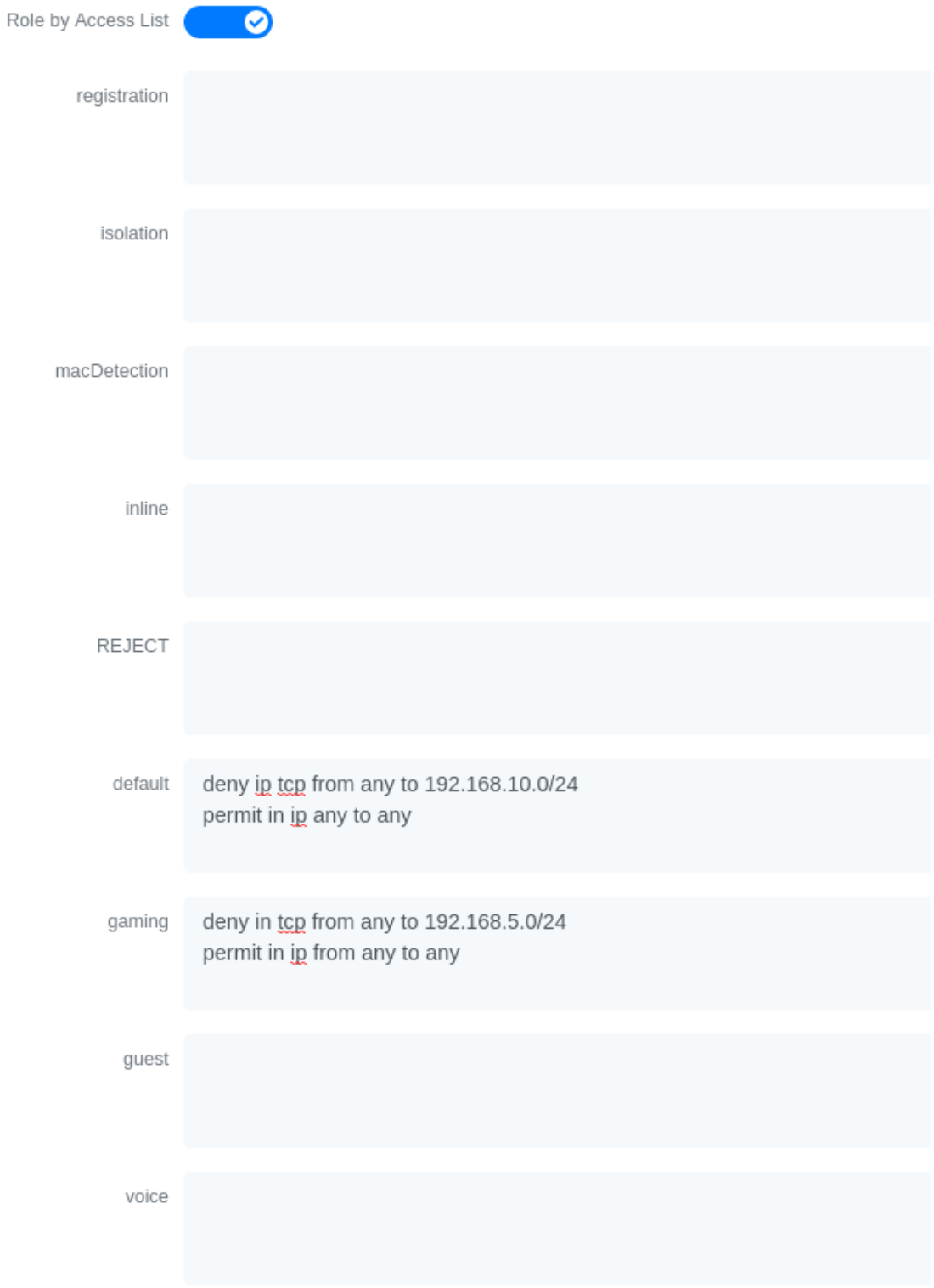
For example, if you want the users that are in the registration VLAN to only use HTTP, HTTPS, DNS and DHCP you can configure this ACL in the registration role.



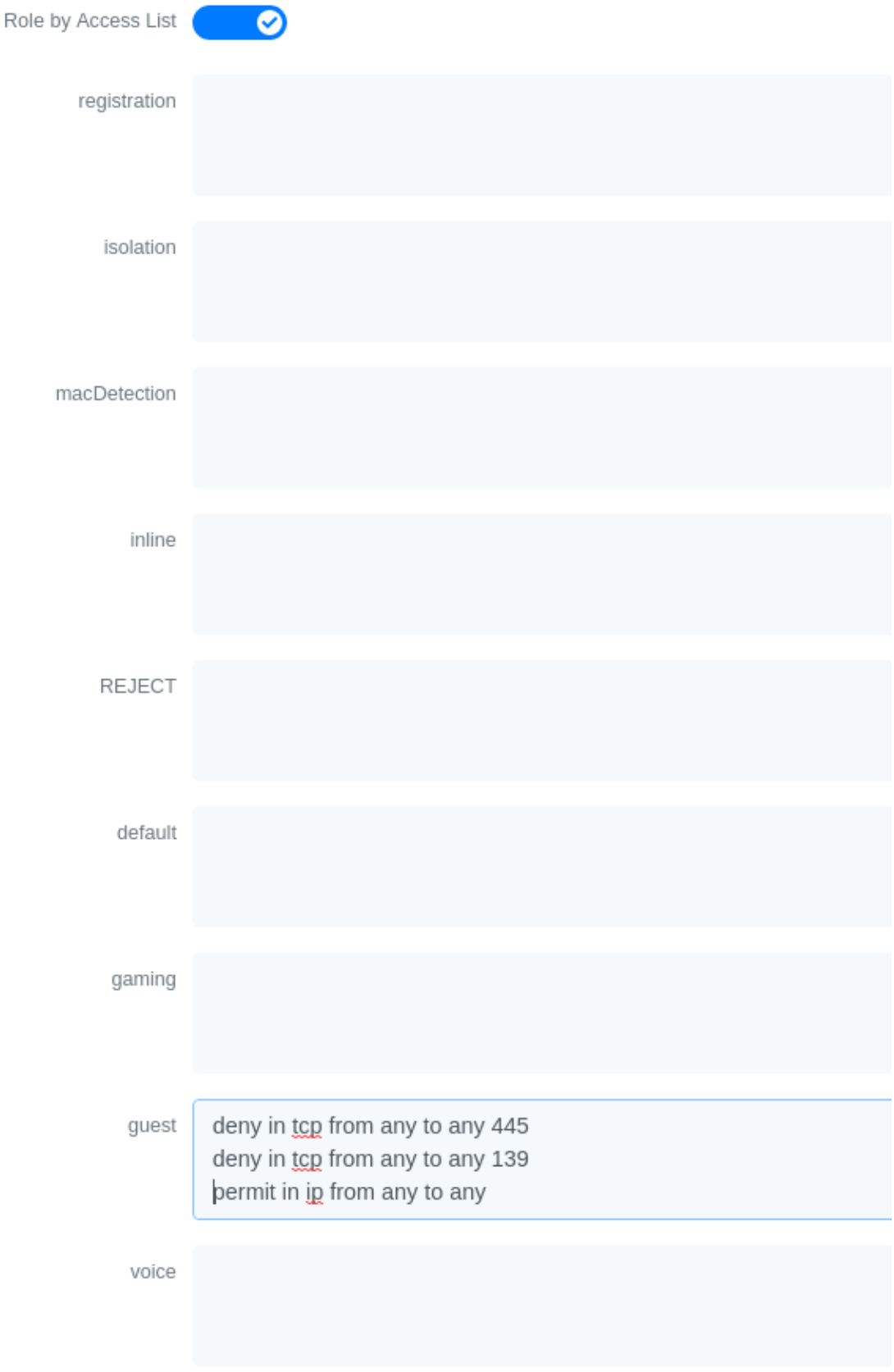
Now, your normal users are placed in the 'default' role and your guests in the 'guest' role.

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

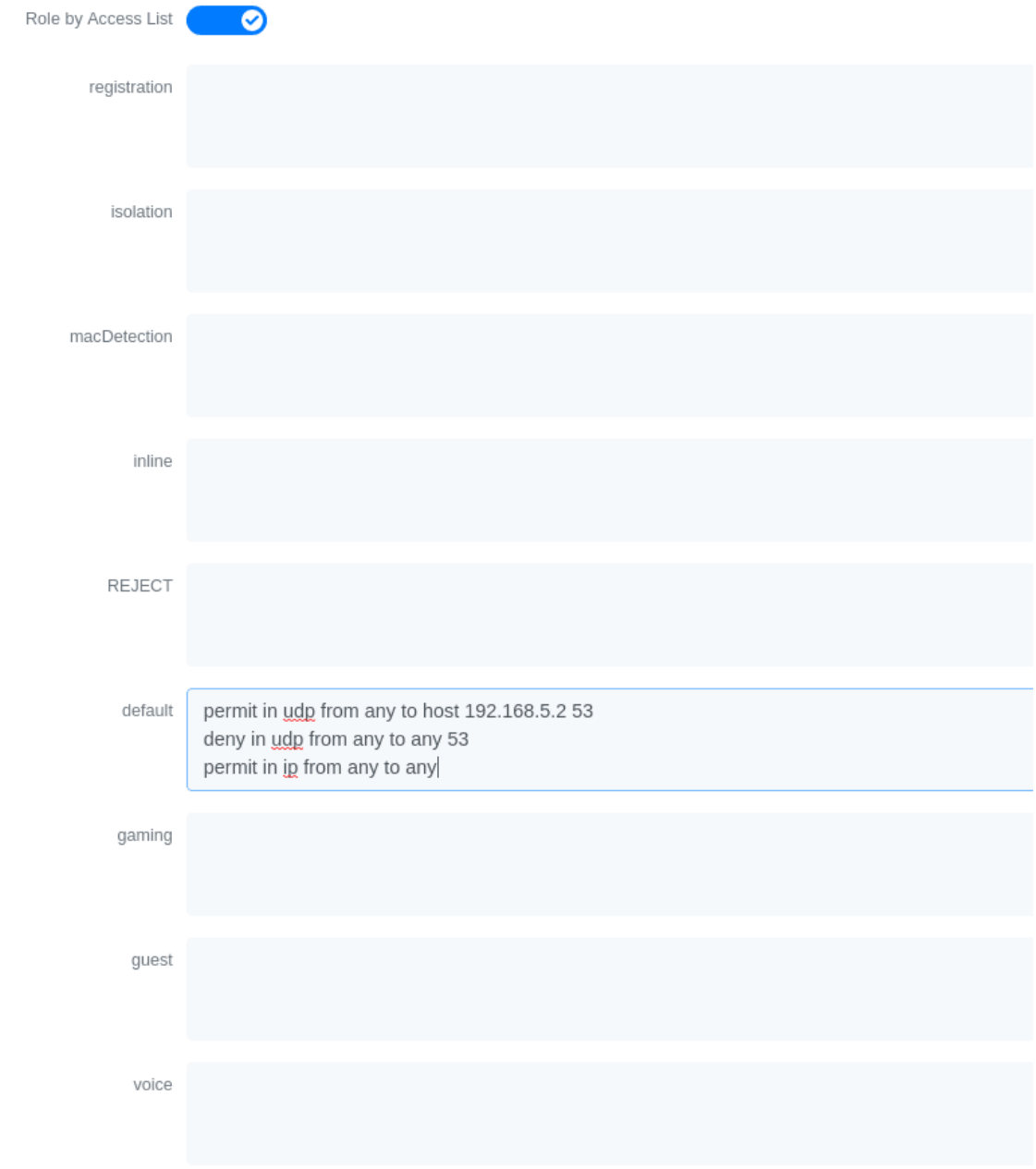
You can prevent communications between both networks using these access lists



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



3.21. Huawei

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

3.21.1. 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
```

3.21.2. 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
```

3.21.3. 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
```

3.21.4. 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
```

3.21.5. 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
```

3.21.6. Troubleshooting commands

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

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

3.22. IBM

3.22.1. 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

To configure the IBM RackSwitch G8052 switch module, in the admin interface go to Configuration → Network Devices → 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

3.23. Intel

3.23.1. Express 460 and Express 530

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

- linkUp/linkDown

Exact command-line configuration to be contributed...

3.24. 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)

3.24.1. Junos Modules

Standard switch module supporting legacy Juniper switches using Junos versions before v12.x.

Junos v12.x and Junos v13.x

Junos v12.x and v13.x modules designed for switches operating on JuniperOS v12.x and v13.x. Inherits all functionalities from "EX2200 and EX4200" modules; all configurations below apply to Junos v12.x and v13.x.

Junos v15.x and Junos v18.x

Junos v15.x and v18.x modules designed for switches using JuniperOS v15.x and v18.x. Inherits all functionalities from "EX2200_v15 and EX2300" modules.

```
# 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.

3.24.2. 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"
```

3.24.3. 802.1X configuration

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

```
                }
            }
        }
    }
}
Ctrl-D
# commit comment "packetfenced dot1x"
```

3.24.4. 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"
```

3.24.5. 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.

3.24.6. 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
```

3.25. 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

3.25.1. 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!

3.26. Linksys

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

- linkUp/linkDown

Don't forget to update the startup config!

3.26.1. 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
```

3.27. 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.

3.27.1. 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!

3.27.2. 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
```

3.27.3. 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

3.28. 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.

3.28.1. 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
```

3.28.2. 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
```

3.29. 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

3.30. SMC

3.30.1. 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
```

3.30.2. TigerStack 6224M

Supports linkUp/linkDown mode

Global config settings

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

3.31. Ubiquiti

3.31.1. 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

Switch IP assumed: 192.168.1.254

Uplink 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

Switch IP assumed: 192.168.1.254

Uplink 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
```

4. Wireless Controllers and Access Point Configuration

4.1. Assumptions

Network infrastructure assumptions for this configuration:

- PacketFence 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

4.2. Unsupported Equipment

Wireless network access configuration is more consistent between vendors due to standardization compared to wired side: VLAN assignment done centrally with RADIUS and consistent client protocol (MAC-Authentication or 802.1X).

This consistency means most wireless network devices work out-of-the-box with PacketFence. Only missing piece typically: remote client deauthentication for VLAN assignment (deauth user to reconnect and get new VLAN).

Even if your wireless equipment isn't explicitly supported by PacketFence, try it. Next section covers objectives for testing equipment without existing configuration.

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.

4.3. 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.

4.3.1. 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

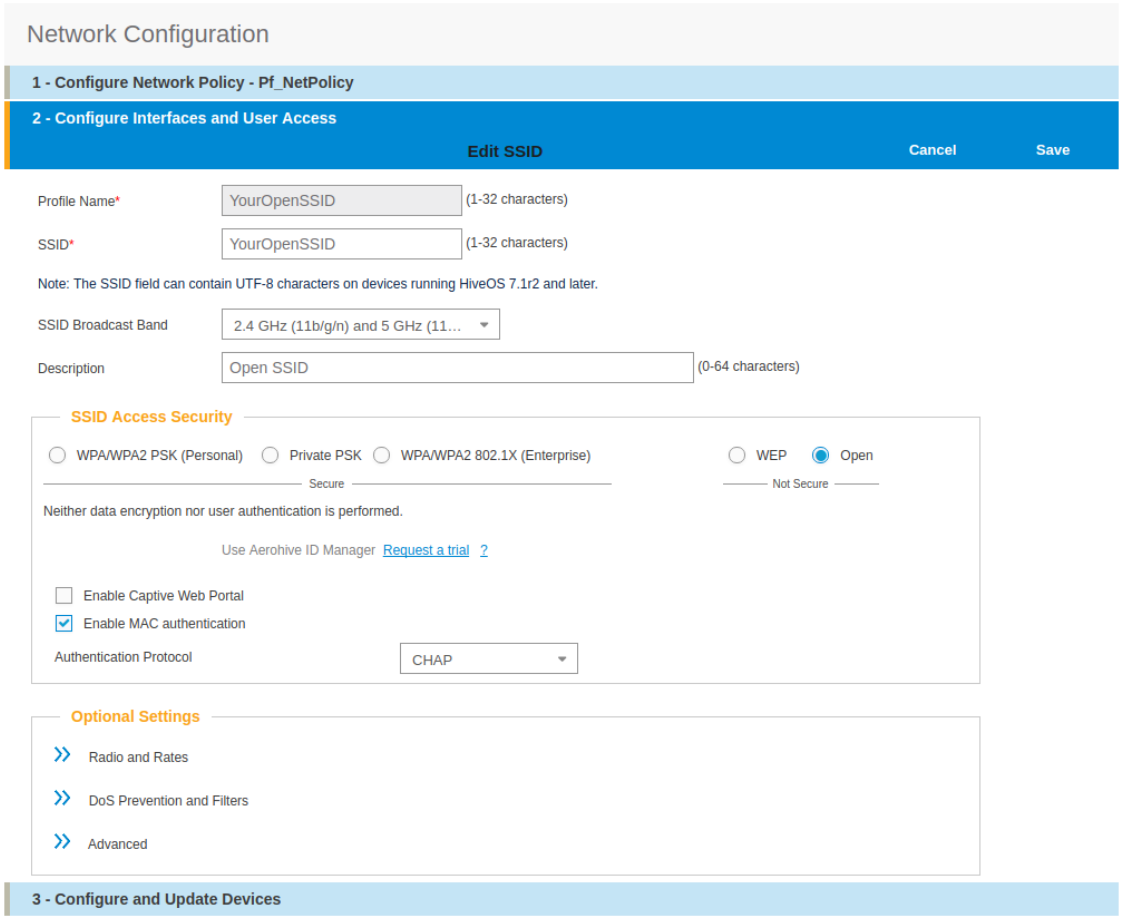
Configure the Aerohive APs and SSID

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:

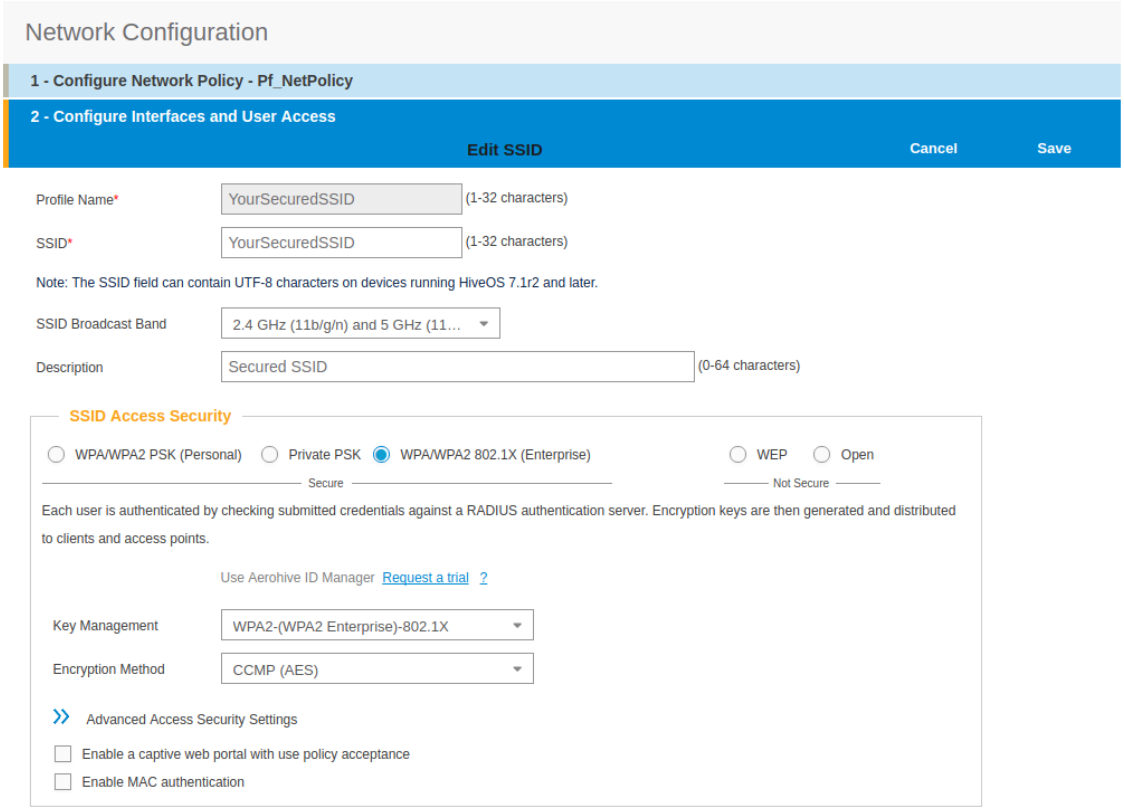
- click on **New**
  - SSID Access Security: **Open**
  - check the box *Enable MAC authentication*
- click on **Save**



For a secure SSID using 802.1X:

- click on **New**

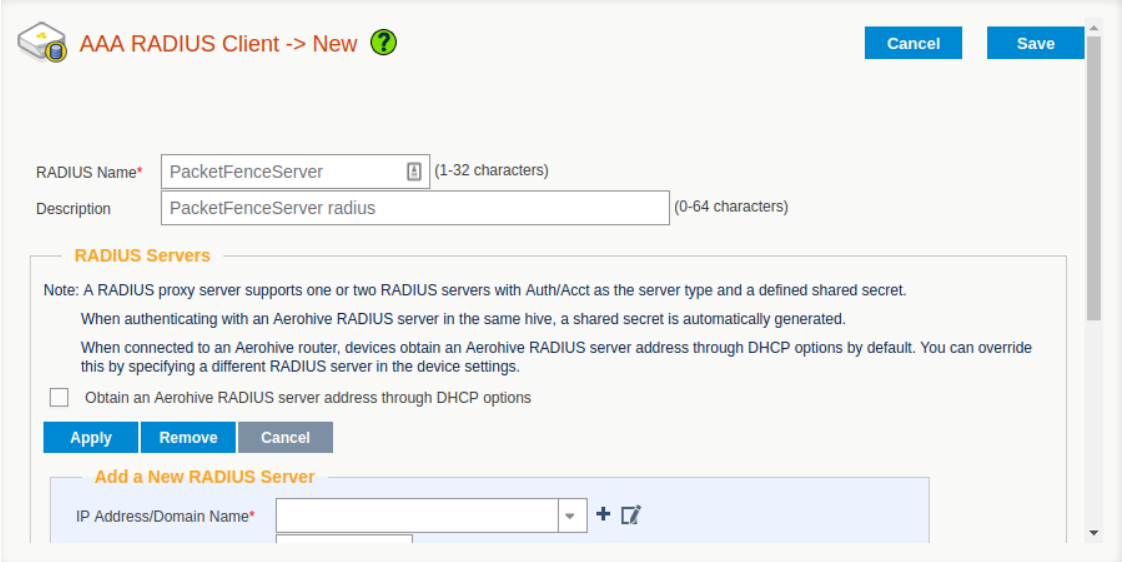
- SSID Access Security: **WPA/WPA2 802.1X (Enterprise)**
- Key Management; **WPA2-(WPA2 enterprise)-802.1X**
- Encryption method: **CCMP (AES)**



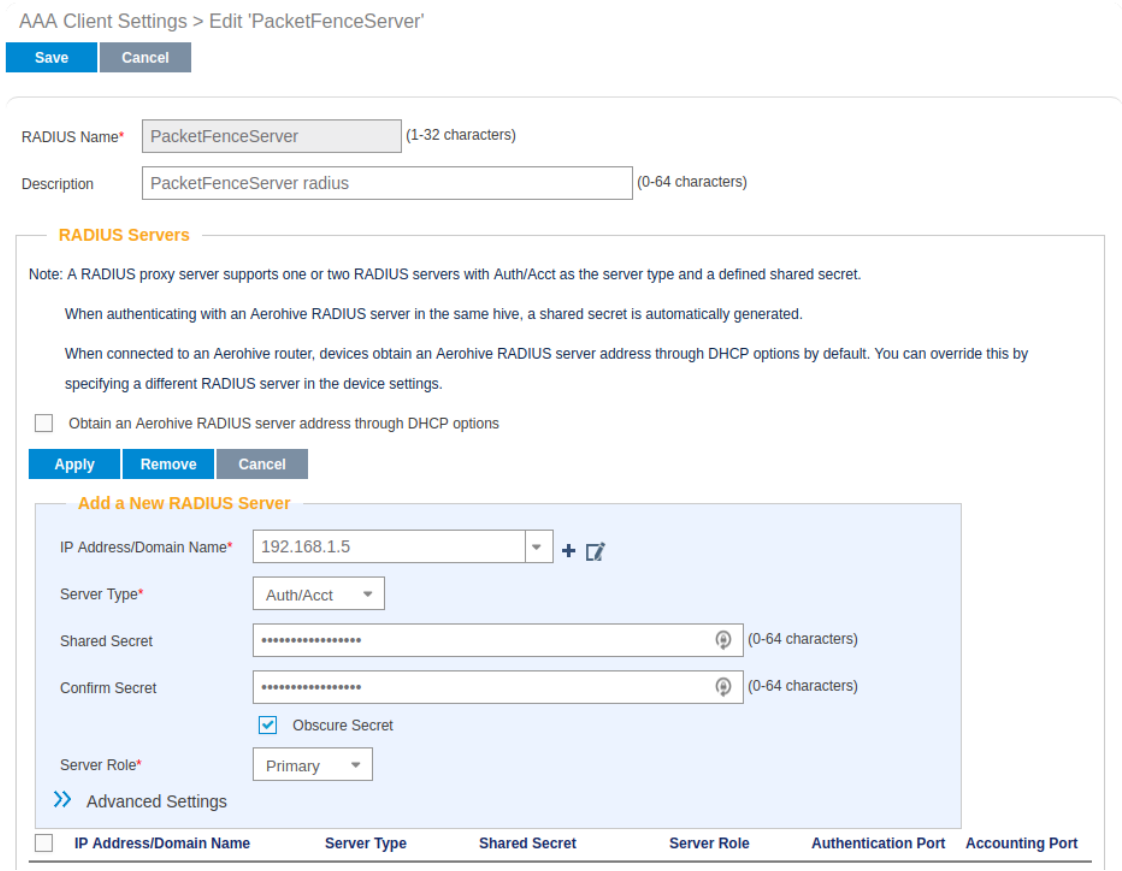
- click on **Save**
- from SSID, be sure to have selected both SSIDs previously created, and click **OK**

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



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

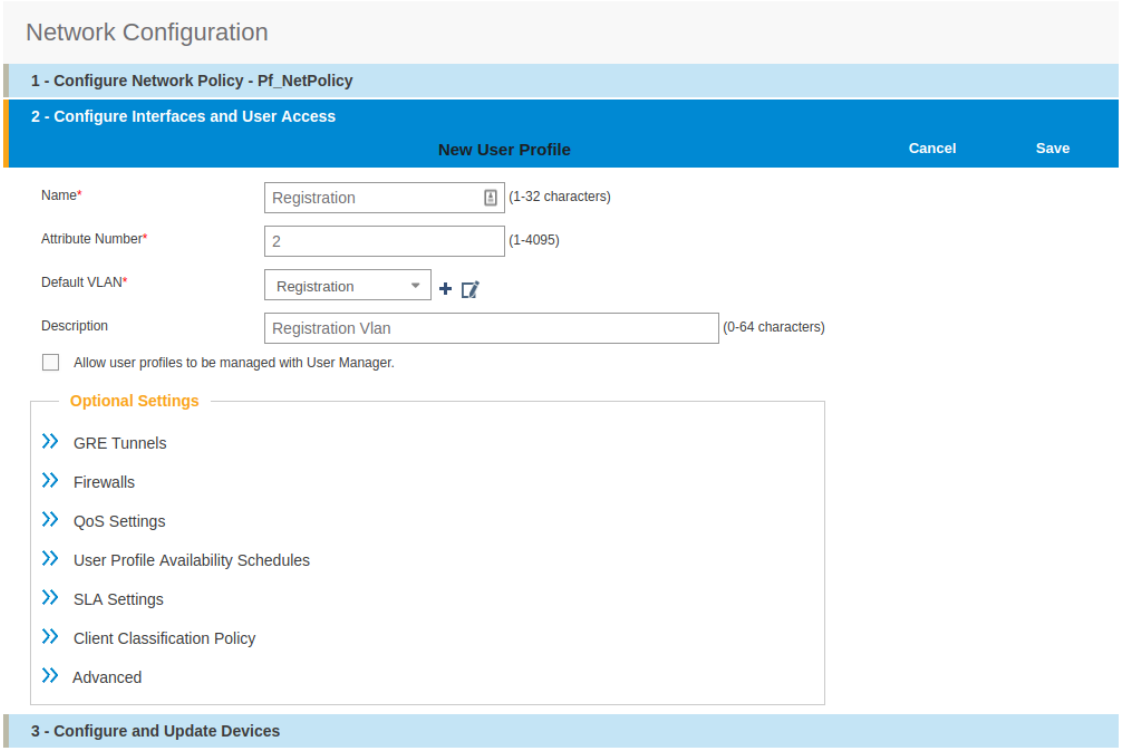


- deploy the *Optionnal Setting(not supported by RADIUS Proxy)* section and check the *Permit Dynamic Change of Authorization Message (RFC 3576)*

- 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*



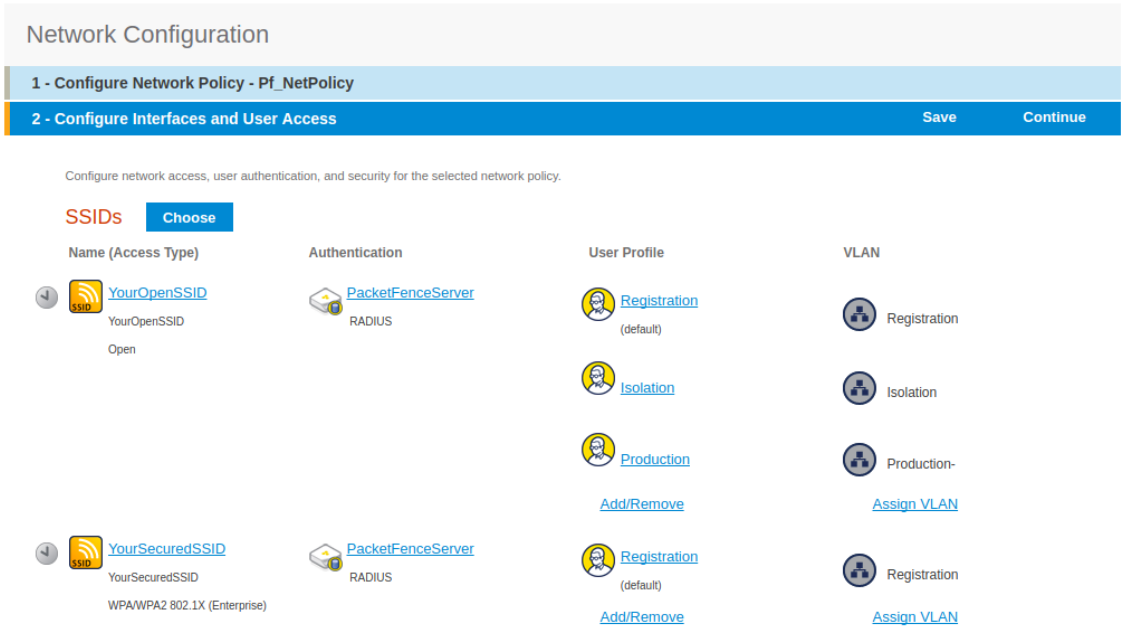
Create and add the other VLANs:

- 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



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

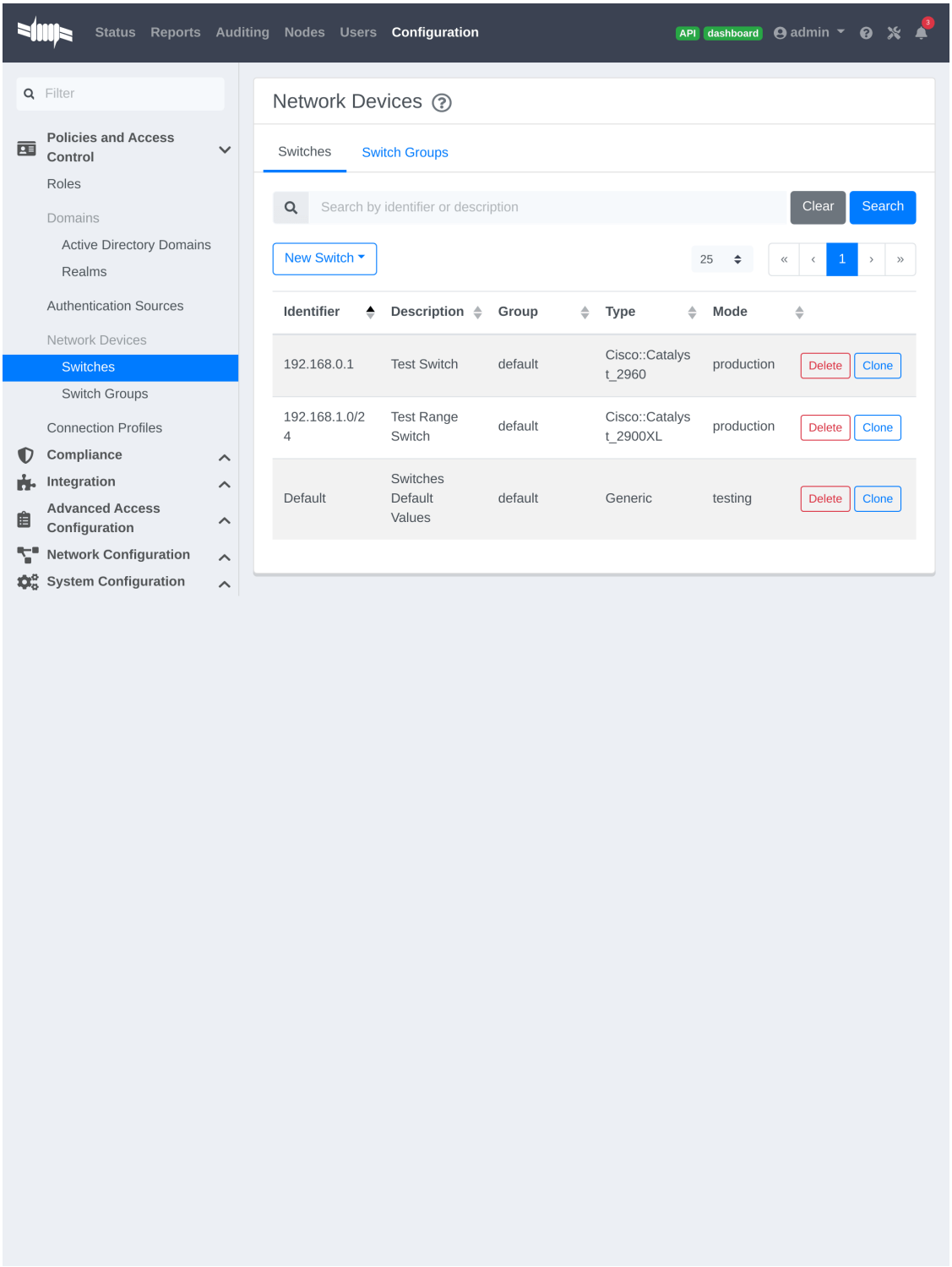
Aerohive have a session replication feature to ease the EAP session roaming between two access points. However, this may cause problems when you bounce the wireless card of a client, it will not do a new RADIUS request. Two settings can be tweaked to reduce the caching impact, it is the roaming cache 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:

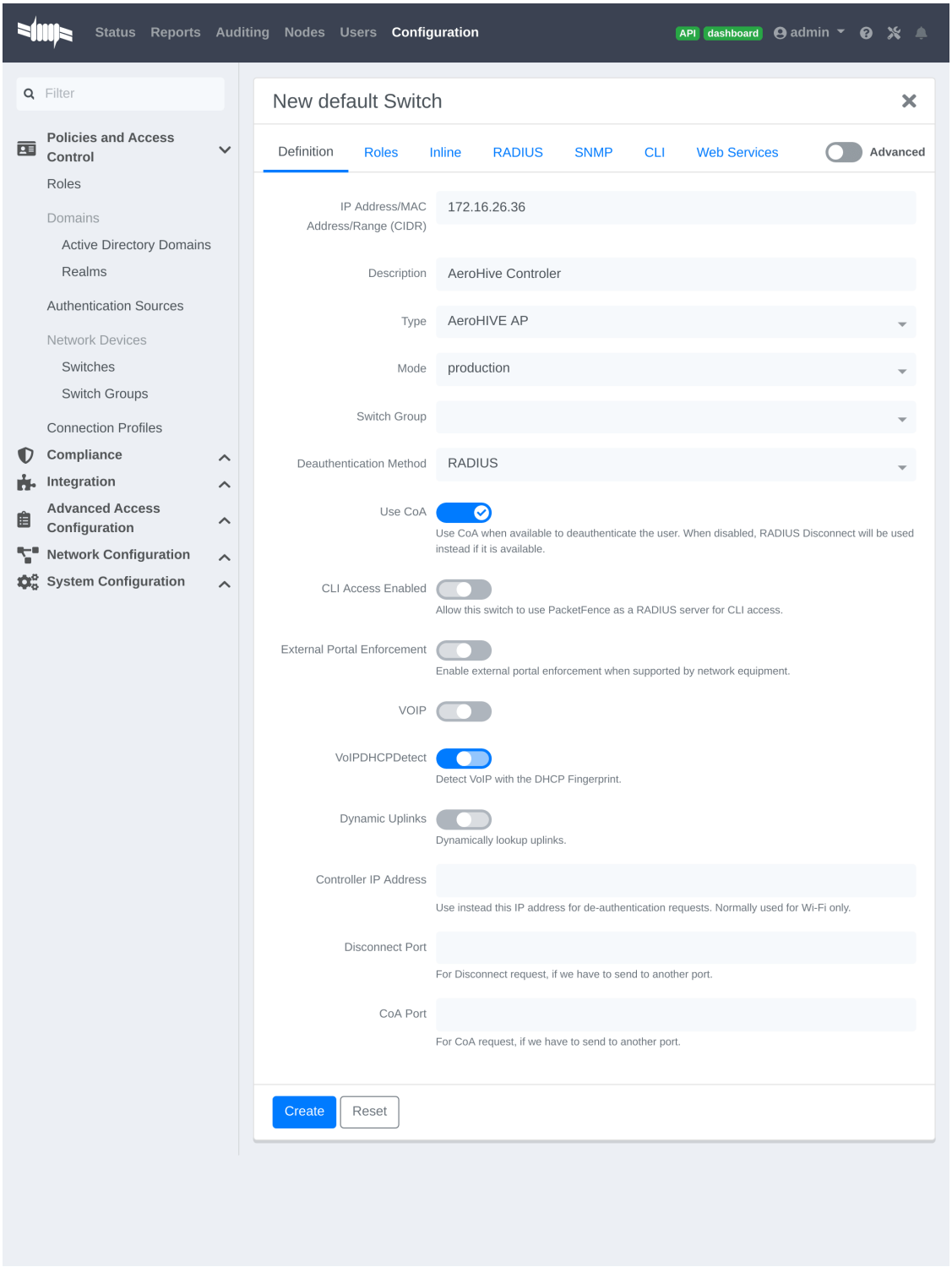
- from *Configuration / Policies and Access Control / Switches /*
- on the line where there is the *default*, on the right, Click on *CLONE*



In *Definition*:

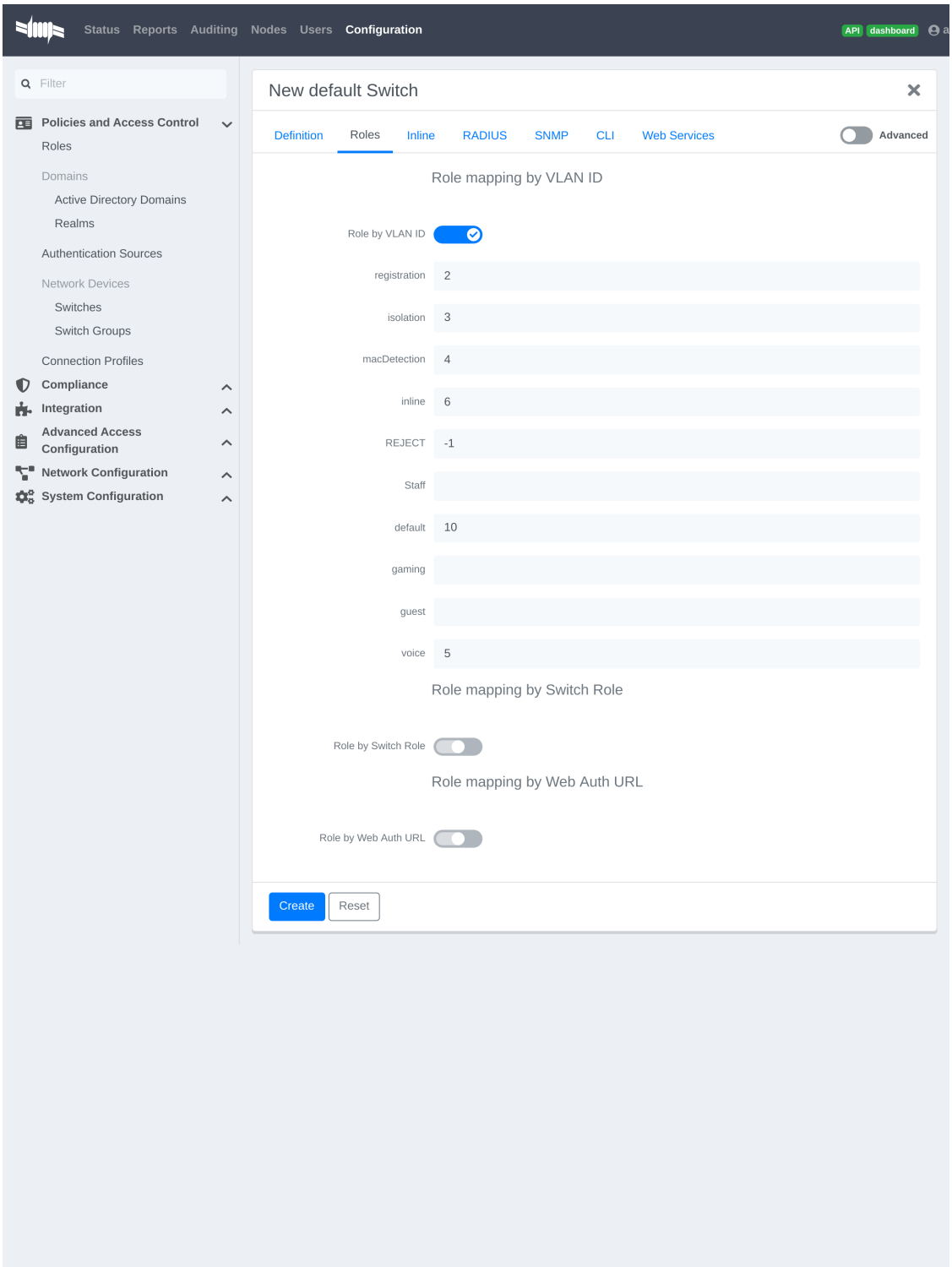
- *IP Address/MAC Address/Range (CIDR)*, give the network address of your *Production* network; For us, it will be **172.16.1.1**
- *Description*, give a description so you can quickly see what it is about

- 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**



From *Role*:

- set all VLAN ID for each roles



From *RADIUS*:

- modify the secret passphrase previously sets in the Aerohive HiveManager
- click on **SAVE**

This ends the PacketFence configuration.

4.3.2. Web Auth (External Captive Portal) Configuration

In this section we will describe the WebAuth configuration using PacketFence as an external captive poral.

Assumptions

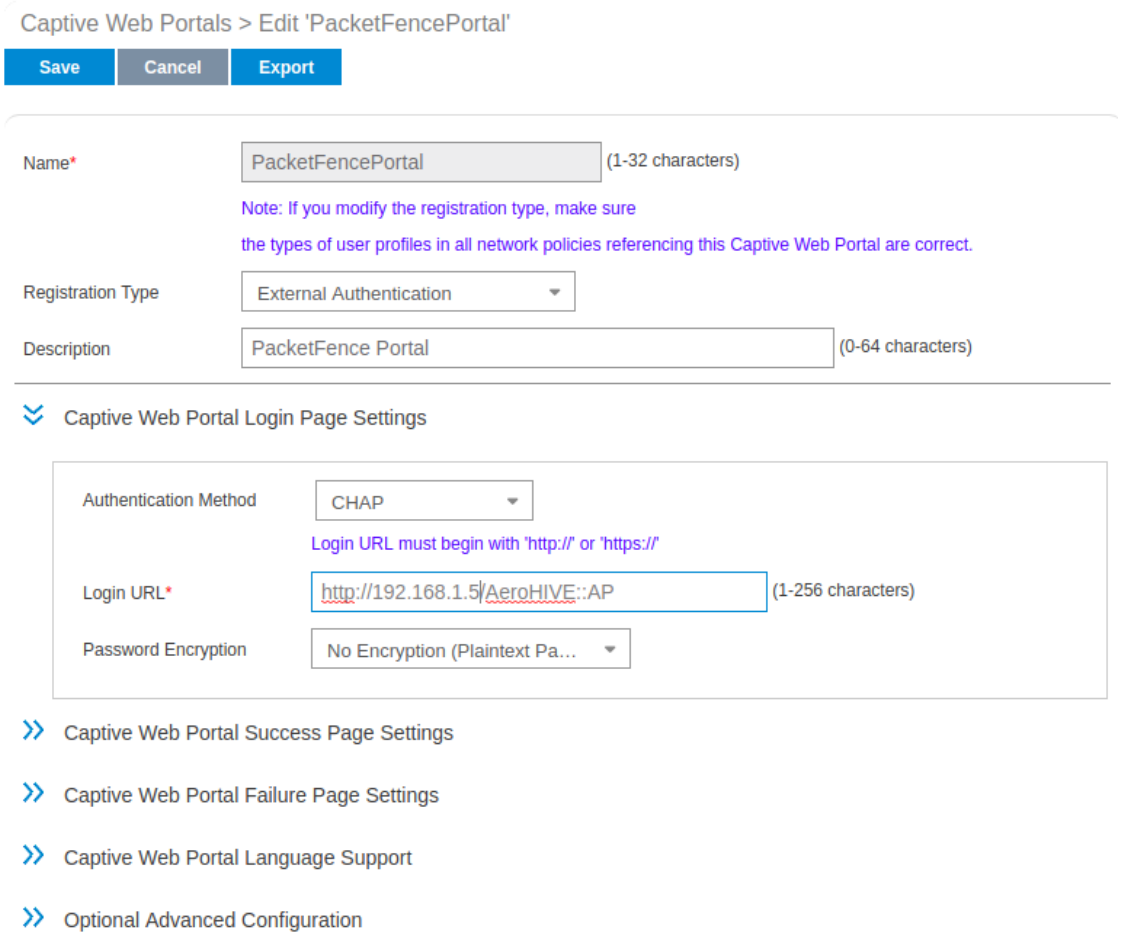
In this part, it is recommended that the default VLAN must be the native VLAN. This way, the AP and the others network equipments will be able to manage VLANs.

You already have a Network Policy and at least one Access Point configured.

Configure the external captive portal

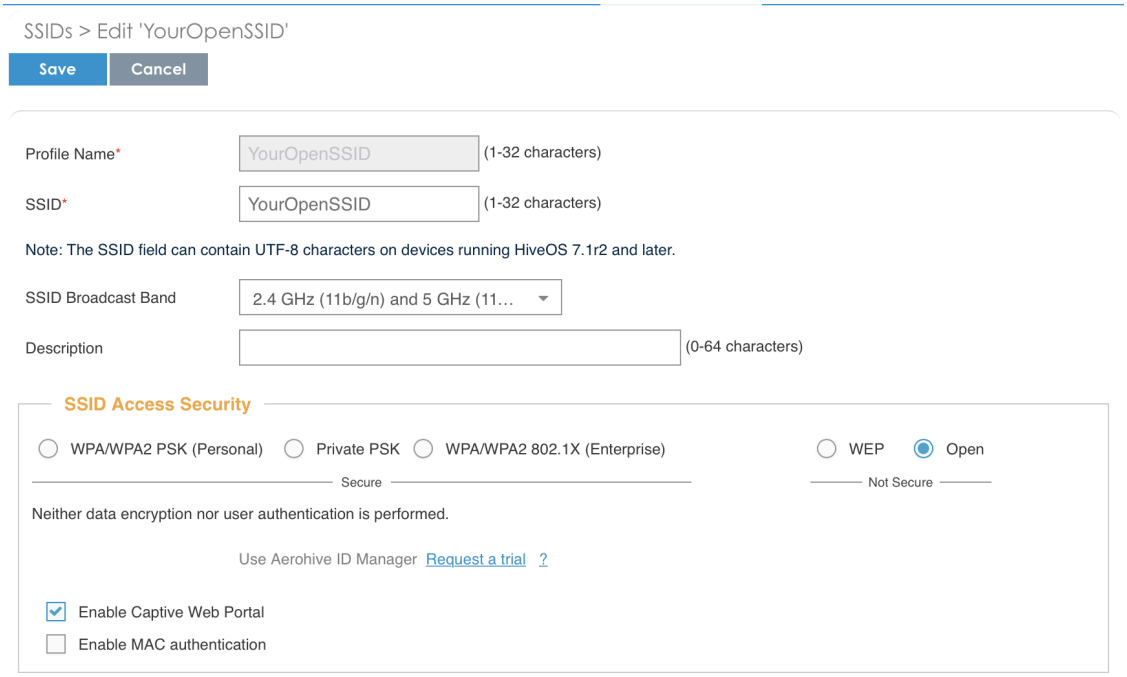
Create a new Captive Portal Profile:

- 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**



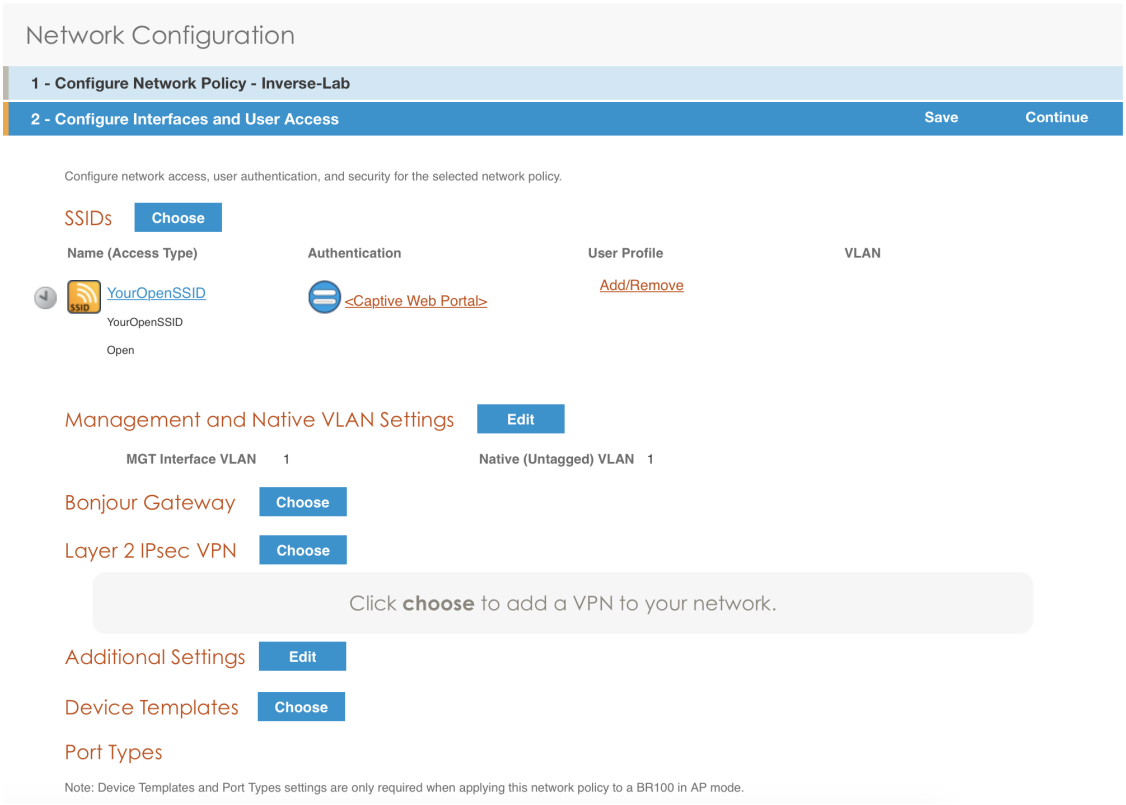
Create a SSID to enable Captive Portal functionality:

- 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:

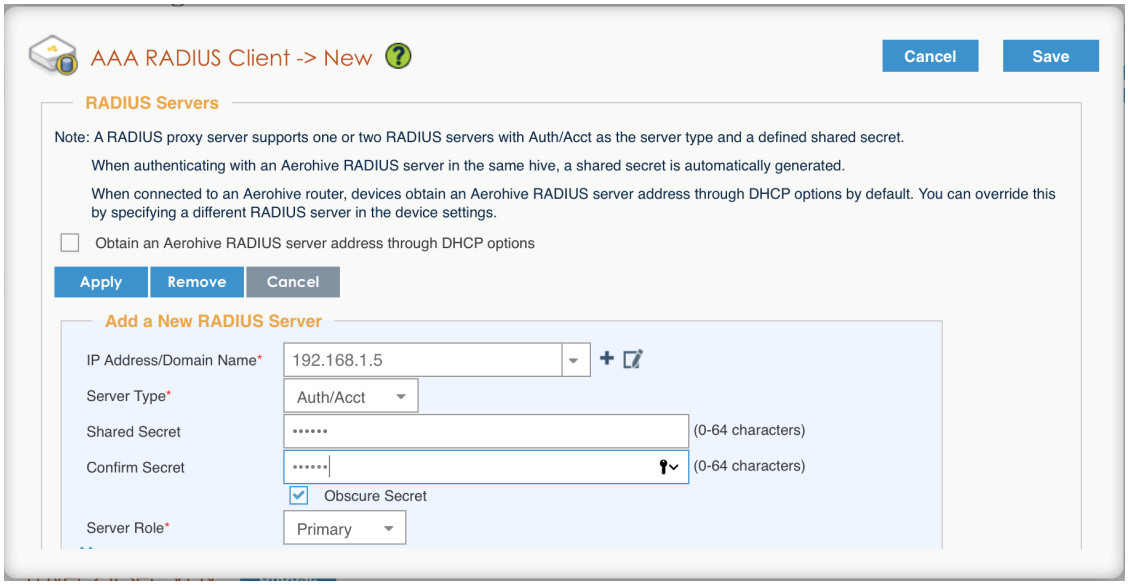


Configure and broadcast your SSID:

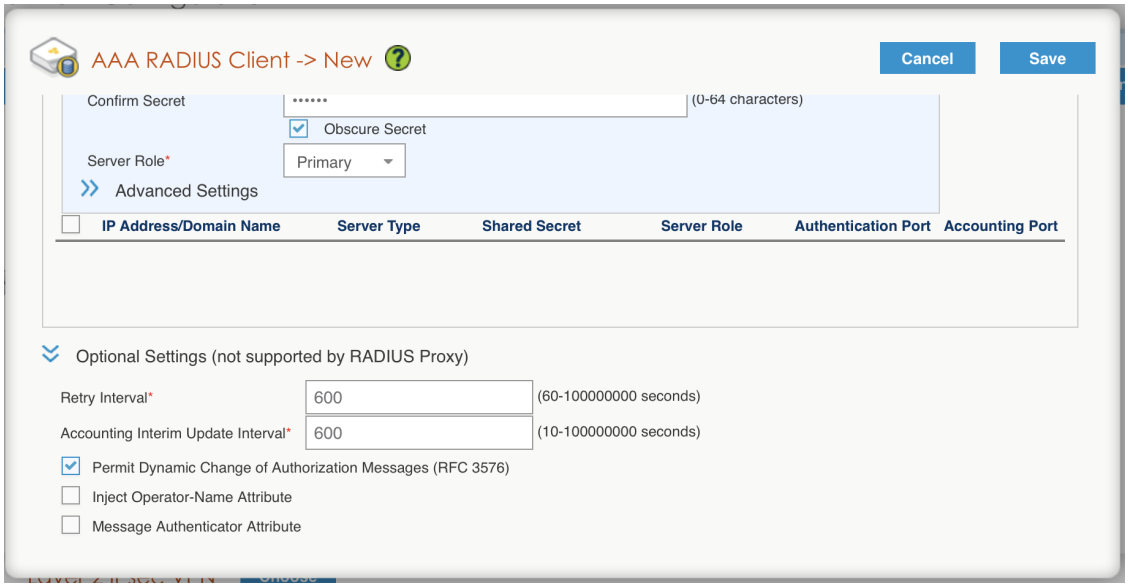
- from the HiveManager, go to **CONFIGURATION → NETWORK POLICIES**
- choose Network Policy and click OK, you should see this:



- 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

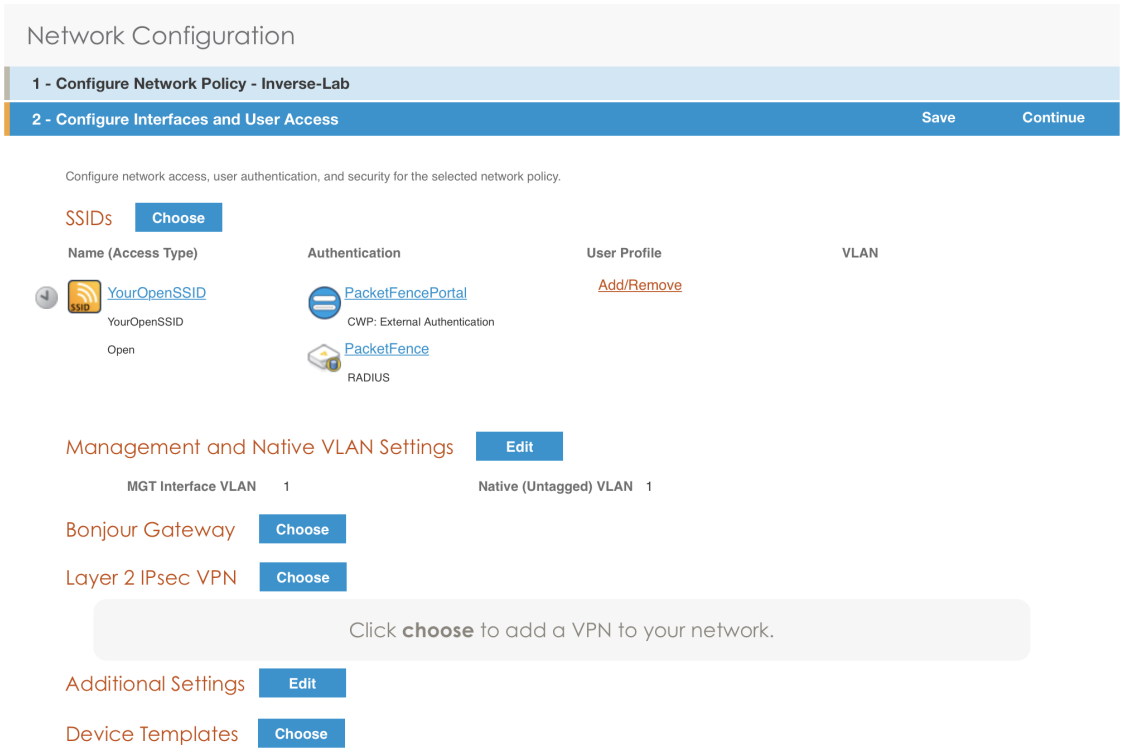


- click on Apply
- click on *Optional Settings (not supported by RADIUS Proxy)* and check **Permit Dynamic Change of Authorization Messages (RFC 3576)**

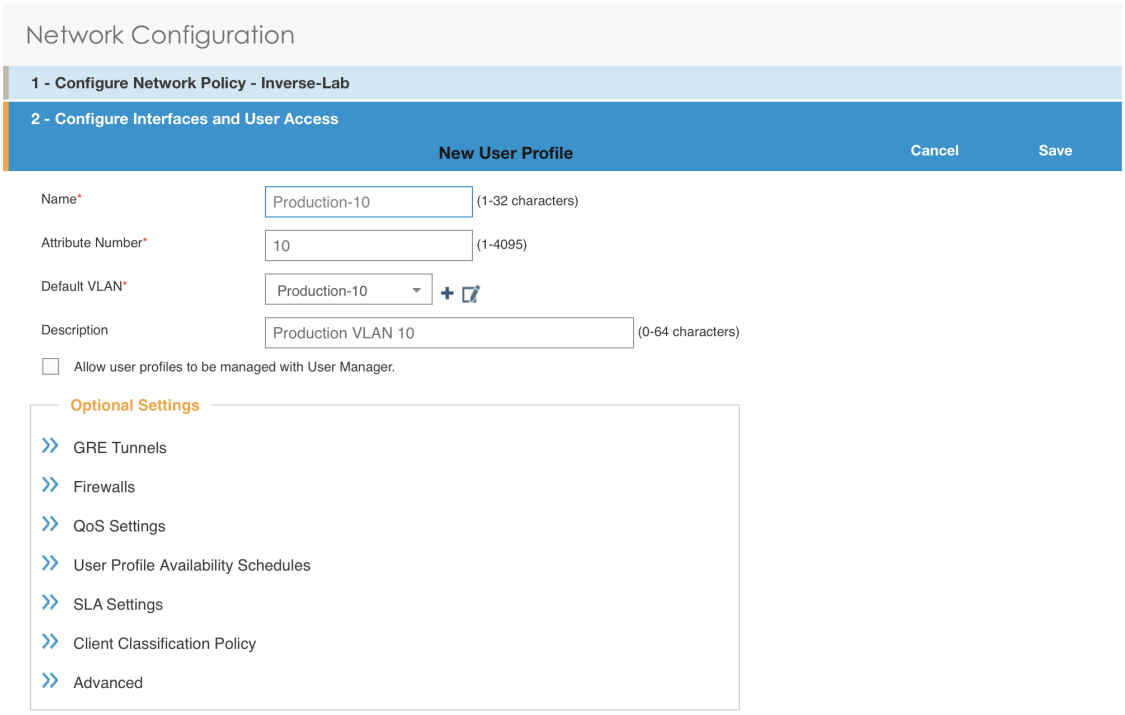


- click on the Save button

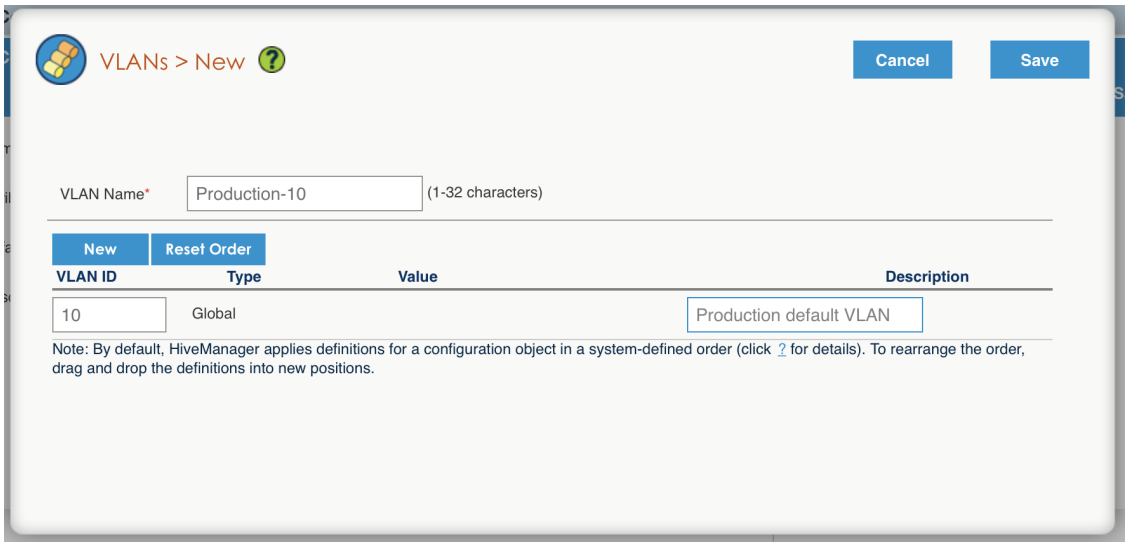
Configure the User profile:



- under *User Profile* , click on **Add/Remove** and click on New



- 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



- click the Save button
- make sure the new user profile name is selected and then Save

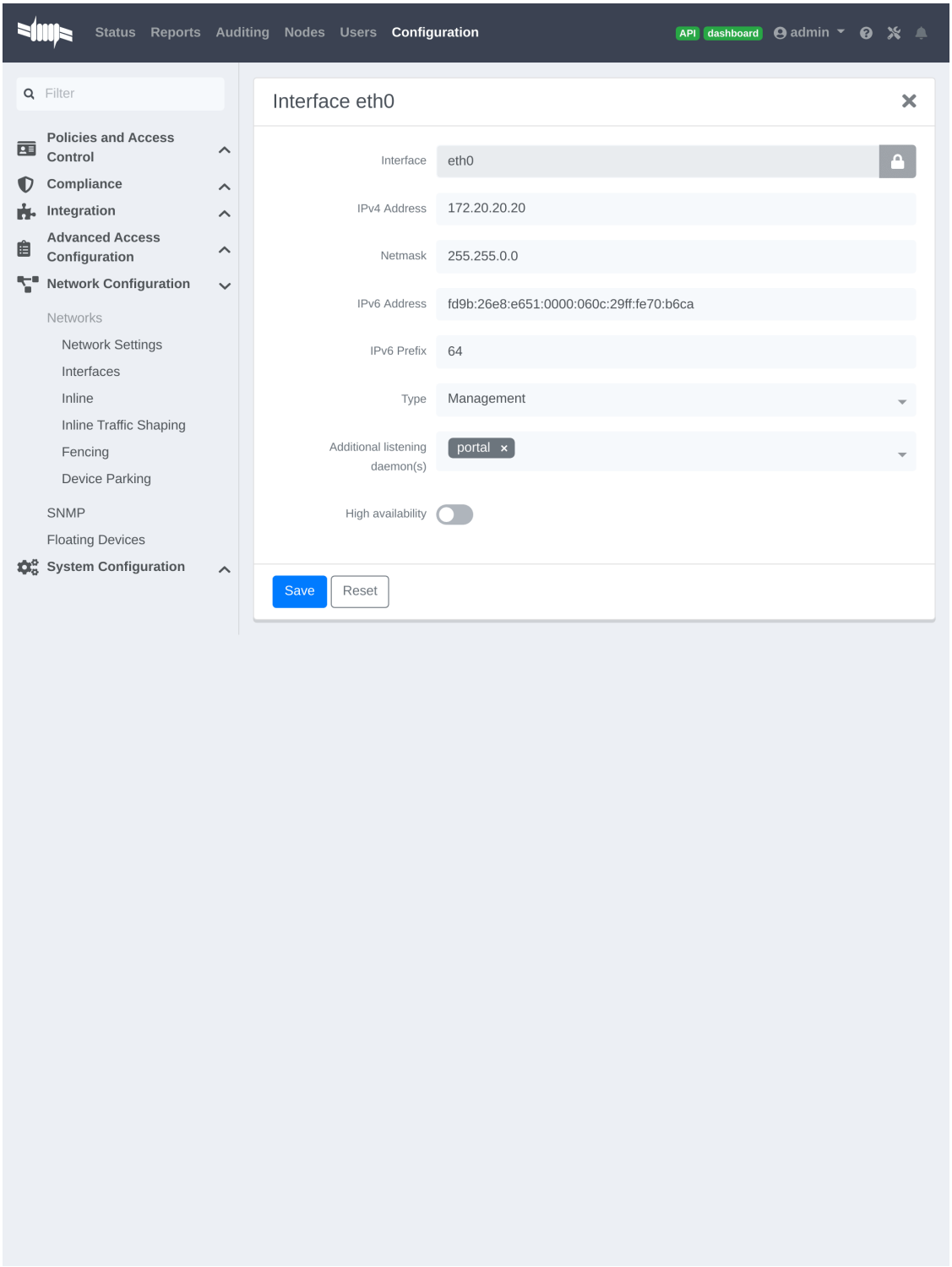
Push the configuration to the Access Point:

- 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**



4.3.3. 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**

4.3.4. 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, 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**.

4.4. 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.

4.4.1. 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.

4.4.2. 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
    }
}
```

4.4.3. 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
        }
}
```

4.4.4. 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 {
            }
        }
    }
}
```

4.4.5. 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.

4.5. Avaya

4.5.1. Wireless Controller

NOTE To be contributed....

4.6. Aruba

4.6.1. All Aruba OS

Basic Aruba wireless controller configuration for PacketFence via the controller web interface. Tested on Aruba Controller 200 (ArubaOS 5.0.3.3) and Controller 600 (ArubaOS 6.0) - applies to all Aruba models.

CAUTION For existing Aruba controller users, create new AAA profiles and apply to new SSIDs instead of modifying default ones to avoid user impact.

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, 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.

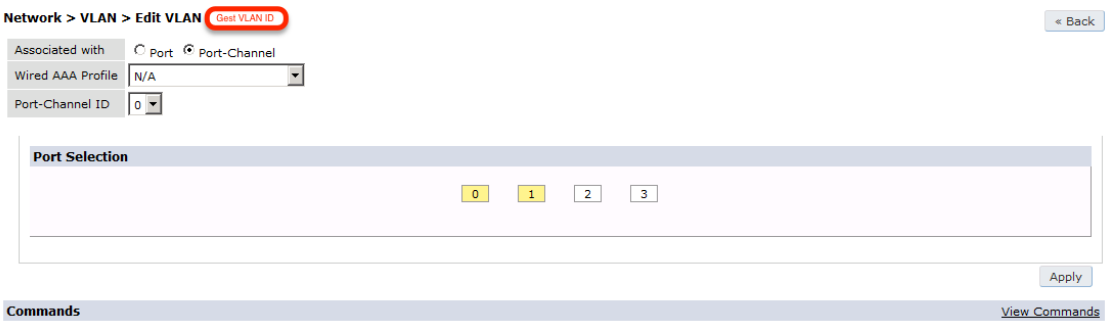
WIPS

In order to use the WIPS feature in PacketFence, please follow those simple steps to send the traps to PacketFence.

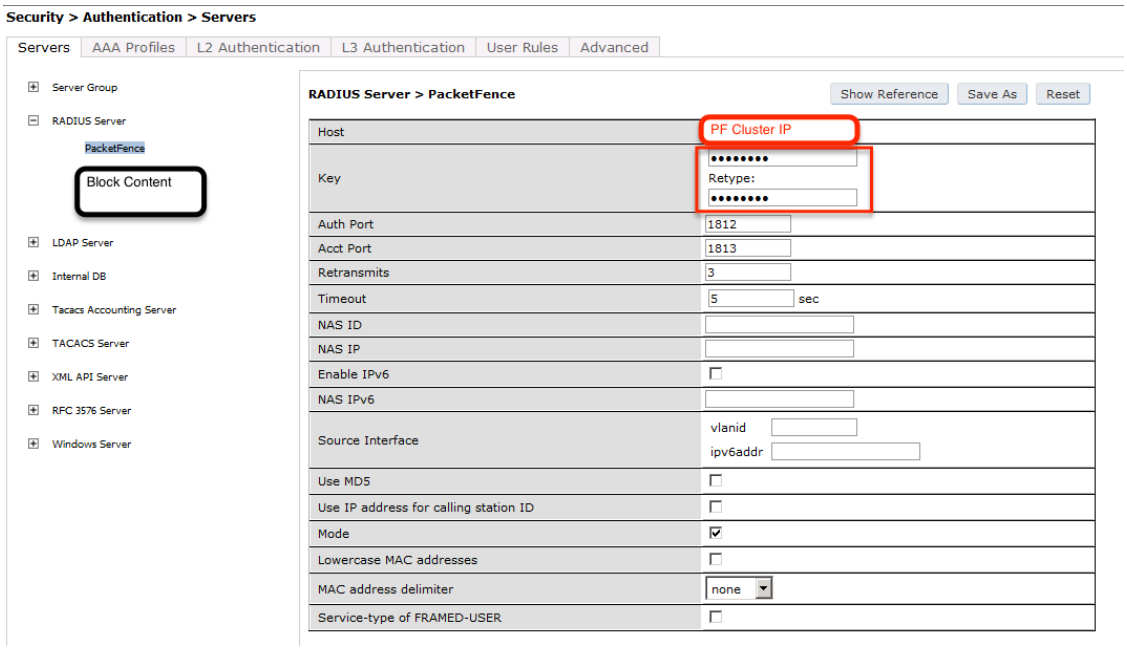
First, configure PacketFence to be a trap receiver. Under *Configuration → SNMP → Trap Receivers*, add an entry for the PF management IP. By default, all traps will be enabled. If you want to disable some, you will need to connect via CLI, and run the **snmp-server trap disable <trapname>** command.

WebAuth

First of all you will need to configure a guest VLAN.



Next, you will need to configure a RADIUS server.




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

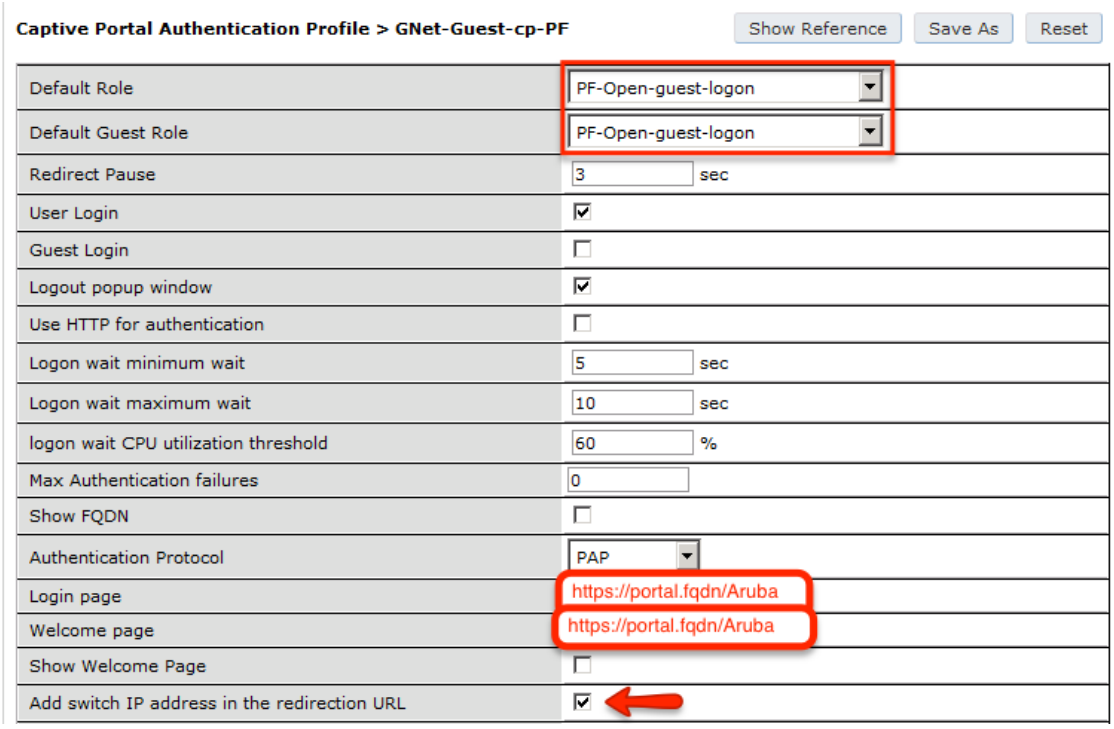
Add your RADIUS server to a AAA group, under *Security* → *Authentication* → *Servers* → *Server Group*:

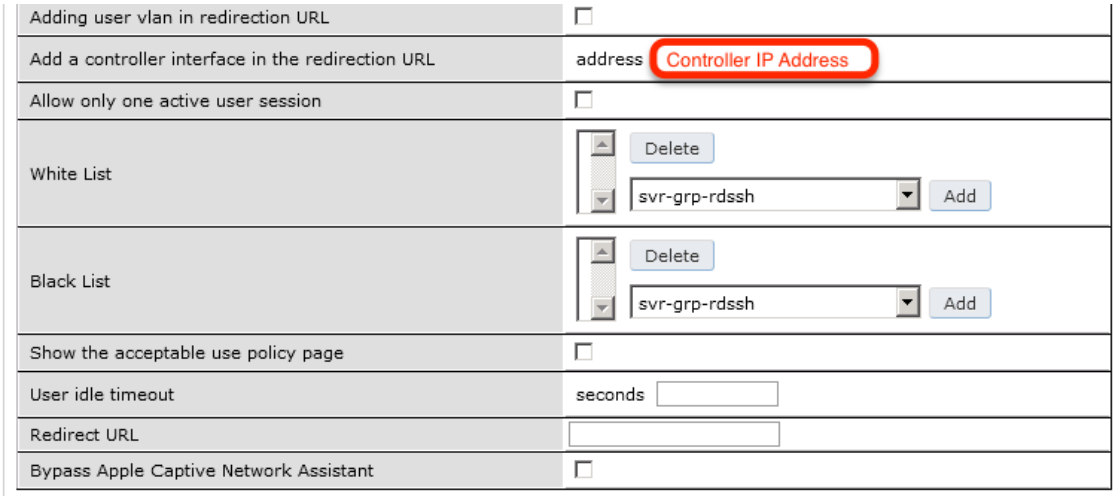
```
aaa server-group "packetfence"
auth-server "packetfence" position 1
```

Then define the RFC 3576 server, which will allow you to do CoA.


```
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*.





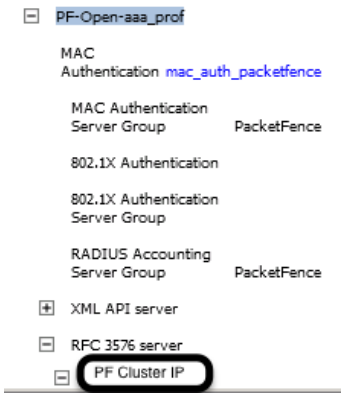

```
aaa authentication captive-portal "packetfence-externalportal"
default-role auth-guest
redirect-pause 3
no logout-popup-window
login-page https://192.168.1.5/Aruba
switchip-in-redirection-url
```

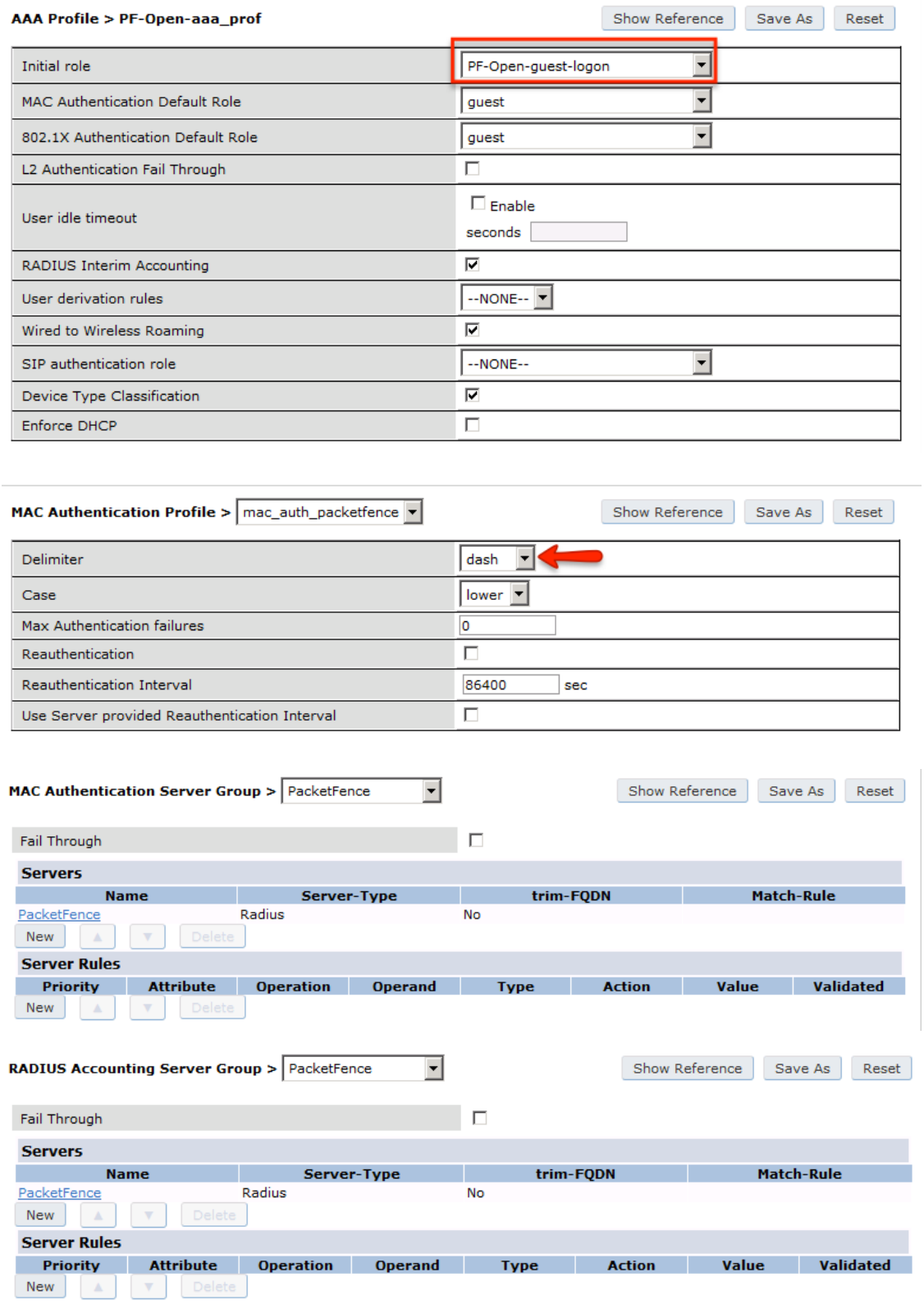
Now create the policy for the guest access, for example Internet only.

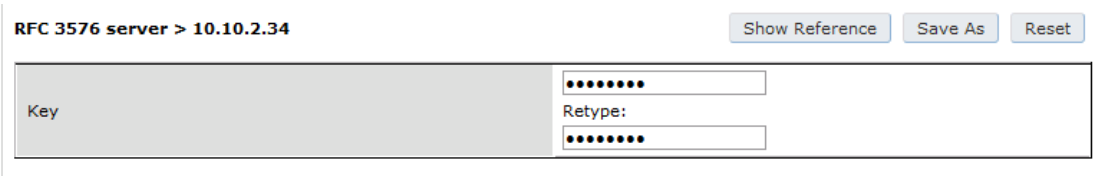
Add the authentication for the Captive Portal Profile via *Security* → *Authentication* → *L3 Authentication* → *Captive Portal Authentication Profile* → *Server Group*:

```
aaa authentication captive-portal "packetfence-externalportal"
server-group "packetfence"
```

Adjust the configuration of the AAA profile through *Security* → *Authentication* → *Profiles* → *AAA Profiles*:




AAA Profile > PF-Open-aaa_prof
Show Reference
Save As
Reset
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
Show Reference
Save As
Reset
Delimiter
dash
Case
lower
Max Authentication failures
0
Reauthentication
Reauthentication Interval
86400
sec
Use Server provided Reauthentication Interval
MAC Authentication Server Group >
PacketFence
Show Reference
Save As
Reset
Fail Through
Servers
Name
Server-Type
trim-FQDN
Match-Rule
PacketFence
Radius
No
New
Delete
Server Rules
Priority
Attribute
Operation
Operand
Type
Action
Value
Validated
New
Delete
RADIUS Accounting Server Group >
PacketFence
Show Reference
Save As
Reset
Fail Through
Servers
Name
Server-Type
trim-FQDN
Match-Rule
PacketFence
Radius
No
New
Delete
Server Rules
Priority
Attribute
Operation
Operand
Type
Action
Value
Validated
New
Delete



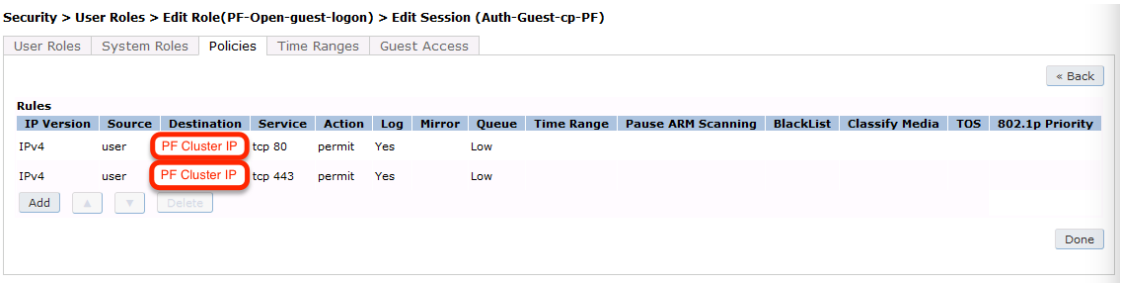

```
aaa profile "packetfence-externalportal"
initial-role packetfence-portal
radius-interim-accounting
radius-accounting "packetfence"
rfc-3576-server "192.168.1.5"
```

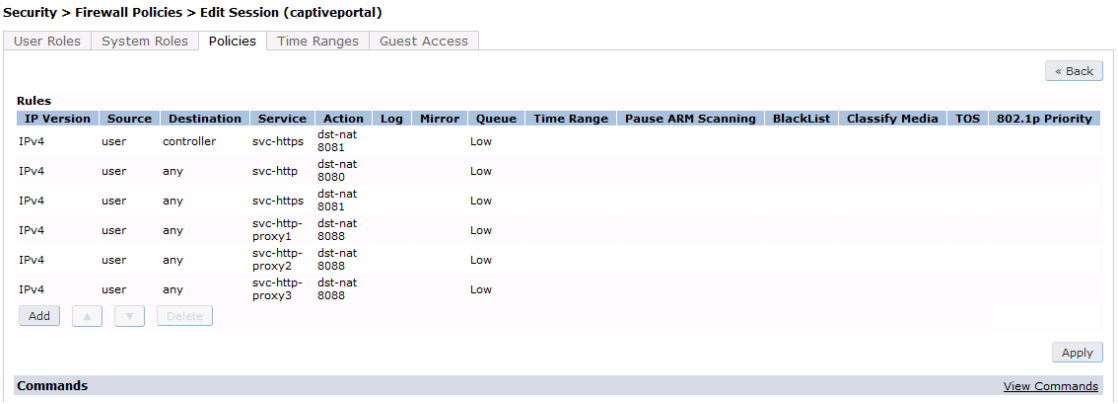
Define a policy to permit the traffic.

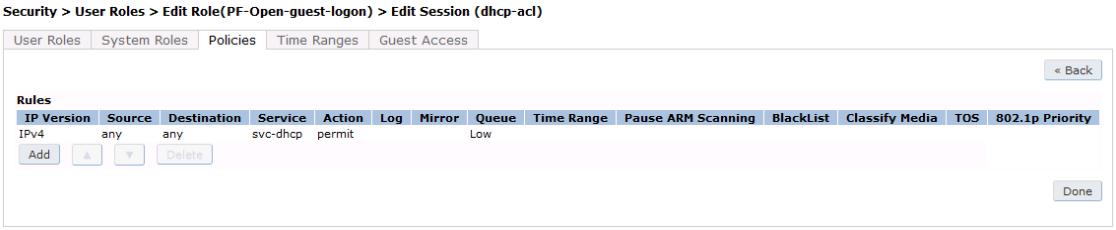
First add a destination, *Advanced Services* → *Stateful Firewall* → *Destinations*:

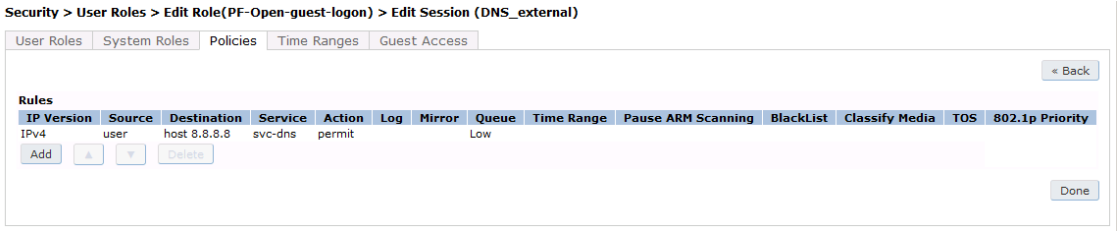
```
netdestination packetfence-portal
host 192.168.1.5
```

Create an ACL for the redirection, *Security* → *Firewall Policies*:









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
```

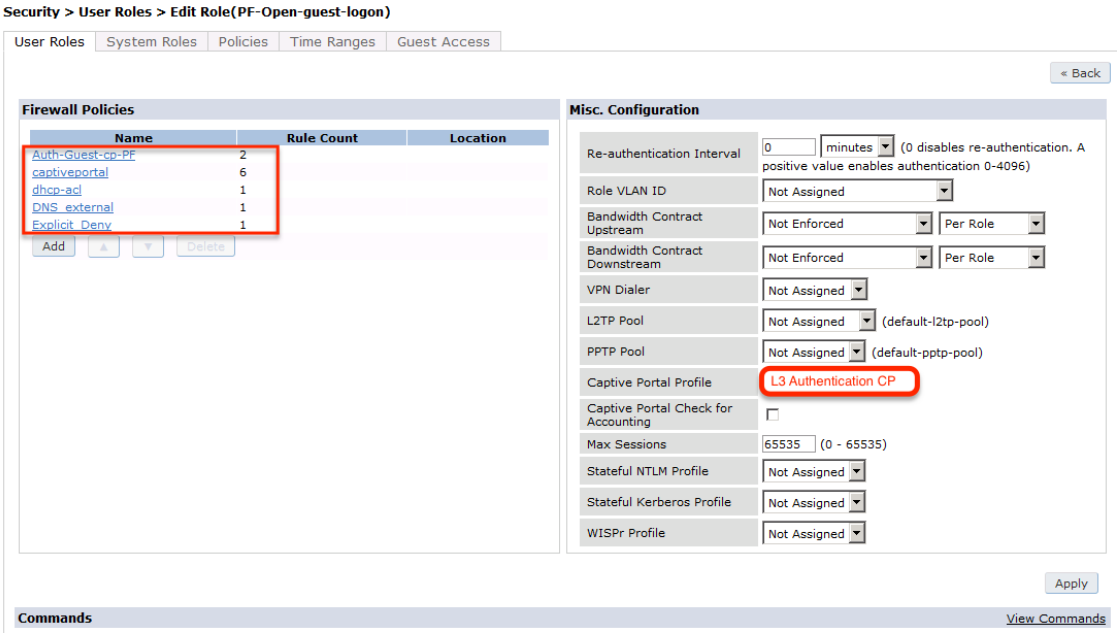
Enable the "firewall allow-tri-session" :

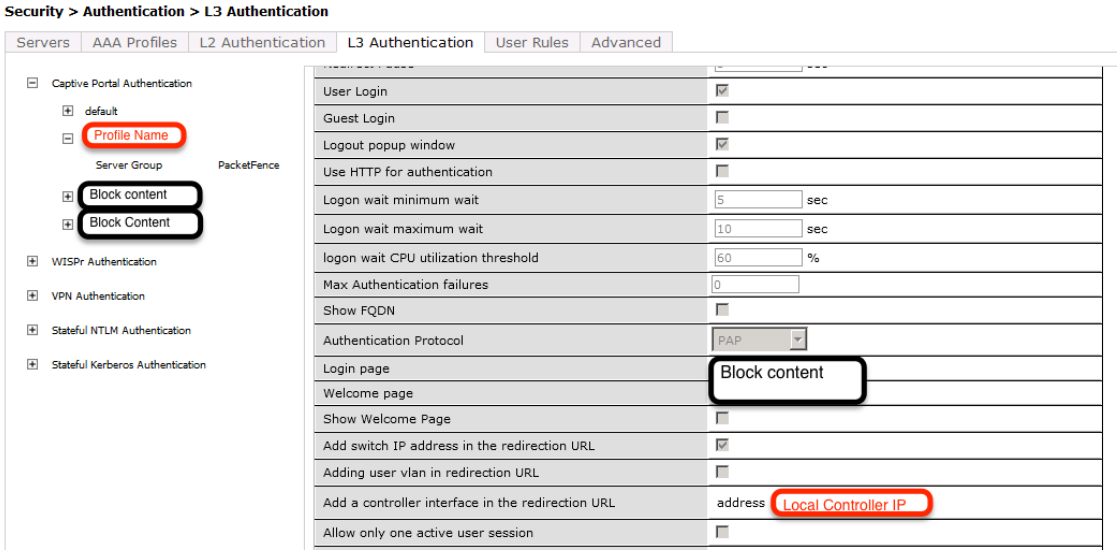
```
firewall allow-tri-session
```

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*:





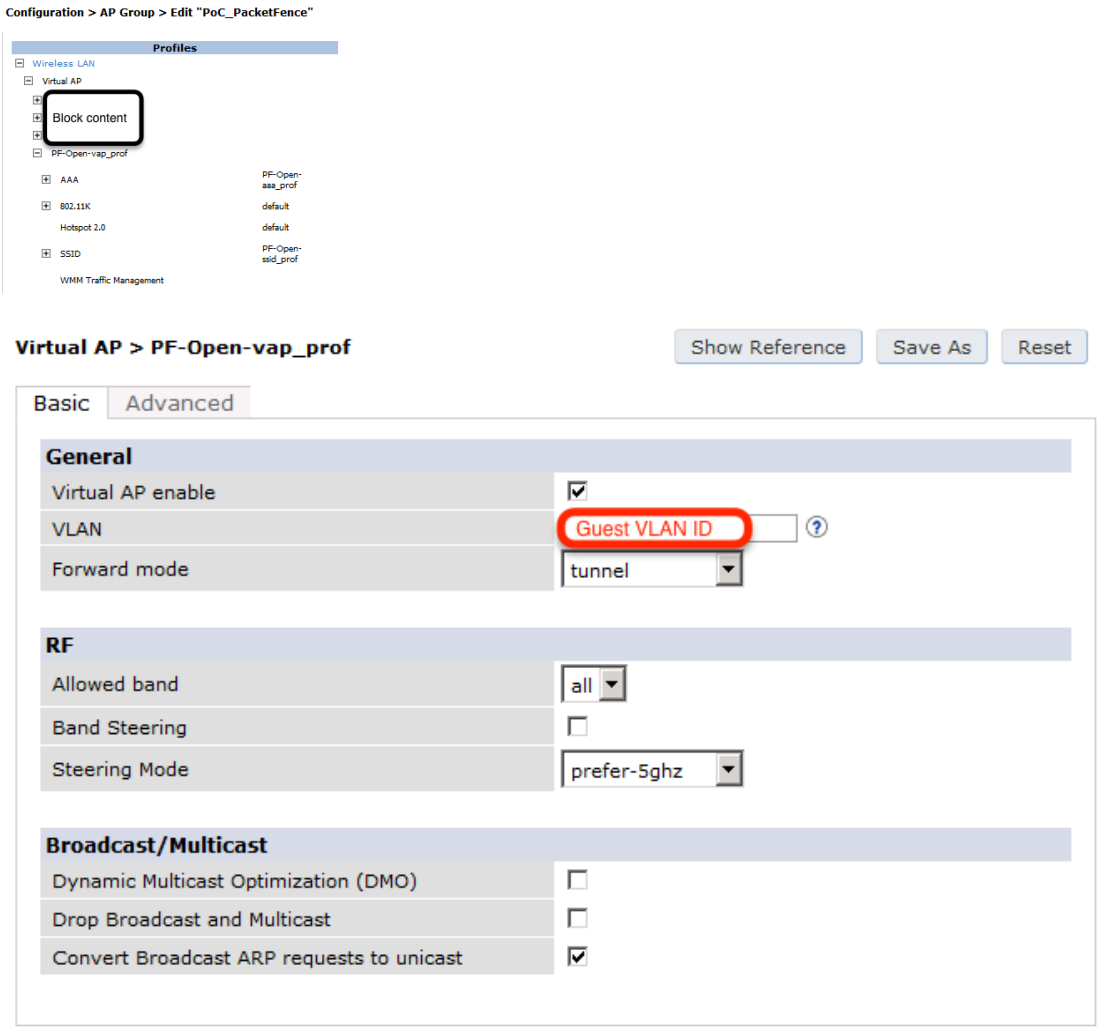

```
user-role "packetfence-portal"
access-list session "packetfence-externalportal" position 1
access-list session "captiveportal" position 2
access-list session "guest-logon-access" position 3
access-list session "block-internal-access" position 4
access-list session "v6-logon-control" position 5
access-list session "captiveportal6" position 6
captive-portal "packetfence-externalportal"
```

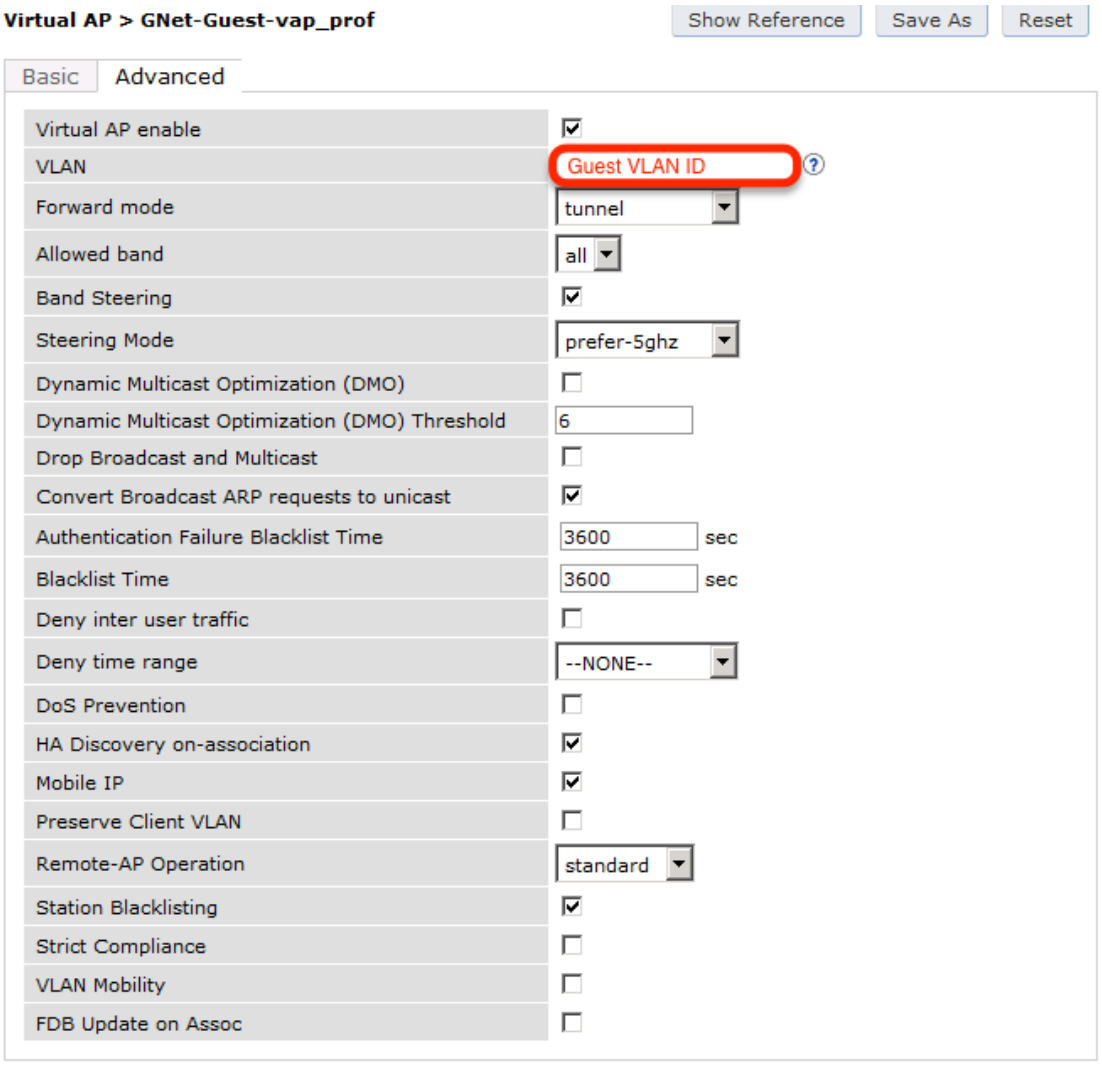
Finaly create the SSID and associate the profile to it, `Virtual AP profile`:

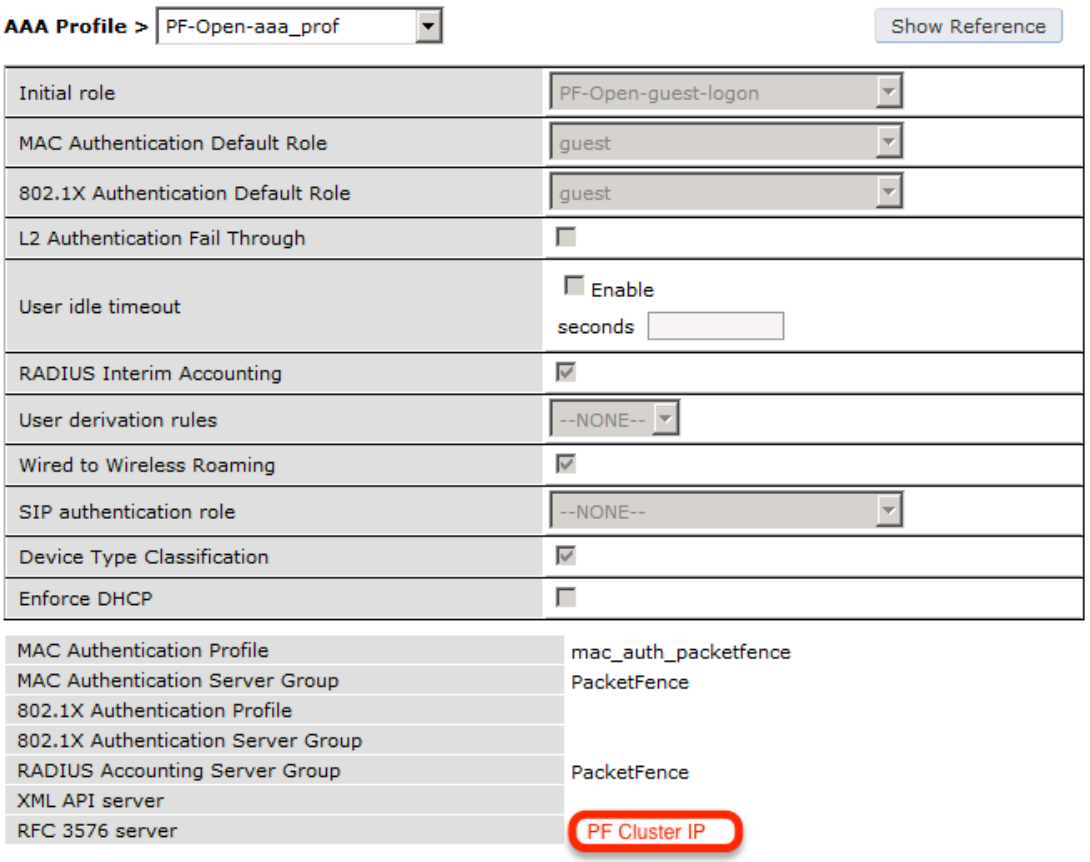
```
wlan virtual-ap "packetfence-externalportal"
```

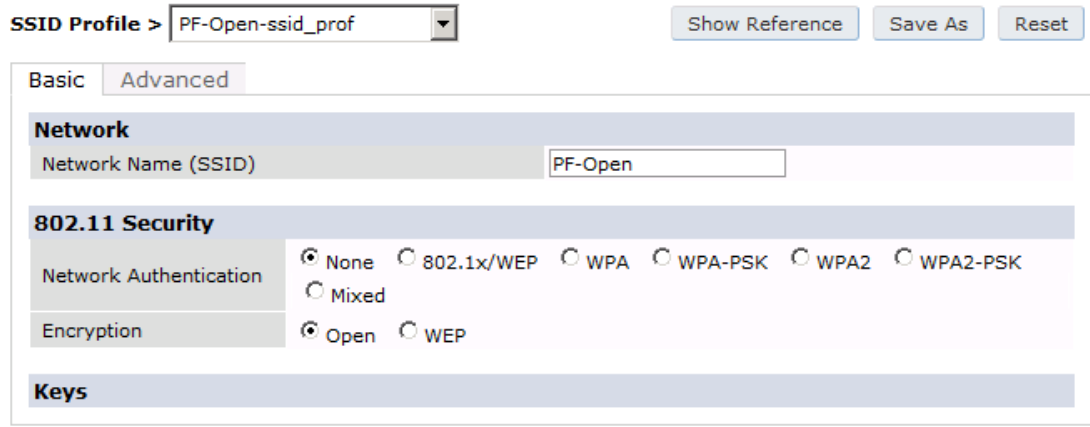
```
ssid-profile "packetfence-externalportal"
aaa-profile "packetfence"
```

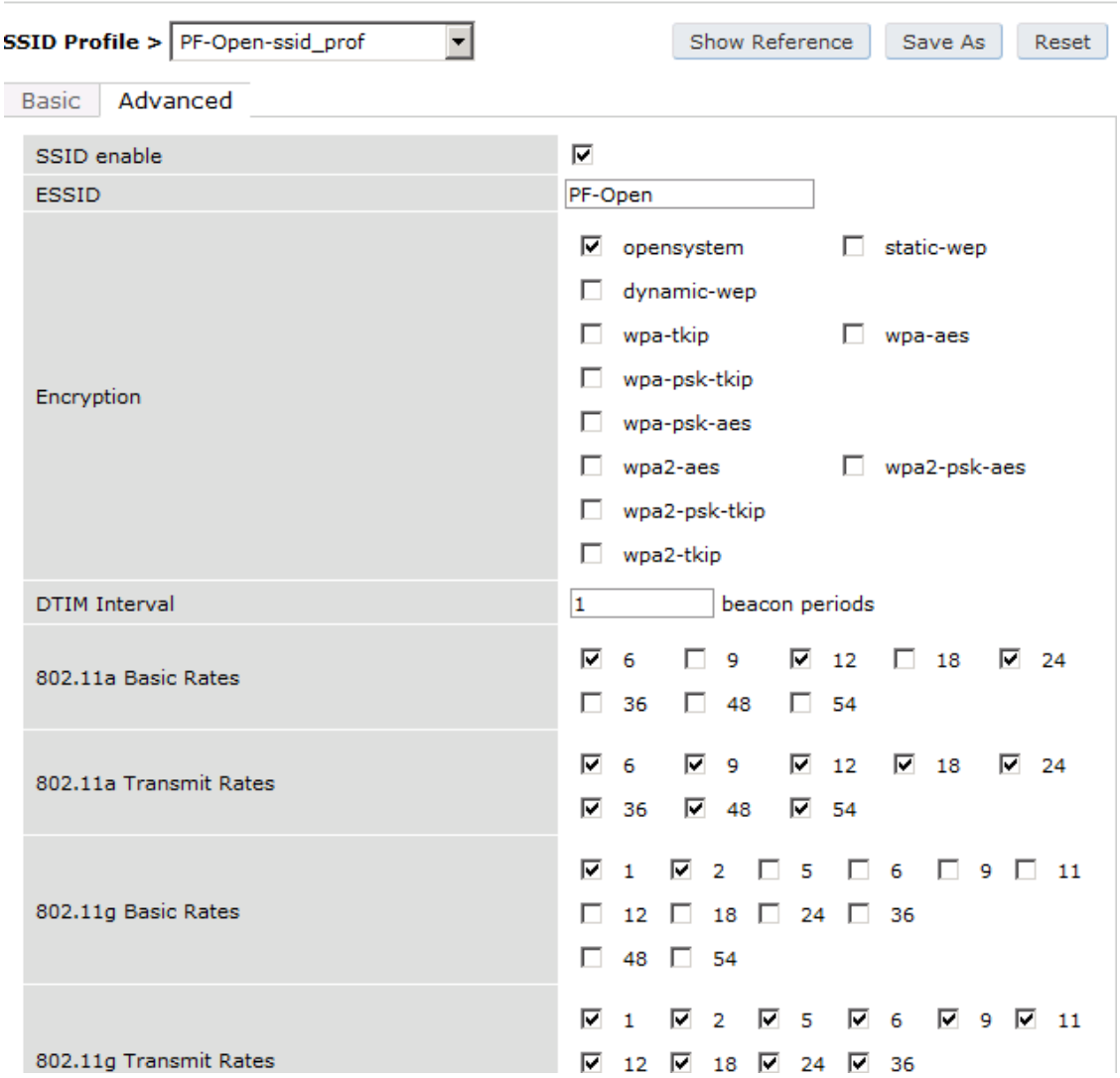
General AP settings and master-slave controller case.



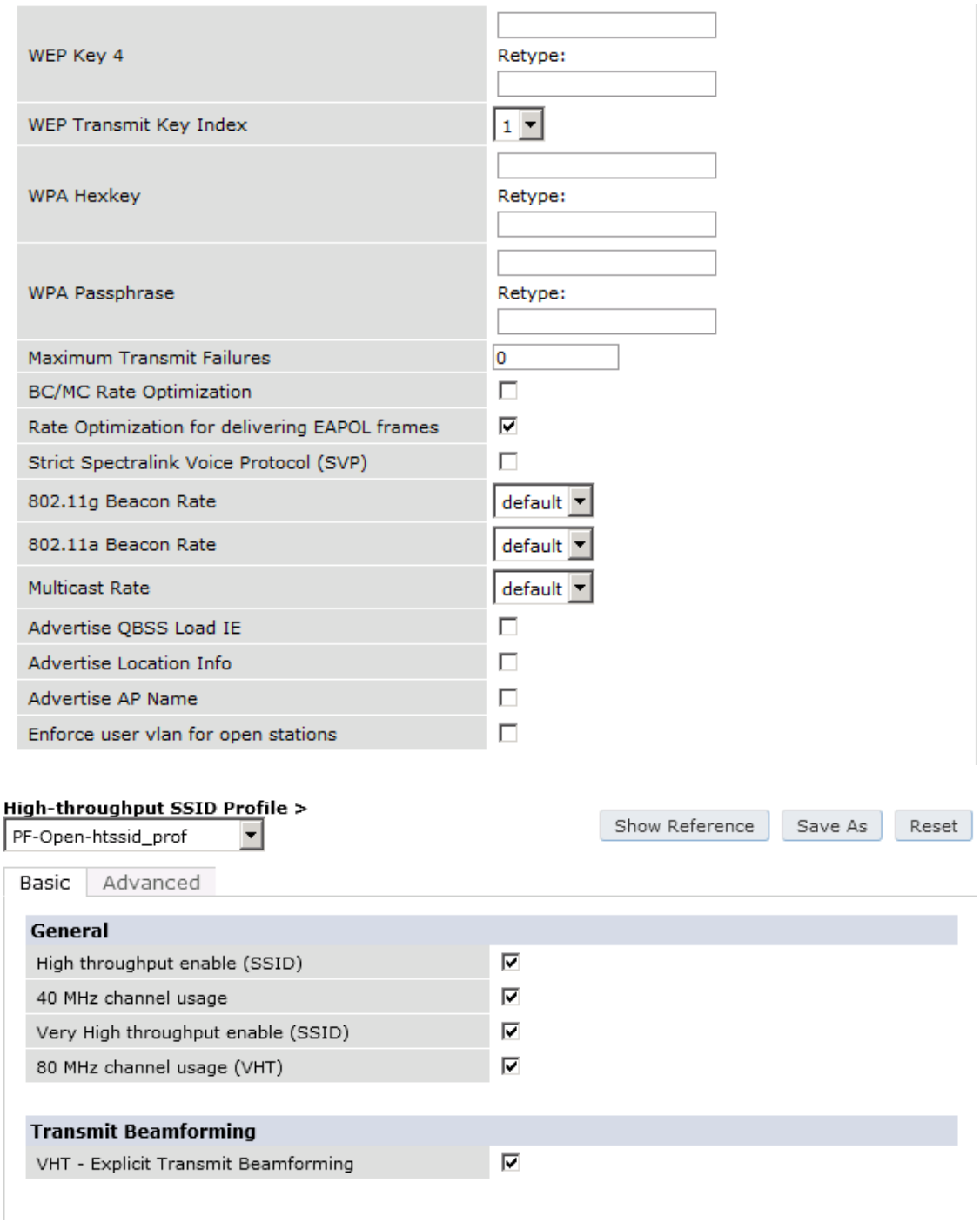

Virtual AP > GNet-Guest-vap_prof
Show Reference
Save As
Reset
Basic
Advanced
Virtual AP enable
VLAN
Guest VLAN ID
Forward mode
tunnel
Allowed band
all
Band Steering
Steering Mode
prefer-5ghz
Dynamic Multicast Optimization (DMO)
Dynamic Multicast Optimization (DMO) Threshold
6
Drop Broadcast and Multicast
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

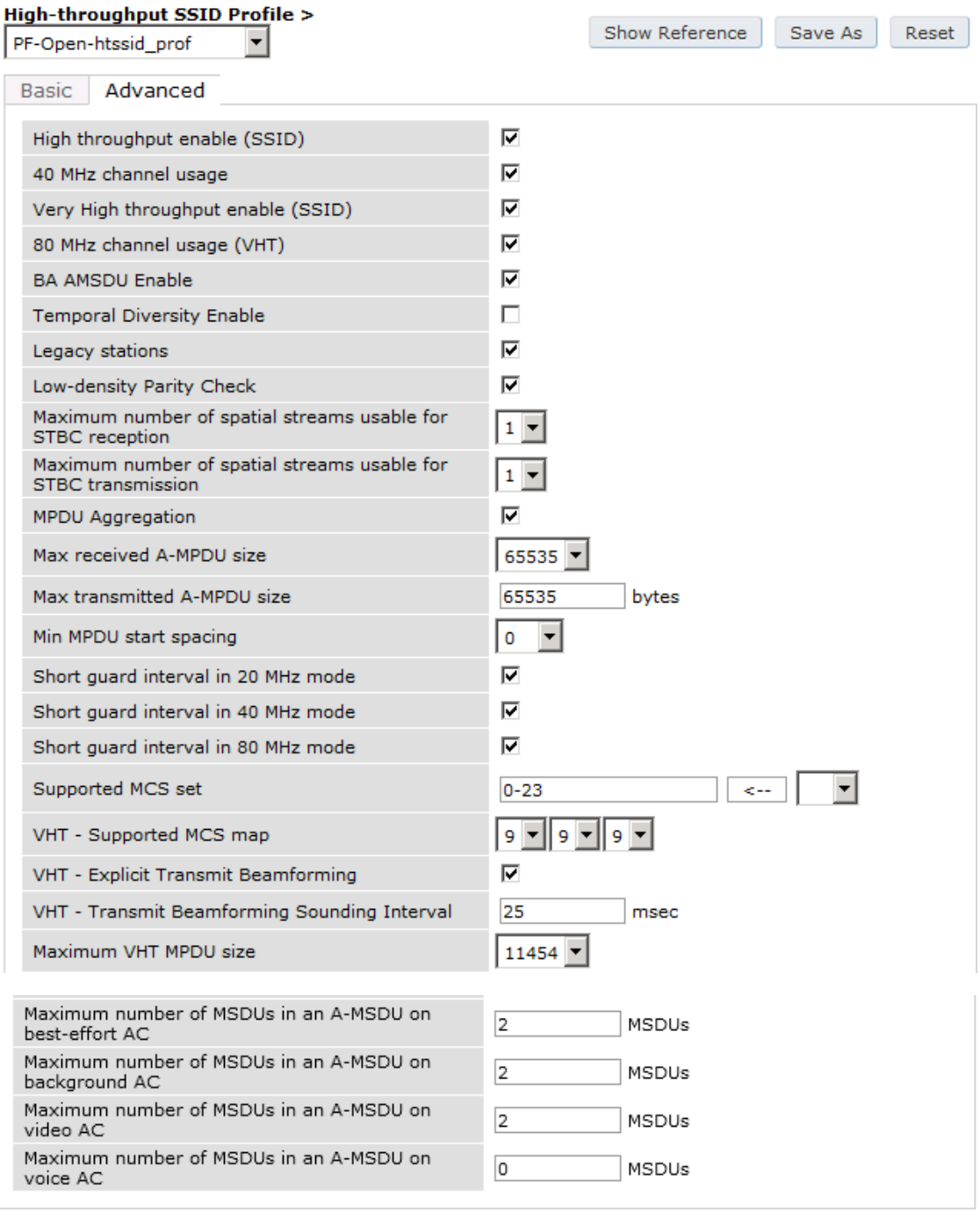

AAA Profile > PF-Open-aaa_prof
Show Reference
Initial role
PF-Open-guest-logon
MAC Authentication Default Role
guest
802.1X Authentication Default Role
guest
L2 Authentication Fail Through
User idle timeout
Enable
seconds
RADIUS Interim Accounting
User derivation rules
--NONE--
Wired to Wireless Roaming
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

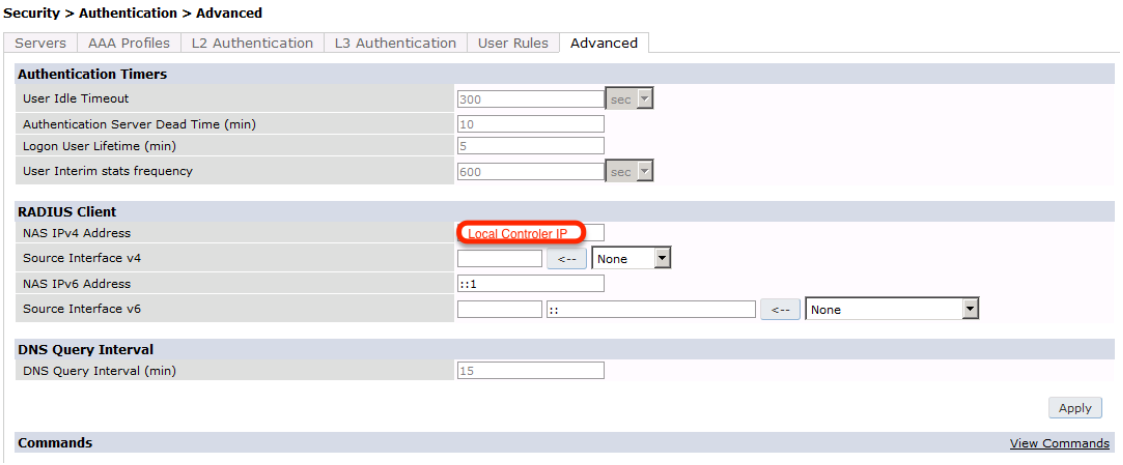

SSID Profile > PF-Open-ssid_prof
Show Reference
Save As
Reset
Basic
Advanced
Network
Network Name (SSID)
PF-Open
802.11 Security
Network Authentication
None
802.1x/WEP
WPA
WPA-PSK
WPA2
WPA2-PSK
Mixed
Encryption
Open
WEP
Keys


SSID Profile > PF-Open-ssid_prof
Show Reference
Save As
Reset
Basic
Advanced
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

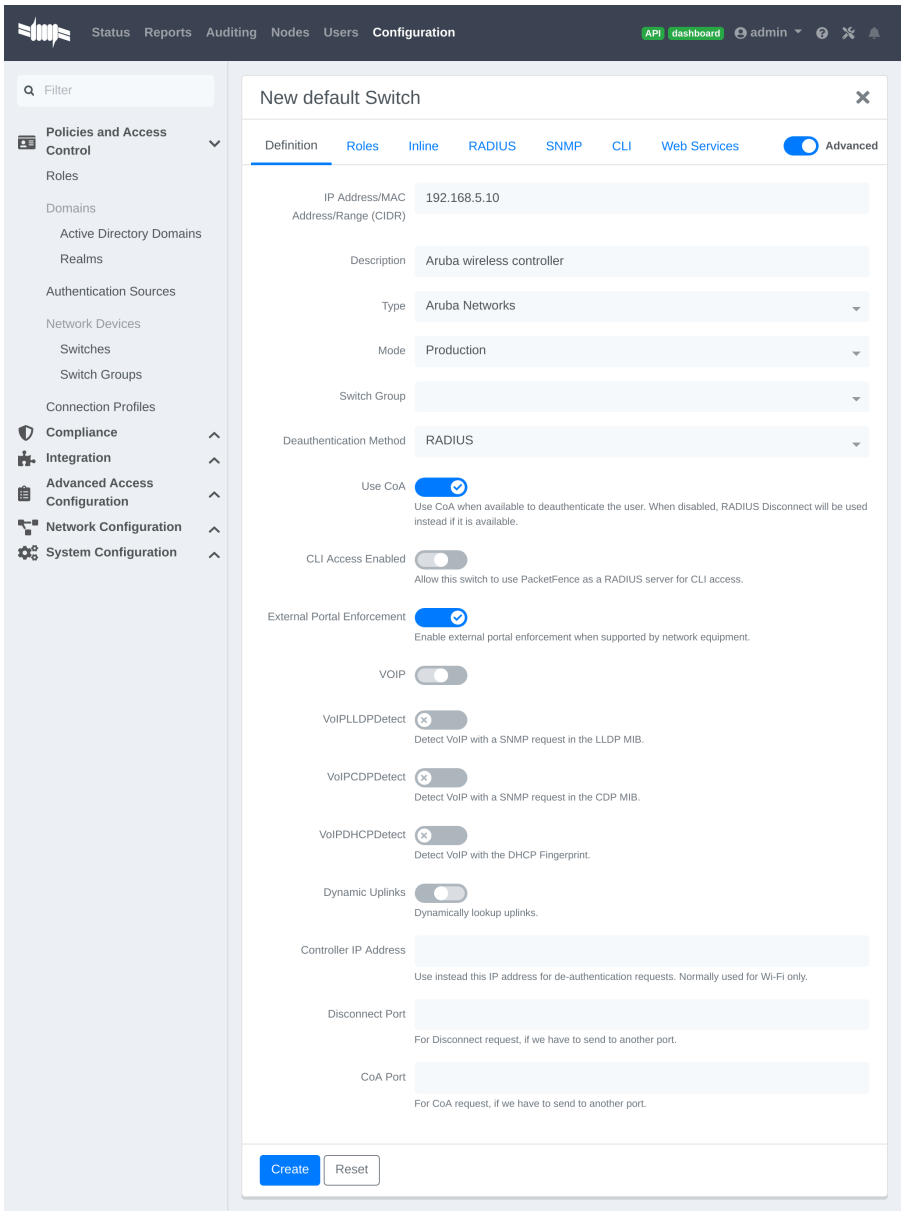
	☑ 48 ☑ 54
Station Ageout Time	1000 sec
Max Transmit Attempts	8
RTS Threshold	2333 bytes
Short Preamble	☑
Max Associations	64
Wireless Multimedia (WMM)	☐
Wireless Multimedia U-APSD (WMM-UAPSD) Powersave	☑
WMM TSPEC Min Inactivity Interval	0 msec
Override DSCP mappings for WMM clients	☐
DSCP mapping for 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:

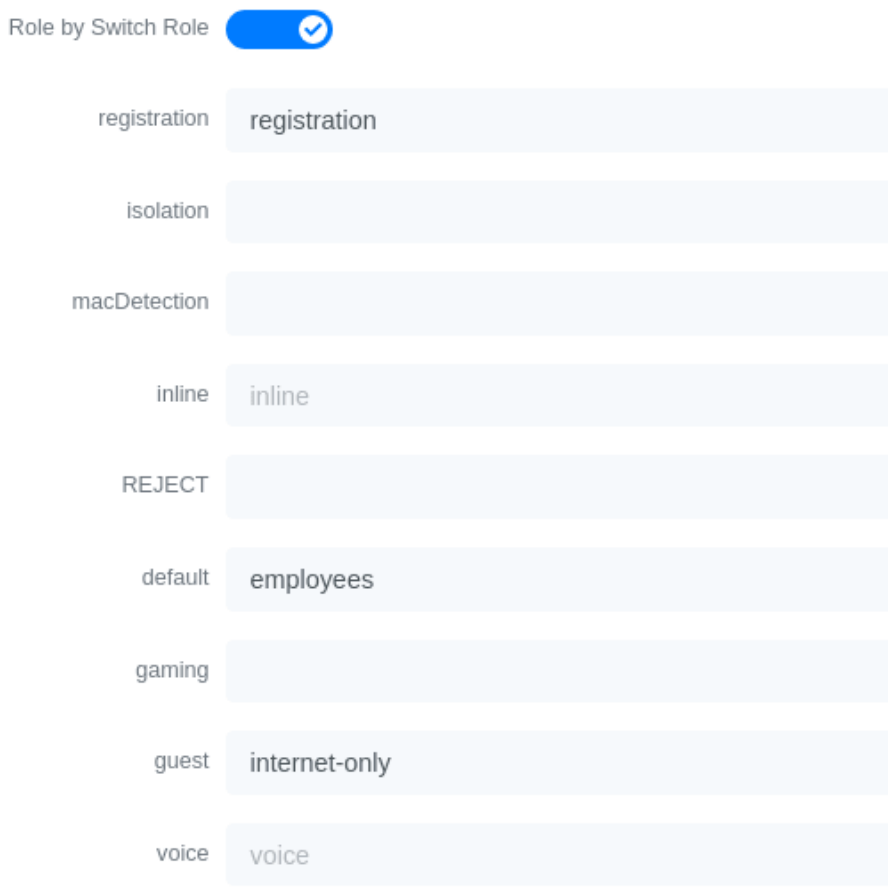

WEP Key 4
Retype:
WEP Transmit Key Index
1
WPA Hexkey
Retype:
WPA Passphrase
Retype:
Maximum Transmit Failures
0
BC/MC Rate Optimization
Rate Optimization for delivering EAPOL frames
Strict Spectralink Voice Protocol (SVP)
802.11g Beacon Rate
default
802.11a Beacon Rate
default
Multicast Rate
default
Advertise QBSS Load IE
Advertise Location Info
Advertise AP Name
Enforce user vlan for open stations
High-throughput SSID Profile >
PF-Open-htssid_prof
Show Reference
Save As
Reset
Basic
Advanced
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
Show Reference
Save As
Reset
Basic
Advanced
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



The next step will be to configure the Aruba WiFi controller for WebAuth in PacketFence, add the switch with the model choice `Aruba Network`,


Status
Reports
Auditing
Nodes
Users
Configuration
API
dashboard
admin
Filter
Policies and Access Control
Roles
Domains
Active Directory Domains
Realms
Authentication Sources
Network Devices
Switches
Switch Groups
Connection Profiles
Compliance
Integration
Advanced Access Configuration
Network Configuration
System Configuration
New default Switch
Definition
Roles
Inline
RADIUS
SNMP
CLI
Web Services
Advanced
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.
Create
Reset



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

4.6.2. 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 use the instructions above for the controller web interface 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"
```

4.6.3. 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
```

4.7. Belair Networks (now Ericsson)

4.7.1. 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.

4.8. Bluesocket

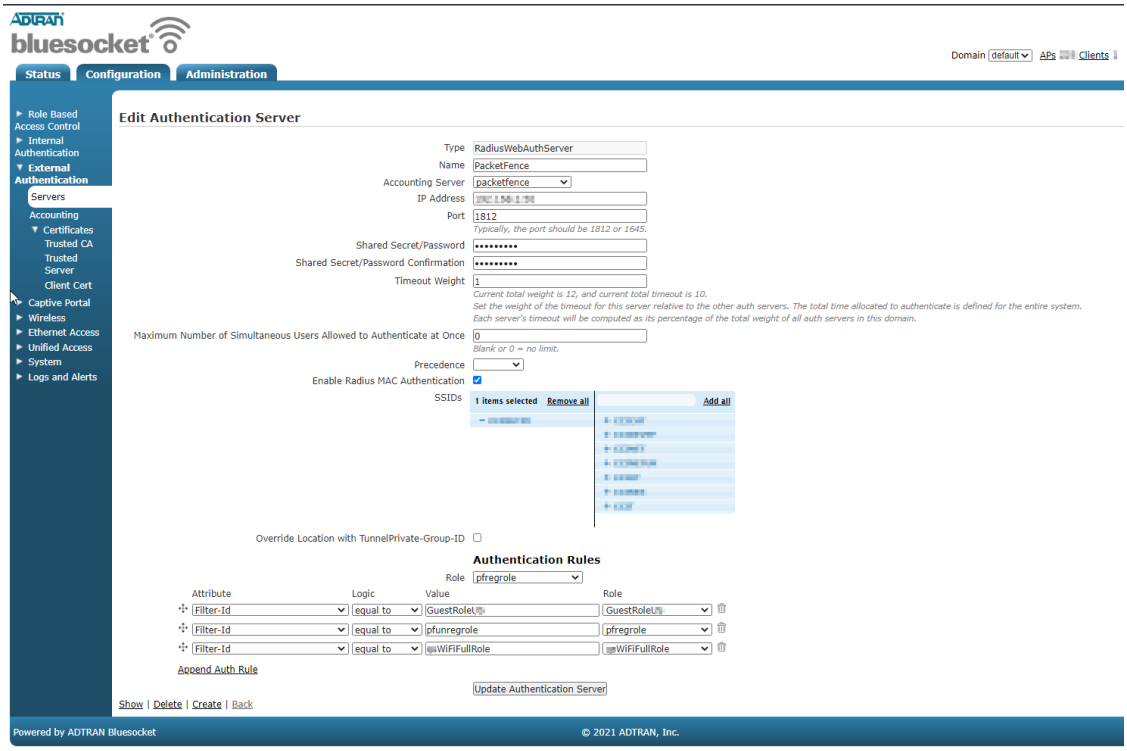
4.8.1. MAC Authentication

Bluesocket side

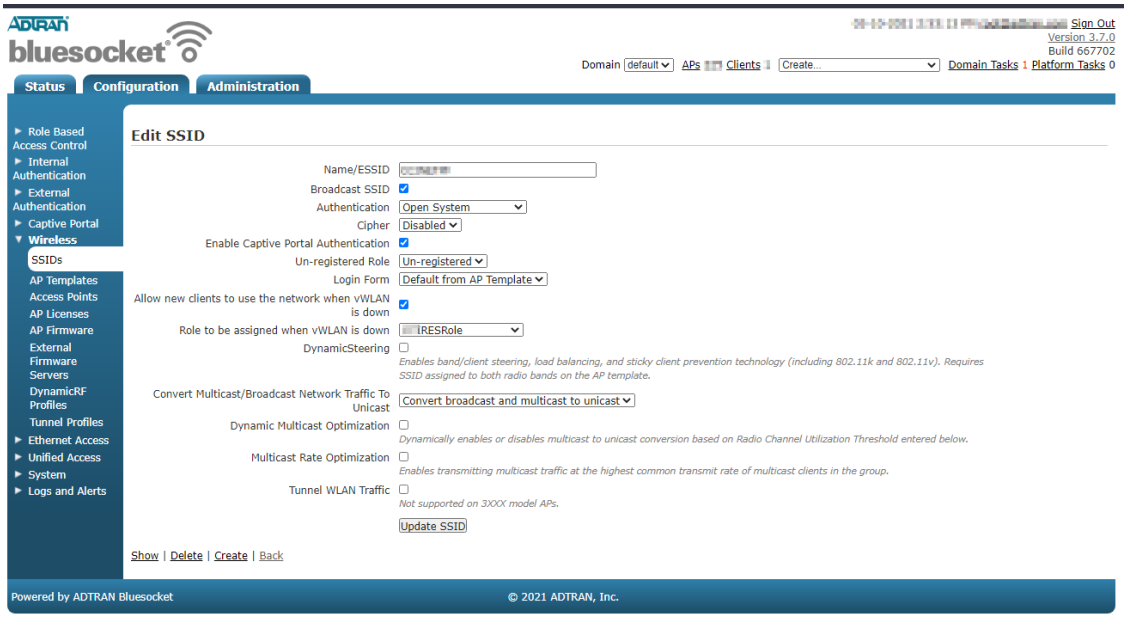
In order to configure mac authentication on the Bluesocket, you must have access to the controller.

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.



Next, you need to create an SSID in Wireless → SSIDs and important, check for "Enable Captive Portal Authentication".



PacketFence side

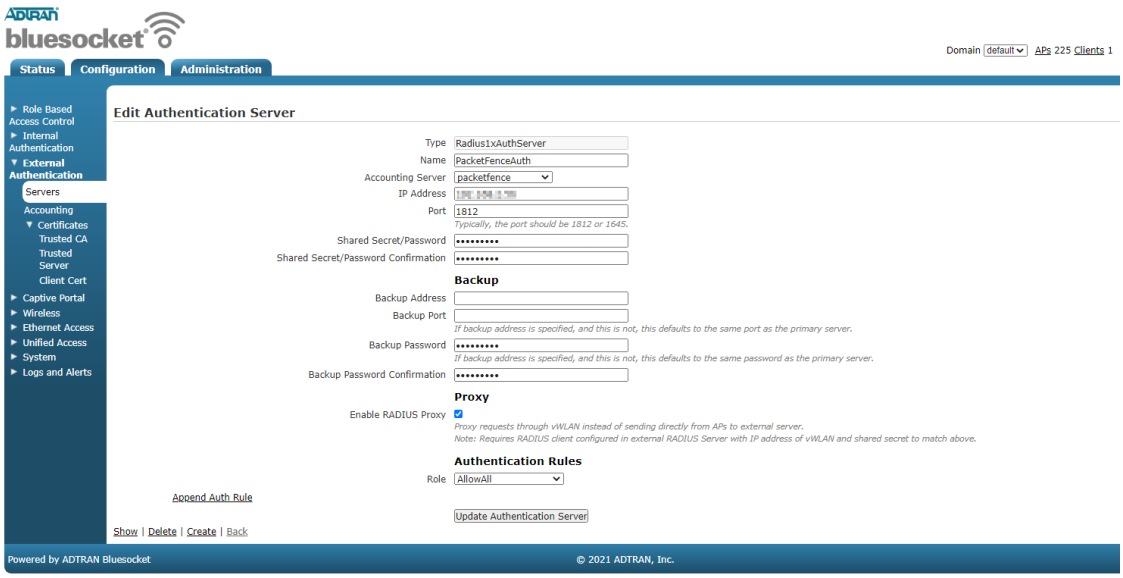
You have to define the ip address of the Blusocket controller in PacketFence.

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".

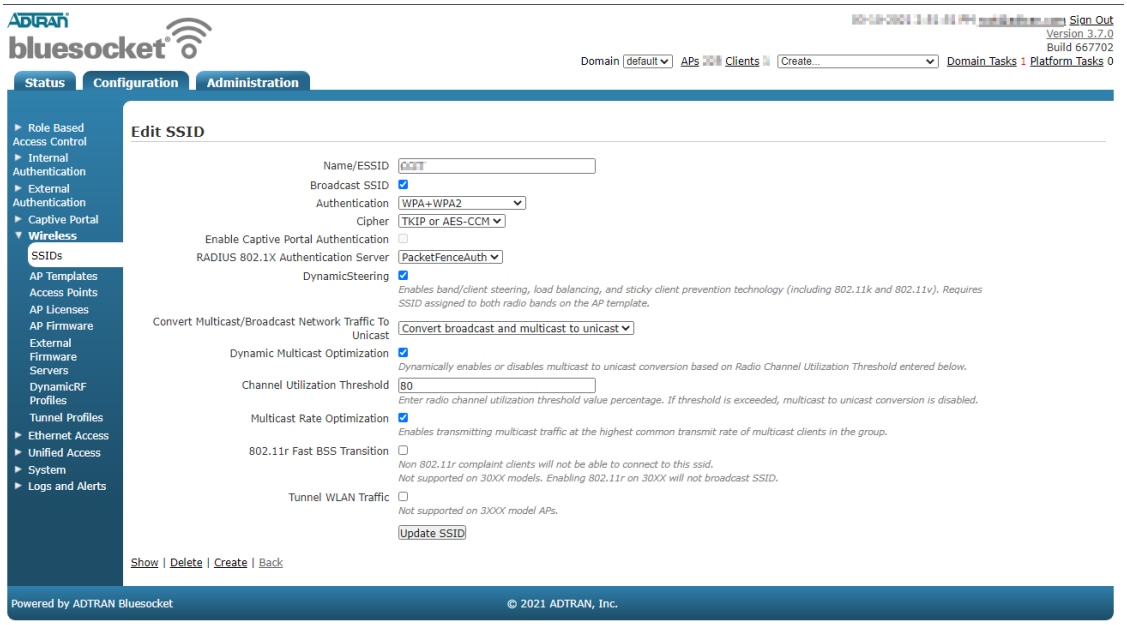
For the deauthentication you need to select HTTPS and fill the Web Services section with the username and password to connect to the Bluesocket API.

4.8.2. 802.1x

First, you must configure a Radius1XAuthServer in External Authentication.



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"



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.

4.9. Brocade

4.9.1. RF Switches

See the Motorola RF Switches documentation.

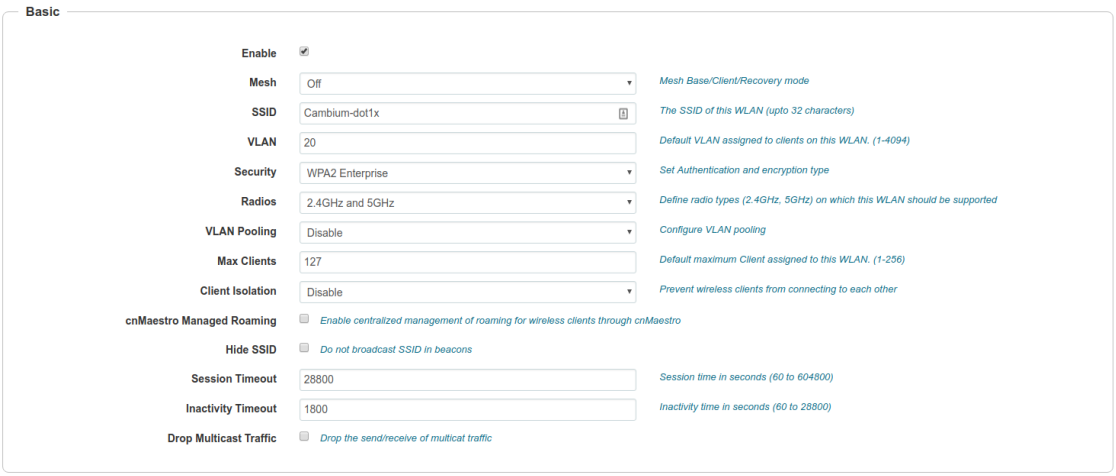
4.10. Cambium

4.10.1. cnPilot E410

802.1X

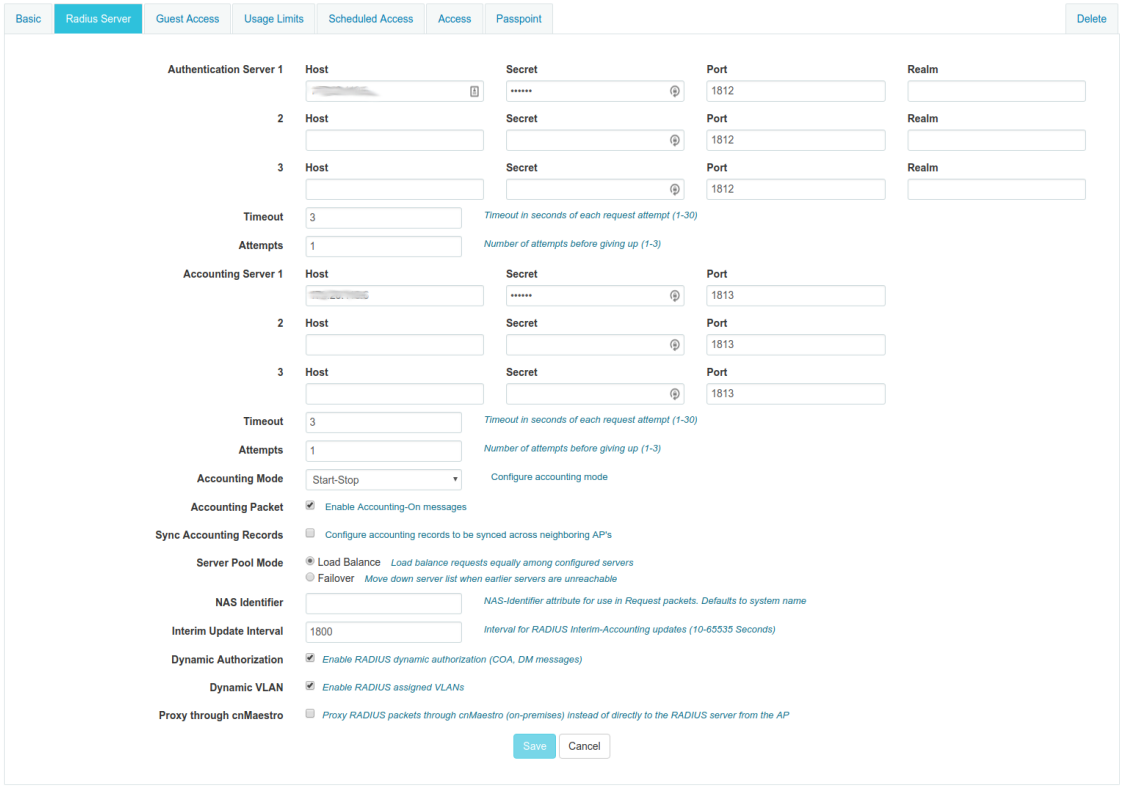
To setup the Cambium cnPilot E410 AP to use 802.1x, first, you need to already have configured the VLANs that will be used in the AP under *Configure* → *Network*. Make sure that in *Configure* → *Network* → *Ethernet Ports*, the port is configured to **Trunk Multiple VLANs**, and the list of VLANs are 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.



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.

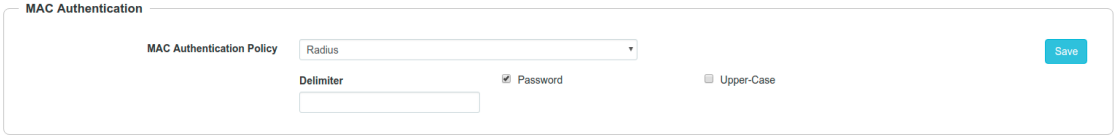
Check the **Dynamic Authorization** and **Dynamic VLAN** boxes and save.



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.



Web Authentication

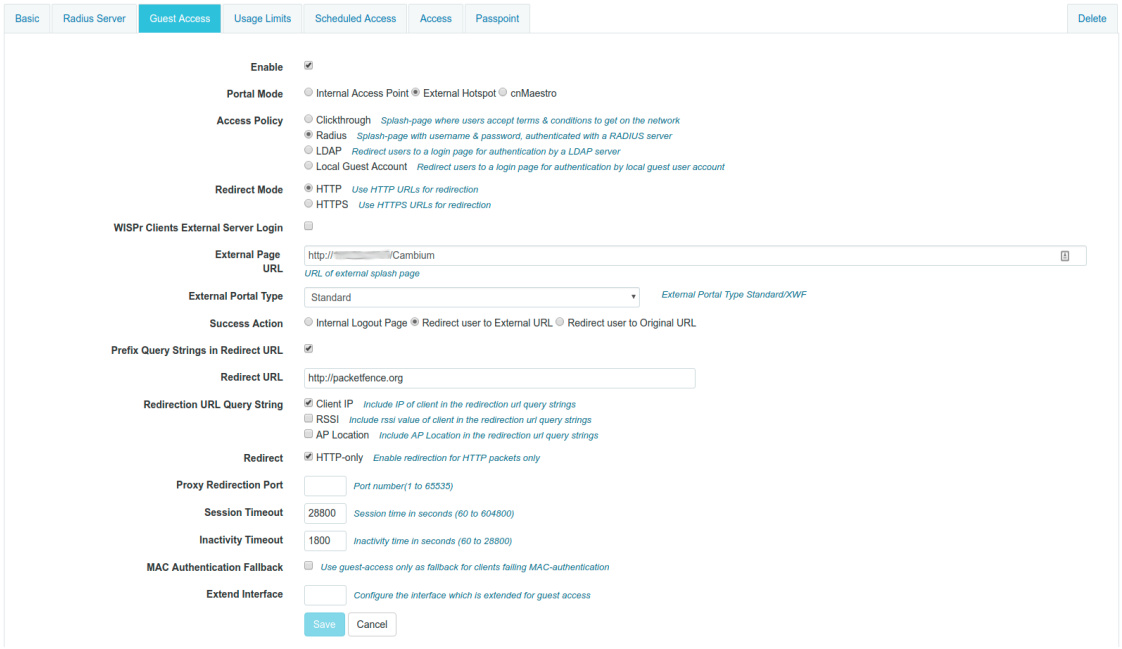
To enable Web Authentication, go to your WLAN in *Configure* → *WLAN*, create a new WLAN with open Security, and click on the tab **Guest Access** to set the following:

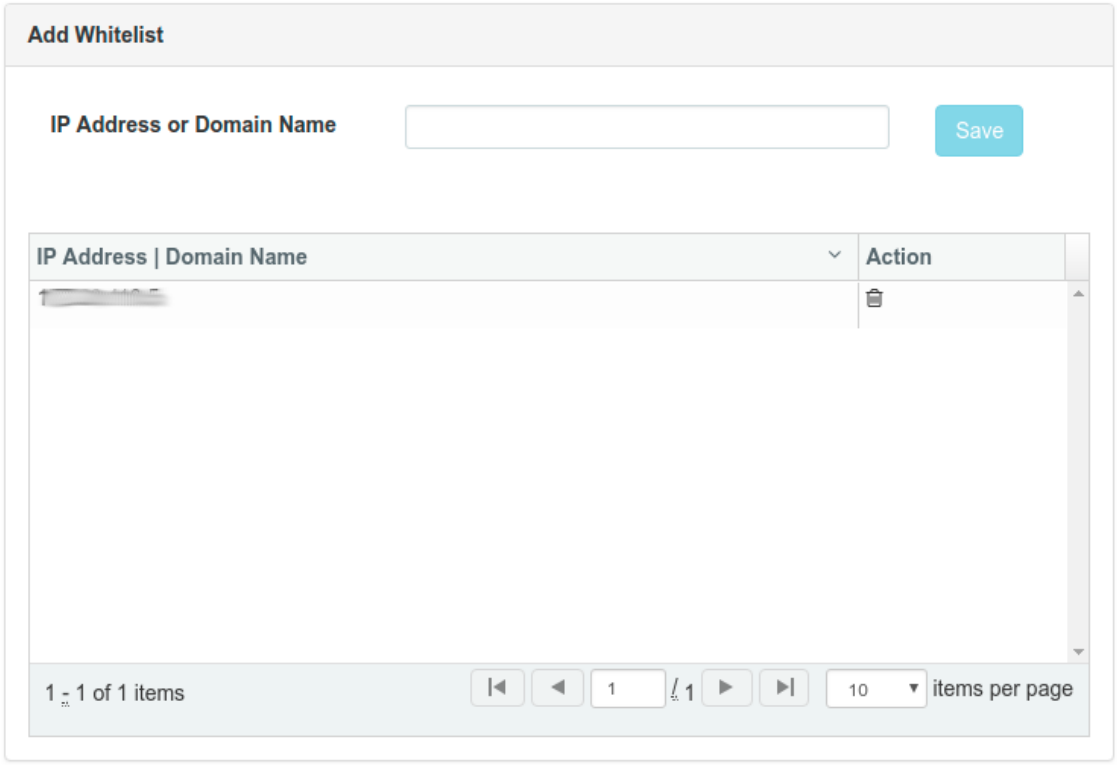
- Enable: check the box
- Portal Mode: External Hotspot
- Access Policy: Radius
- Redirect Mode: HTTP
- External Page URL: http://_IP_ADDRESS_OF_PACKETFENCE/Cambium
- External Portal Type: Standard
- Success Action: Your preferred action.

- Prefix Query Strings in Redirect URL: check the box
- Redirection URL Query String: check Client IP
- Redirect: check HTTP-only

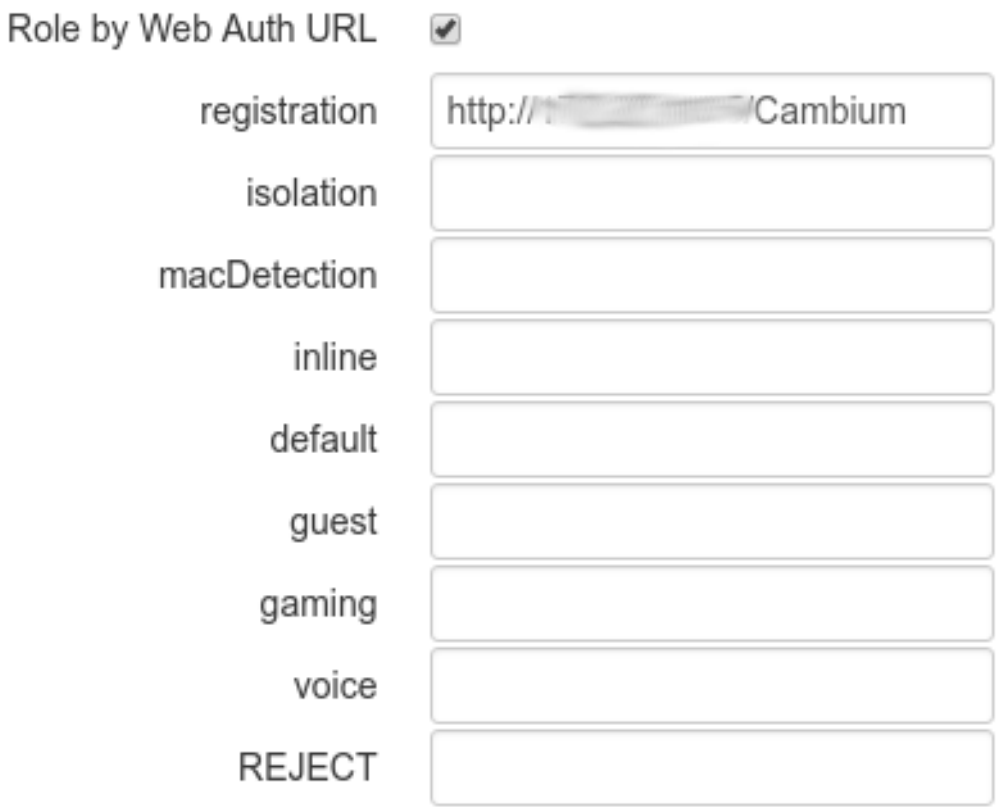
Click Save.

In the **Add Whitelist** section, add the IP address or domain name of your PacketFence server, then save.





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.



4.11. Cisco

4.11.1. 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
```

4.11.2. 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
```

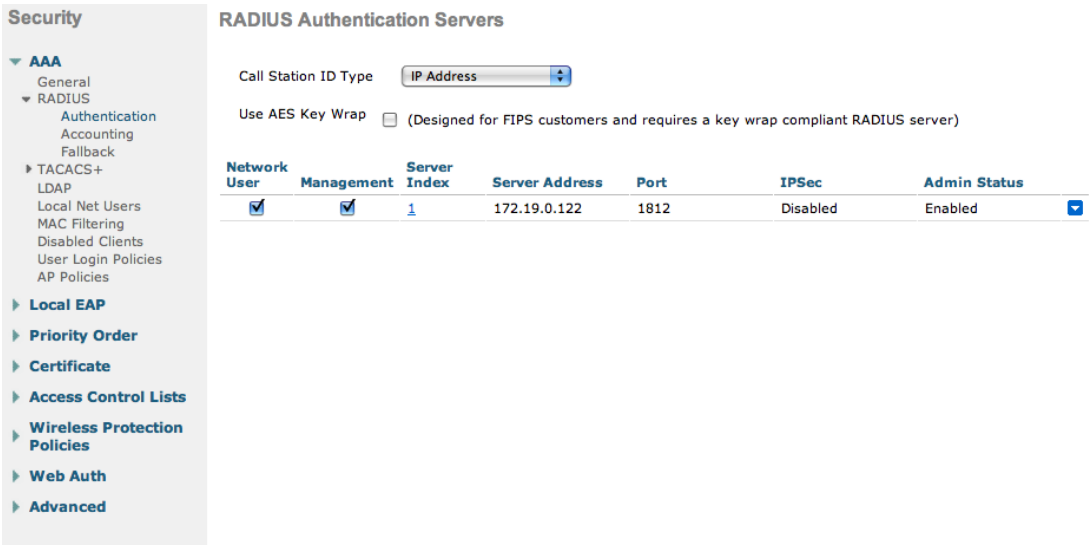
4.11.3. Aironet (WDS)

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

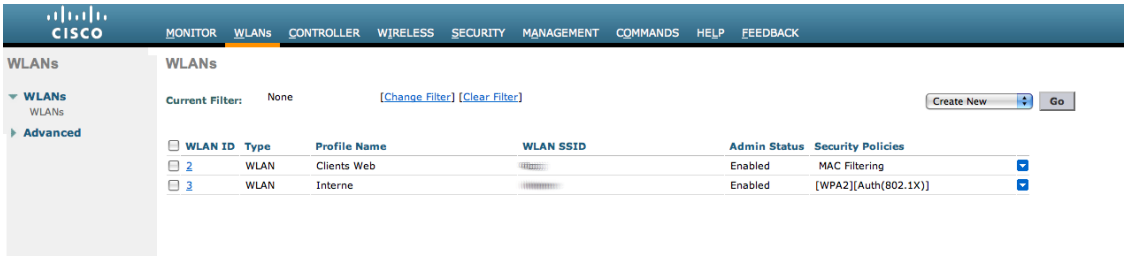
4.11.4. Wireless LAN Controller (AireOS)

In this section, we cover the basic configuration of the WLC for PacketFence using the WLC web interface.

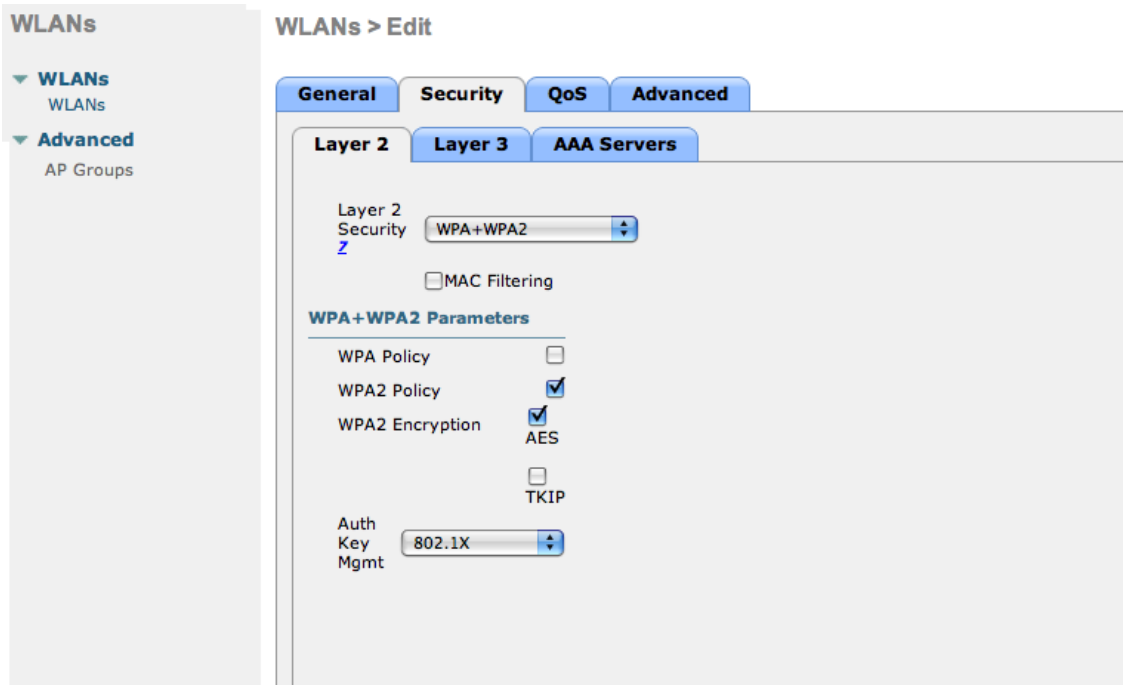
- First, globally define the FreeRADIUS server running on PacketFence (PacketFence's IP) and make sure *Support for RFC 3576* (also called *Support for CoA*) is enabled. When the option is missing from your WLC, it is enabled by default.



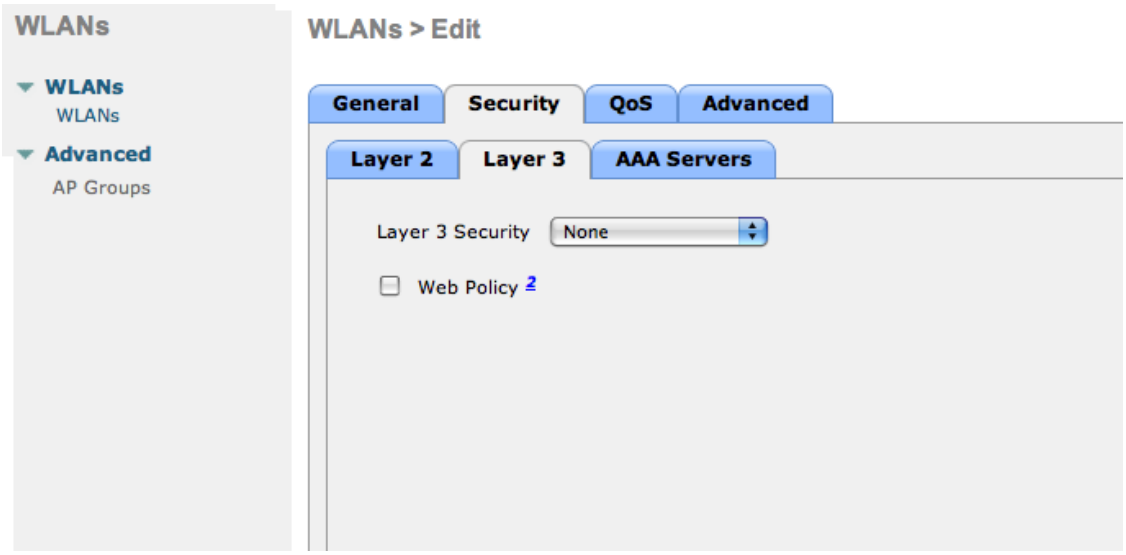
- Then we create two SSIDs:
  - PacketFence-Public: non-secure with MAC authentication only
  - PacketFence-Secure: secure with WPA2 Enterprise PEAP/MSCHAPv2



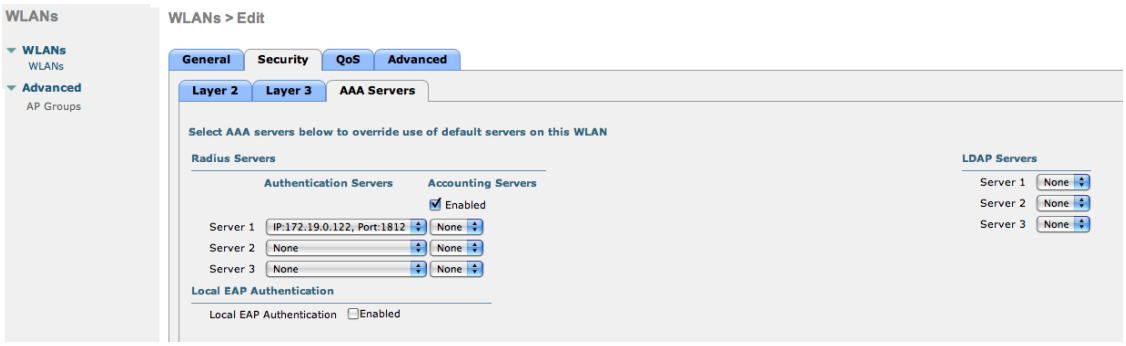
- In the secure SSID, make sure 802.1X is enabled and select the appropriate encryption for your needs (recommended: WPA + WPA2)



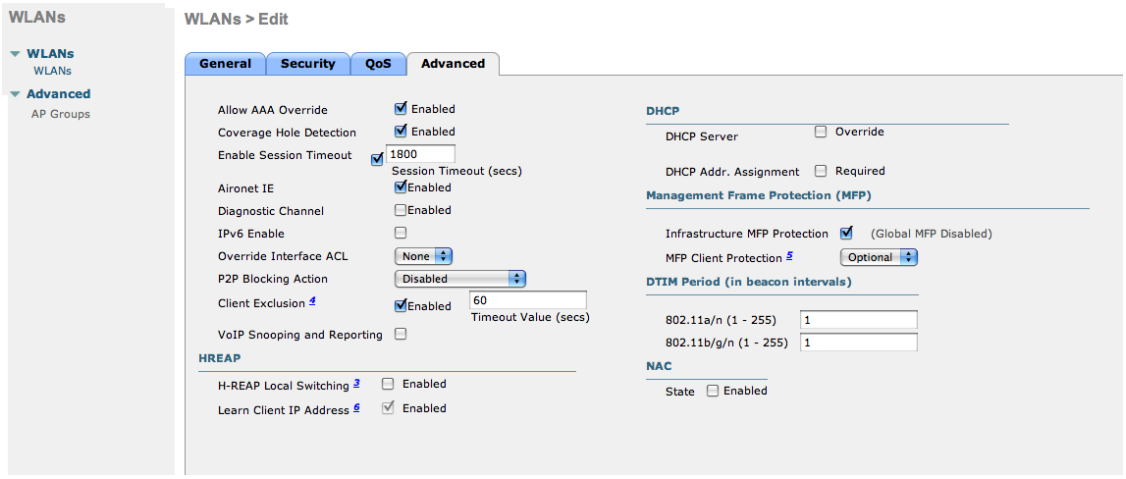
- No layer 3 security



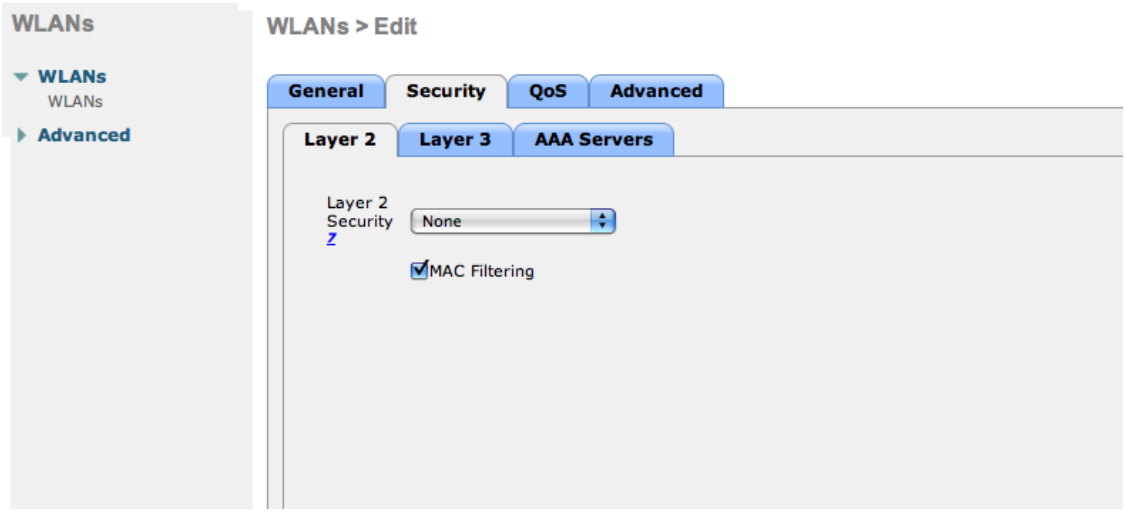
- We set the IP of the FreeRADIUS server



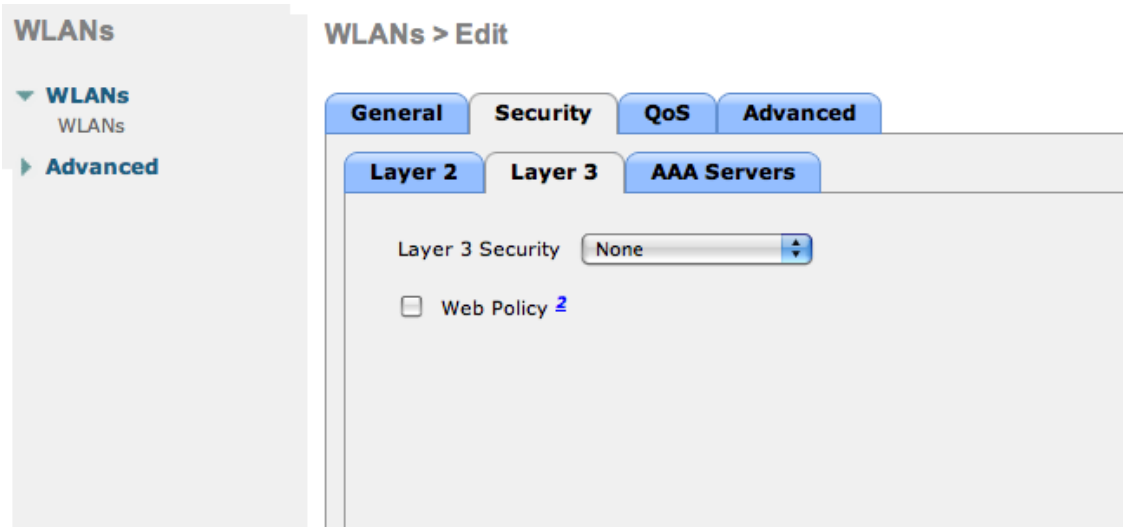
- VERY IMPORTANT: Allow AAA override (this allows VLAN assignment from RADIUS)



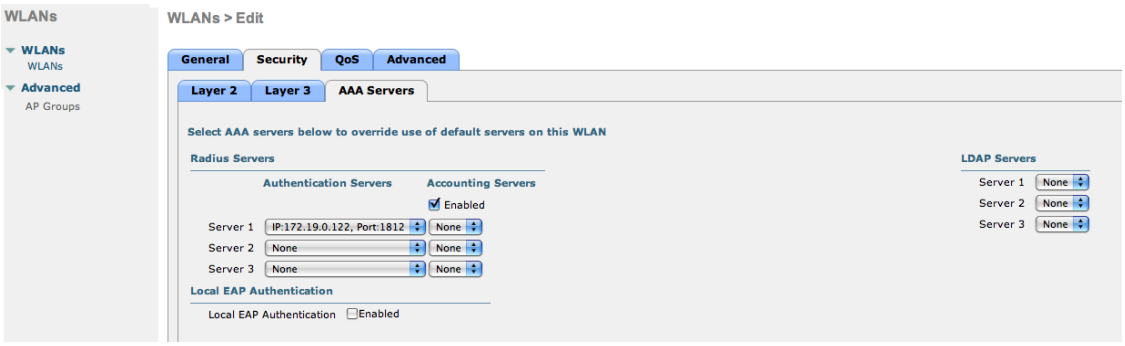
- Edit the non-secure SSID: Enable MAC authentication at level 2



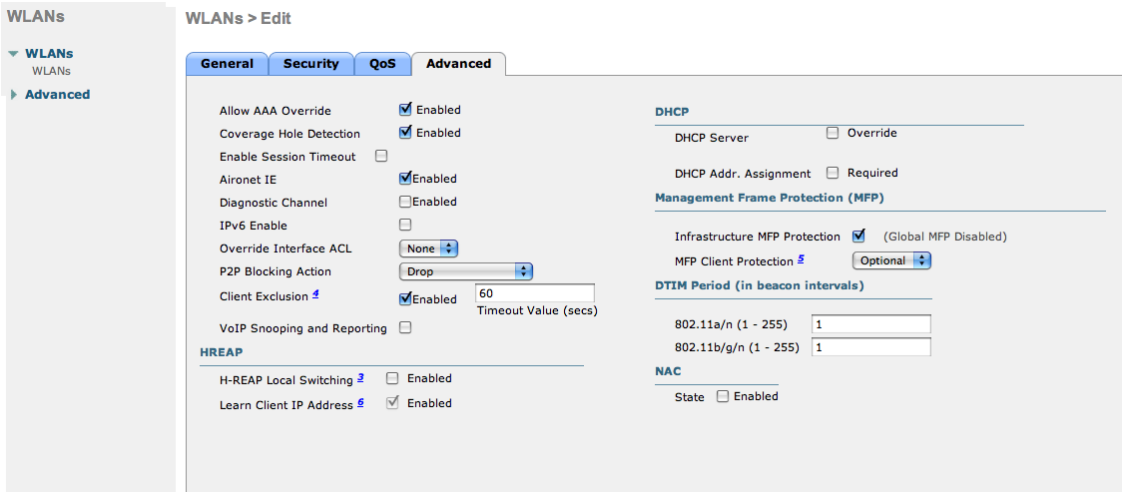
- Nothing at level 3



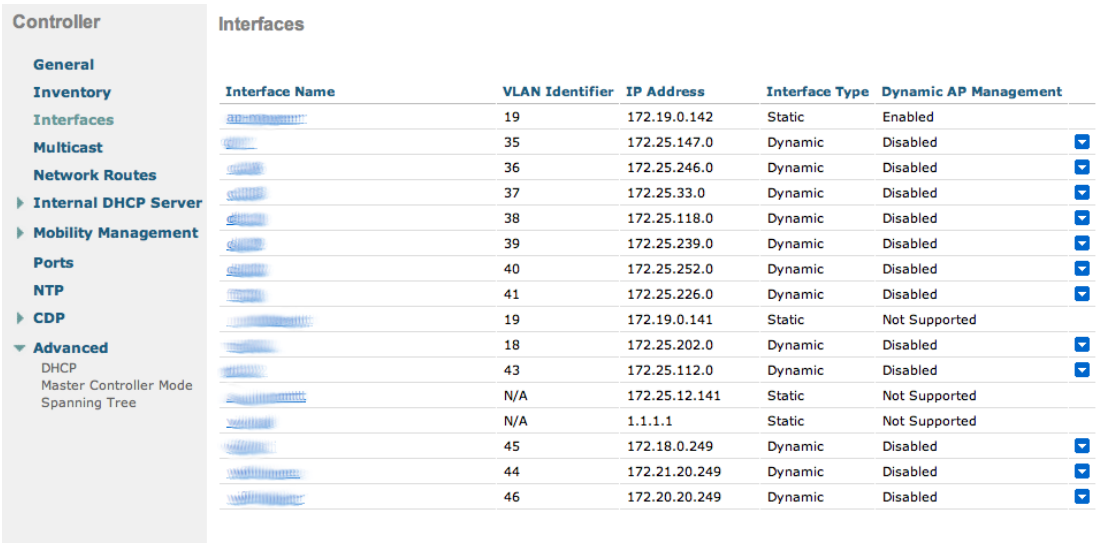
- We set the IP of the FreeRADIUS server



- VERY IMPORTANT: Allow AAA override (this allows VLAN assignment from RADIUS)



- Finally, in *Controller* → *Interfaces* tab, create an interface per VLAN that could be assigned



WARNING	When creating interfaces, it's important to configure DHCP servers. Otherwise, WLC will block DHCP requests.

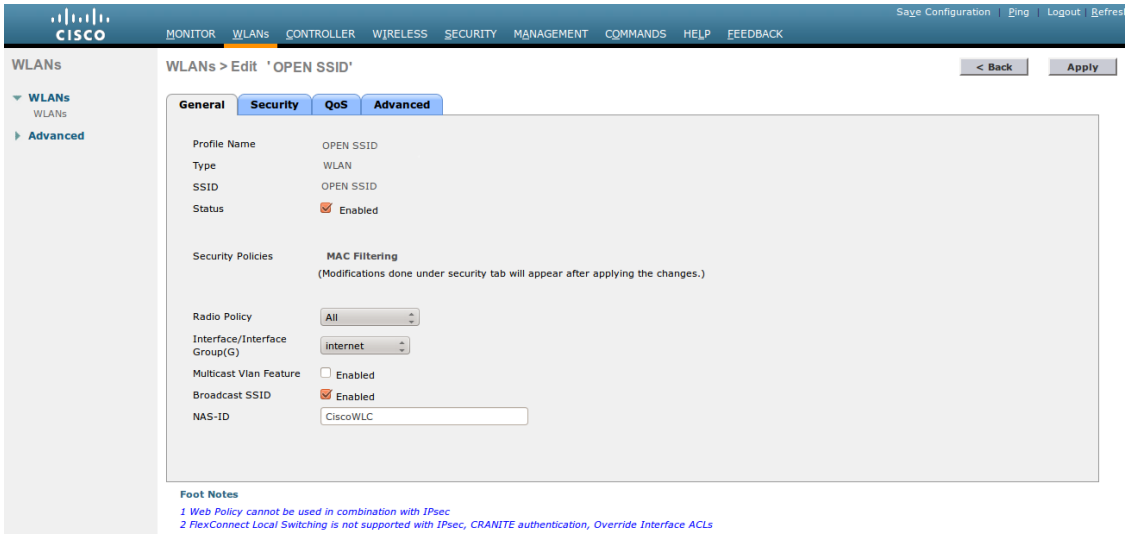
You are good to go!

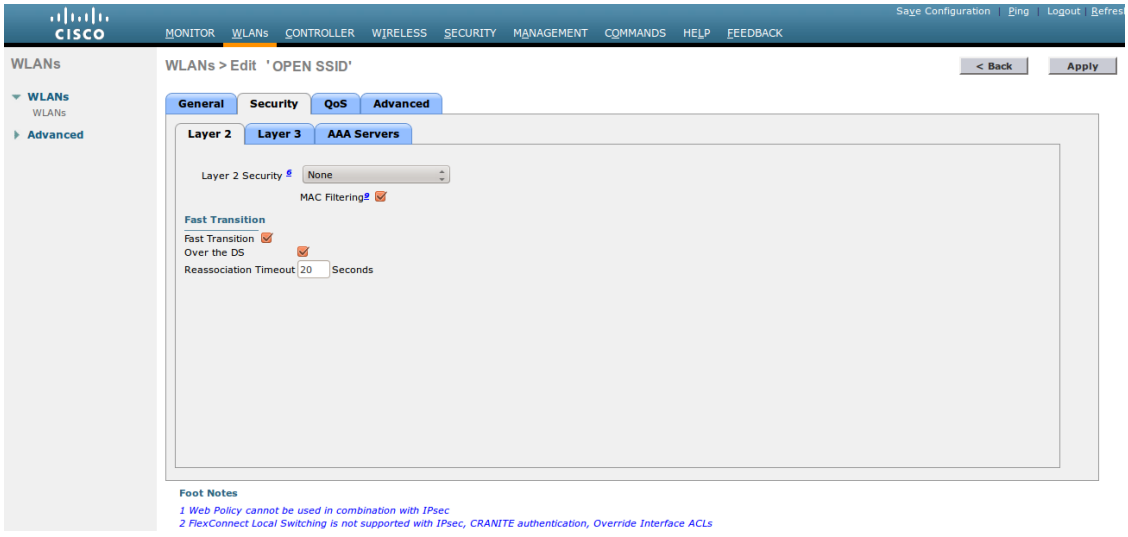
Wireless LAN Controller (AireOS) Web Auth

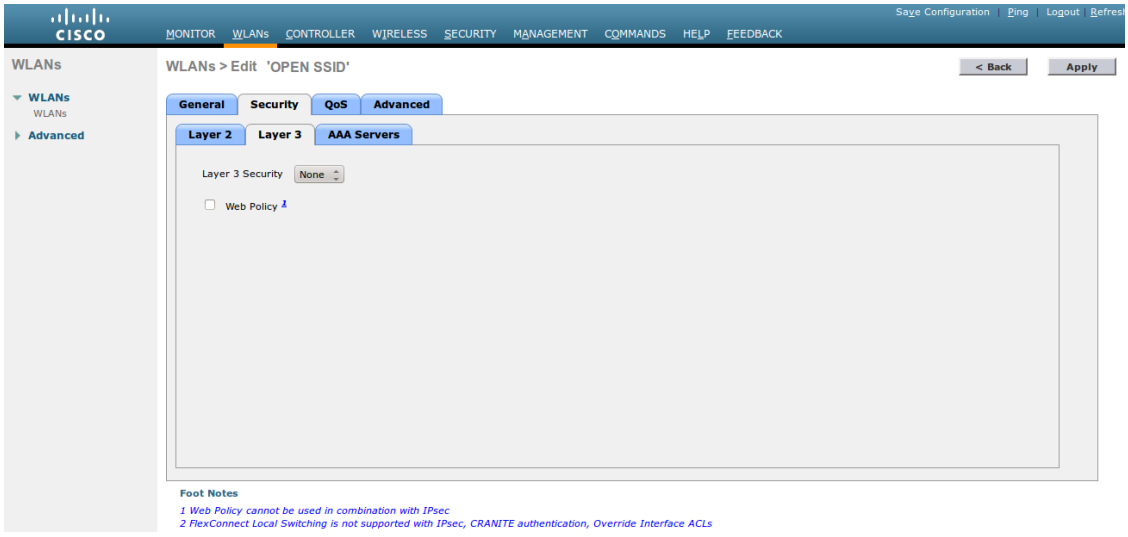
In this section, we cover the basic configuration of the WLC AireOS Web Auth for PacketFence using the WLC web interface. The idea is to forward the device to the captive portal with an ACL if the device is in an unreg state and allow the device to reach Internet (or the normal network) by changing the ACL once registered. In the unreg state, the WLC will intercept the HTTP traffic and forward the device to the captive portal.

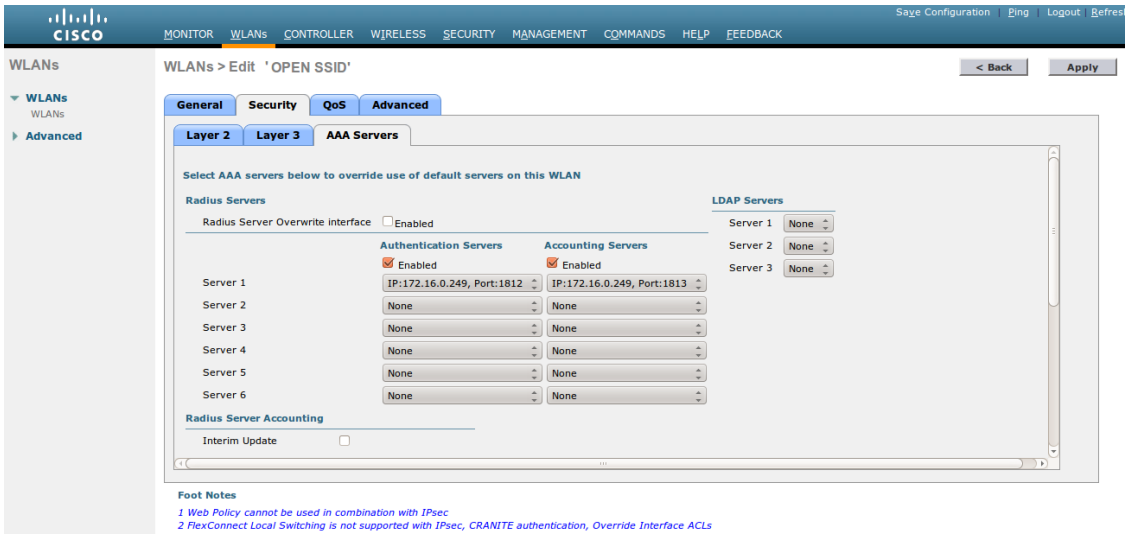
In this sample configuration, the captive portal uses the IP address 172.16.0.250, the management interface uses the IP address 172.16.0.249 and the WLC uses the IP address 172.16.0.248. The DHCP and DNS servers are not managed by PacketFence (WLC DHCP Server, Production DHCP Server)

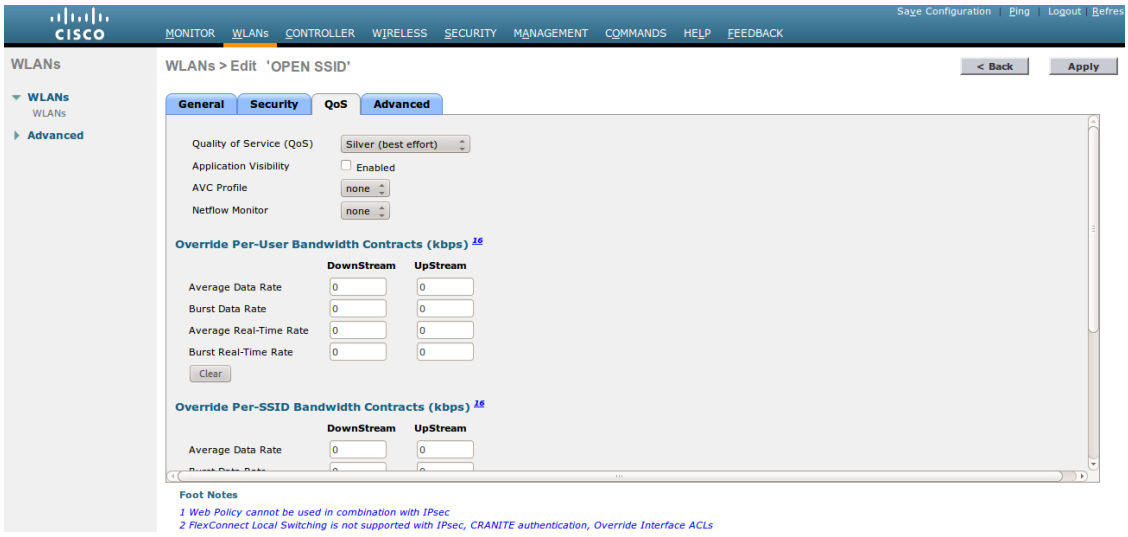
- First, globally define the FreeRADIUS server running on PacketFence (PacketFence's management interface) and make sure *Support for RFC 3576* is enabled (if not present it is enabled by default)
- Then we create a SSID:
  - OPEN SSID: non-secure with MAC authentication only

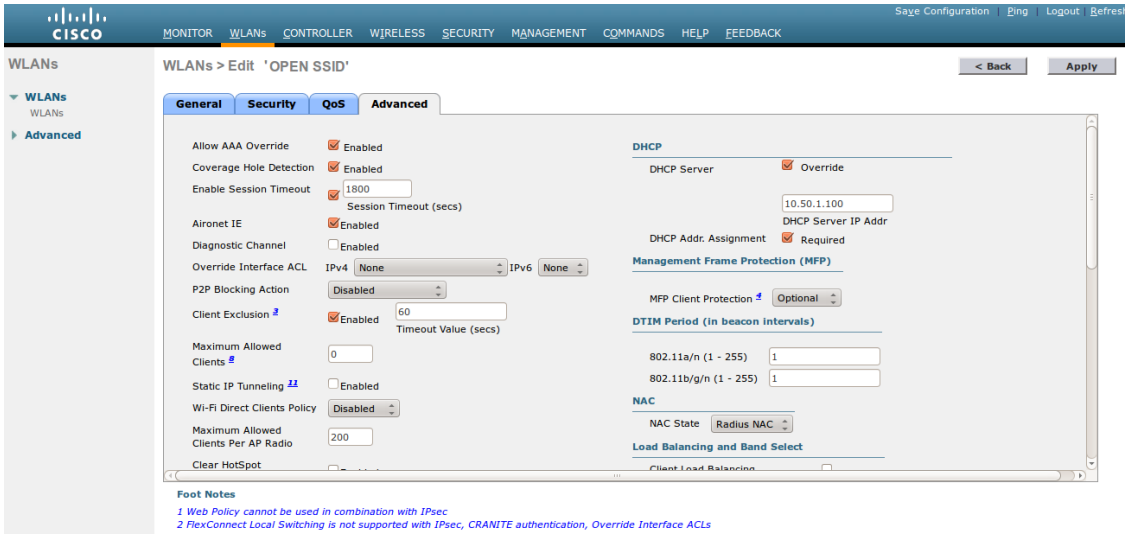

Save Configuration | Ping | Logout | Refresh
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
WLANs > Edit 'OPEN SSID'
< Back
Apply
General
Security
QoS
Advanced
Profile Name
OPEN SSID
Type
WLAN
SSID
OPEN SSID
Status
Enabled
Security Policies
MAC 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


Save Configuration | Ping | Logout | Refresh
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
WLANs > Edit 'OPEN SSID'
< Back
Apply
General
Security
QoS
Advanced
Layer 2
Layer 3
AAA Servers
Layer 2 Security
None
MAC Filtering
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

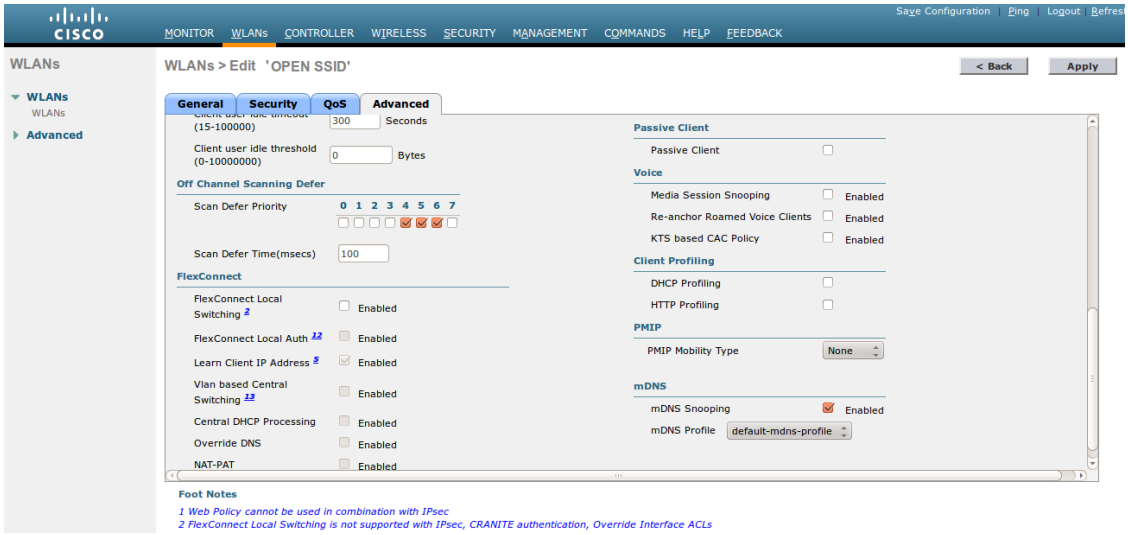

Save Configuration | Ping | Logout | Refresh
MONITOR WLANs CONTROLLER WIRELESS SECURITY MANAGEMENT COMMANDS HELP FEEDBACK
WLANs
WLANs
WLANs
Advanced
WLANs > Edit 'OPEN SSID'
< Back
Apply
General
Security
QoS
Advanced
Layer 2
Layer 3
AAA Servers
Layer 3 Security
None
Web Policy
Foot Notes
1 Web Policy cannot be used in combination with IPsec
2 FlexConnect Local Switching is not supported with IPsec, CRANITE authentication, Override Interface ACLs



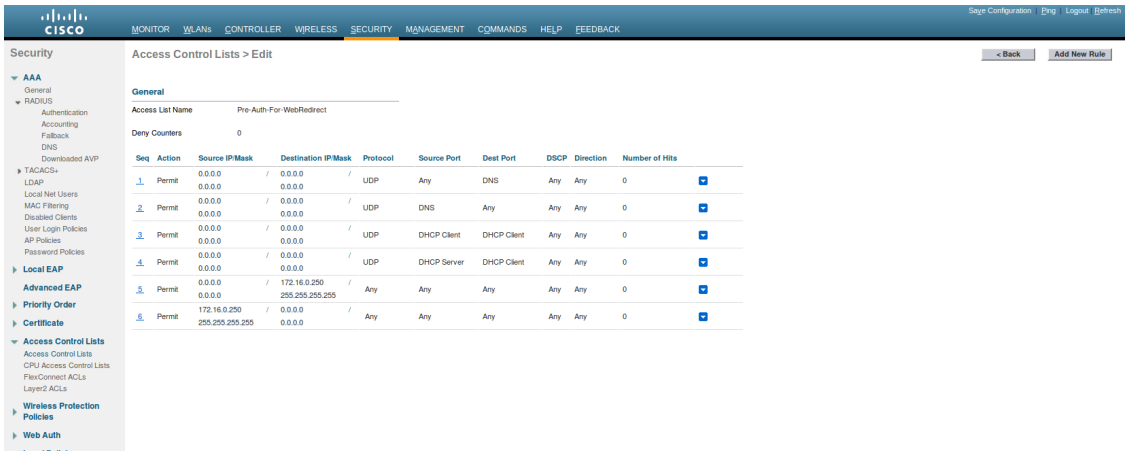




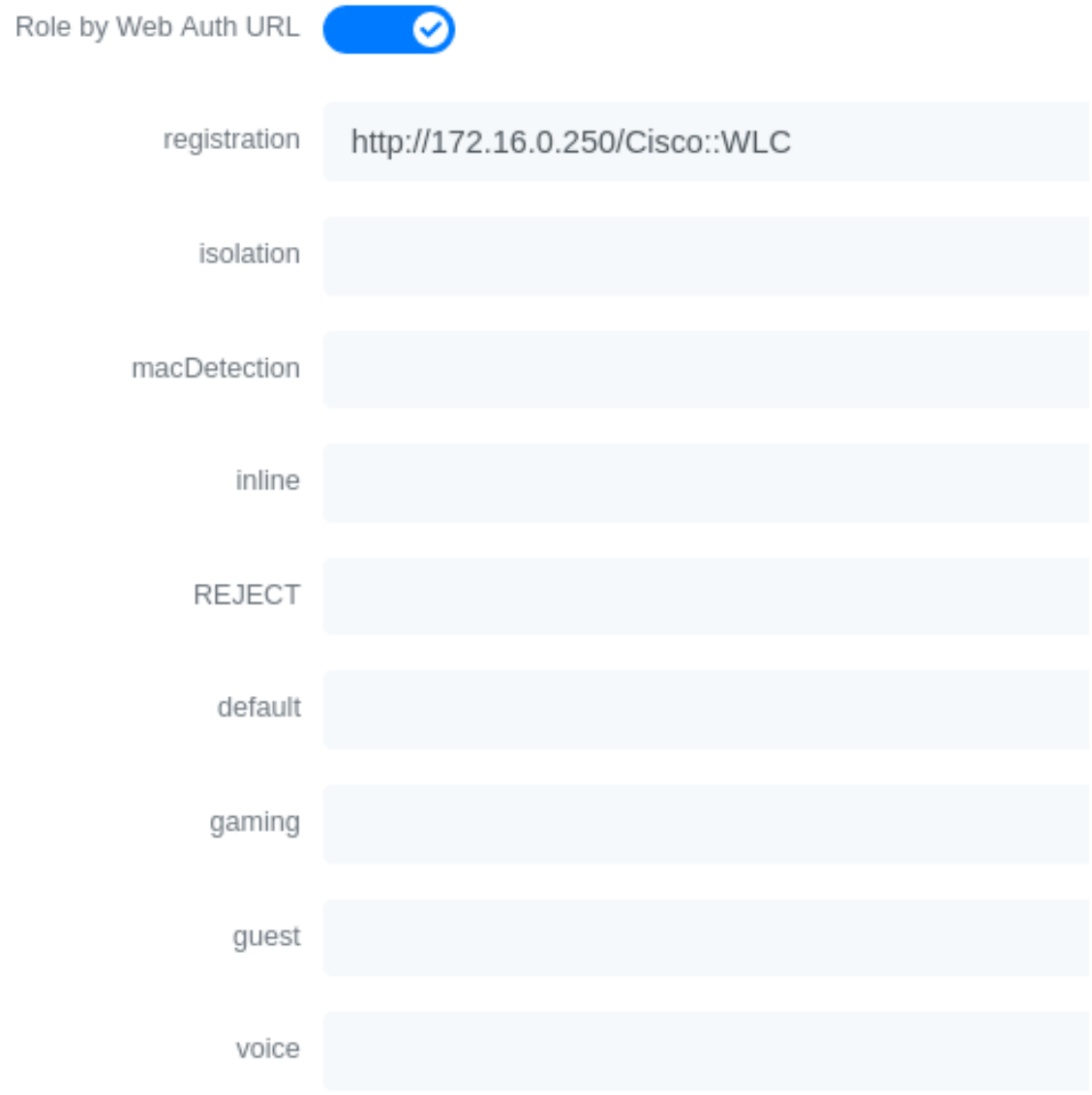
NOTE On more recent controllers, the value 'Radius NAC' in the 'NAC State' setting will be called 'ISE NAC'.



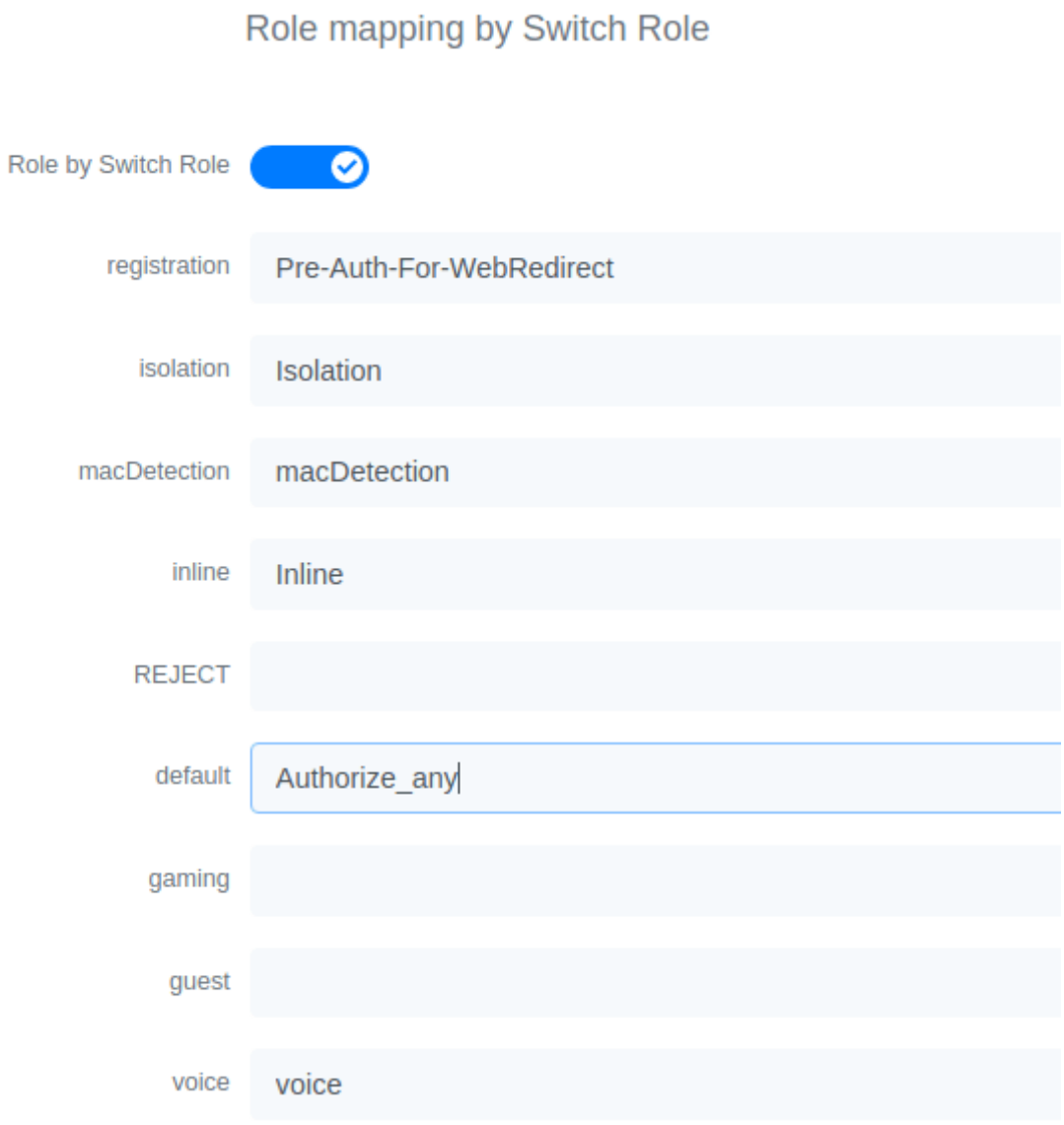
- Then you have to create two ACLs - one to deny all traffic except the required one to hit the portal (Pre-Auth-For-WebRedirect) and the other one to allow anything (Authorize_any) .



- Then the last step is to configure the WLC AireOS in PacketFence. Role by Web Auth URL



Role definition



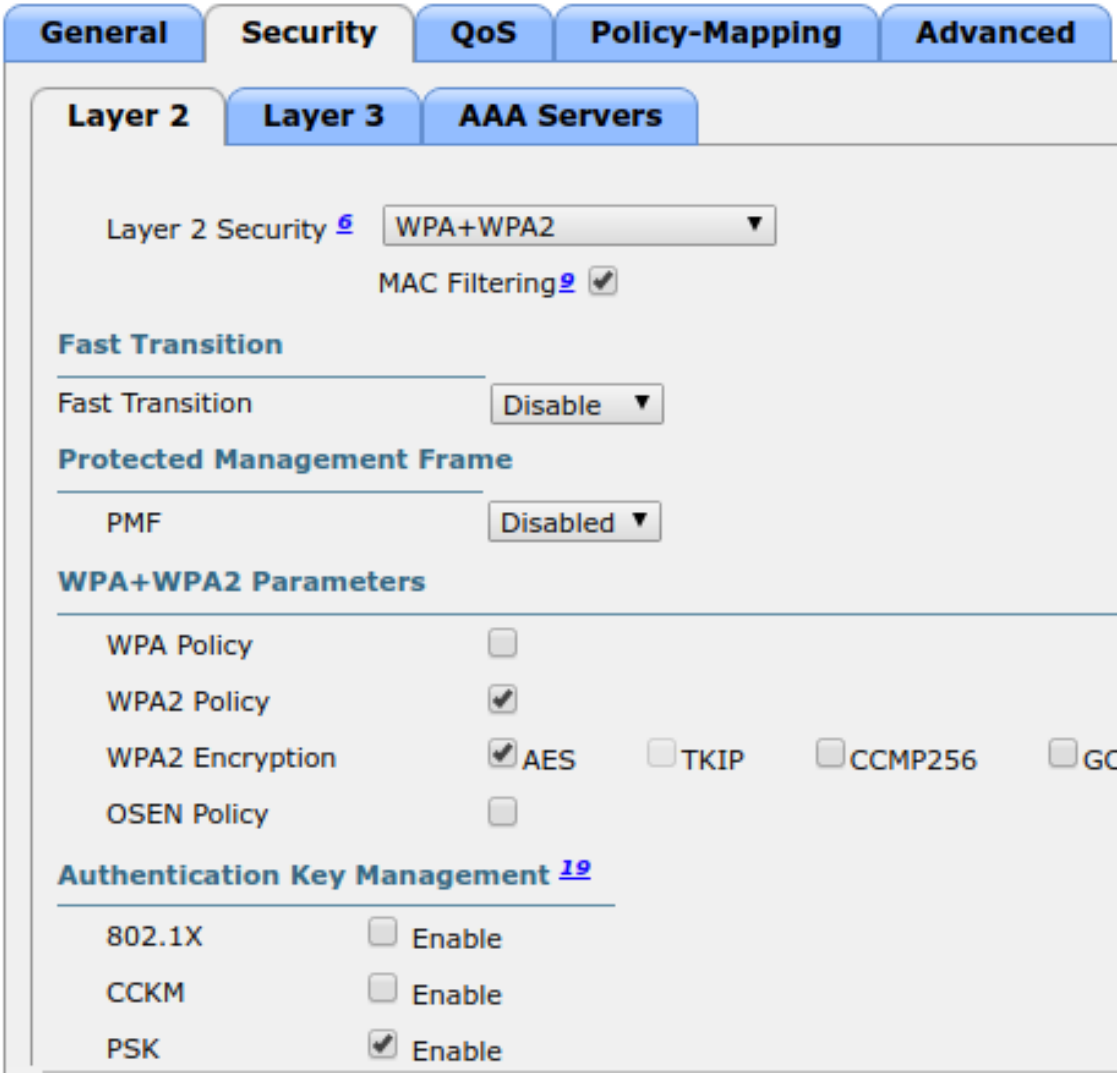
Wireless LAN Controller (AireOS) IPSK

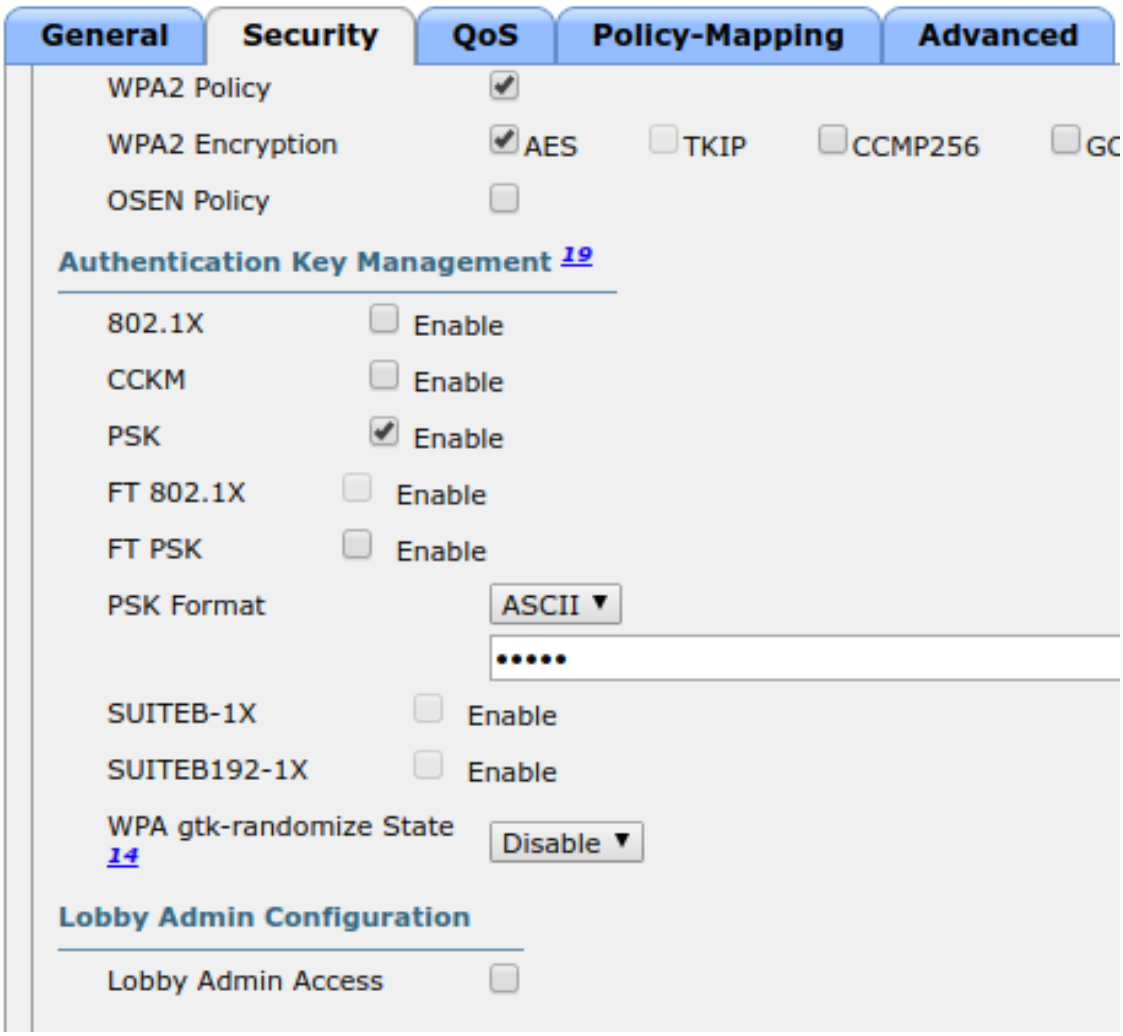
In this section, we cover the basic configuration of the WLC AireOS IPSK feature. Starting from WLC AireOS 8.5 release, Cisco introduces the IPSK feature. Identity PSKs are unique pre-shared keys created for individuals or groups of users on the same SSID.

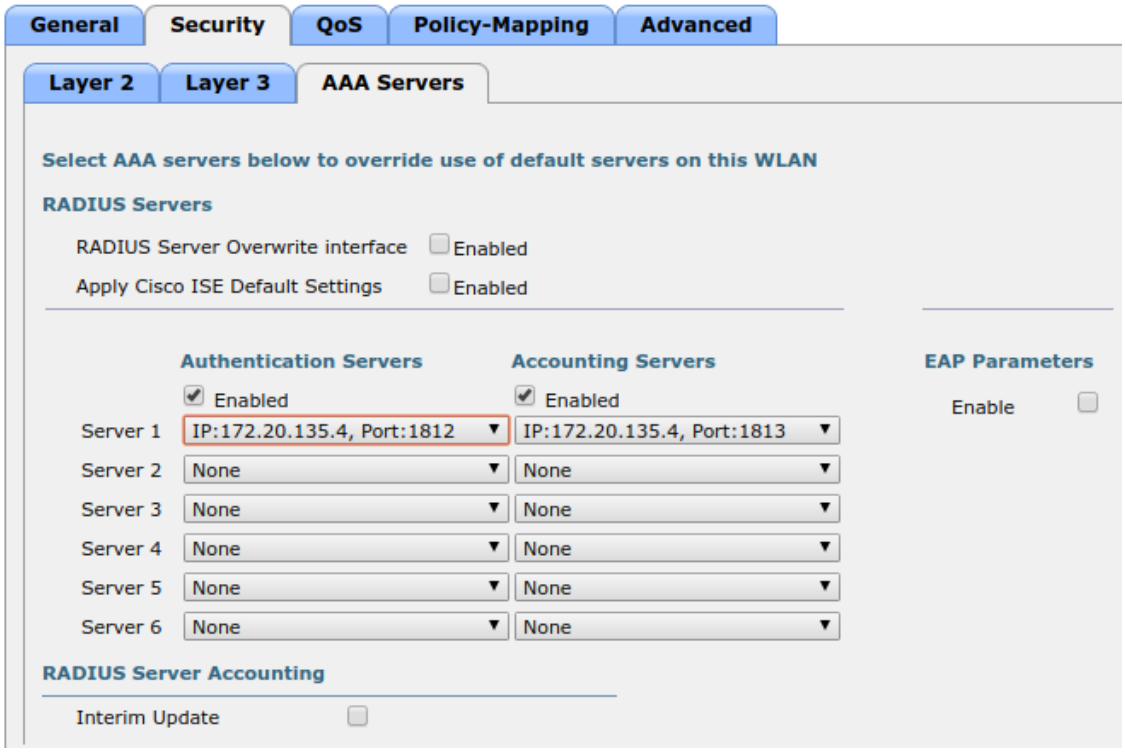
In this section we will cover the WLC configuration and the PacketFence configuration.

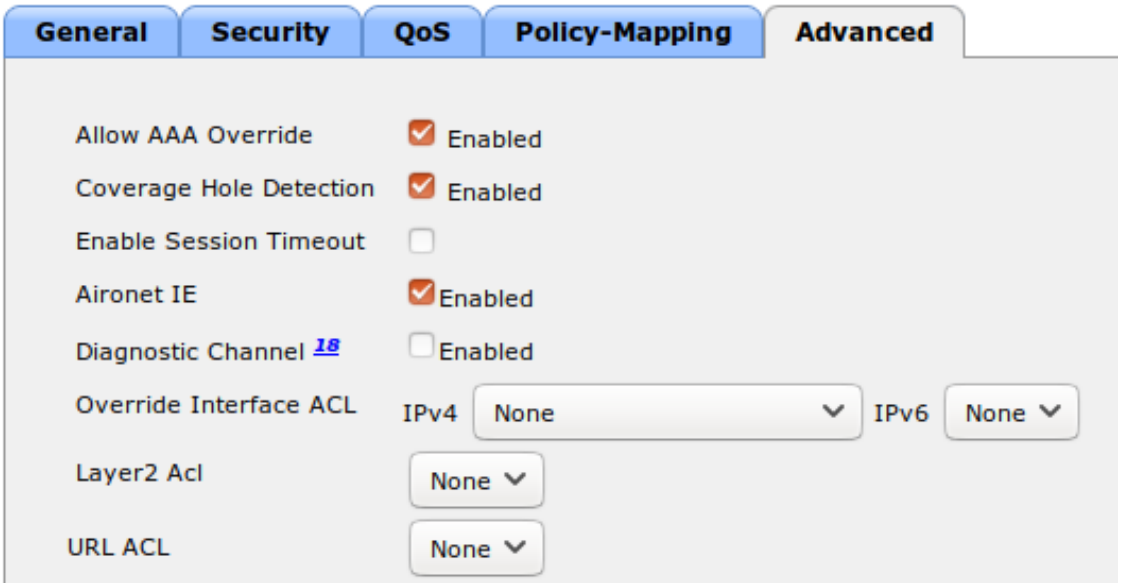
WLC Configuration:

- 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


General
Security
QoS
Policy-Mapping
Advanced
Layer 2
Layer 3
AAA Servers
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
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
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



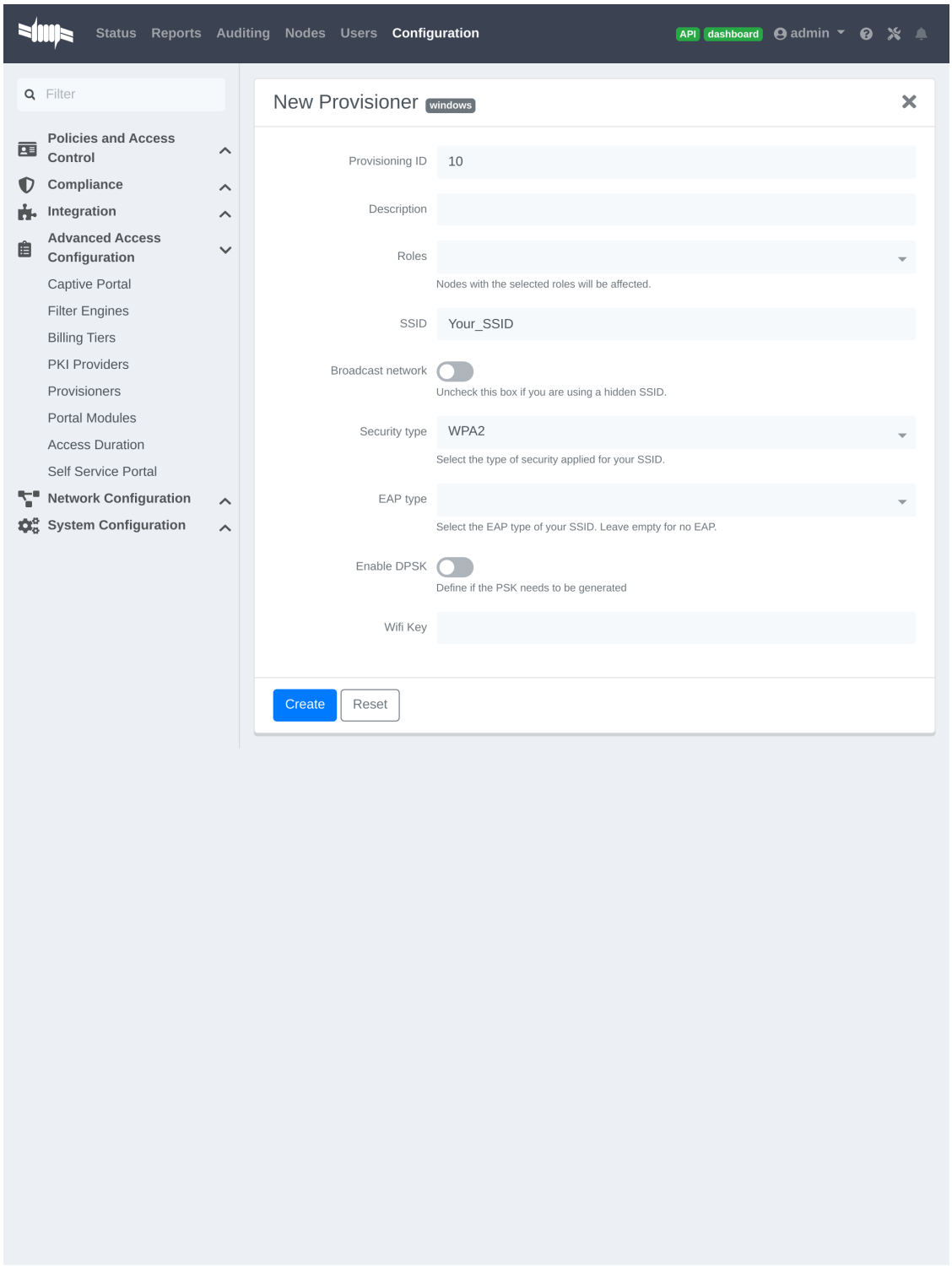


PacketFence Configuration:

- 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

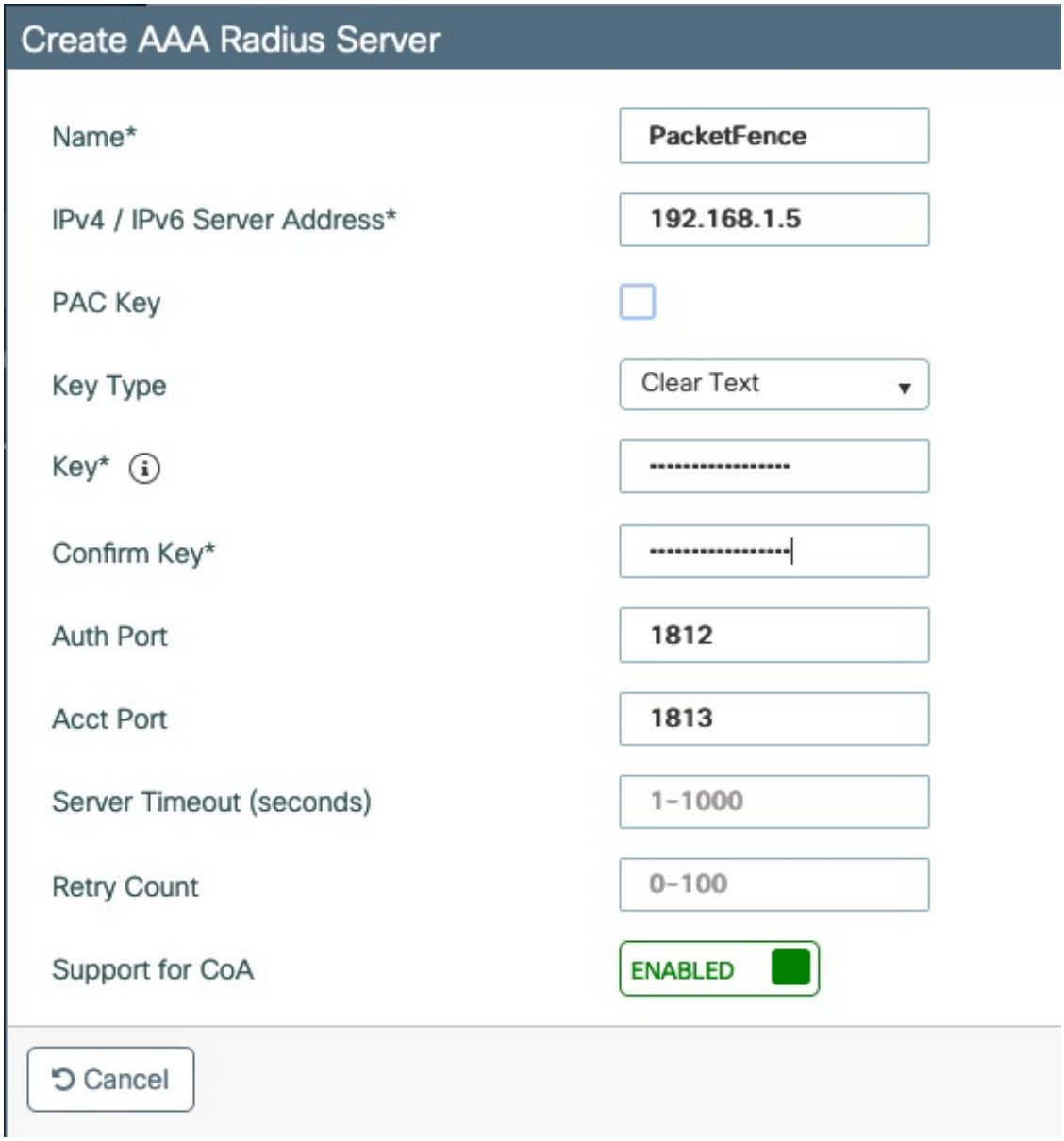
edit a node and change the owner with the one you just edit before. The second way to associate the device is to use a provisioner. There are also 2 ways to do it, use the "IPSK" provisioner (it will show you a page on the portal with the PSK key to use and the SSID to connect to, or use the "Windows/Apple Devices/Android" provisioner and configure it to do IPSK.



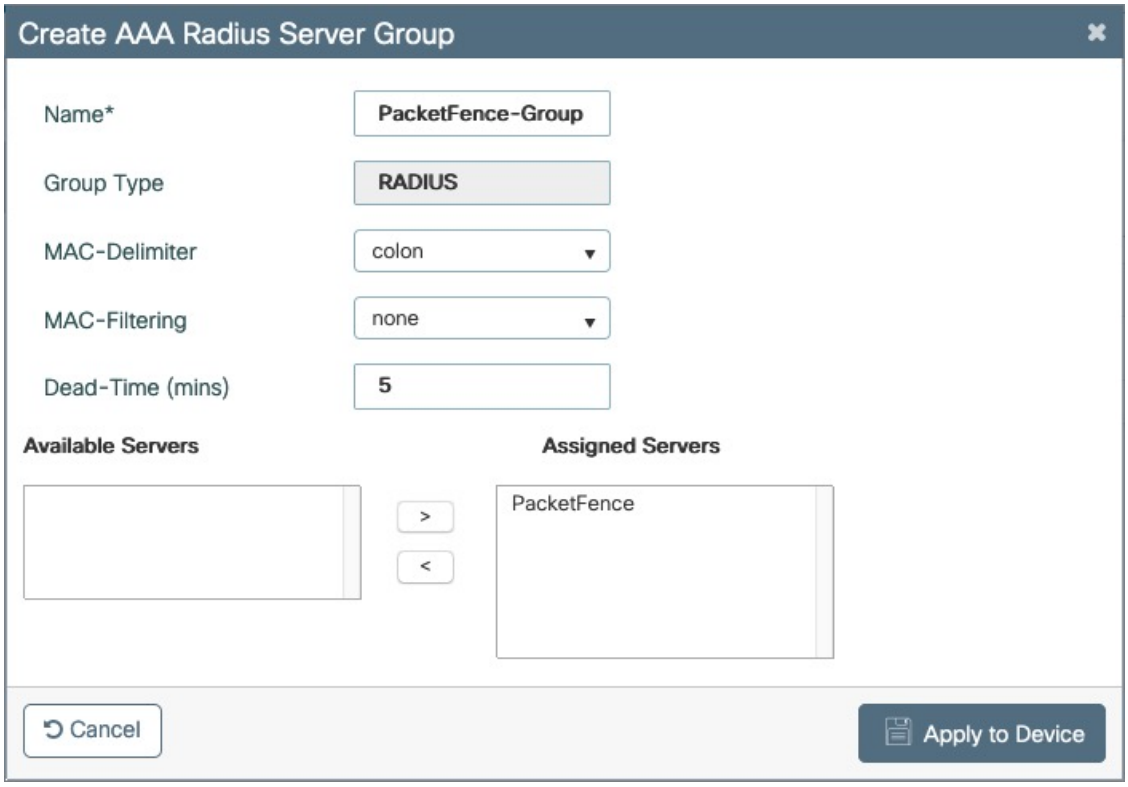
4.11.5. Wireless LAN Controller (IOS XE) 9800

General RADIUS Configuration

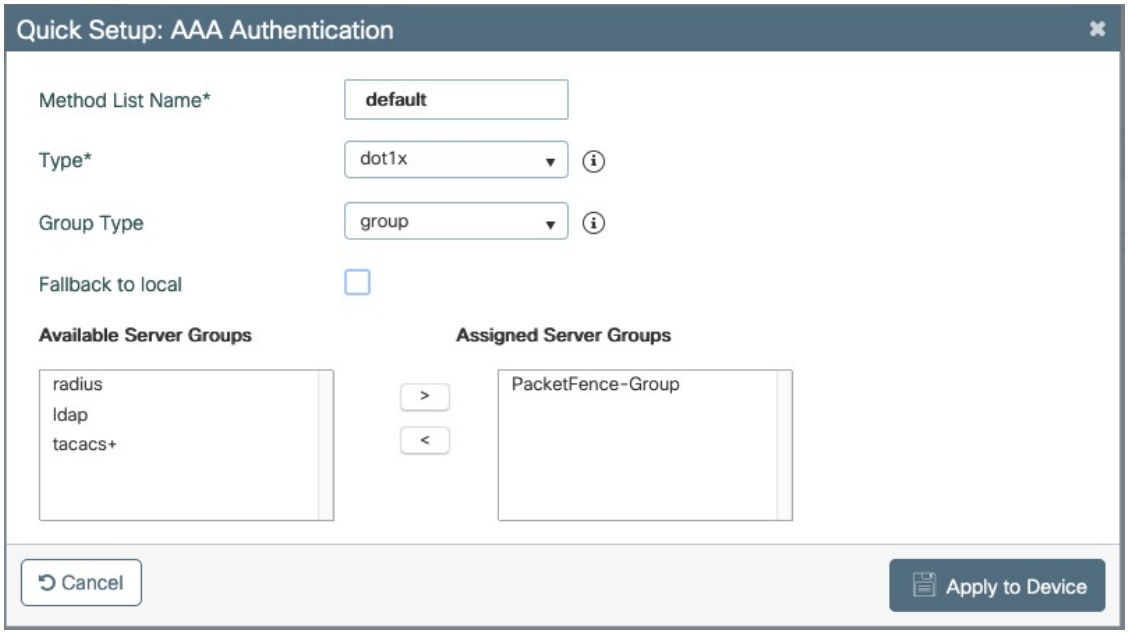
Go to Configuration → Security → AAA → Servers / Groups → Servers, click add



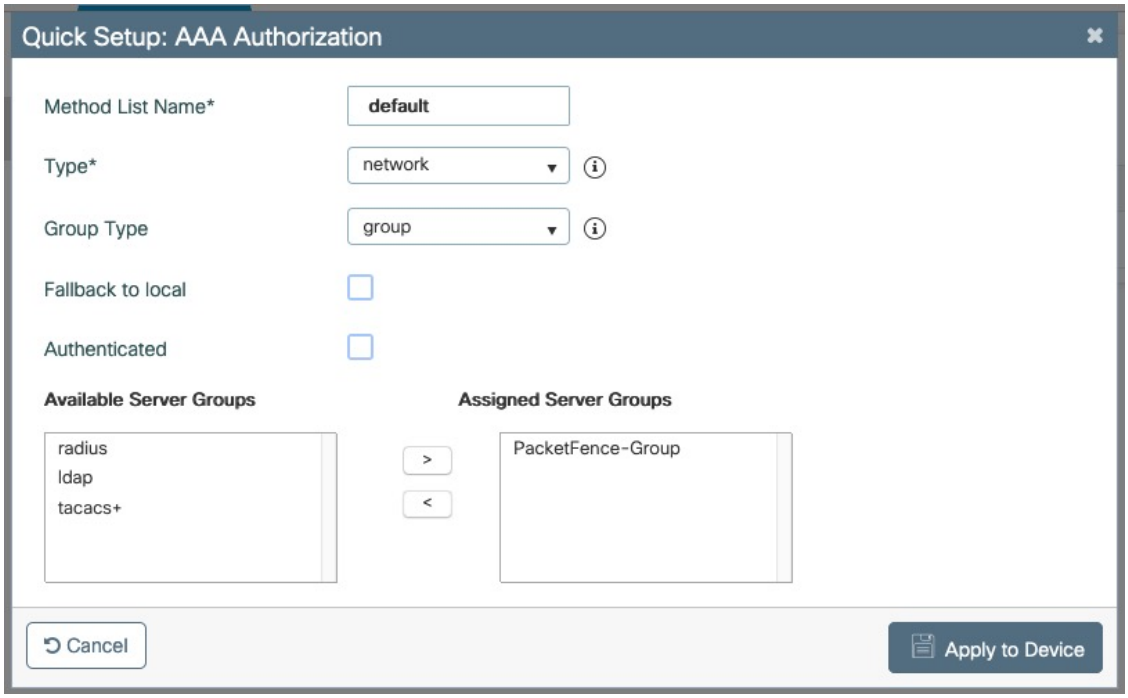
Click Server Groups, click add



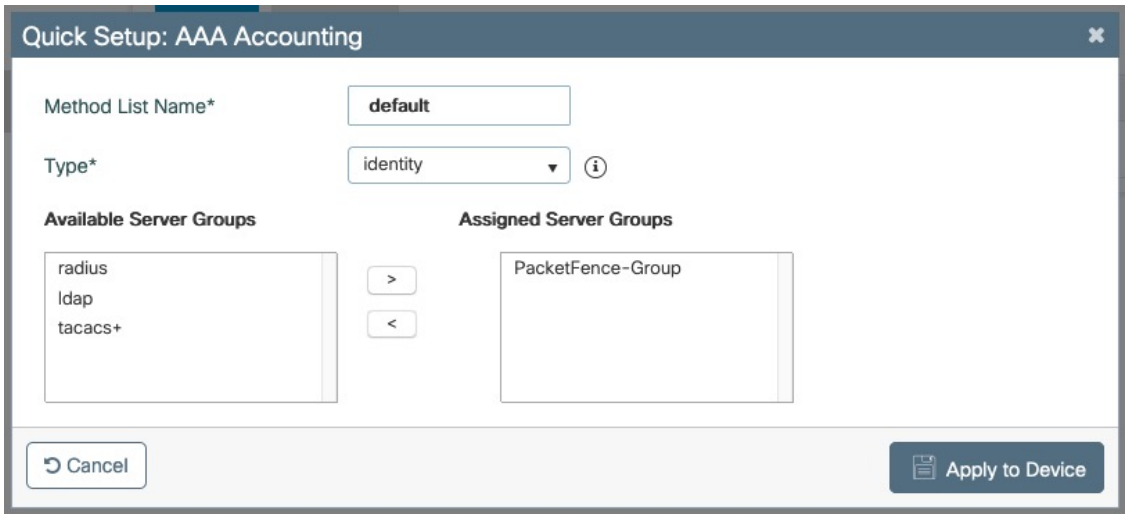
Go to Configuration → Security → AAA → AAA Method List → Authentication, click add



Go to Configuration → Security → AAA → AAA Method List → Authorization, click add



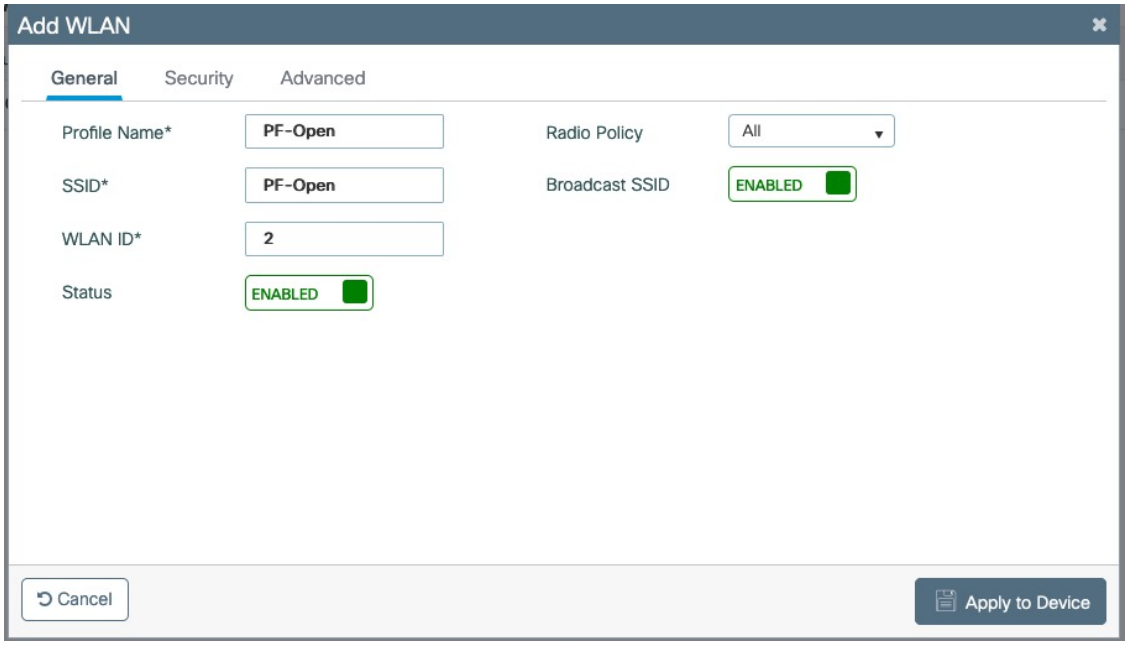
Go to Configuration → Security → AAA → AAA Method List → Accounting, click add

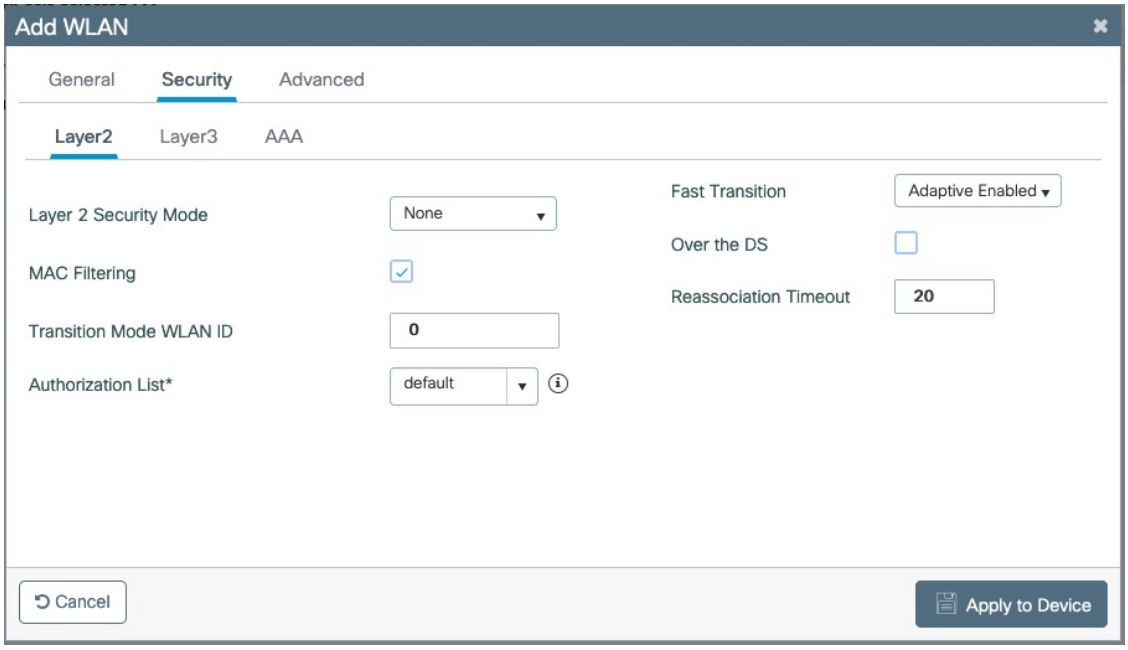


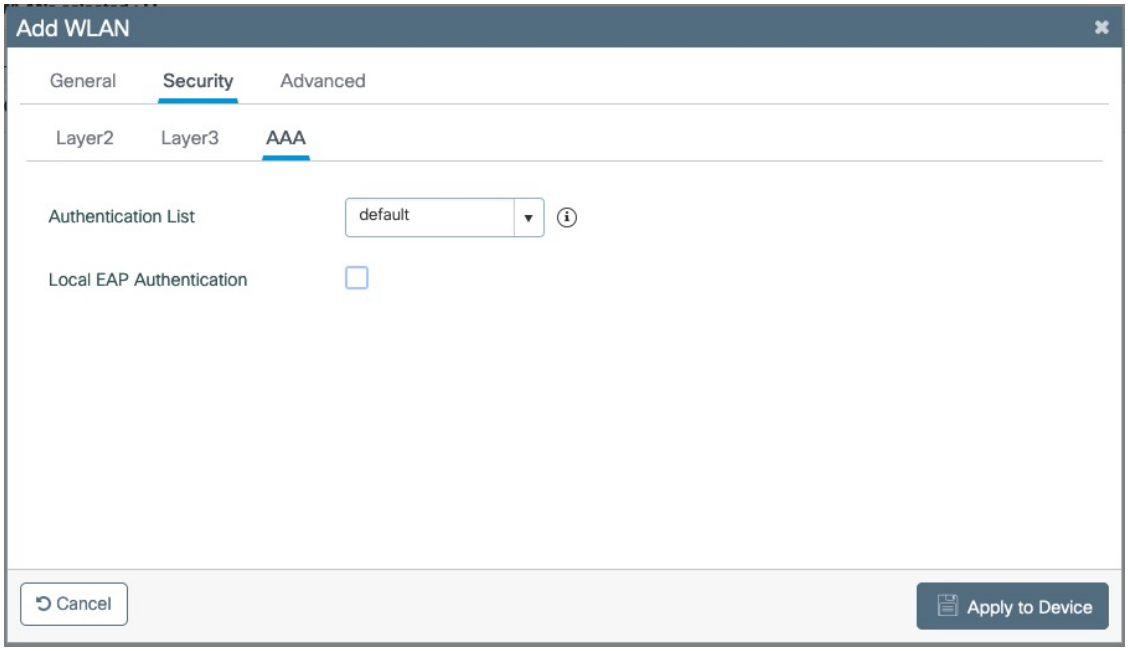
Create WLANs

PF-Open SSID

Go to Configuration → Tags & Profiles → WLANs, click add

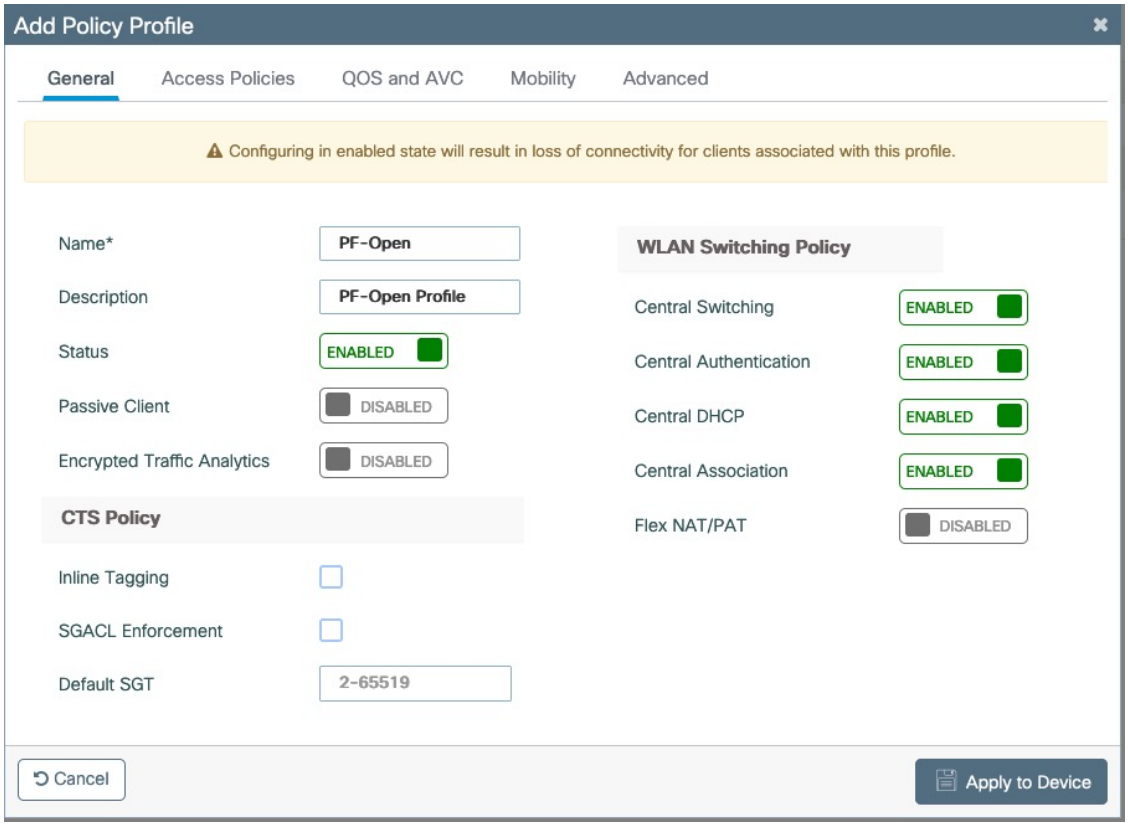

Add WLAN
General
Security
Advanced
Profile Name*
PF-Open
Radio Policy
All
SSID*
PF-Open
Broadcast SSID
ENABLED
WLAN ID*
2
Status
ENABLED
Cancel
Apply to Device

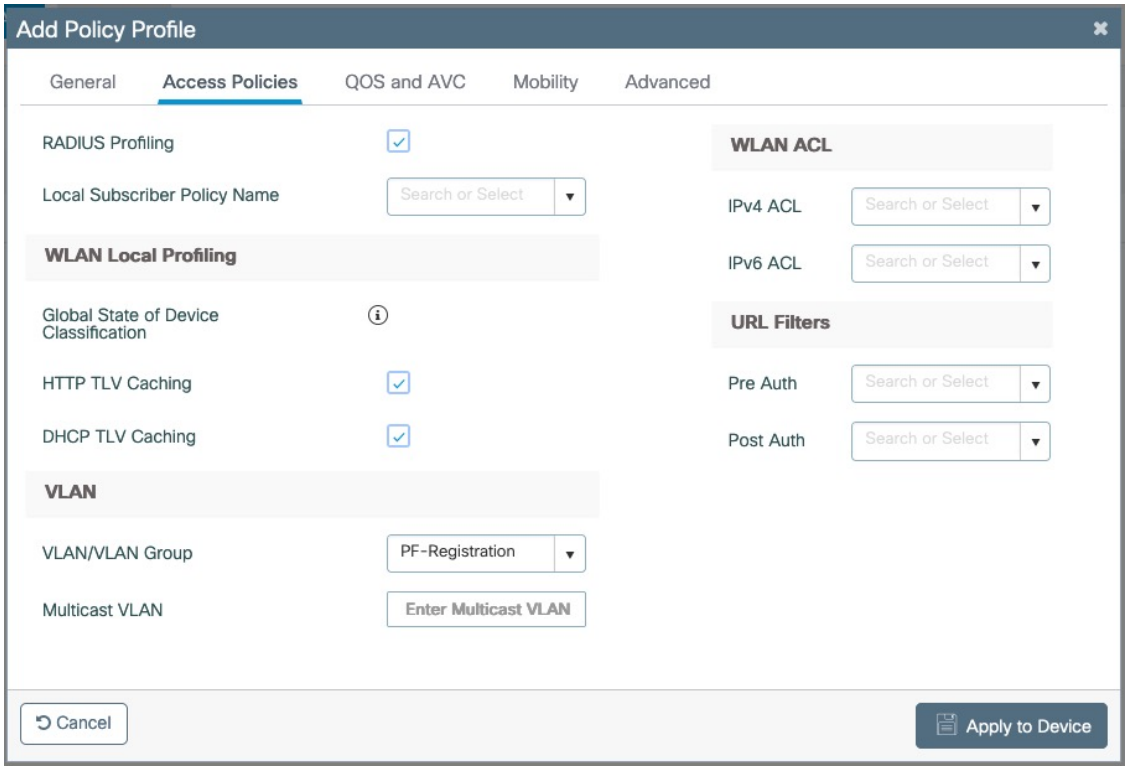

Add WLAN
General
Security
Advanced
Layer2
Layer3
AAA
Layer 2 Security Mode
None
Fast Transition
Adaptive Enabled
MAC Filtering
Over the DS
Transition Mode WLAN ID
0
Reassociation Timeout
20
Authorization List*
default
Cancel
Apply to Device

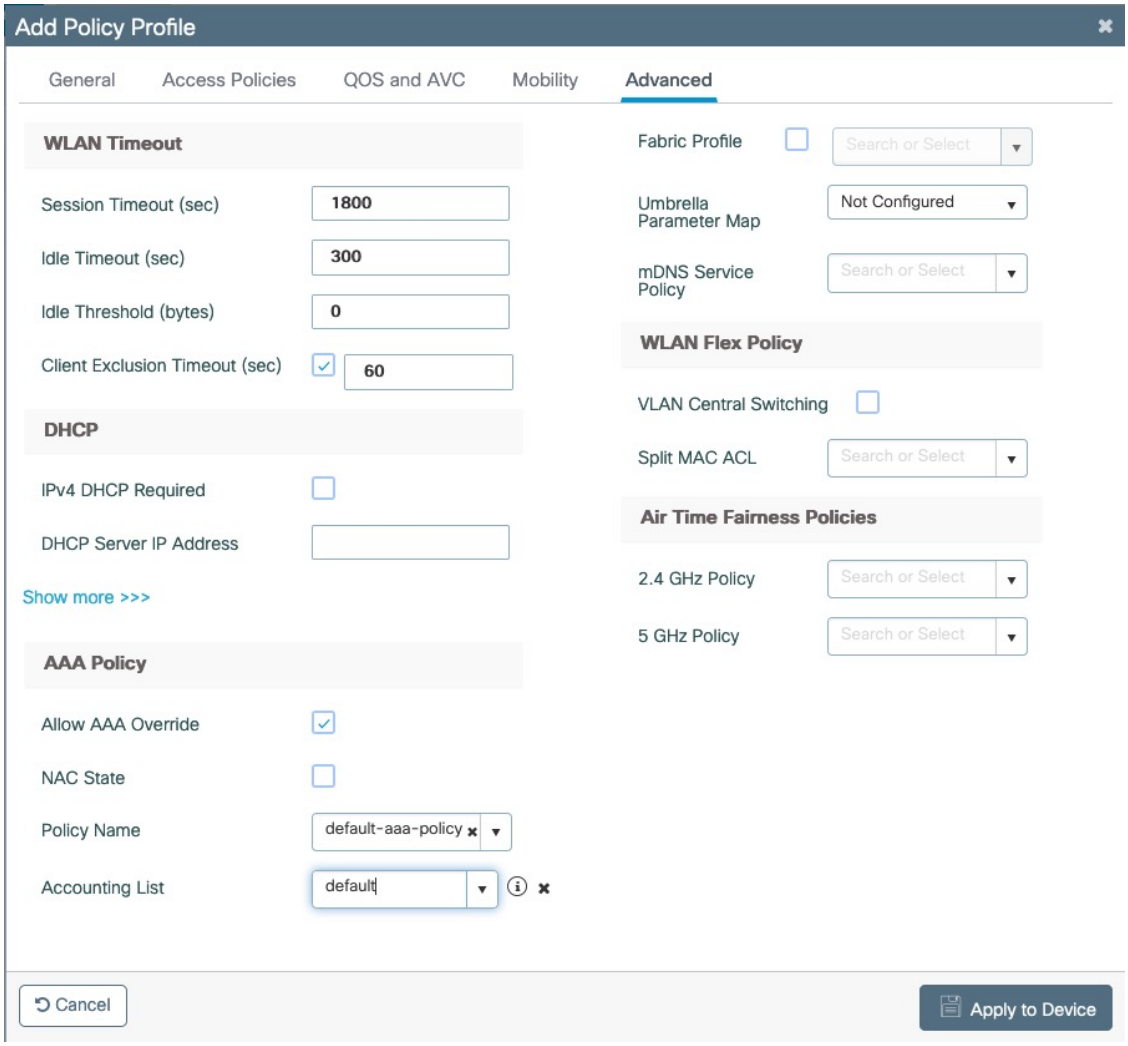


Create Policy Profiles PF-Open

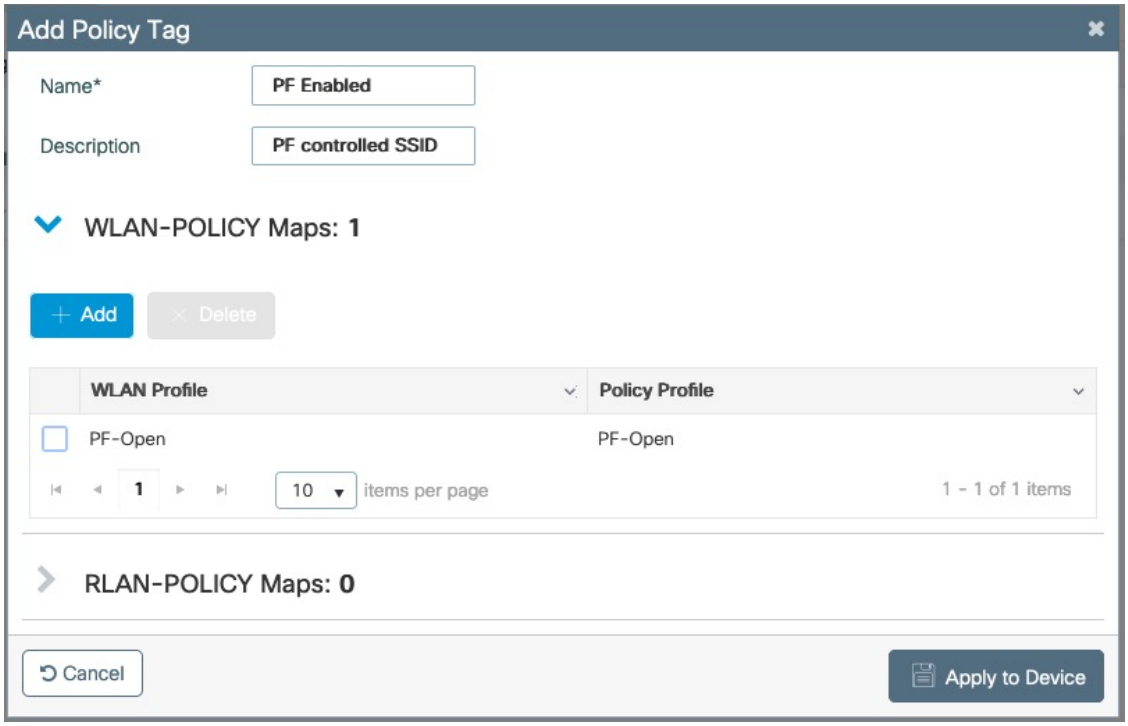
Go to Configuration → Tags & Profiles → Policy, click add




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
IPv6 ACL
URL Filters
Pre Auth
Post Auth
Cancel
Apply to Device



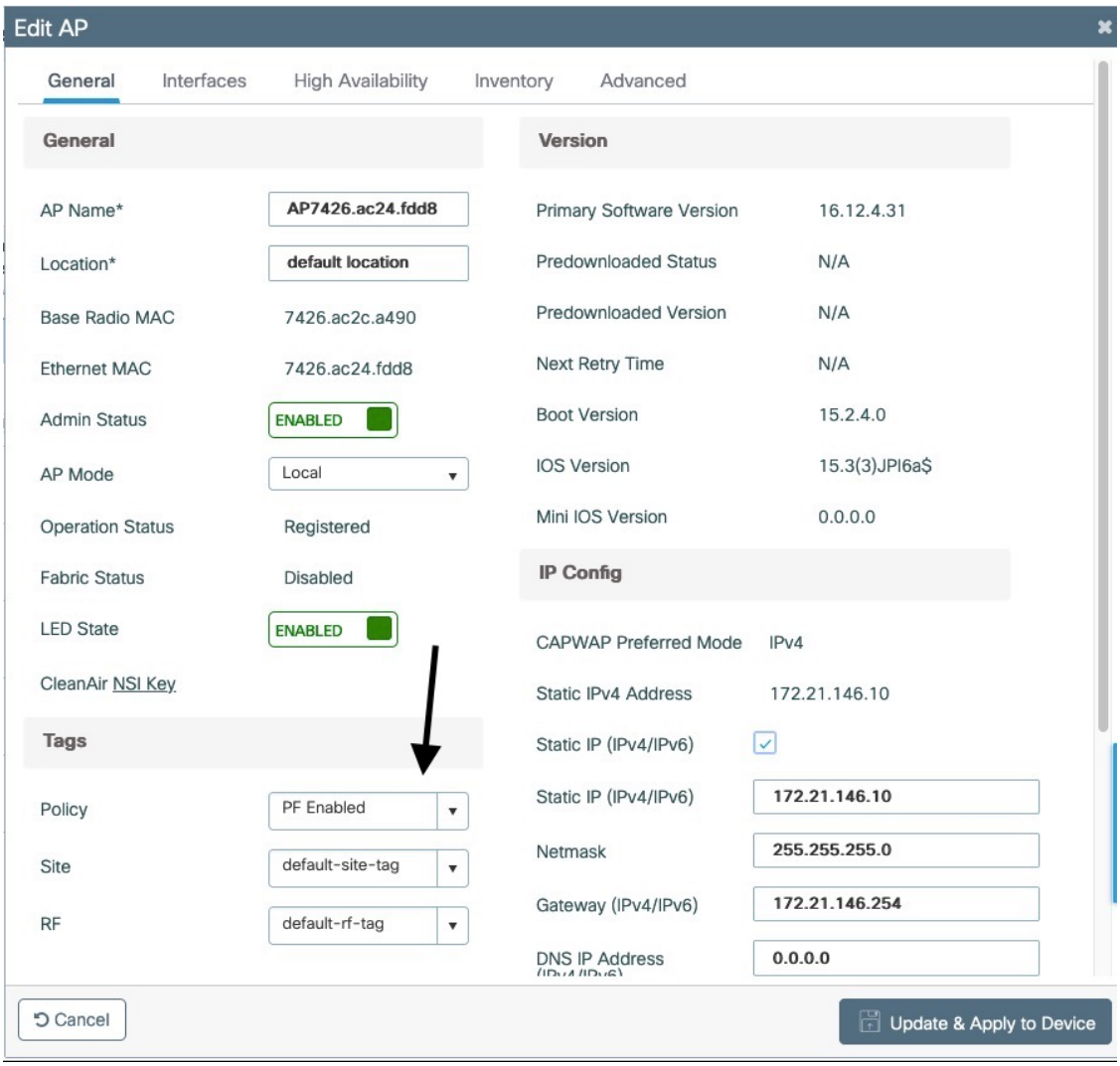
Go to Configuration → Tags & Profiles → Tags, under Policy click add



Go to Configuration → Wireless → Access Points

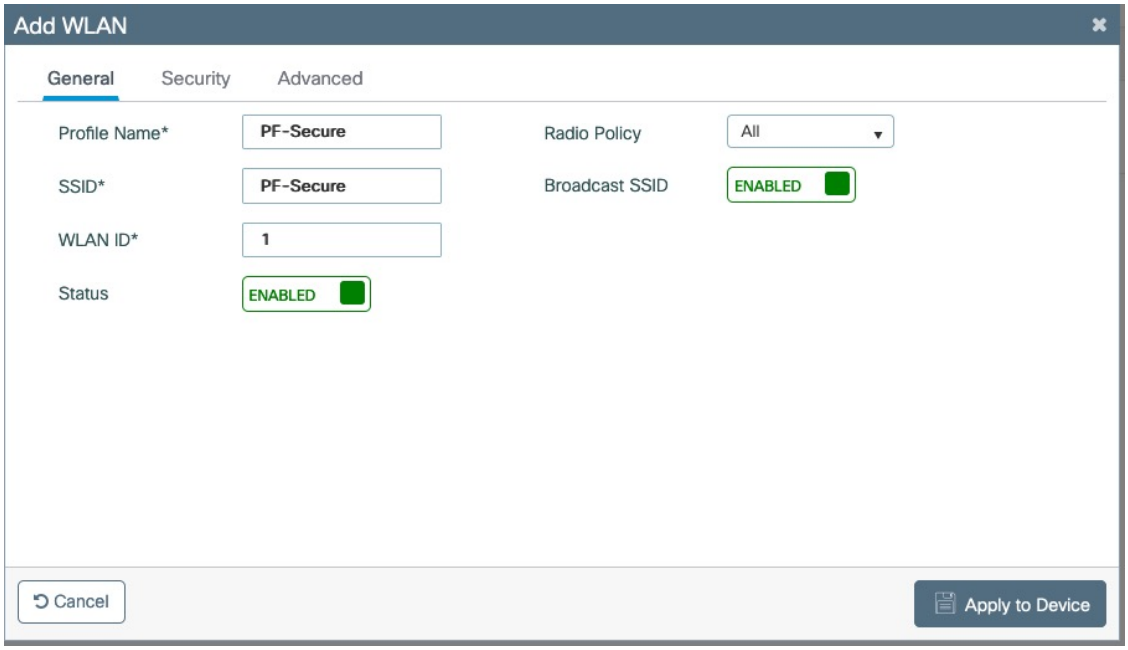
Click on the AP Name or MAC address

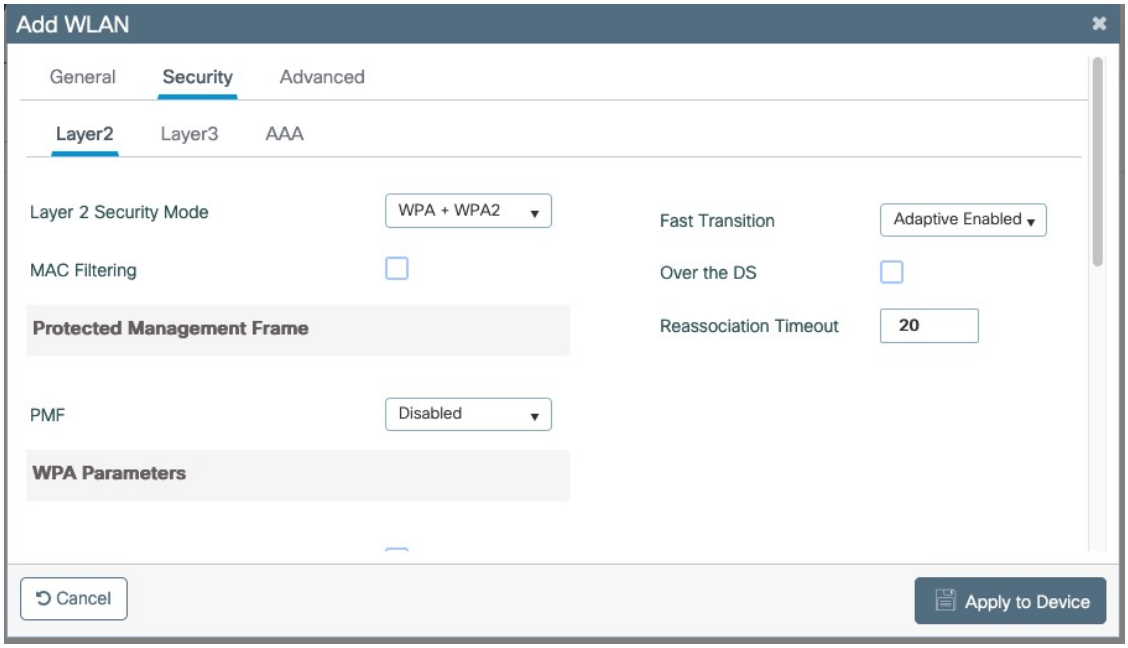
Under General → Tags, Select 'PF Enabled'

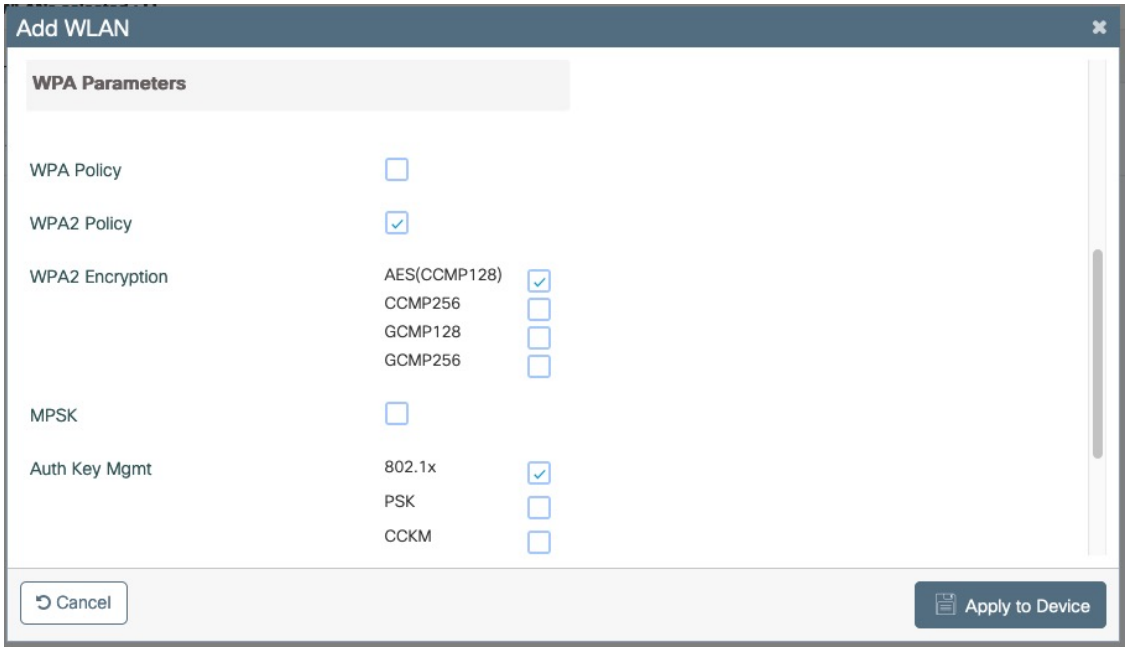


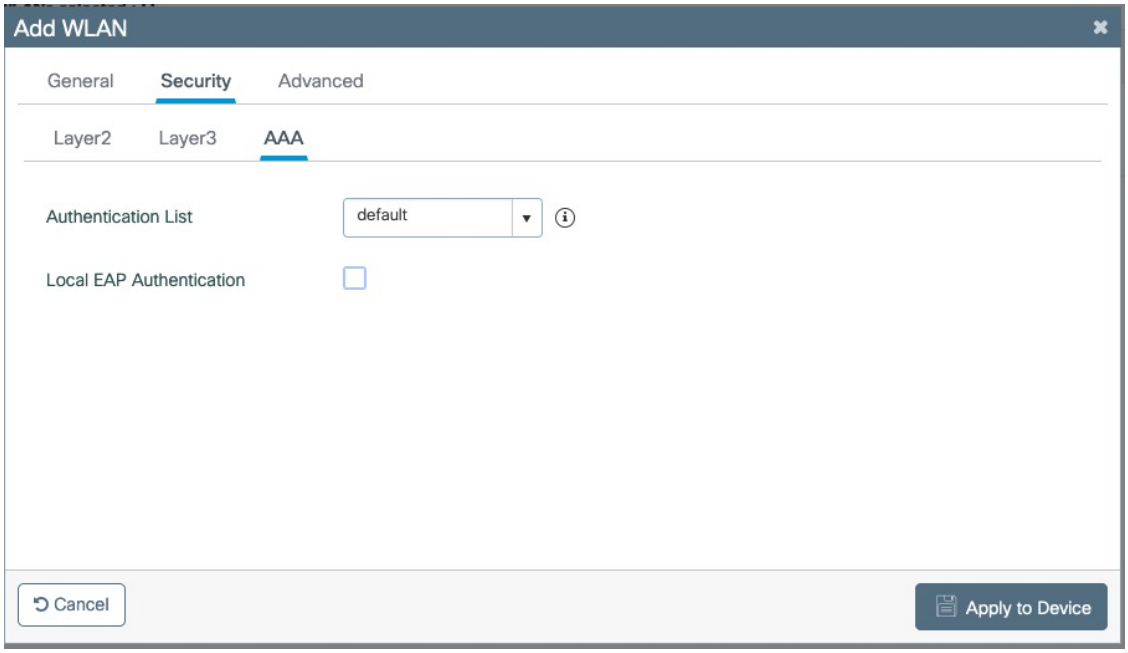
PF-Secure SSID

Go to Configuration → Tags & Profiles → WLANs, click add


Add WLAN
General
Security
Advanced
Profile Name*
PF-Secure
Radio Policy
All
SSID*
PF-Secure
Broadcast SSID
ENABLED
WLAN ID*
1
Status
ENABLED
Cancel
Apply to Device

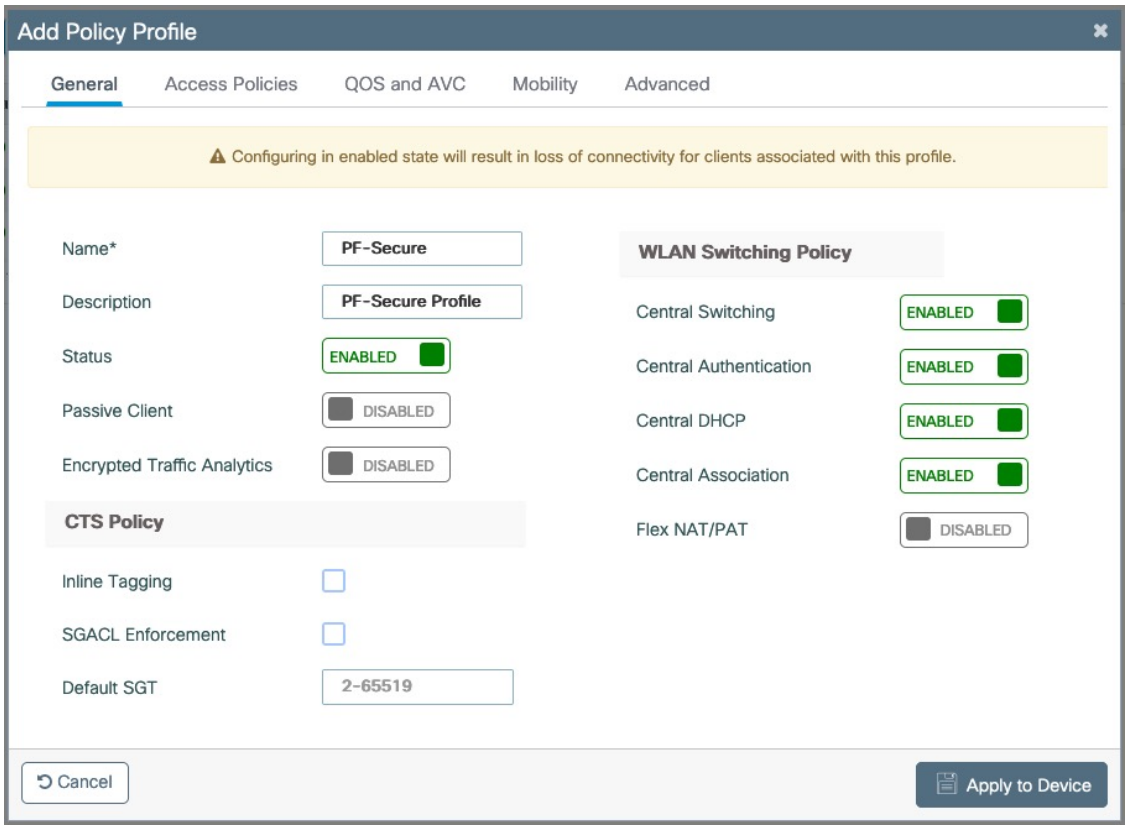

Add WLAN
General
Security
Advanced
Layer2
Layer3
AAA
Layer 2 Security Mode
WPA + WPA2
Fast Transition
Adaptive Enabled
MAC Filtering
Over the DS
Protected Management Frame
Reassociation Timeout
20
PMF
Disabled
WPA Parameters
Cancel
Apply to Device

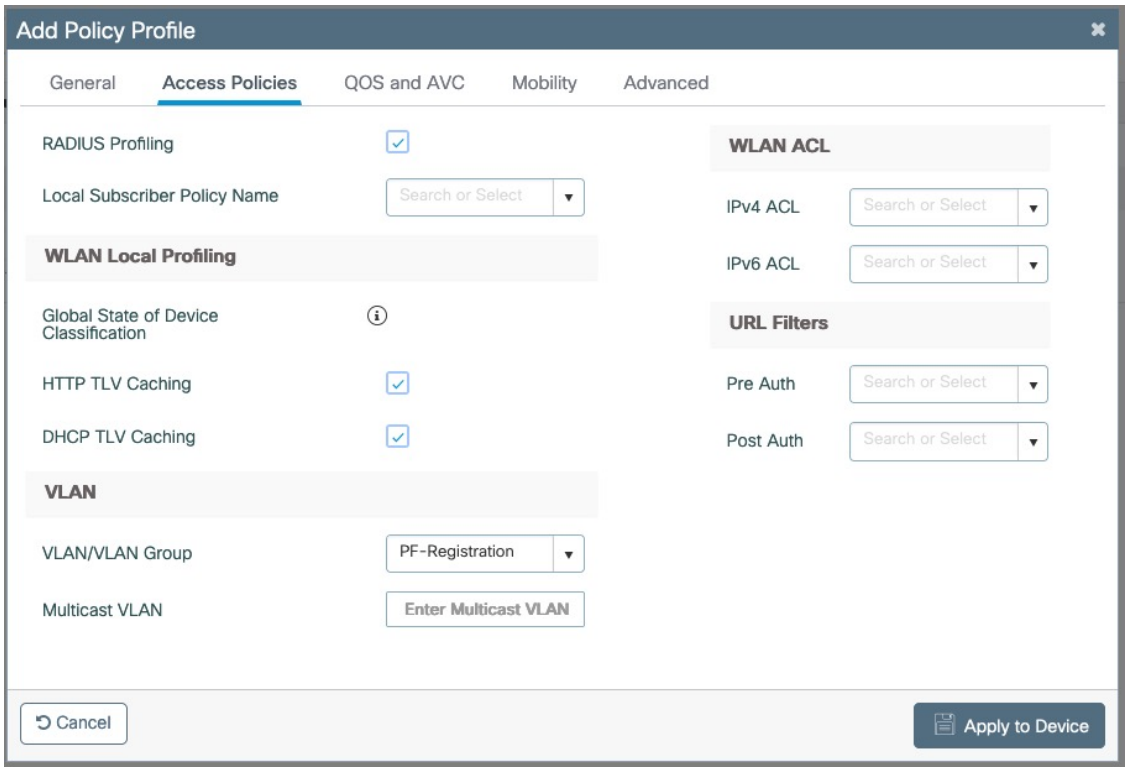


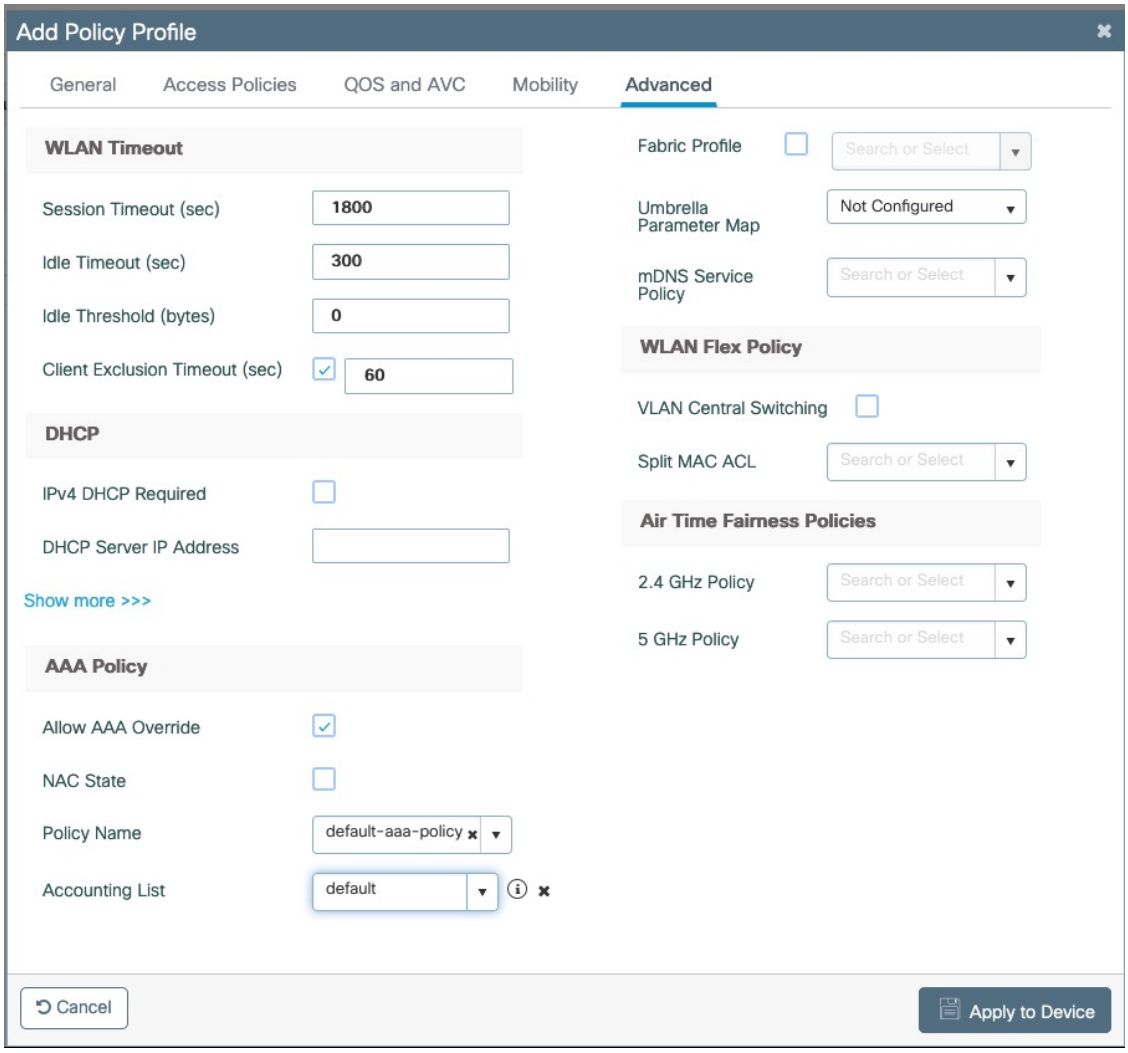


Create Policy Profiles PF-Secure

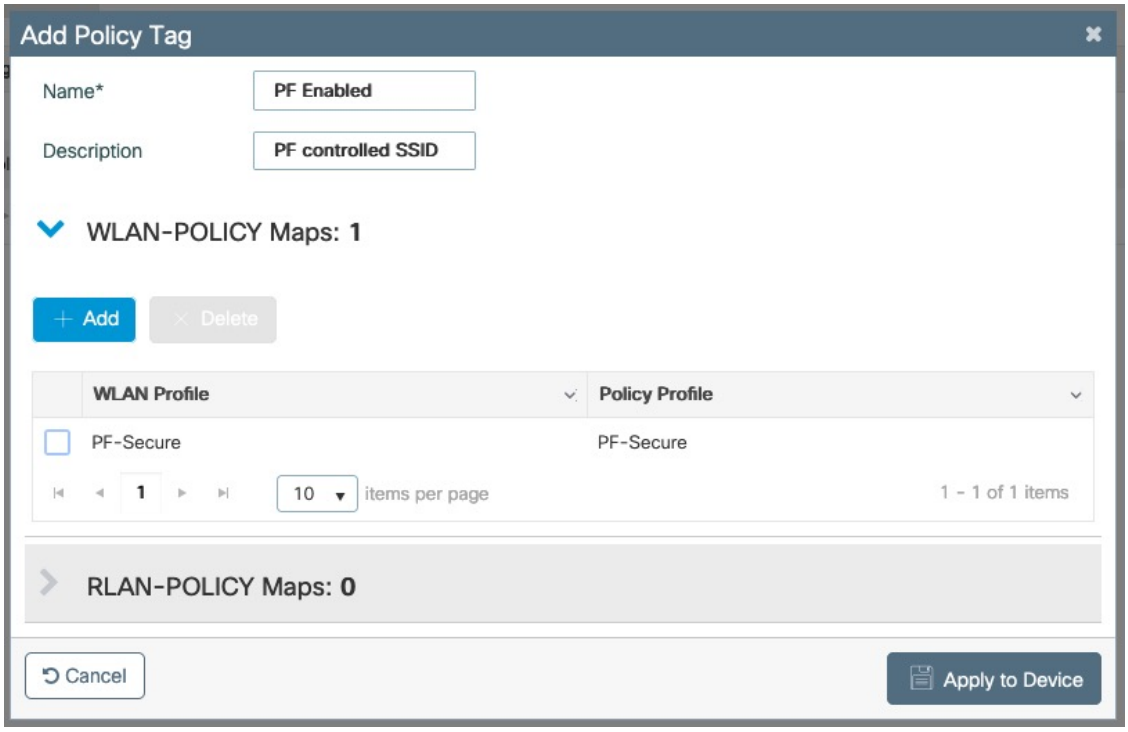
Go to Configuration → Tags & Profiles → Policy, click add


Add Policy Profile
General
Access Policies
QOS and AVC
Mobility
Advanced
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
Cancel
Apply to Device


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
IPv6 ACL
URL Filters
Pre Auth
Post Auth
Cancel
Apply to Device



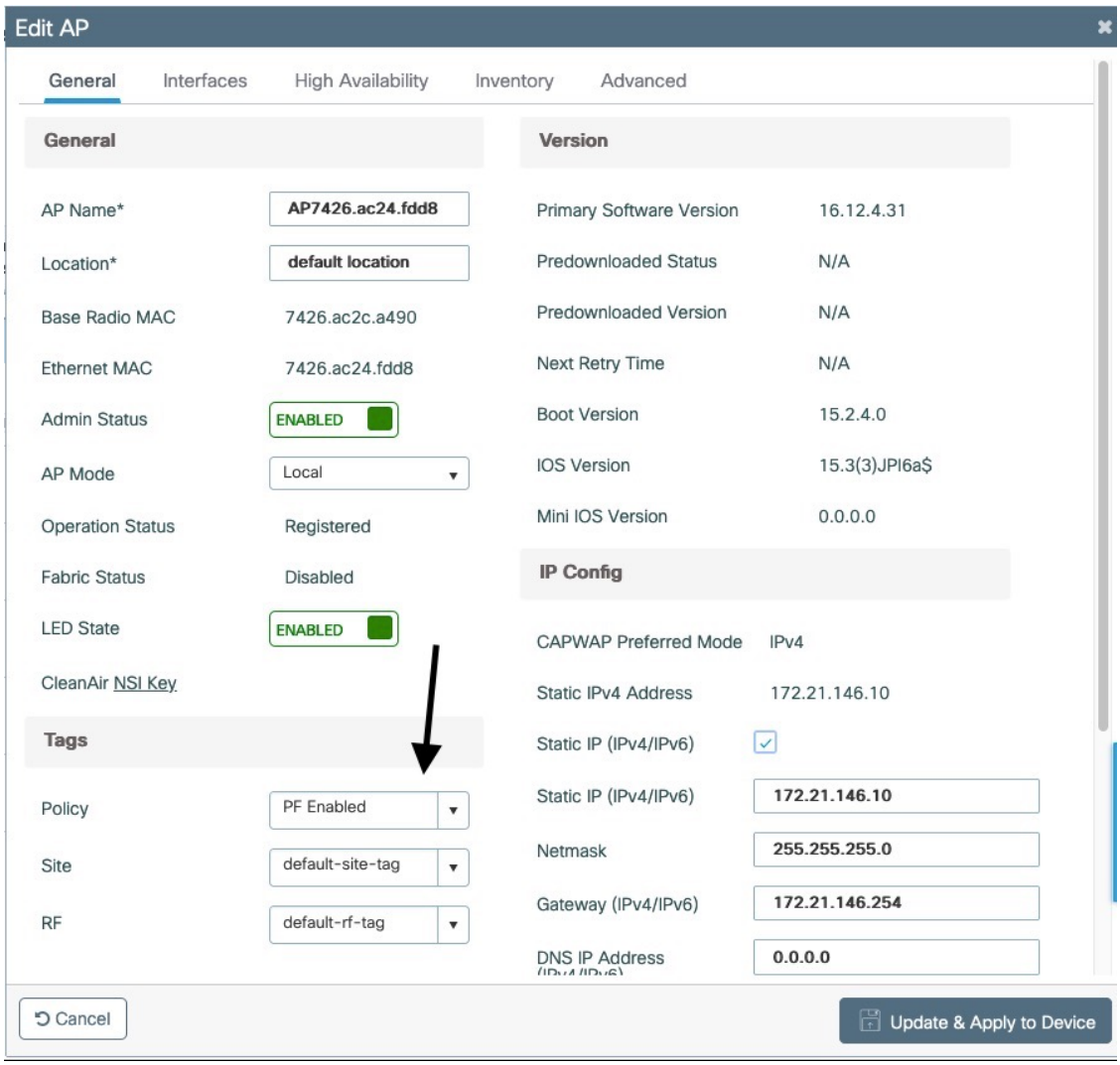
Go to Configuration → Tags & Profiles → Tags, under Policy click add



Go to Configuration → Wireless → Access Points

Click on the AP Name or MAC address

Under General → Tags, Select 'PF Enabled'

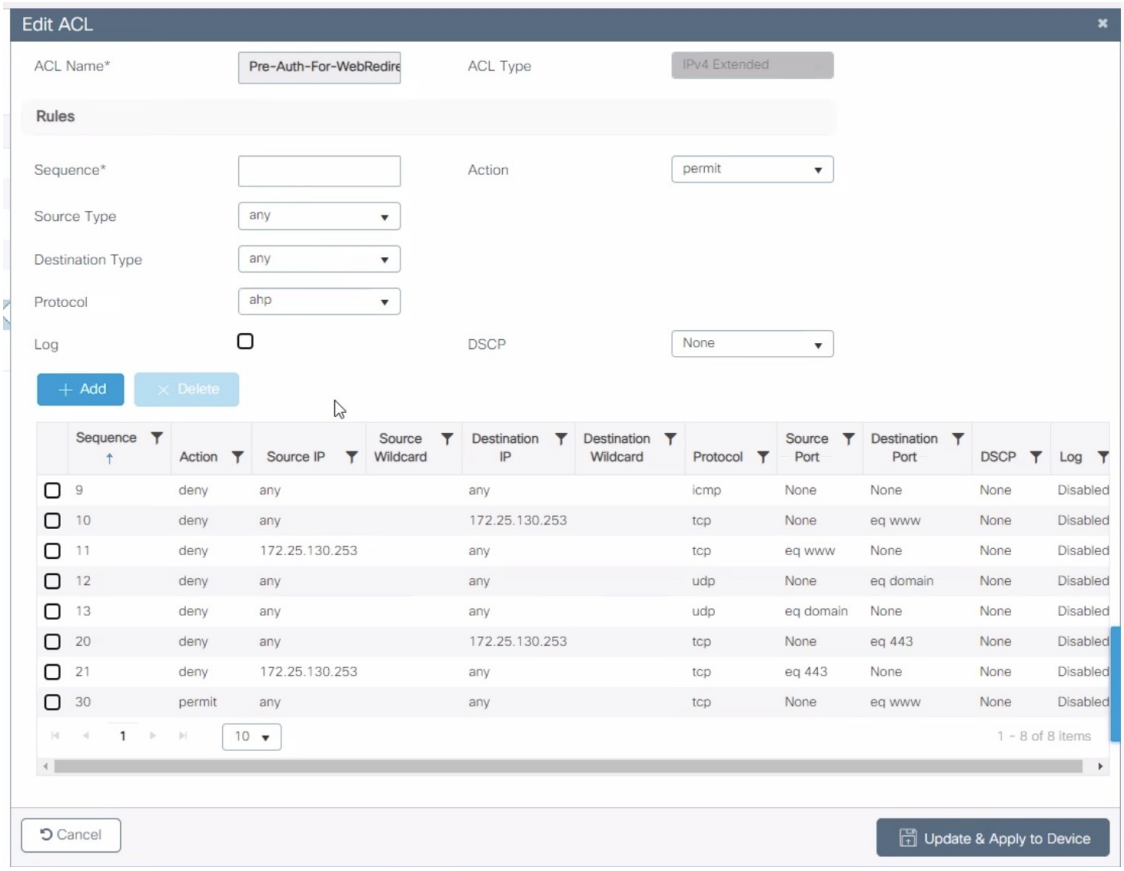


PF-WebAuth SSID

Create Redirect ACL for Guest Web authentication:

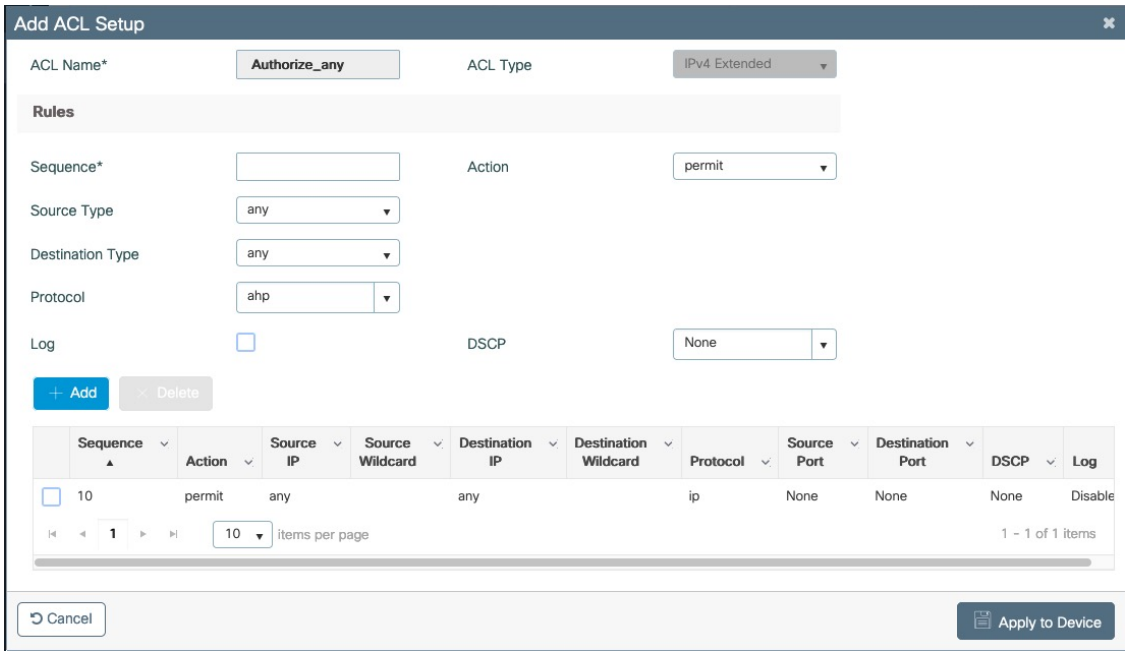
Go to Configuration → Security → ACL, click add

```
Use ACL Name: Pre-Auth-For-WebRedirect
For ACL Type, select IPv4 Extended
```

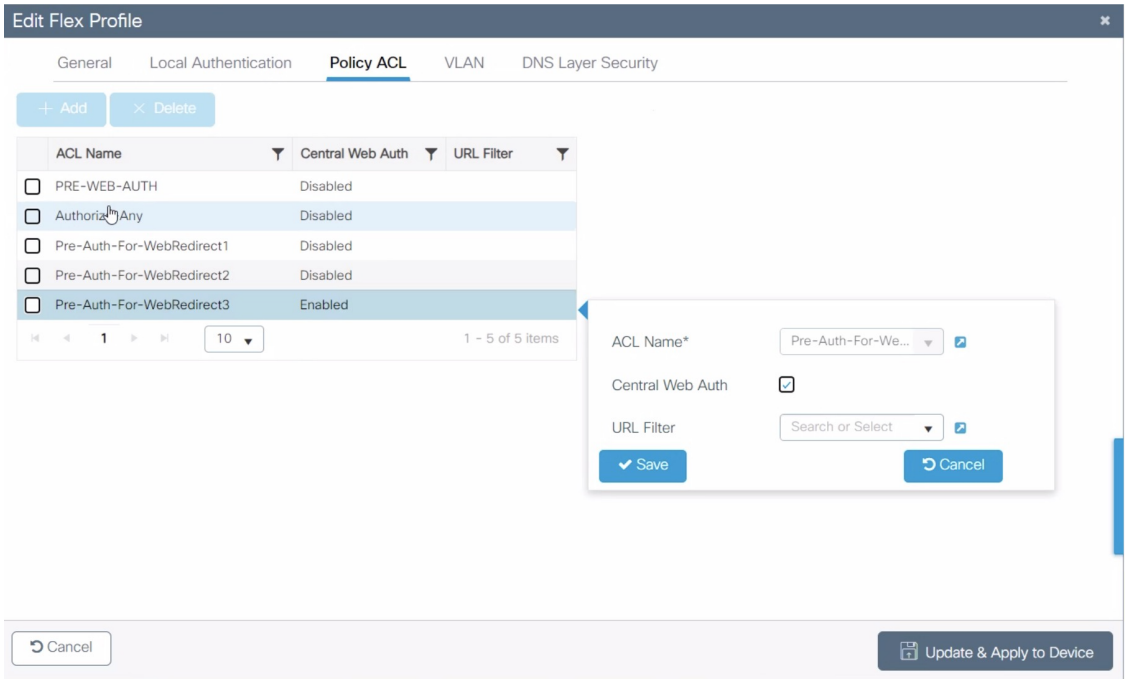


Go to Configuration → Security → ACL, click add

```
Use ACL Name: Authorize_any
For ACL Type, select IPv4 Extended
```

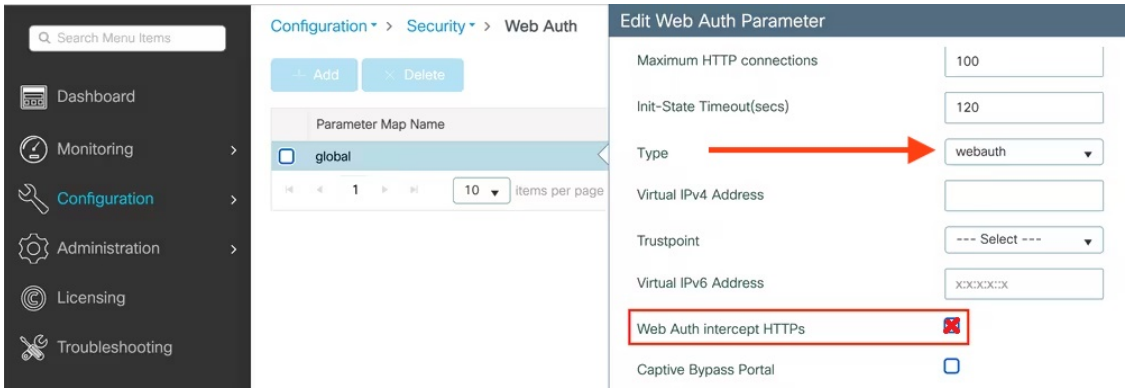


For FlexConnect you will need to enable Central Web Auth



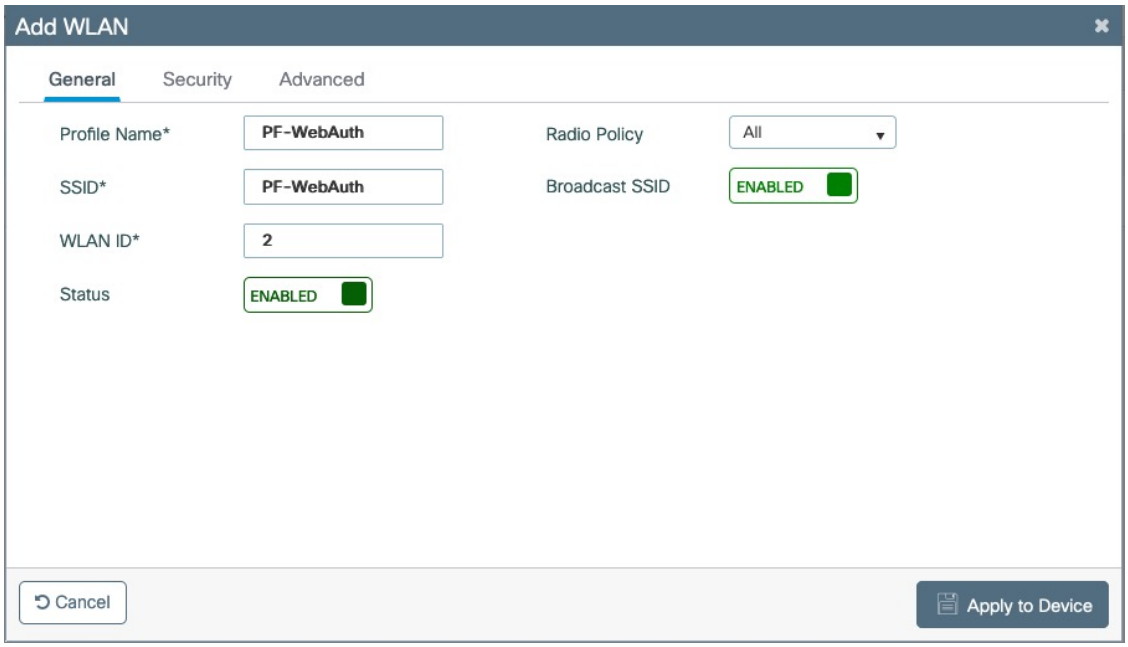
Go to Configuration → Security → Web Auth

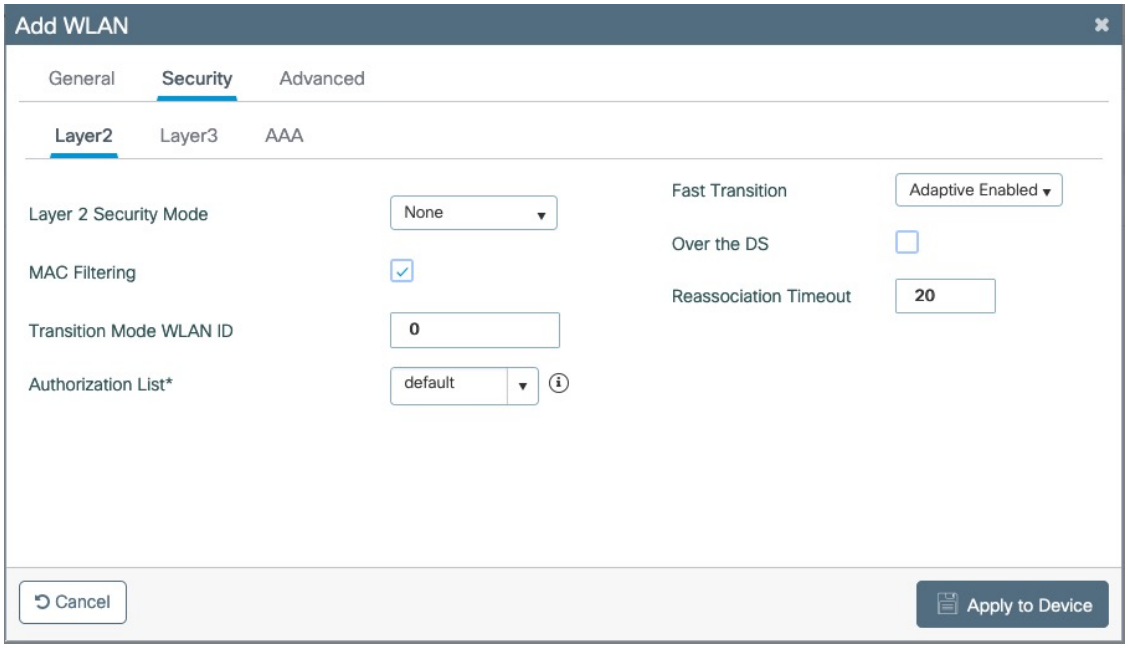
Select Type Webauth and enable Web Auth Intercept HTTPs

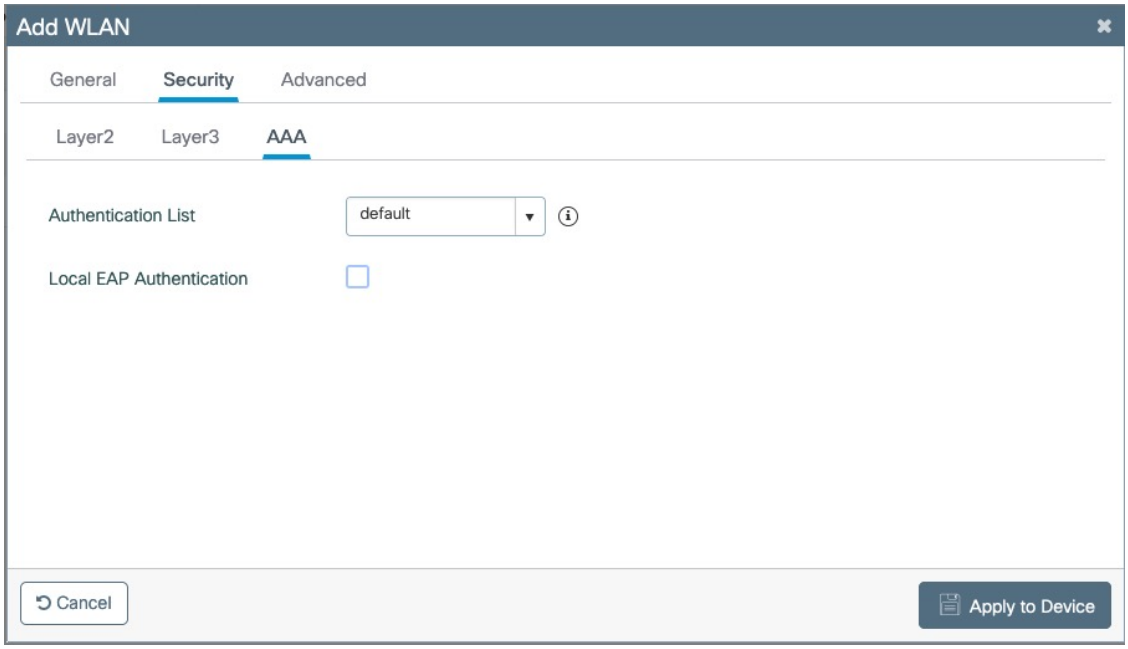


PF-WebAuth SSID creation

Go to Configuration → Tags & Profiles → WLANs, click add

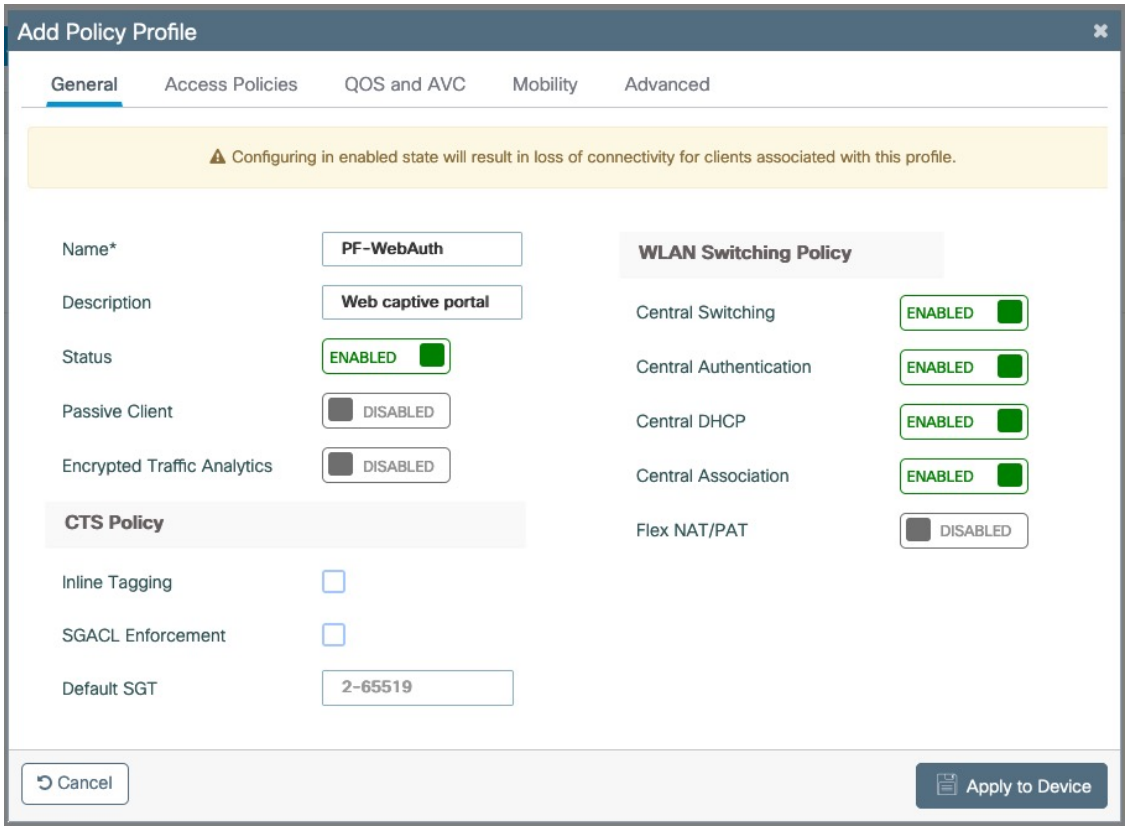


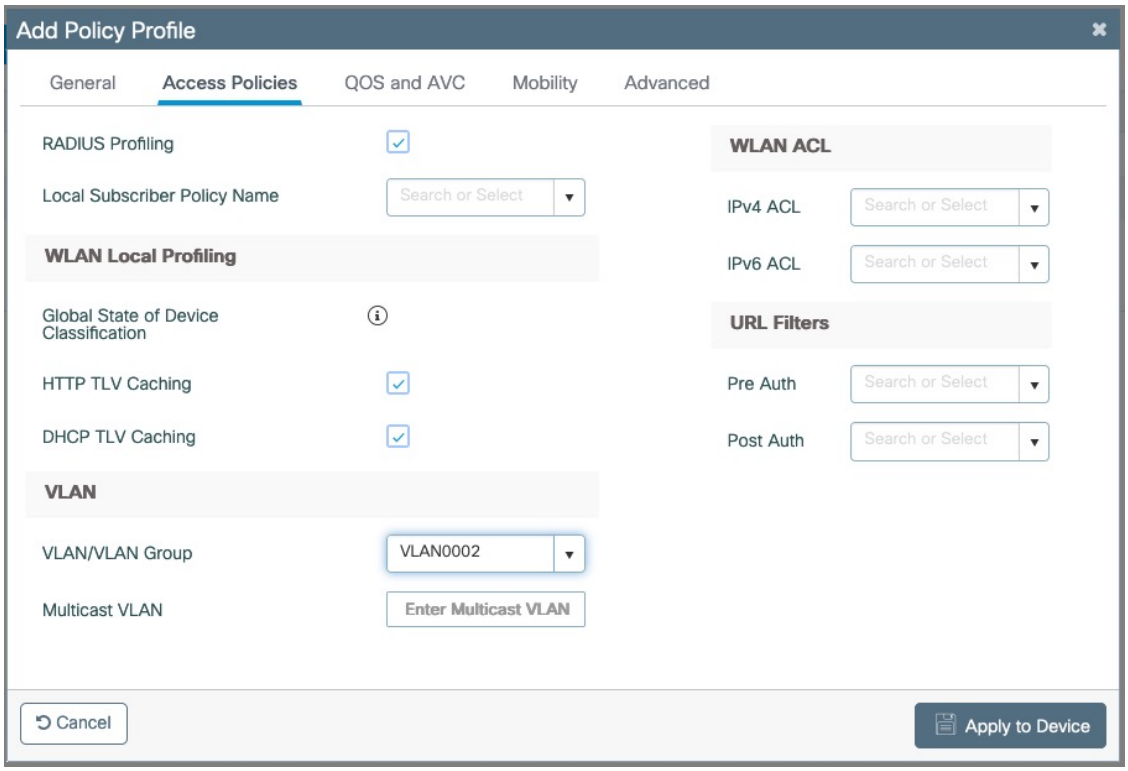


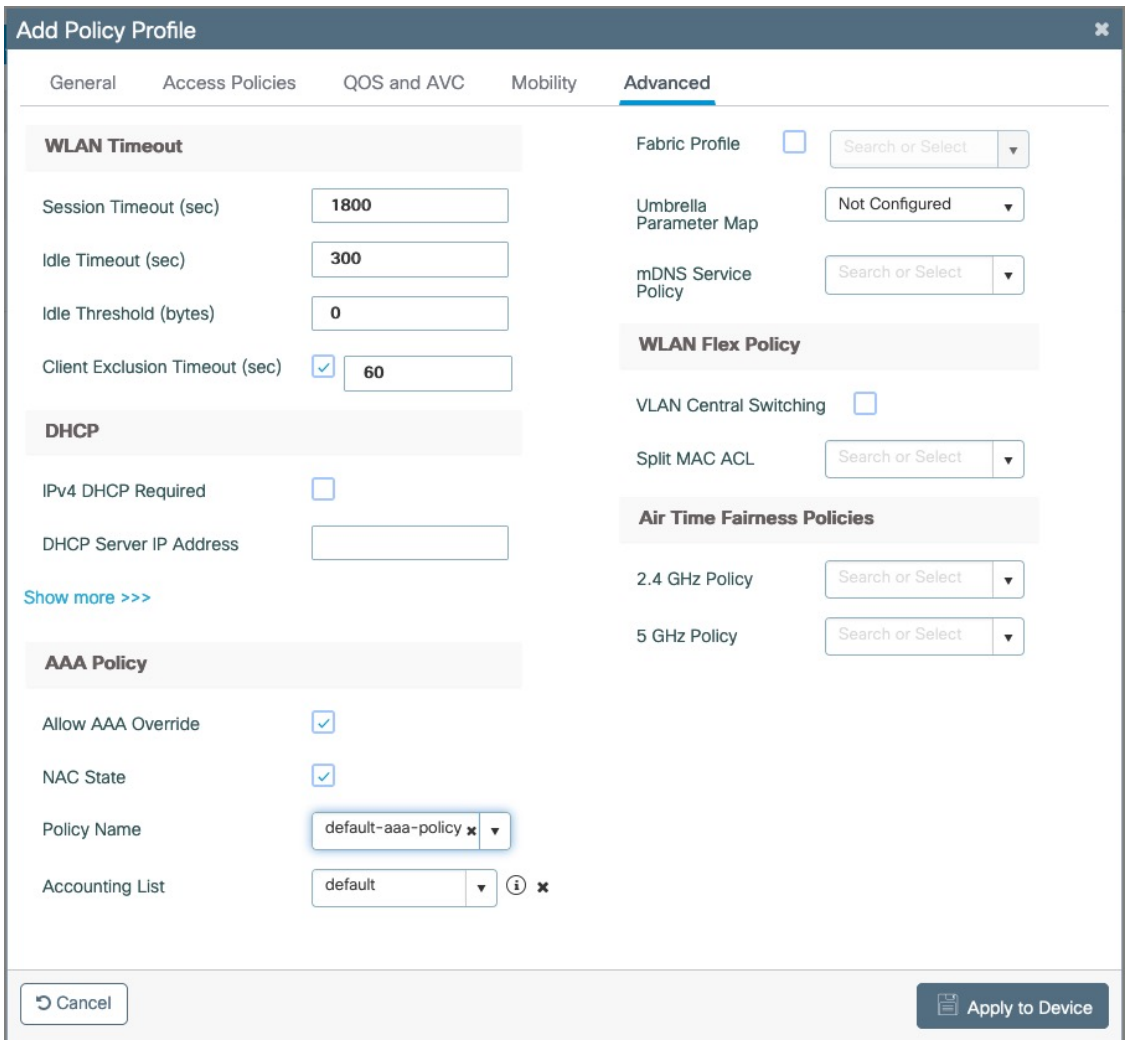


Create Policy Profiles PF-WebAuth

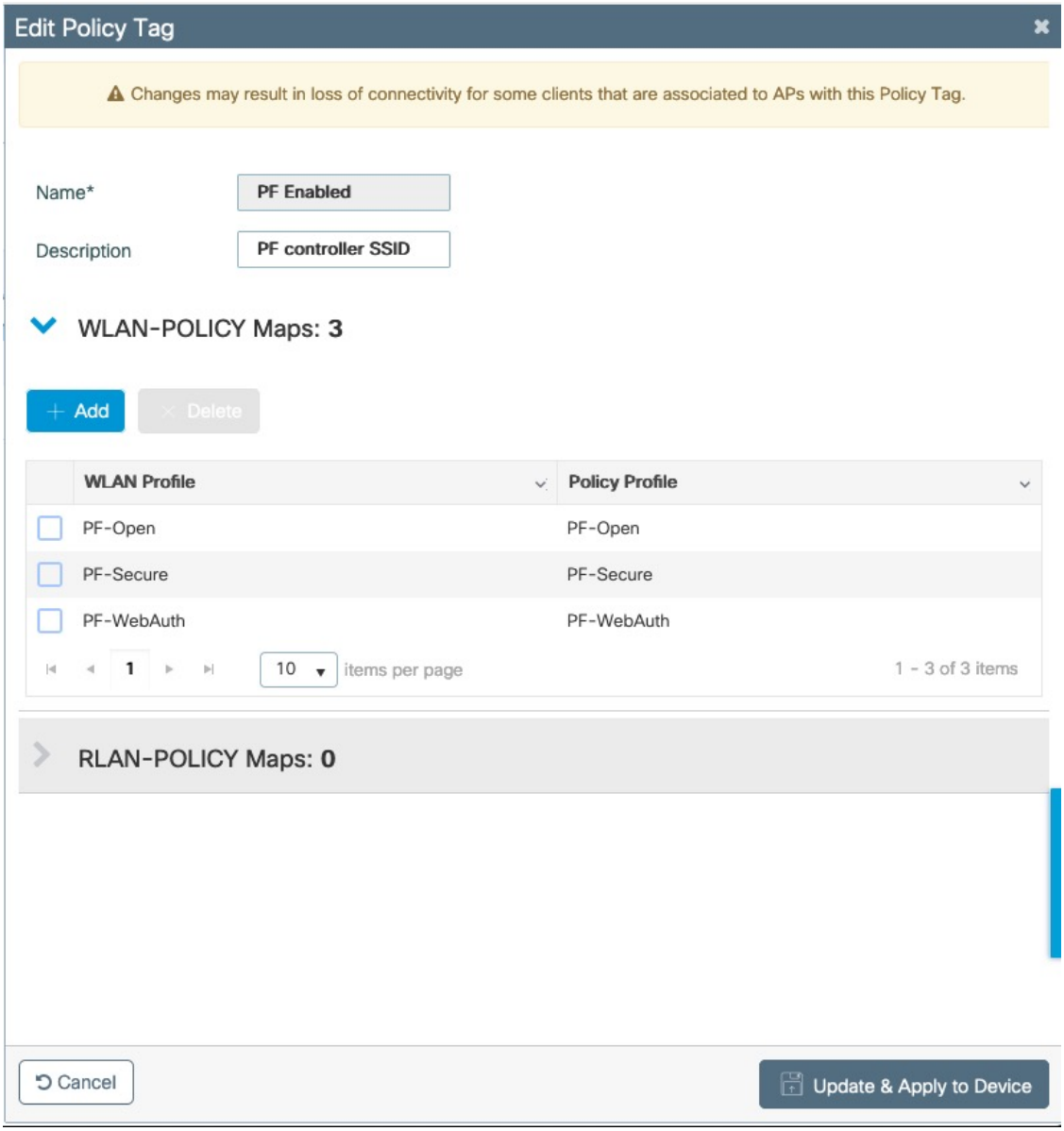
Go to Configuration → Tags & Profiles → Policy, click add


Add Policy Profile
General
Access Policies
QOS and AVC
Mobility
Advanced
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
Cancel
Apply to Device


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
VLAN0002
Multicast VLAN
Enter Multicast VLAN
WLAN ACL
IPv4 ACL
IPv6 ACL
URL Filters
Pre Auth
Post Auth
Cancel
Apply to Device



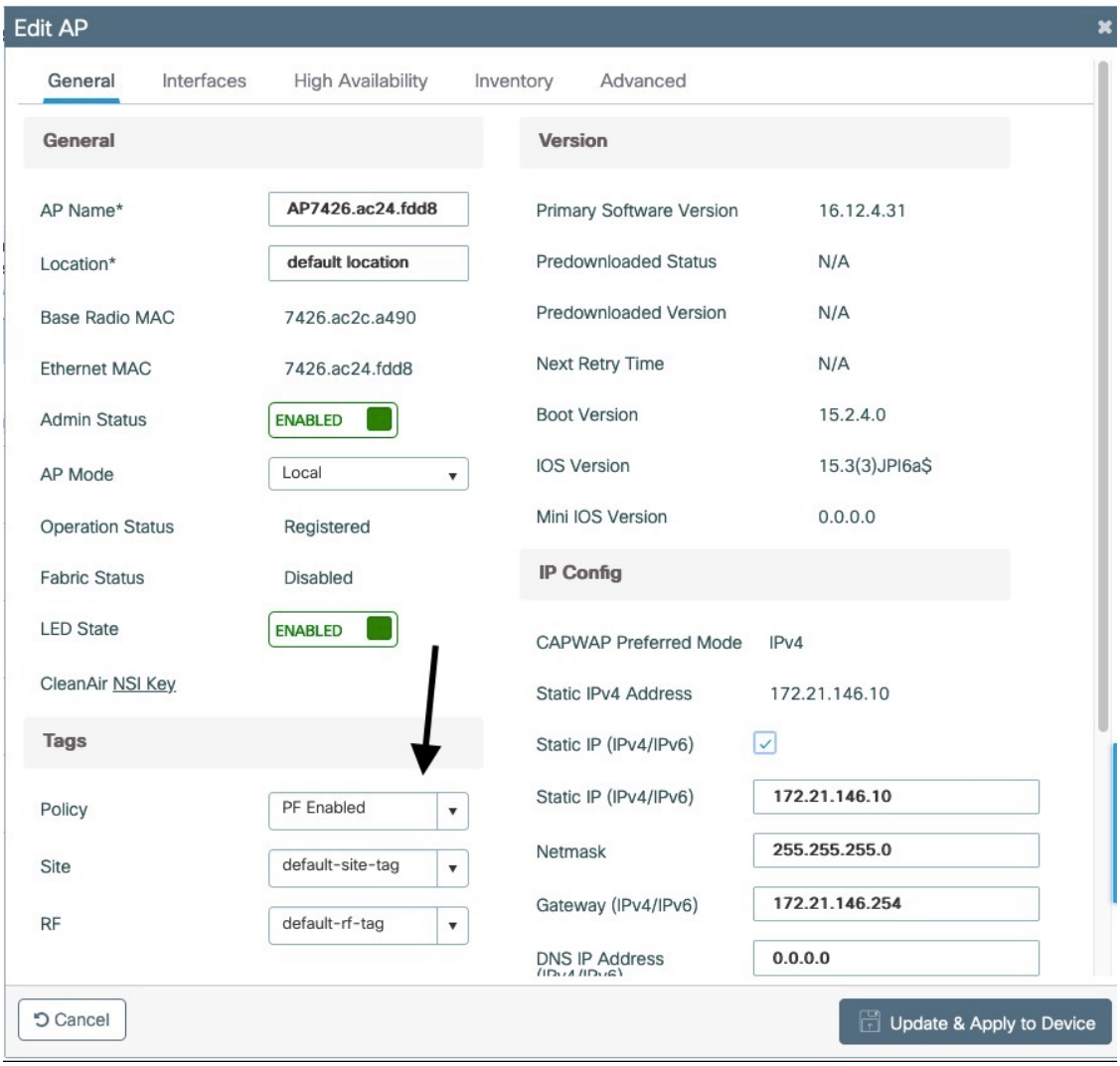
Go to Configuration → Tags & Profiles → Tags, under Policy click add



Go to Configuration → Wireless → Access Points

Click on the AP Name or MAC address

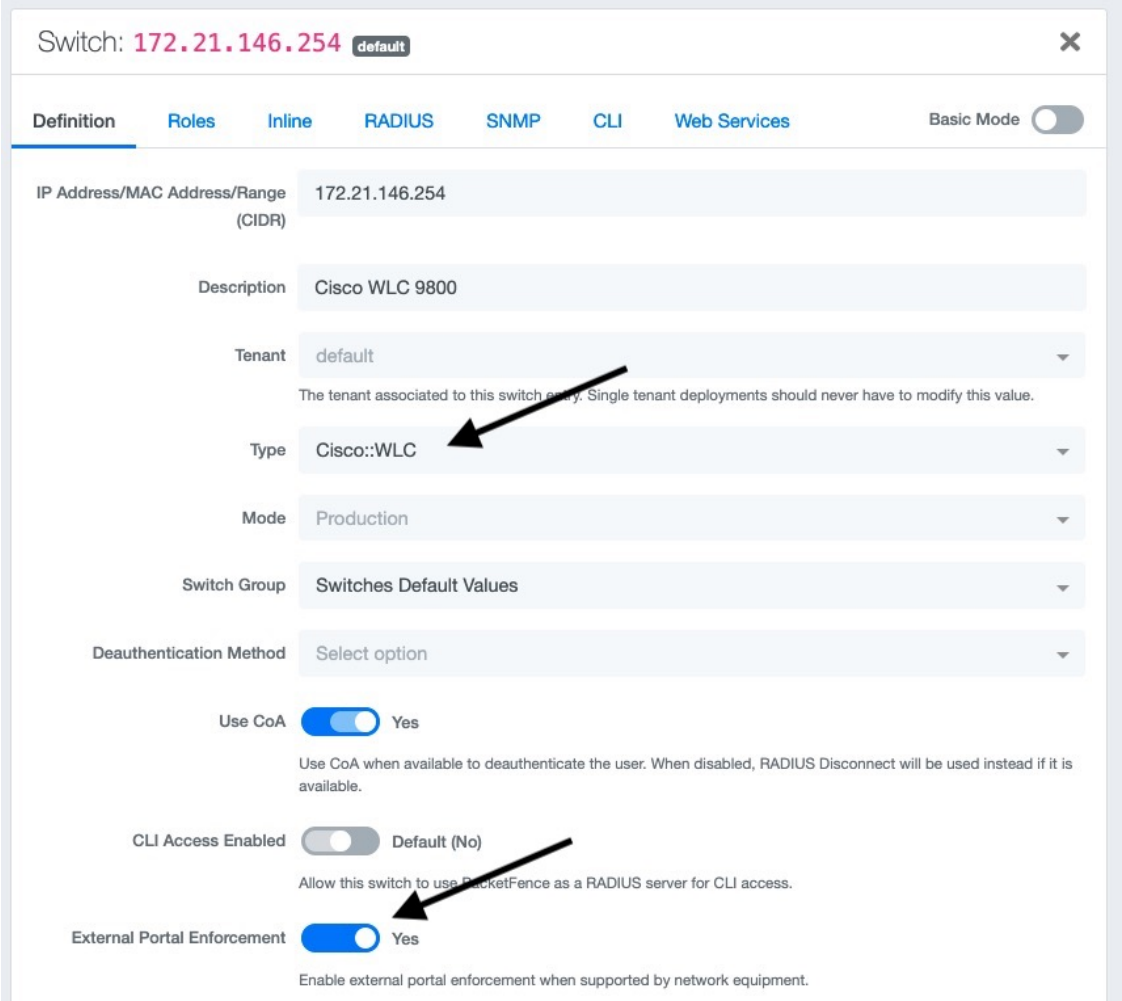
Under General → Tags, Select 'PF Enabled'

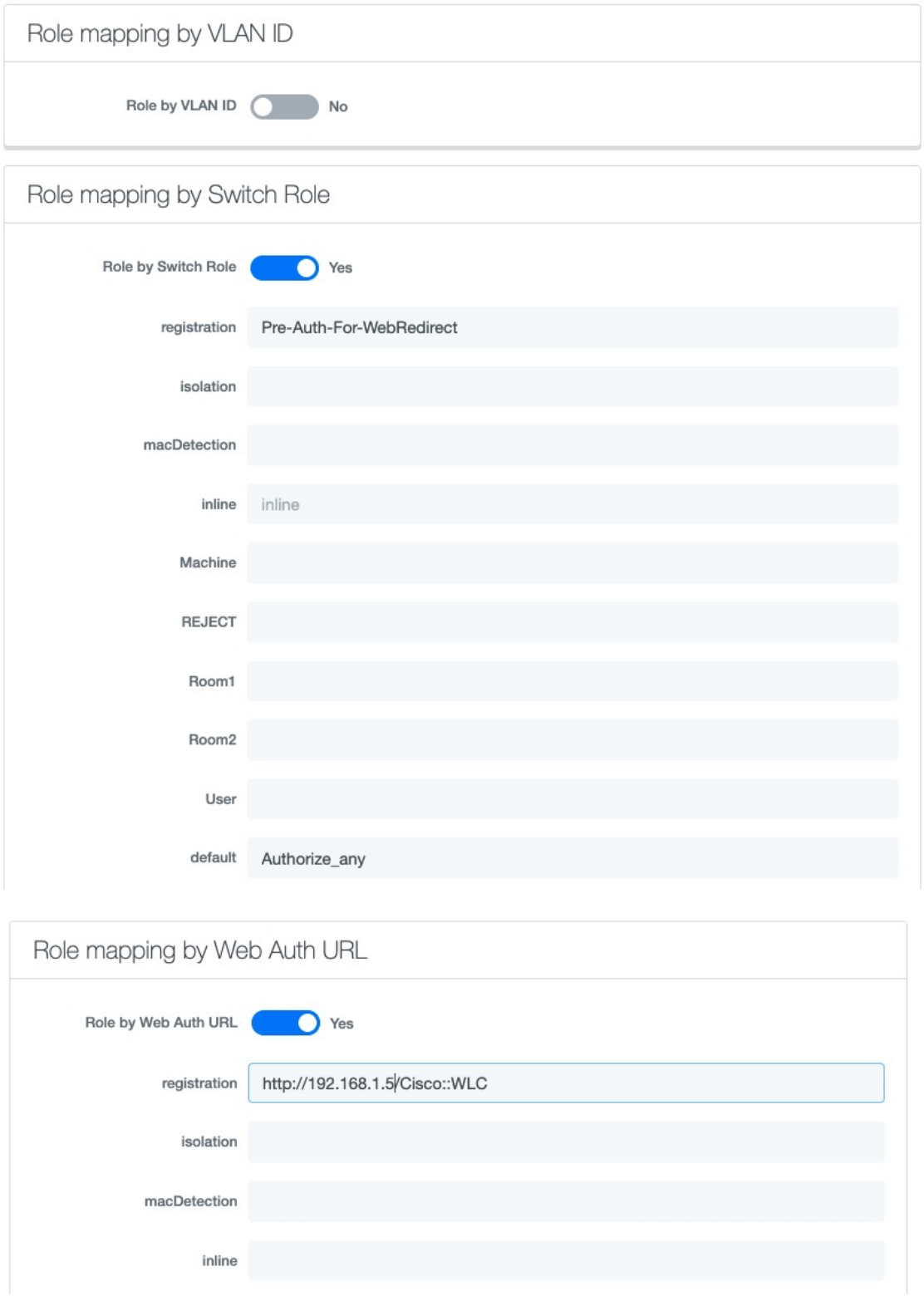


PacketFence switch configuration

Now you will to create a new switch in PacketFence

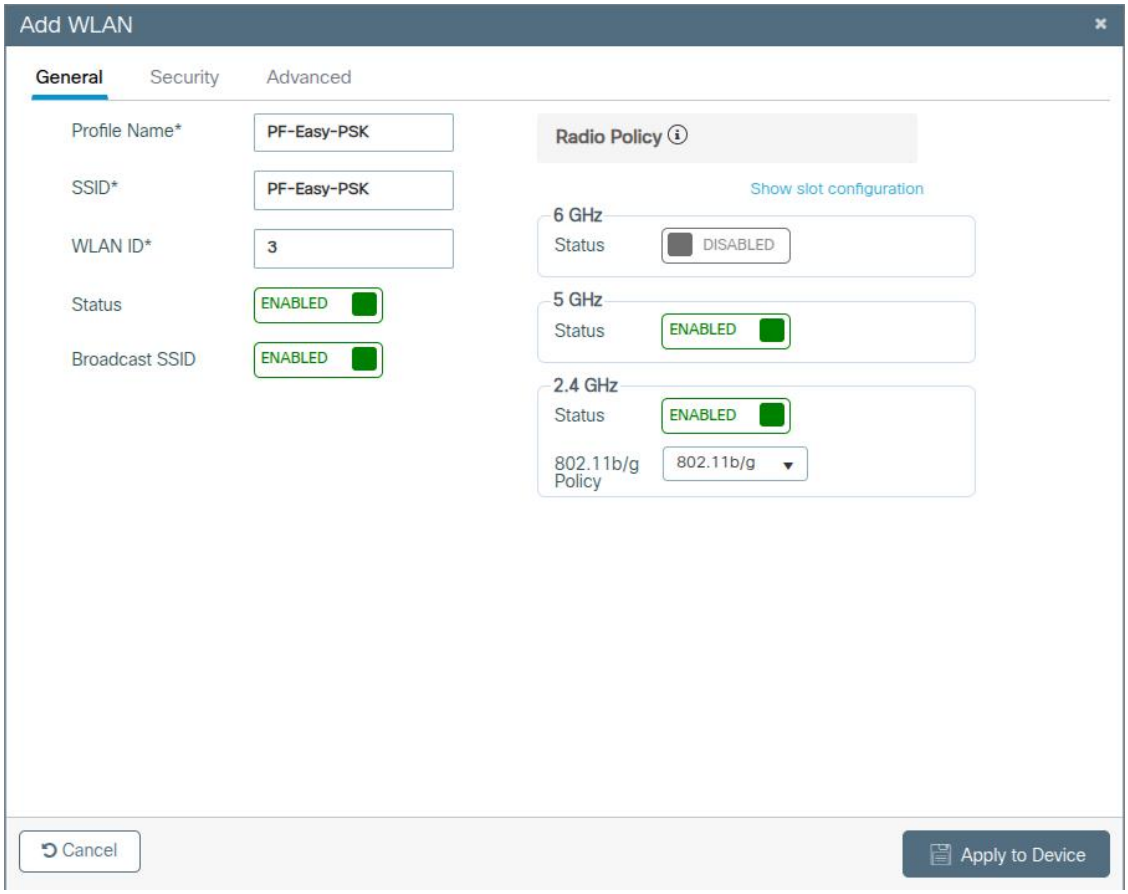
Go to Configuration → Policies and Access Control → Switches → New Switch → default


Switch: 172.21.146.254 default
Definition
Roles
Inline
RADIUS
SNMP
CLI
Web Services
Basic Mode
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.

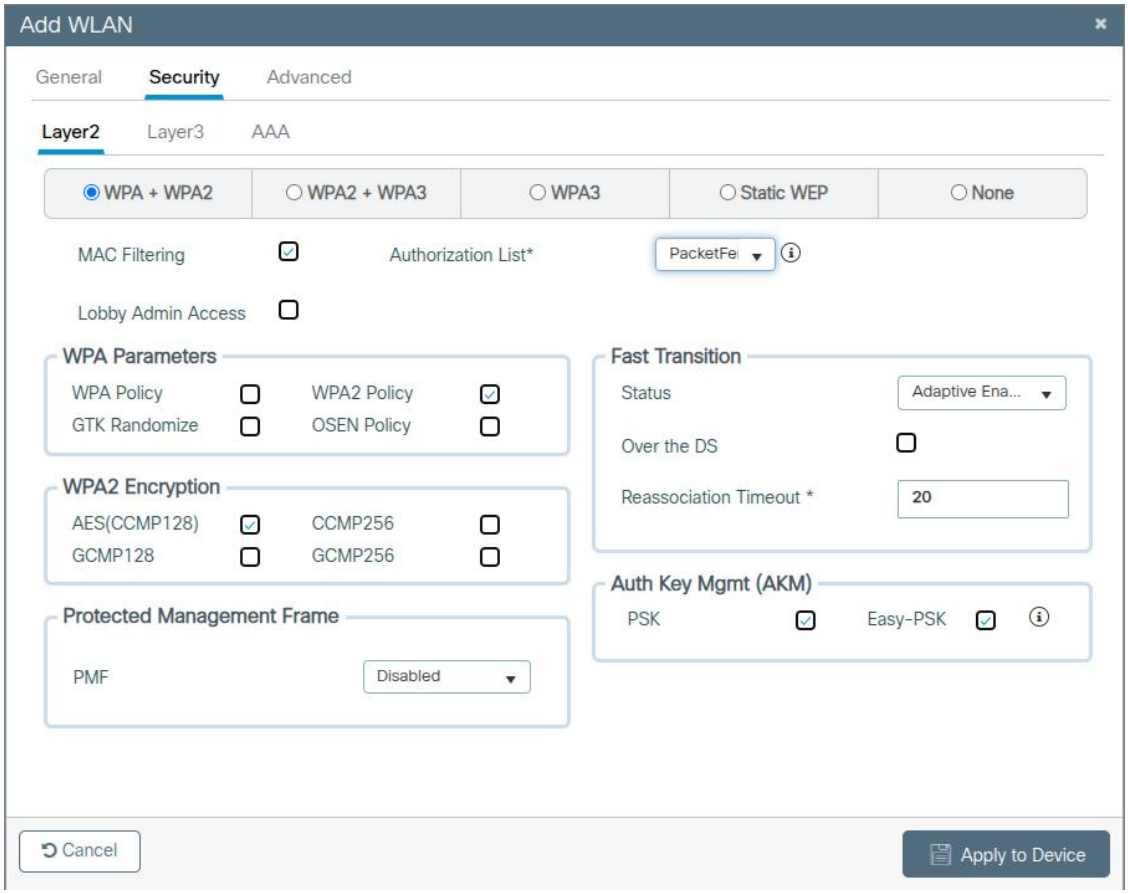


PF-Easy-PSK SSID

Go to Configuration → Tags & Profiles → WLANs, click add



In security Layer2 tab select MAC Filtering, select in AUthorization List the radius server created above. In Auth Key Mgmt (AKM) section select PSK and Easy-PSK.



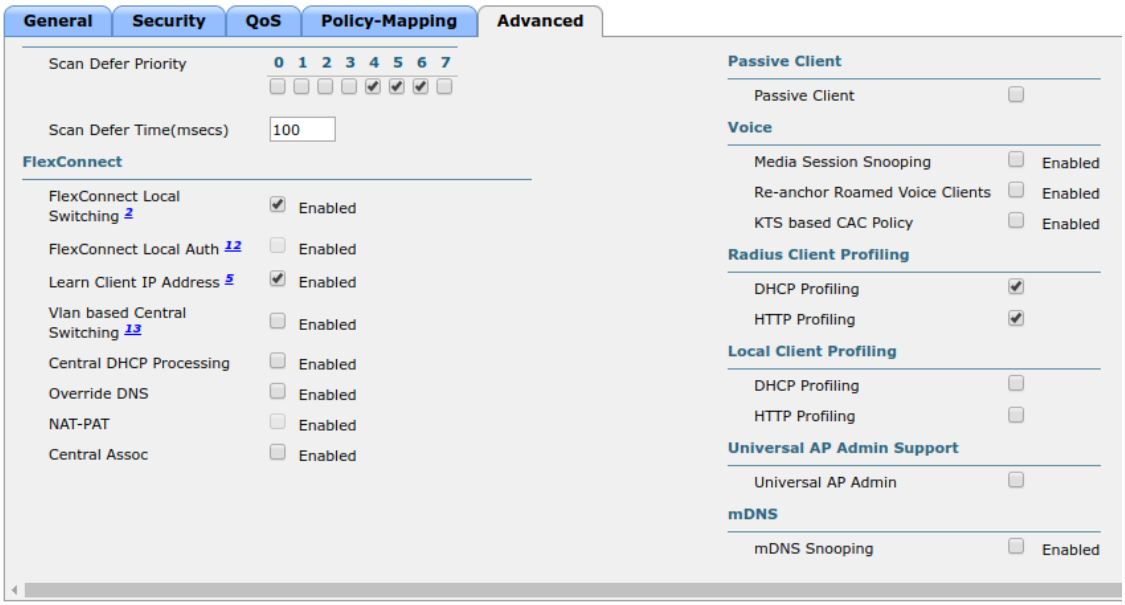
4.11.6. Troubleshooting ignored RADIUS replies

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.

4.11.7. Device Sensor

When using a Cisco WLC, you can enable device sensor by making sure the configuration looks like the following screenshot:



NOTE

Please refer to the wired configuration of Cisco equipment to learn more about device sensor.

4.12. 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.

4.12.1. 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;

4.12.2. 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 another.

Configure chilli

chilli configuration might differ from one equipment vendor to another 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.

4.12.3. 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 admin interface if 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.

4.13. D-Link

4.13.1. DWL Access-Points and DWS 3026

NOTE To be contributed...

4.14. Extreme Networks

4.14.1. 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

4.15. Extricom

4.15.1. 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*.

4.16. 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.

4.16.1. 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
```

4.16.2. 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
```

4.17. Hostapd

4.17.1. 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.

4.17.2. 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

4.17.3. 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

4.18. Huawei

4.18.1. 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
```

4.19. Meraki

To add the AP on PacketFence use the internal IP of the AP.

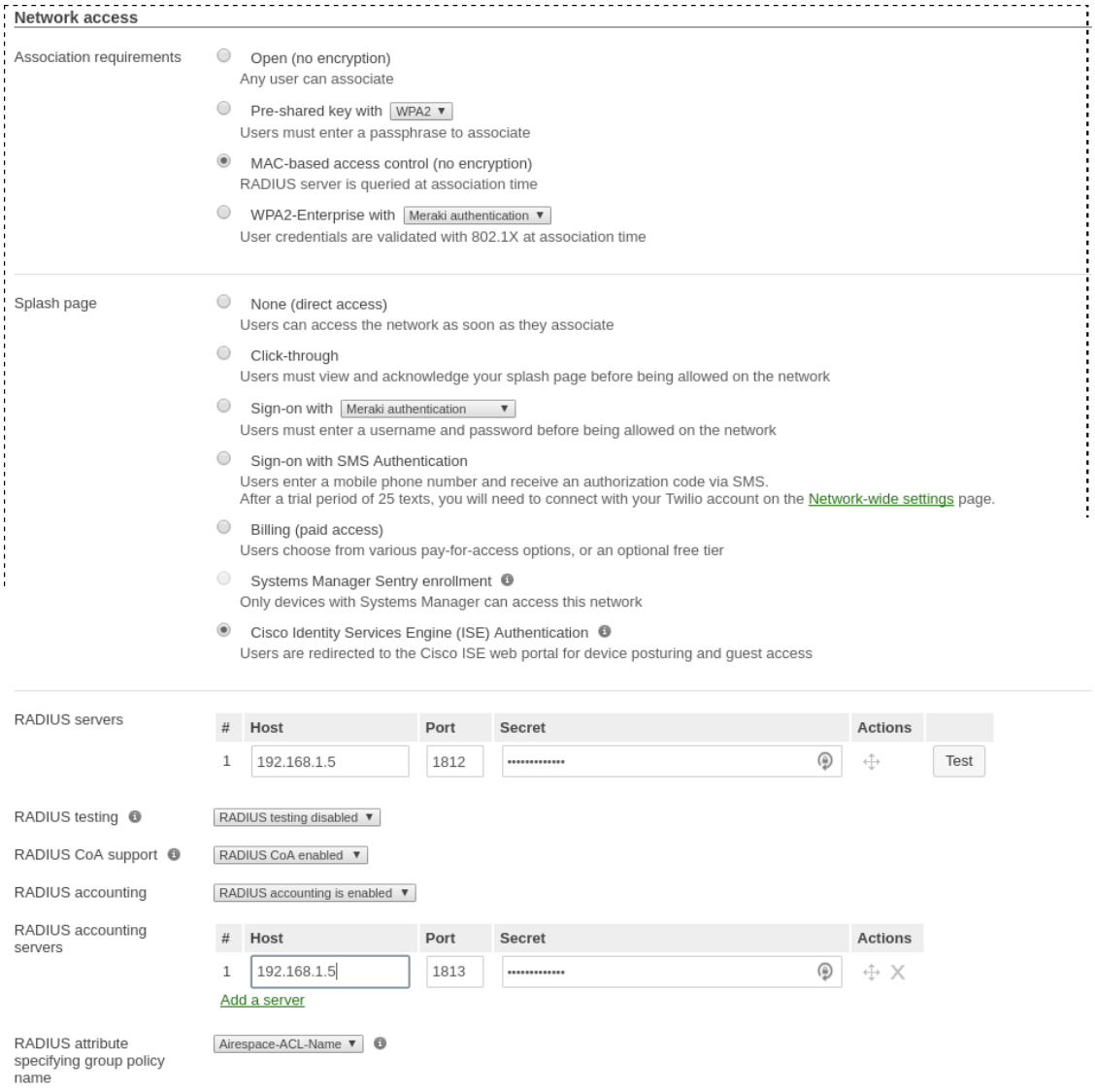
The 'Disconnect port' field must be set to '1700'.

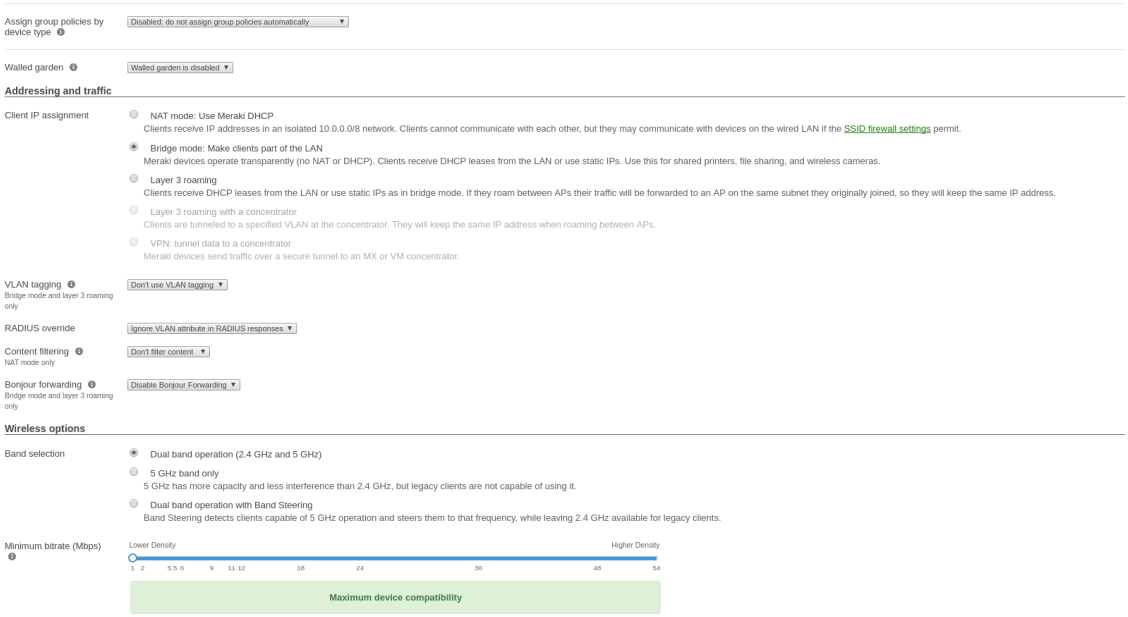
4.19.1. WebAuth

Configure Meraki controller for Web authentication.

NOTE	WebAuth mode on Meraki controller requires "Role mapping by Switch Role" and "Role by Web Auth URL" in switch configuration 'Roles' tab.

Configure your SSID as shown below:

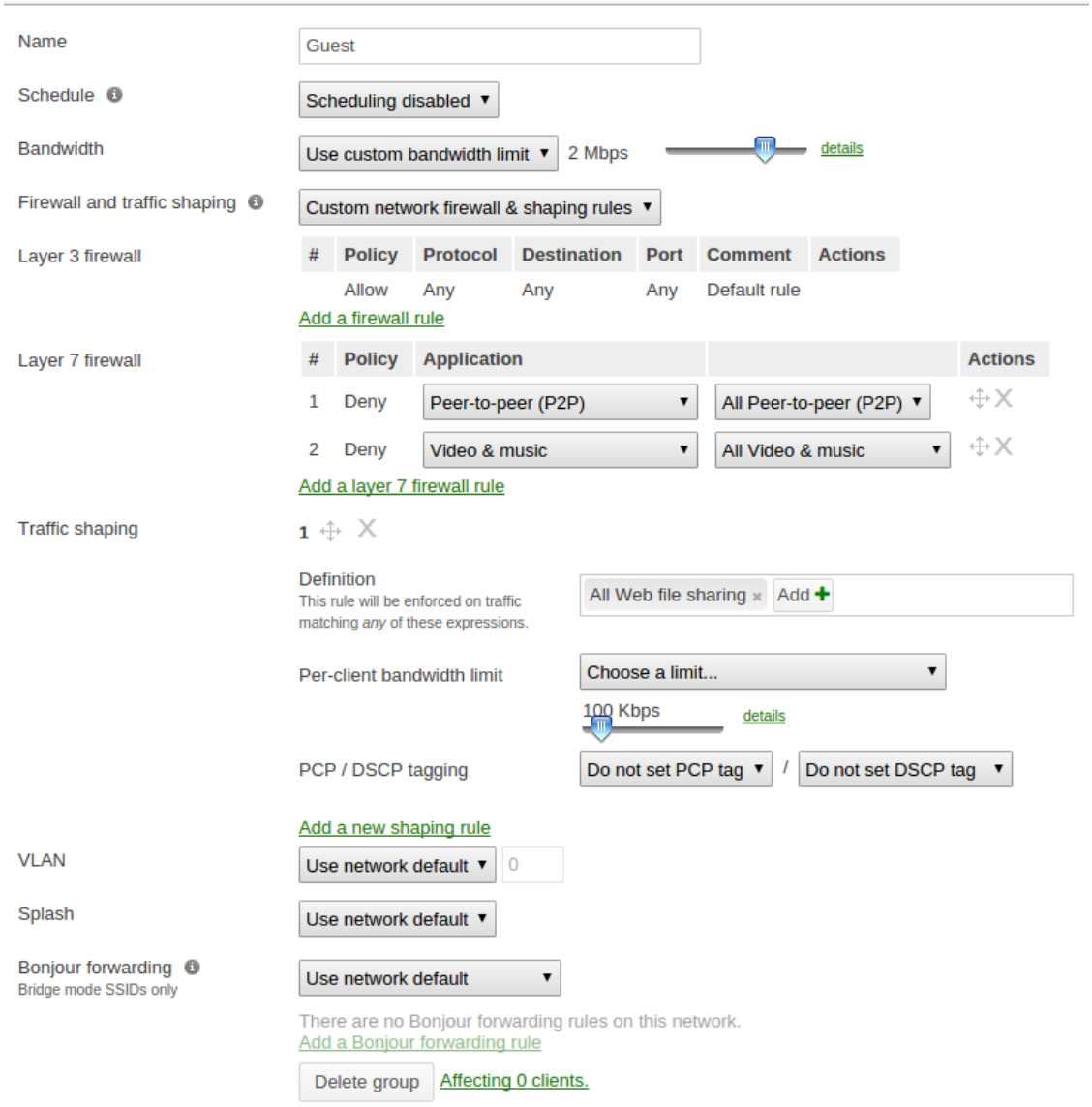

Network access
Association requirements
Open (no encryption)
Any user can associate
Pre-shared key with WPA2
Users must enter a passphrase to associate
MAC-based access control (no encryption)
RADIUS server is queried at association time
WPA2-Enterprise with Meraki authentication
User credentials are 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



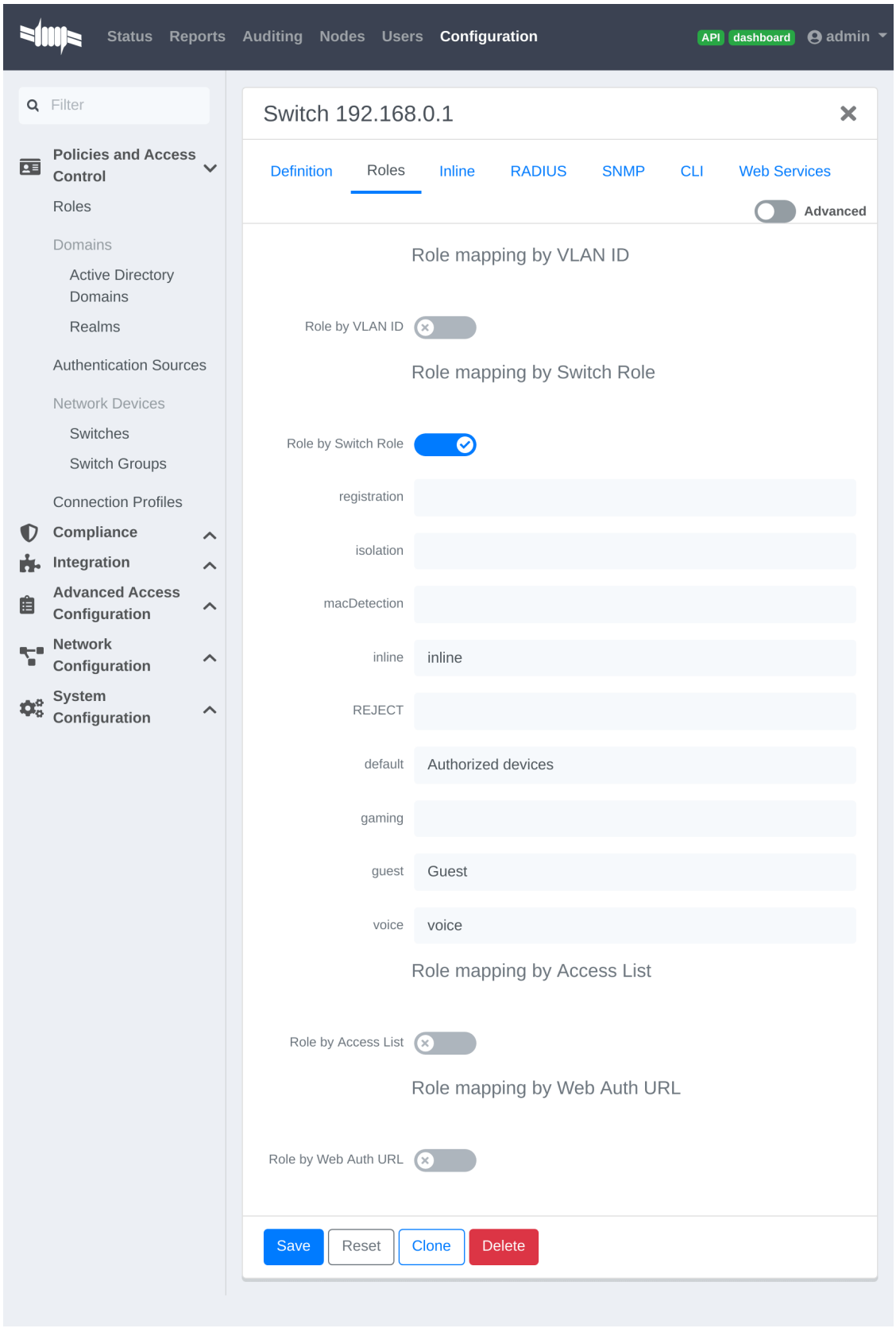
NOTE Must use Airespace-ACL-Name as "RADIUS attribute specifying group policy name".

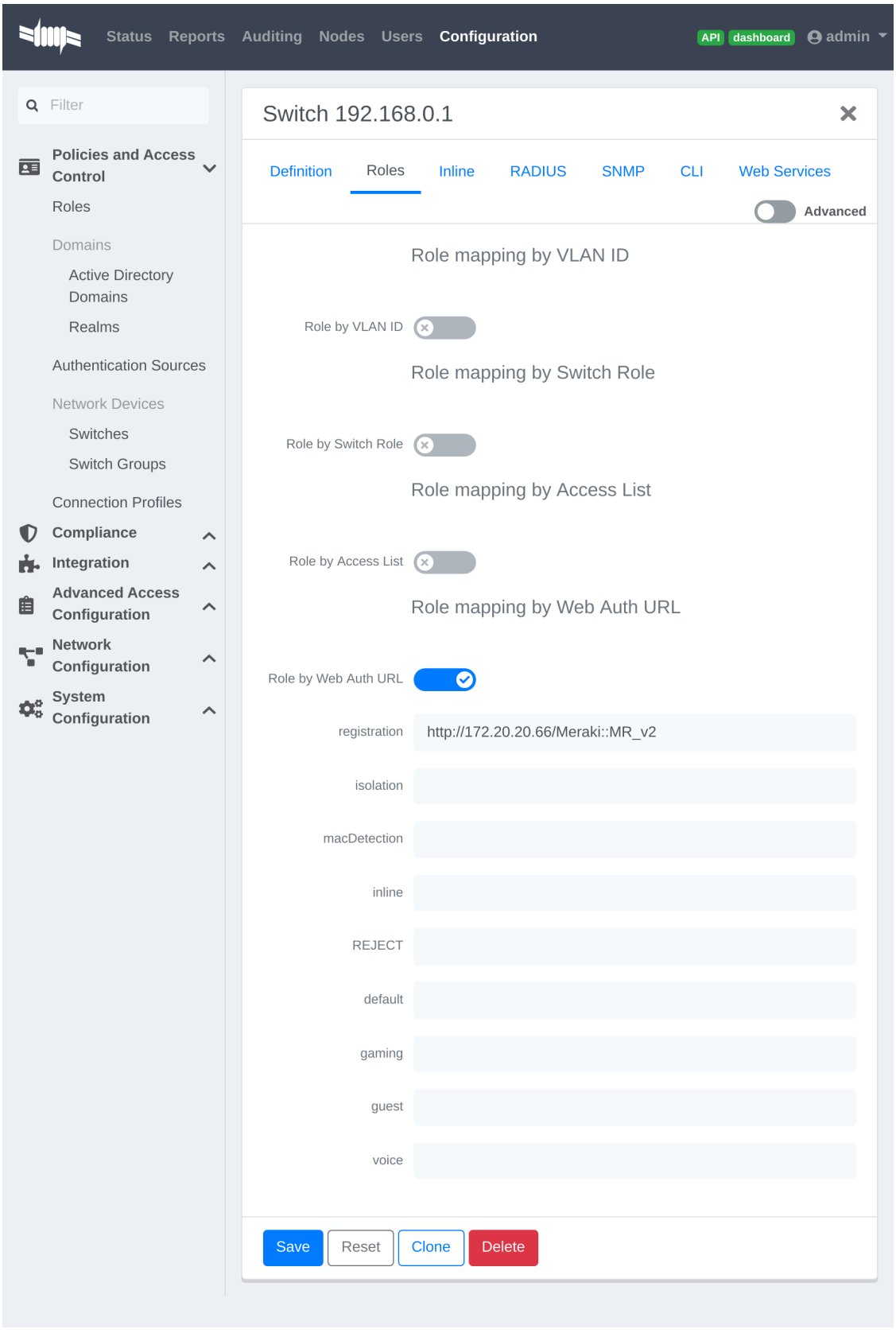
Use switch module "Meraki cloud controller V2" for this configuration.

Configure device roles for your network. Go to 'Network-wide→Group policies' to create policies configurable as roles in PacketFence switch configuration. Creating policy `Guest`:



Your configuration for the tab "Roles" in PacketFence will look like the following:


Status
Reports
Auditing
Nodes
Users
Configuration
API
dashboard
admin
Filter
Policies and Access Control
Roles
Domains
Active Directory Domains
Realms
Authentication Sources
Network Devices
Switches
Switch Groups
Connection Profiles
Compliance
Integration
Advanced Access Configuration
Network Configuration
System Configuration
Switch 192.168.0.1
Definition
Roles
Inline
RADIUS
SNMP
CLI
Web Services
Advanced
Role mapping by VLAN ID
Role by VLAN ID
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
Role mapping by Web Auth URL
Role by Web Auth URL
Save
Reset
Clone
Delete

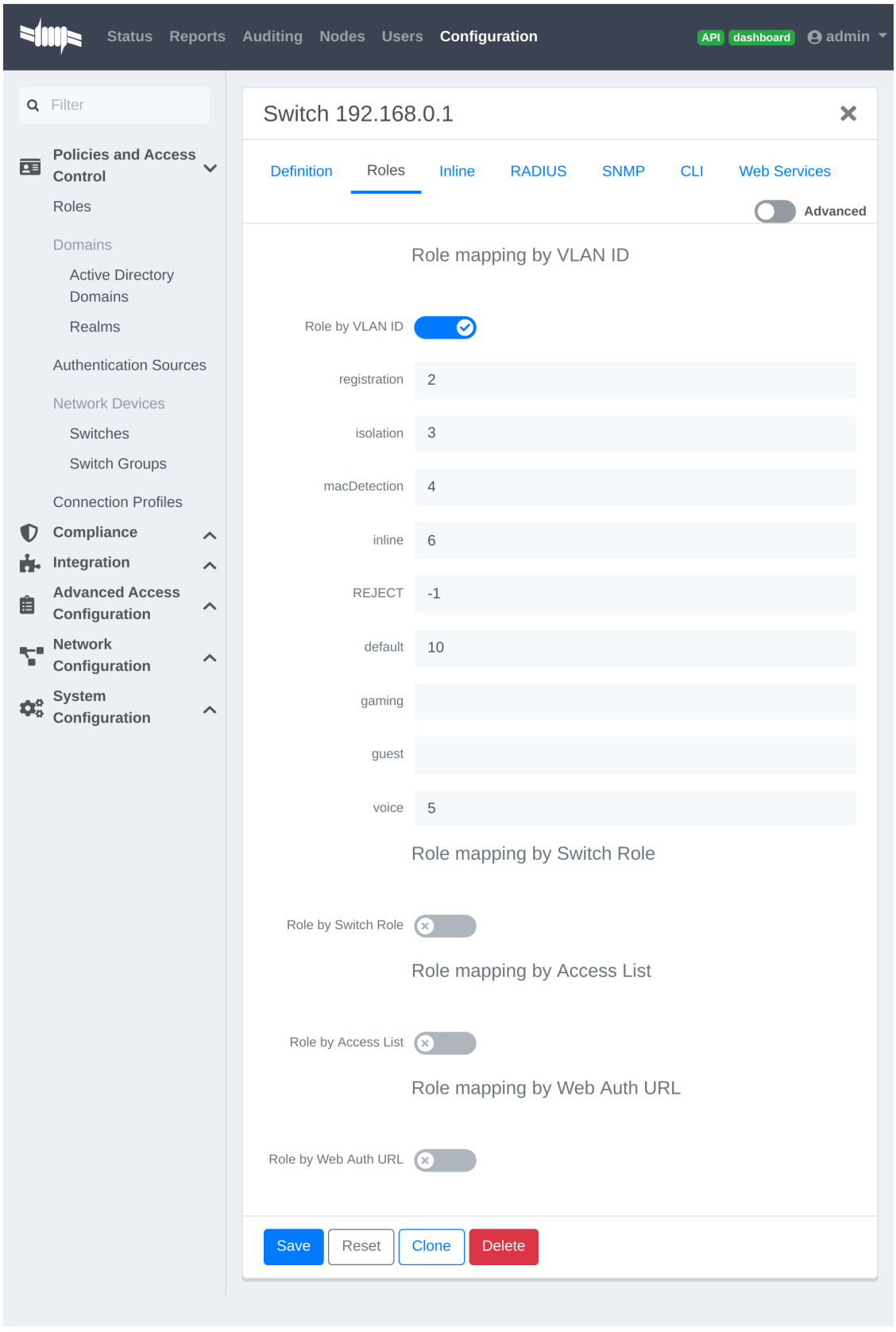


URL in registration field should be in the form: 'http://<your_captive_portal_ip>/Meraki::MR_v2'

4.19.2. 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.

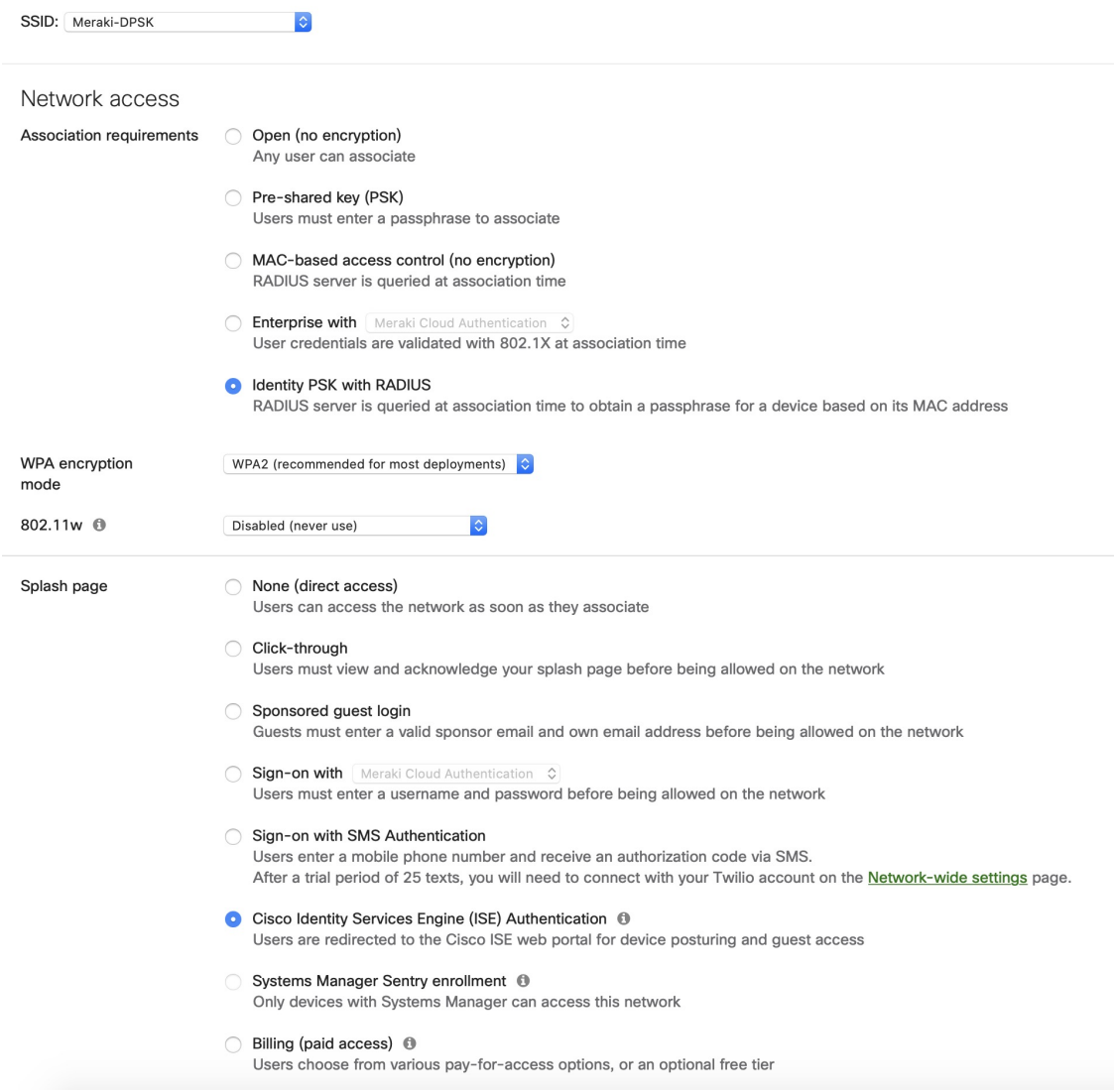

Status
Reports
Auditing
Nodes
Users
Configuration
API
dashboard
admin
Filter
Policies and Access Control
Roles
Domains
Active Directory Domains
Realms
Authentication Sources
Network Devices
Switches
Switch Groups
Connection Profiles
Compliance
Integration
Advanced Access Configuration
Network Configuration
System Configuration
Switch 192.168.0.1
Definition
Roles
Inline
RADIUS
SNMP
CLI
Web Services
Advanced
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
Save
Reset
Clone
Delete

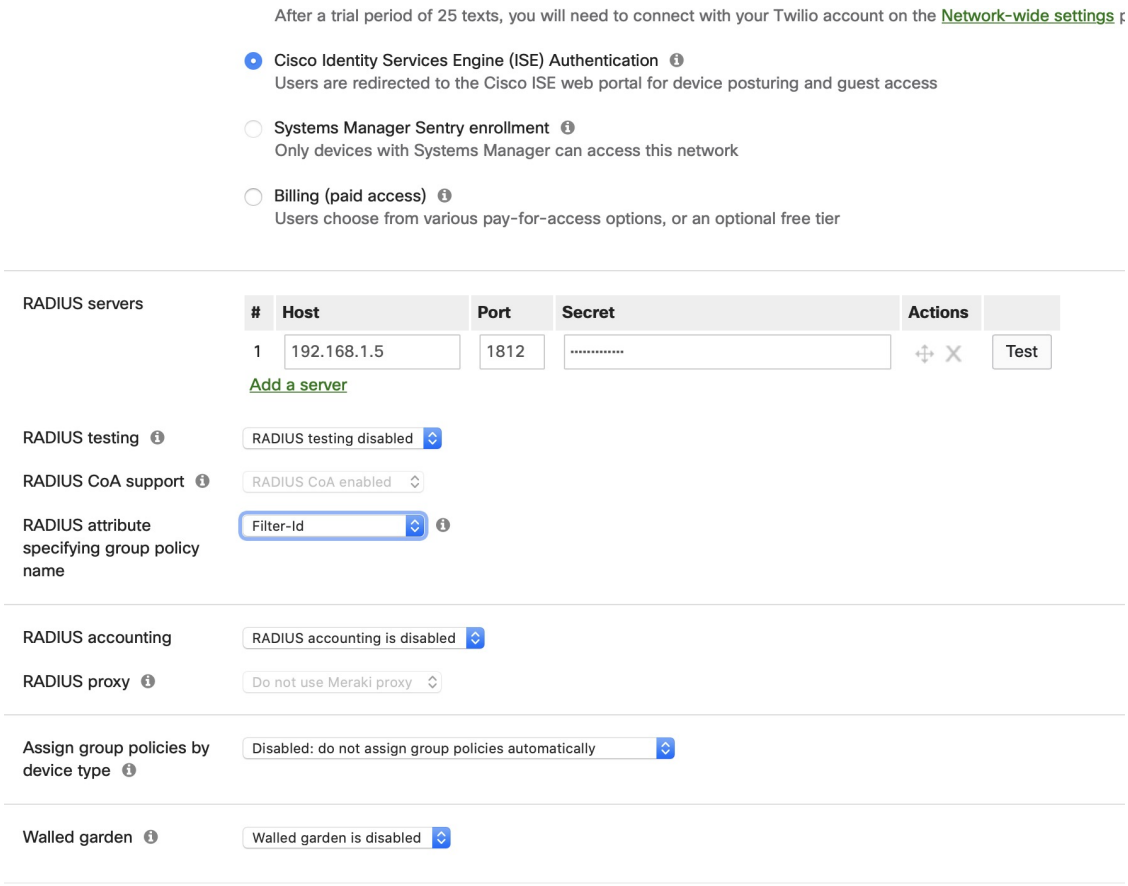
4.19.3. Dynamic PSK (Pre-Shared Key)

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.

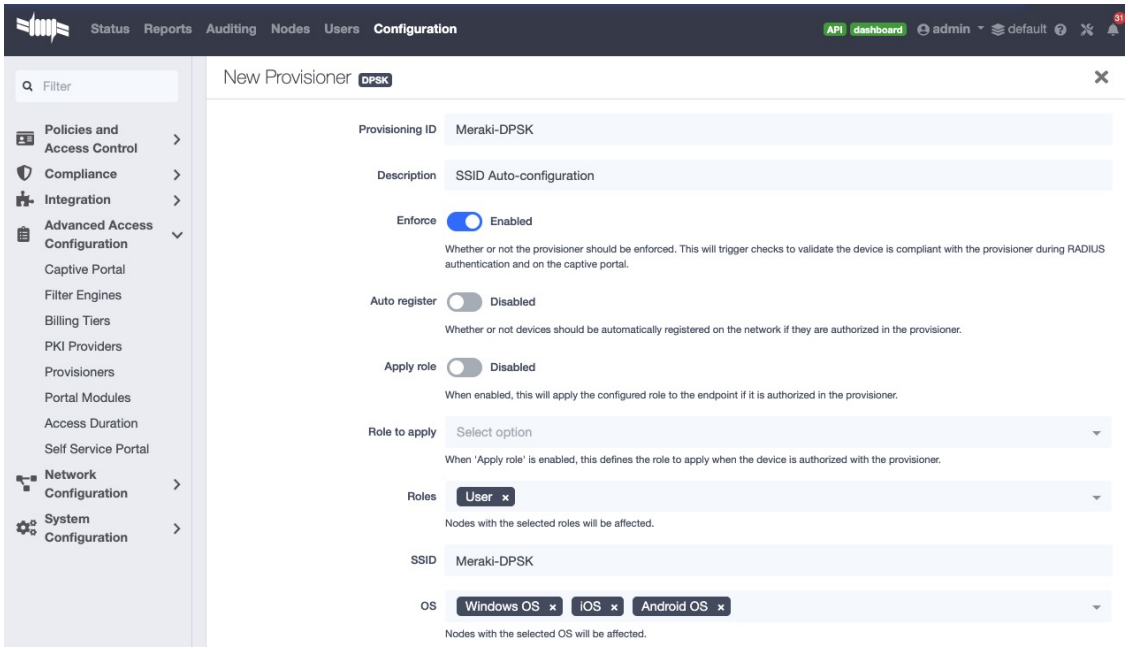
Create the SSID





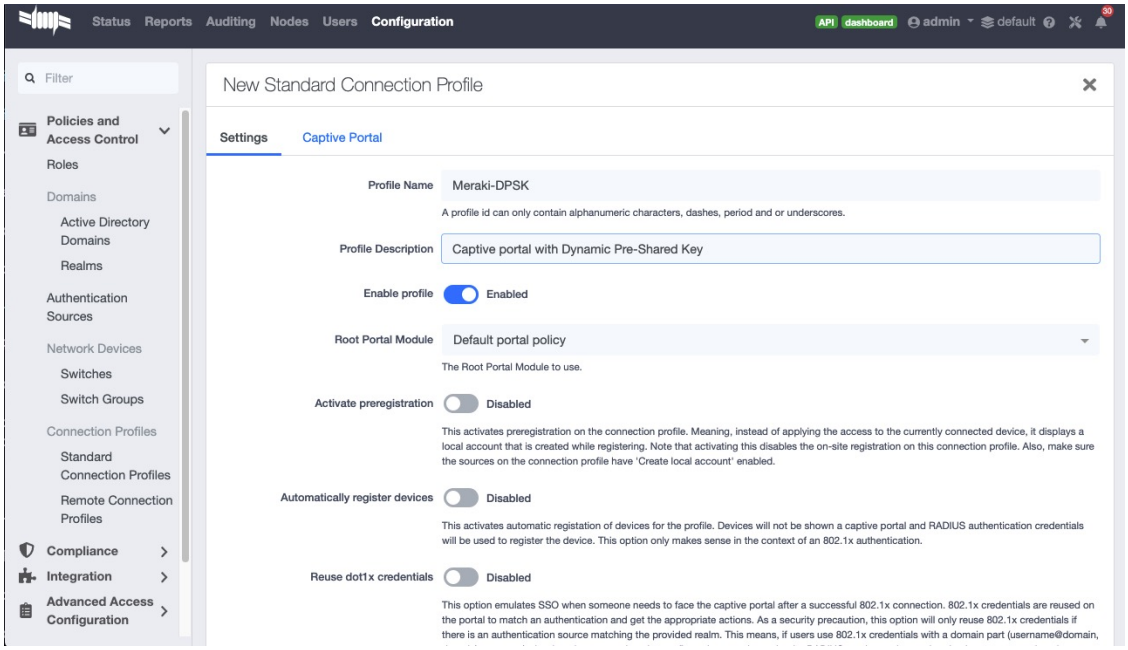
Provioner configuration

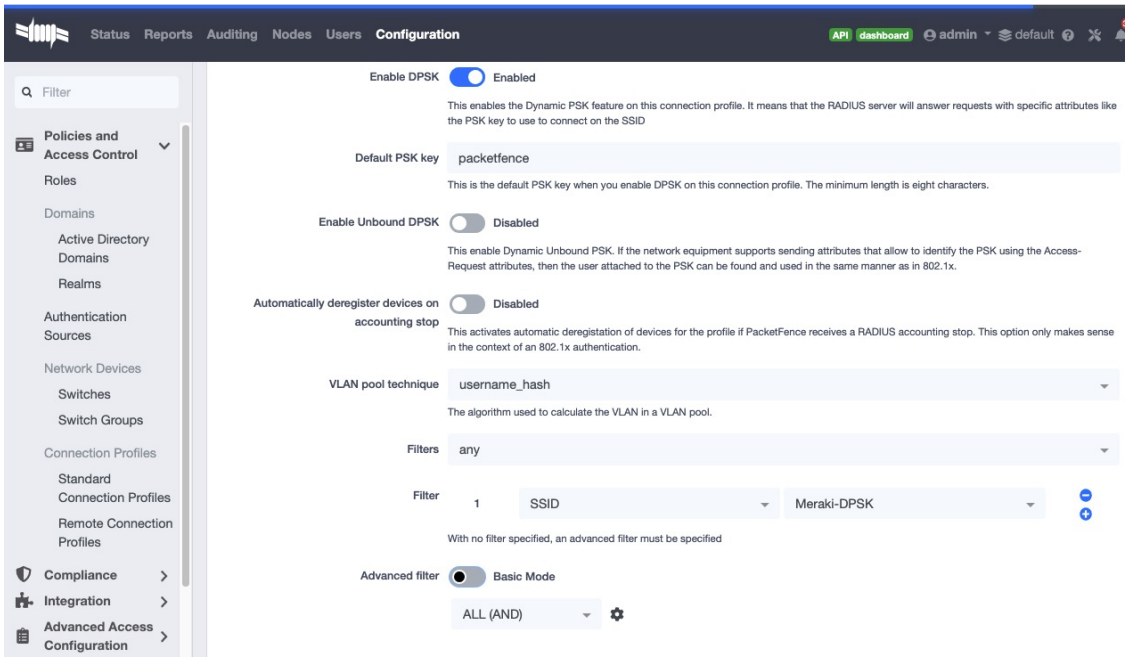
Go to Configuration > Advanced Access Configuration > Provisioner > New provisioner > DPSK

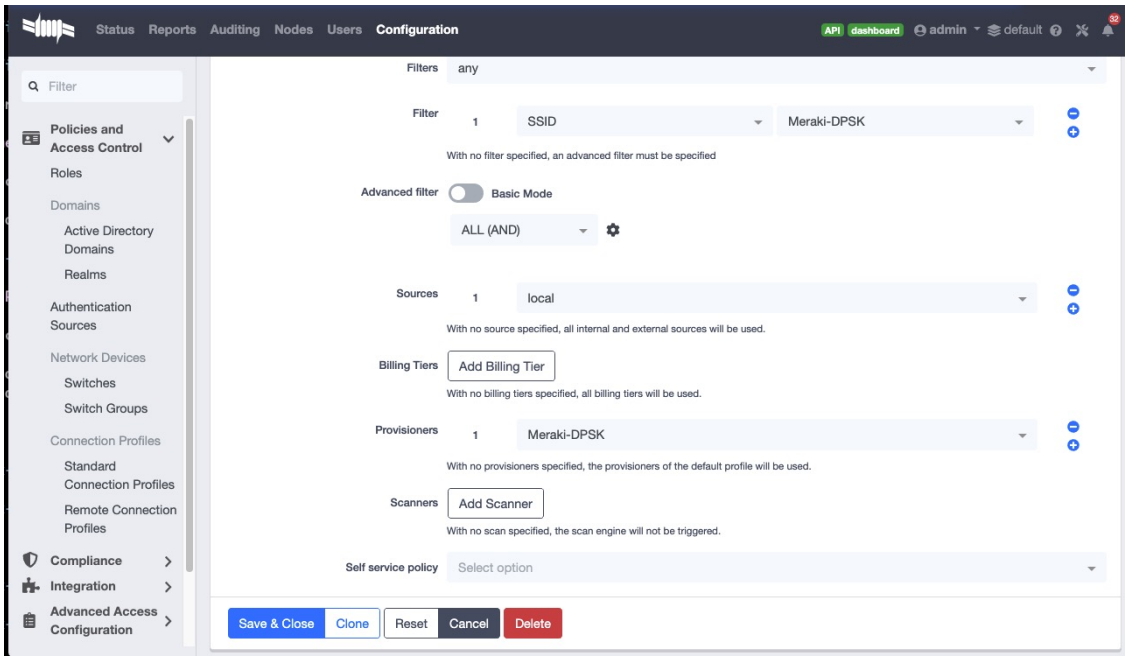


Connection profile configuration

Go to Configuration > Policies and Access Control > Connection Profiles > New Connection Profile







MS Switch Modules

MS Modules This is a standard switch module designed to support all the legacy Meraki Switch series using MS version earlier than v15.x.

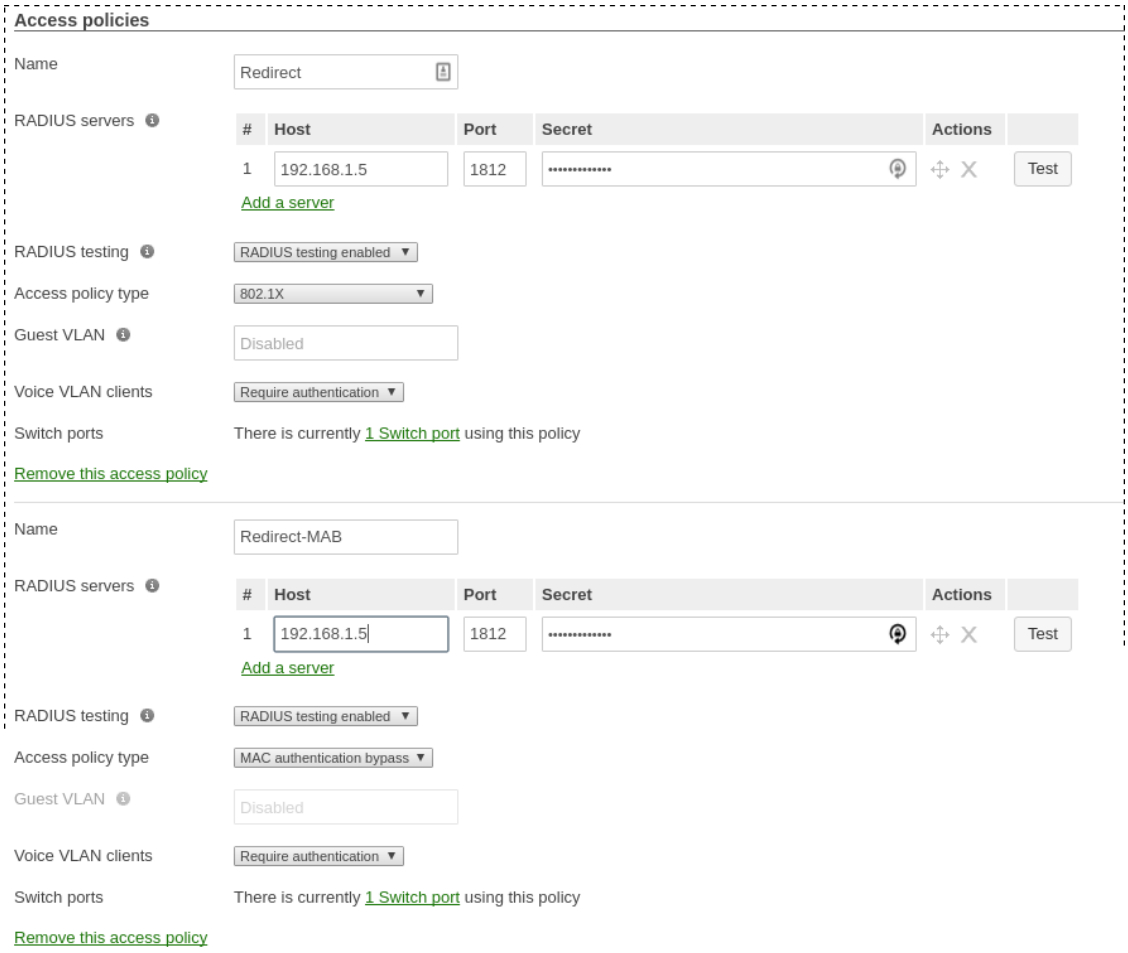
Meraki MSv15 MSv15 module is designed for the switch series operating on MS_OS v15. Furthermore, it inherits all functionalities from the old "MS220_8" module, making all the configurations below applicable to MSv15.

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.

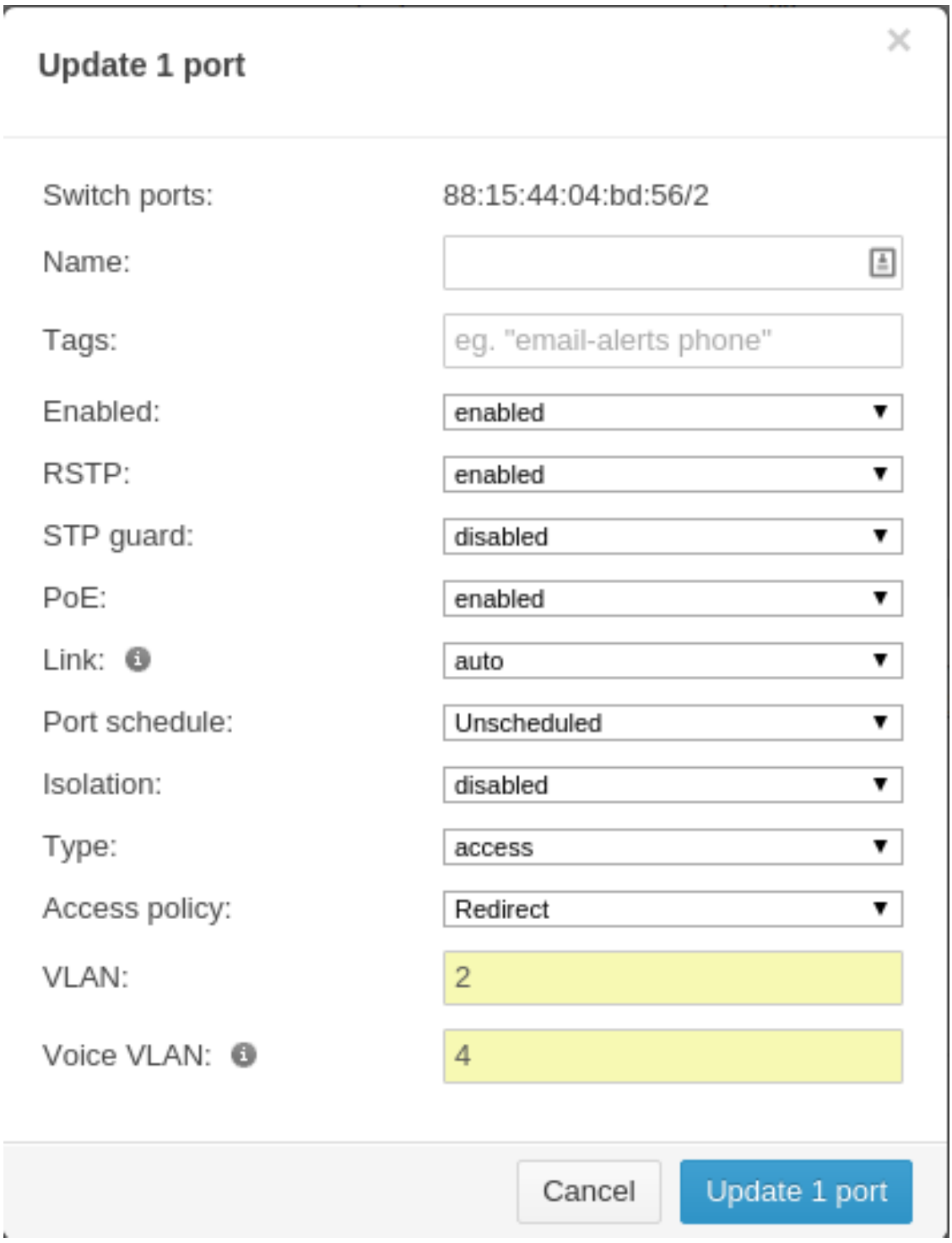
The Meraki switch offer configuration for VLAN enforcement only.

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 'Switching→Access Policies' in the Meraki dashboard menu. From there create a new policy, use the example below to create your 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.



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 your Meraki dashboard under Organization→Configure→Certificates and selecting "Download CA" below RadSec AP Certificates. You can then append the content of this certificate to /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.

4.20. 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
```

4.20.1. 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
```

4.20.2. 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
```

4.20.3. 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
```

4.21. HP

4.21.1. ProCurve Controller MSM710

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

4.22. Meru

4.22.1. Meru Controllers (MC)

In this section, we cover the basic configuration of the Meru wireless controller for PacketFence via the controller web interface.

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, 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.

4.23. Mojo Networks

PacketFence supports SSIDs configured with 802.1X and Web Authentication

4.23.1. 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'.

4.23.2. 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.

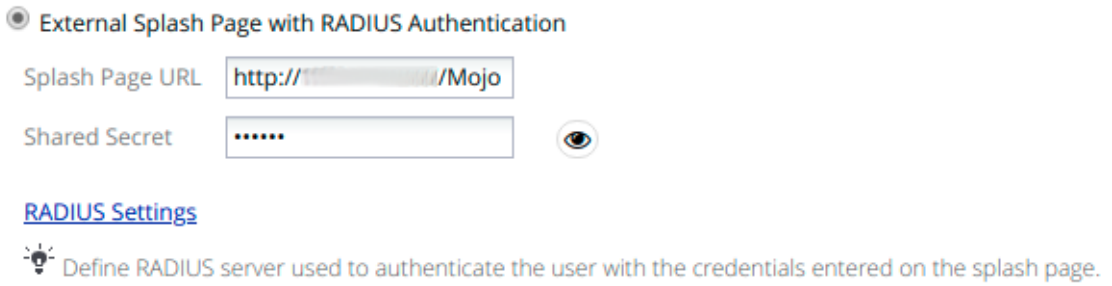
Web Authentication

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:

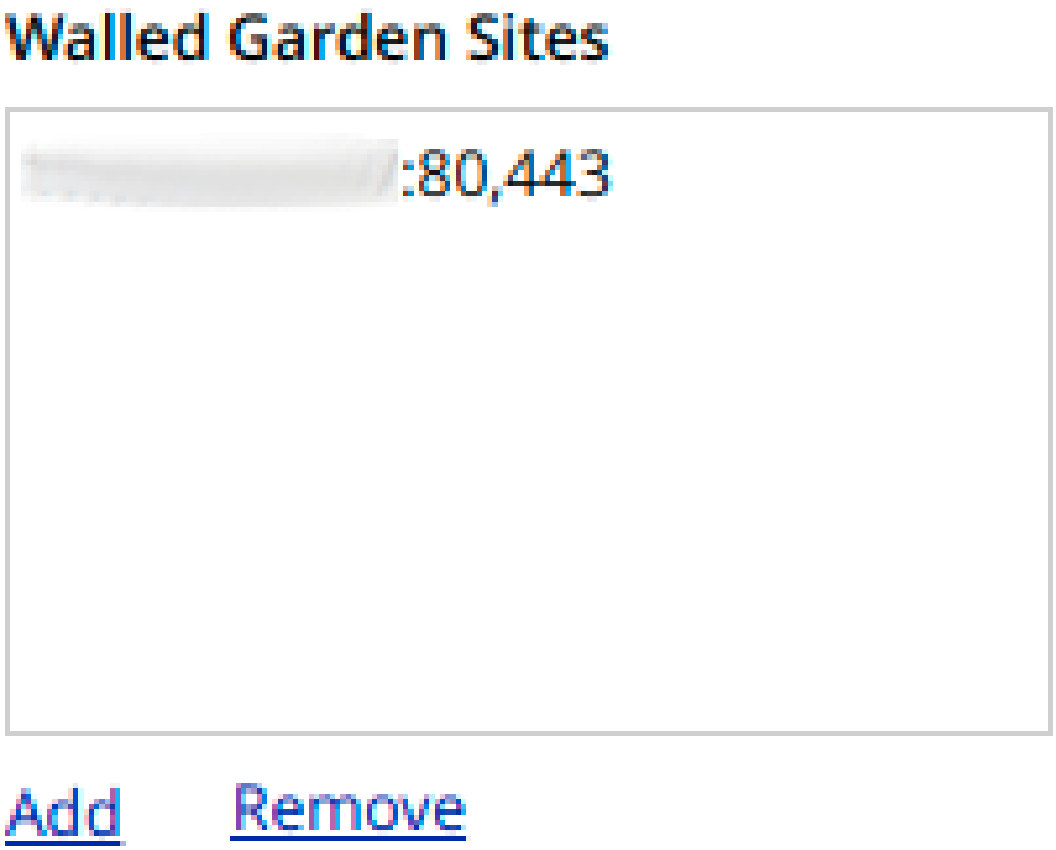
```
Profile Name: Name of the new profile
SSID: Name of your SSID
Security: Open
```


```
Network: VLAN ID for clients
```


```
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.
```




```
On the right, add the IP address or hostname of PacketFence to the Walled
Garden Sites.
```



Save the newly created profile.

4.23.3. 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.

4.23.4. 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.

4.24. 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.

4.24.1. 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, 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
...
```

4.24.2. 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*.

4.25. 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

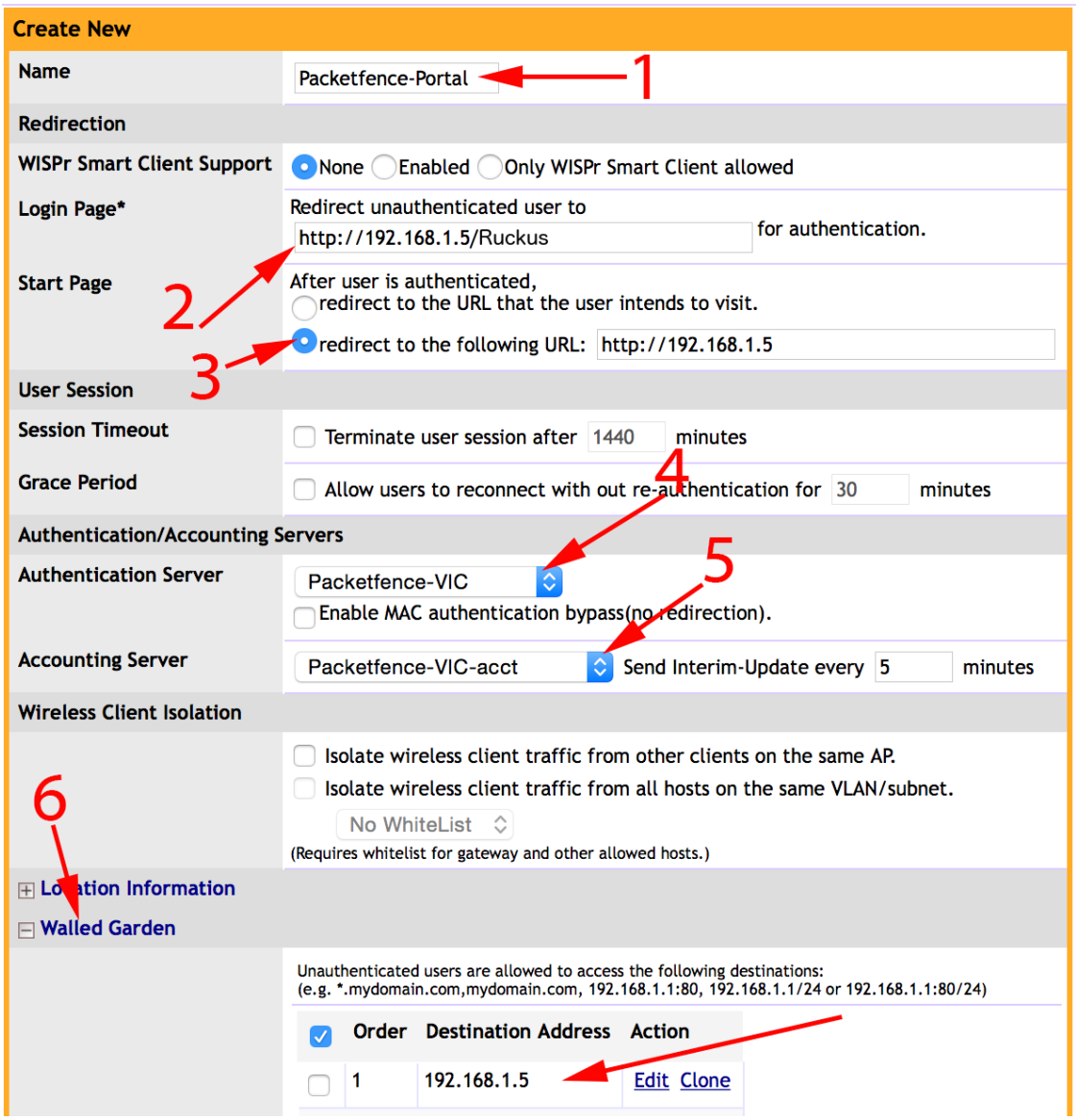
Finally, enable the WIPS feature on the controller. Under *Configure → WIPS → Intrusion Detection and Prevention*, make sure both box are selected, click Apply.

4.25.1. 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*

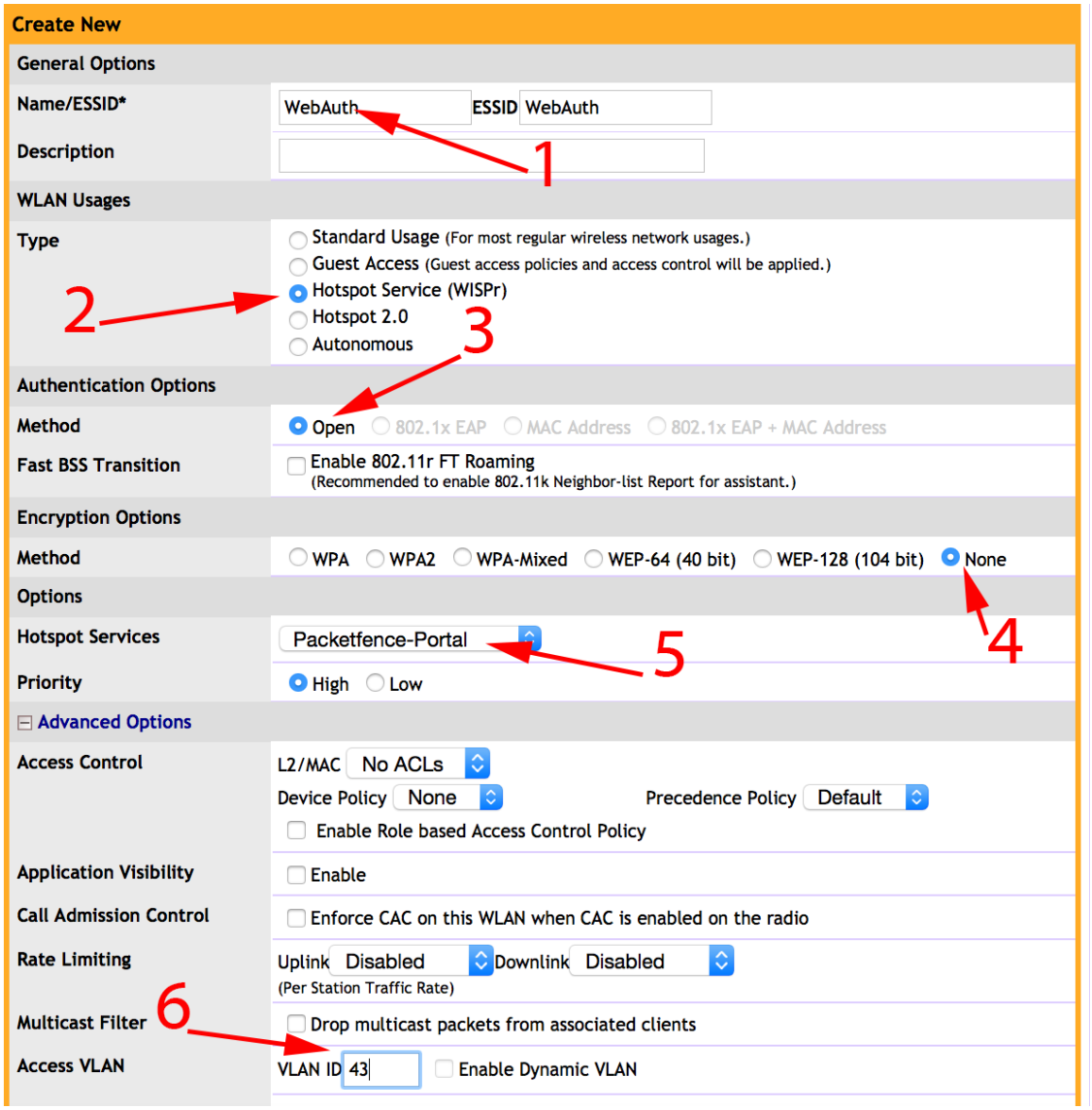



```
1 - Name of your Hotspot service
2 - Login Page: Url of PacketFence portal interface (http://192.168.1.5/Ruckus)
3 - Start Page: redirect to the following URL: http://192.168.1.5
4 - Authentication Server: Select the PacketFence authentication RADIUS server
(default port 1812)
5 - Accounting Server: 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*




```
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`

4.25.2. Ruckus Roles

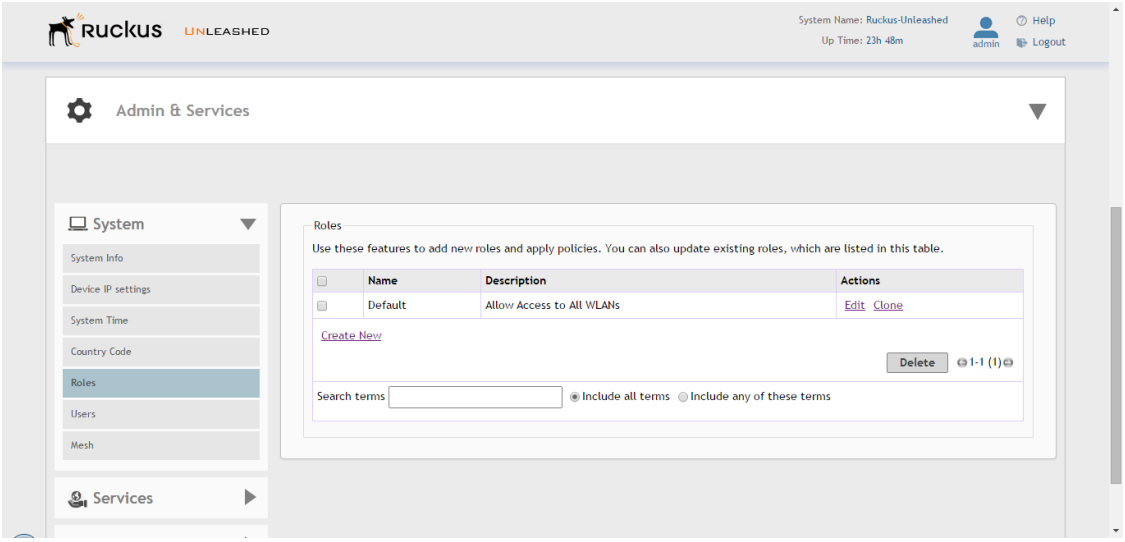
Roles Configuration

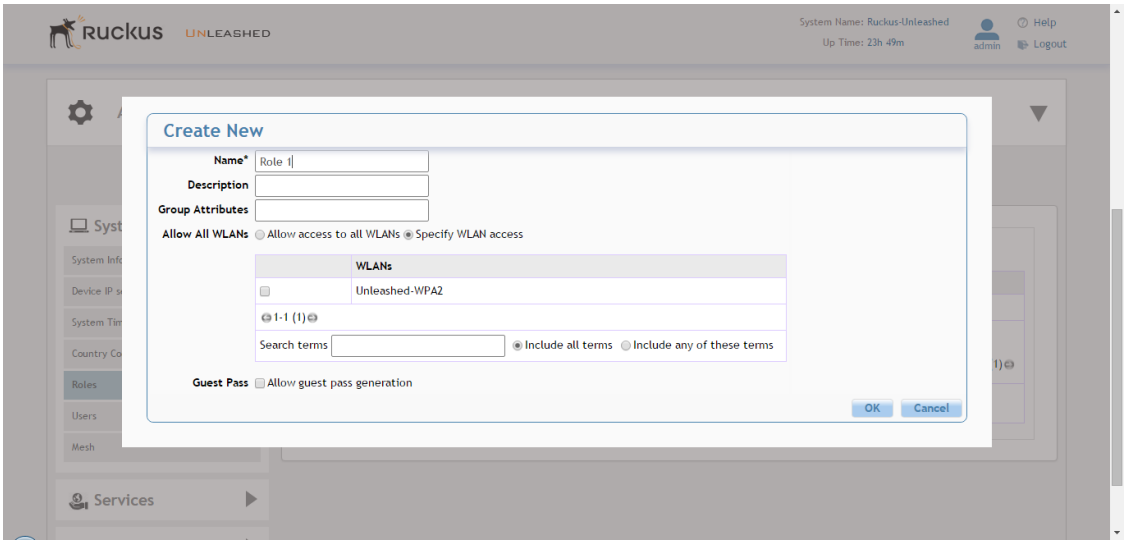
Ruckus allows you to define roles. These roles link all users to the internal WLAN and permit access to all WLAN by default. You can still limit access to certain WLAN. Additionally, these roles can be used to apply per-user rate-limits and ACLs in newer versions of the Zone Director firmware, specifying 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.





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.

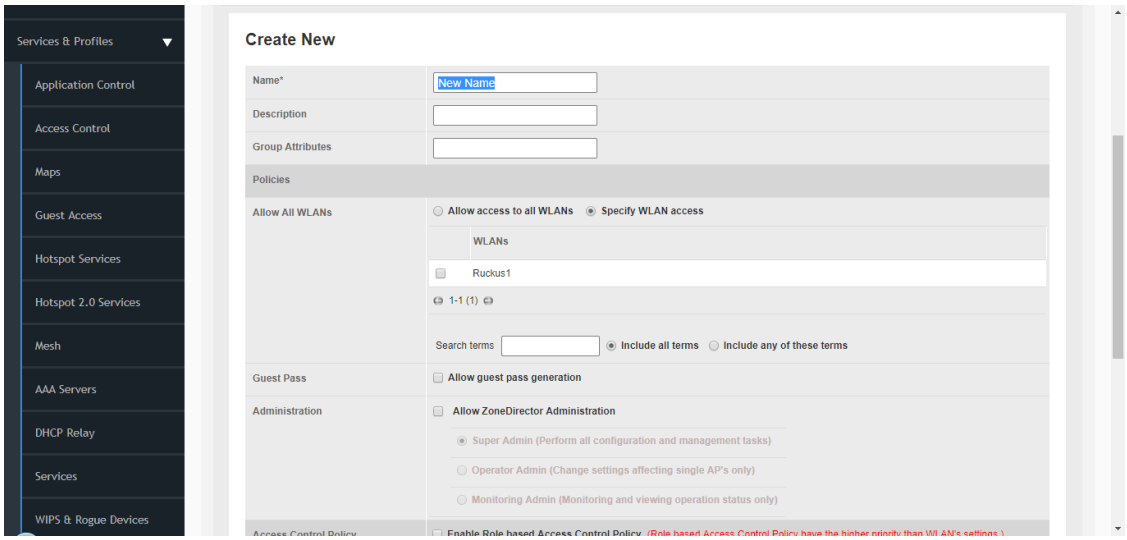
L3/L4/IP address ACL: Apply a Layer 3/Layer 4/IP address ACL to this role.

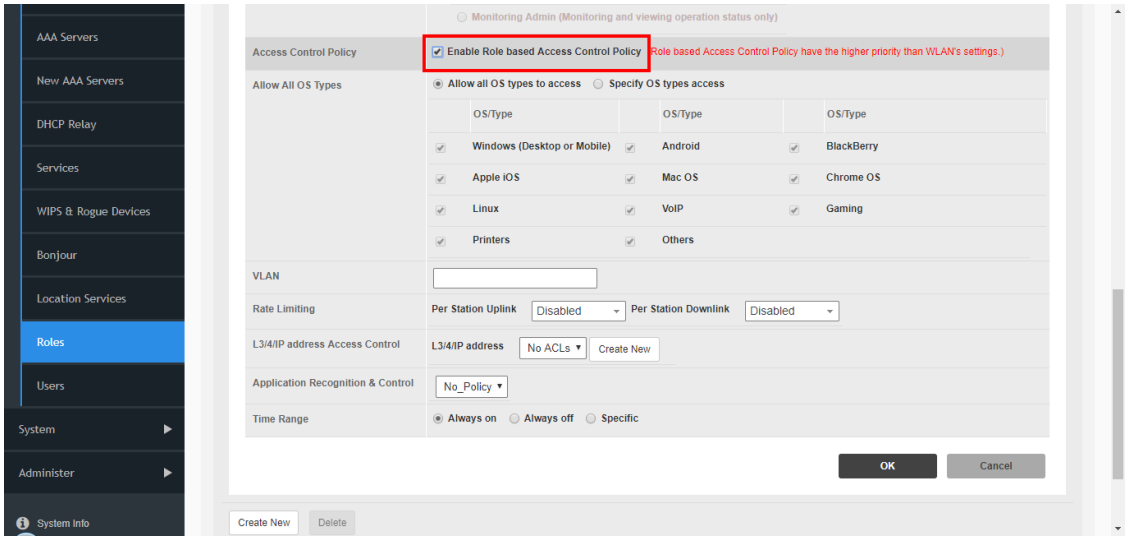
Application Recognition & Control: Apply an application policy to this role.

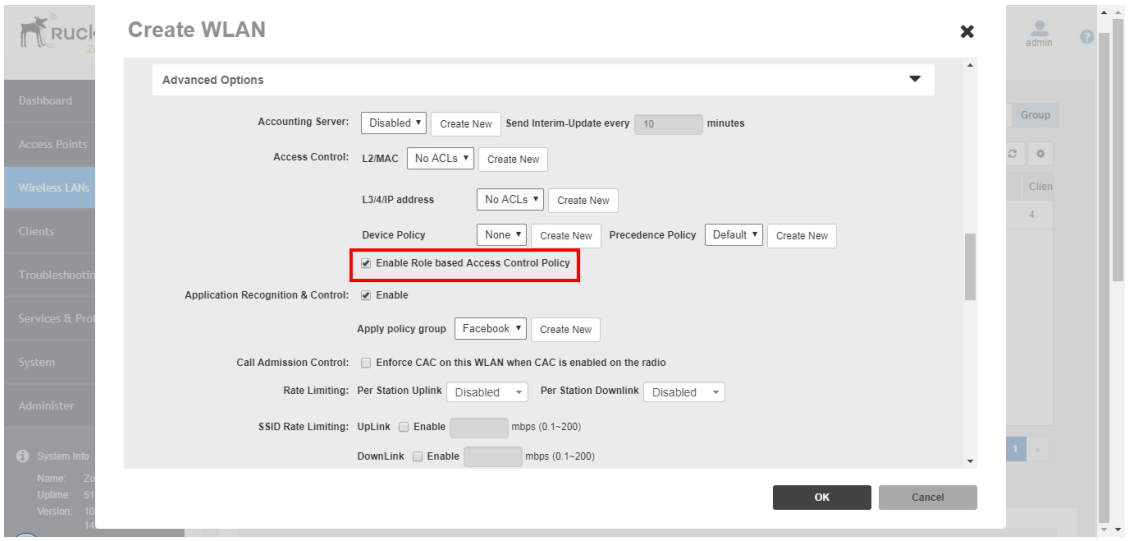
Time Range: Limit the time range during which this role will be allowed to access the WLAN.

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.







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.

4.26. 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 hosting a SmartZone appliance (physical or virtual) inside the 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 the LAN, then opt for the NON-PROXY mode.

4.26.1. Webauth

4.26.2. SmartZone configuration

First, define the 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 the deployment details as described above)

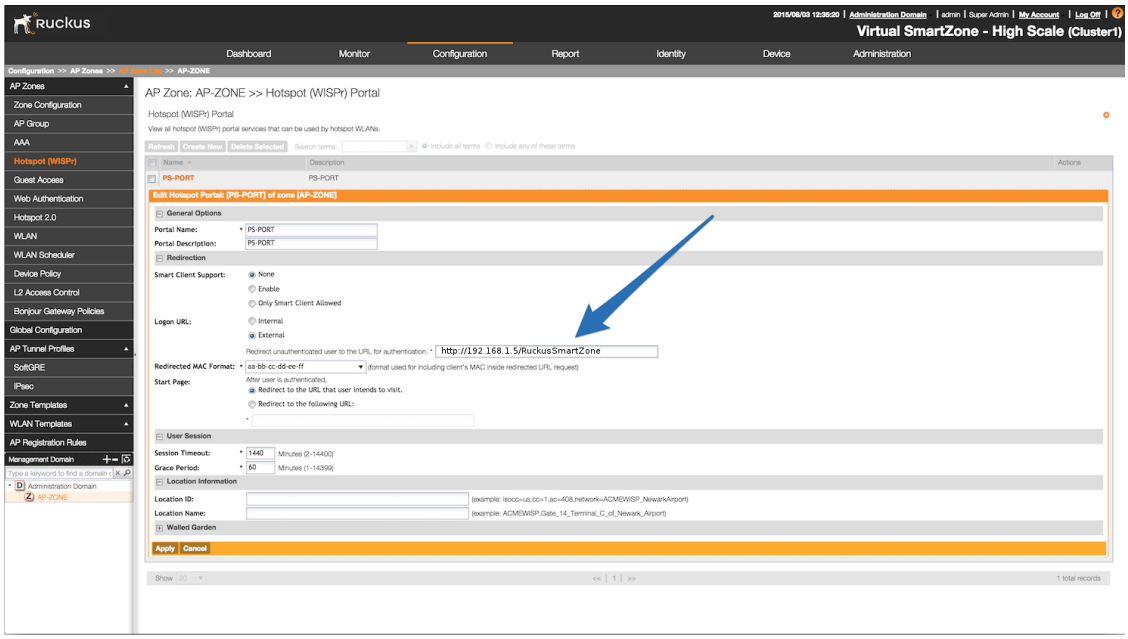
Create the server using the following information (where 192.168.1.5 is the IP address of the PacketFence management interface):

- 'IP Address:' 192.168.1.5
- 'Port': 1812
- 'Secret': useStrongerSecret

Then, in *Configuration → Service and Profiles → Accounting*, create a server with the following information:

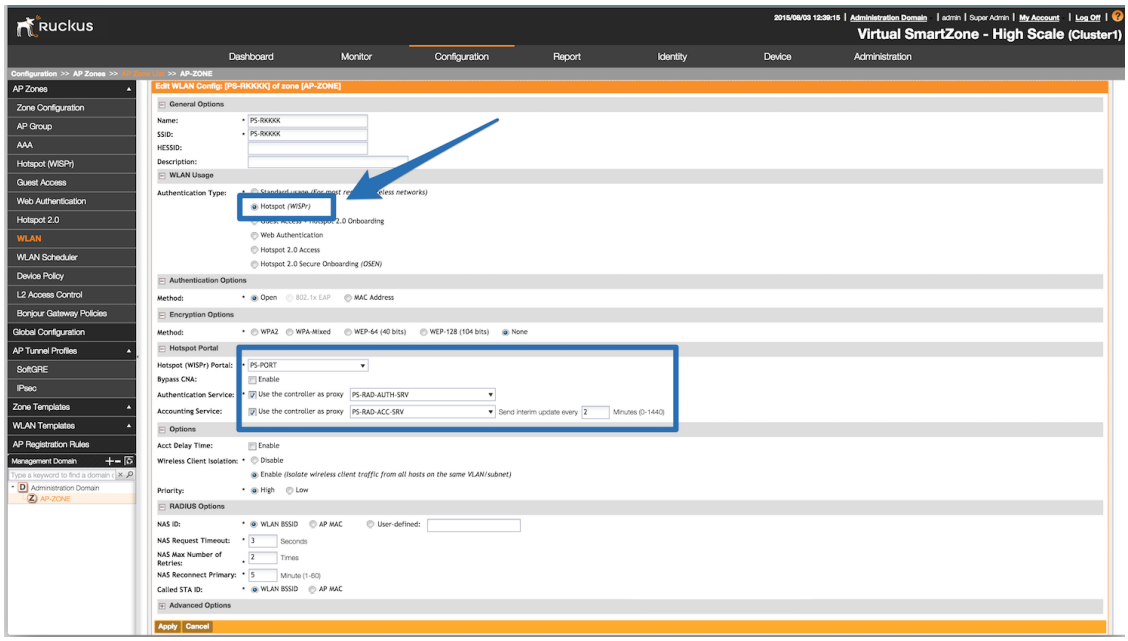
- 'IP Address:' 192.168.1.5
- 'Port': 1813
- 'Secret': useStrongerSecret

After, create a Hotspot in *Configuration → AP Zones → Zone → Hotspot WISPr → Create New*. Adjust 192.168.1.5 to the IP address of the portal.



Then, still on this page, in the 'Walled Gardens', make sure to add the portal IP address in this list.

Next, configure the WLAN to use the Hotspot authentication and point it to PacketFence. Also ensure 'Use the controller as a proxy' is set.



Now, 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 of using a SmartZone High-scale, define a northbound username/password for each Managed Domain so that each customer 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, connect to the Ruckus SmartZone controller using SSH and execute the following command:

```
no encrypt-mac-ip
```

4.26.3. 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.

4.26.4. Mac Authentication

For MAC authentication there are 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.

4.26.5. PROXY mode

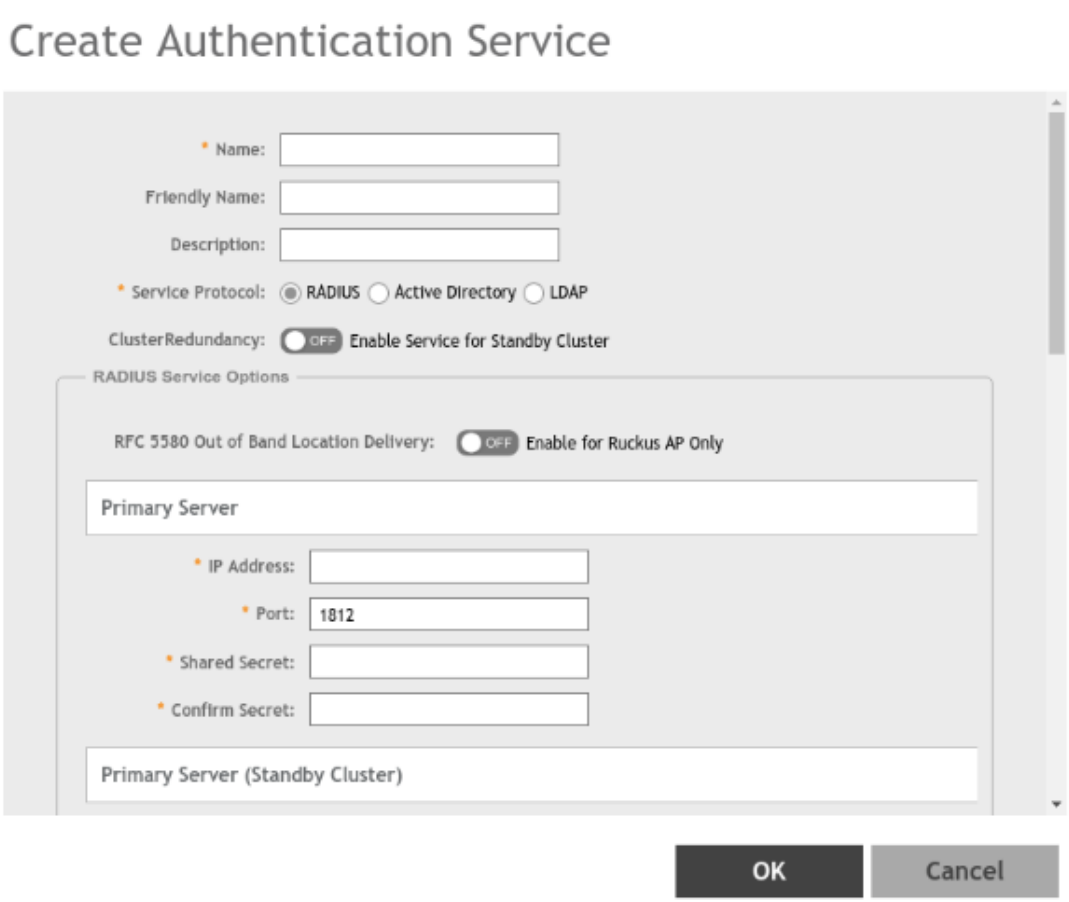
4.26.6. SmartZone configuration

First, define the RADIUS server in *Service and Profiles → Authentication*. Then select the "Proxy (SZ Authenticator)" tab and then select the zone for which to create the AAA server.

Create the server using the following information (where 192.168.1.5 is the IP address of the PacketFence management interface):

- 'Name' : PacketFence-Auth

- 'Service Protocol': RADIUS
- 'IP Address:' 192.168.1.5
- 'Port': 1812
- 'Secret': useStrongerSecret



Then, in *Service and Profiles* → *Accounting*. Then select the "Proxy" tab and then select the zone for which 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

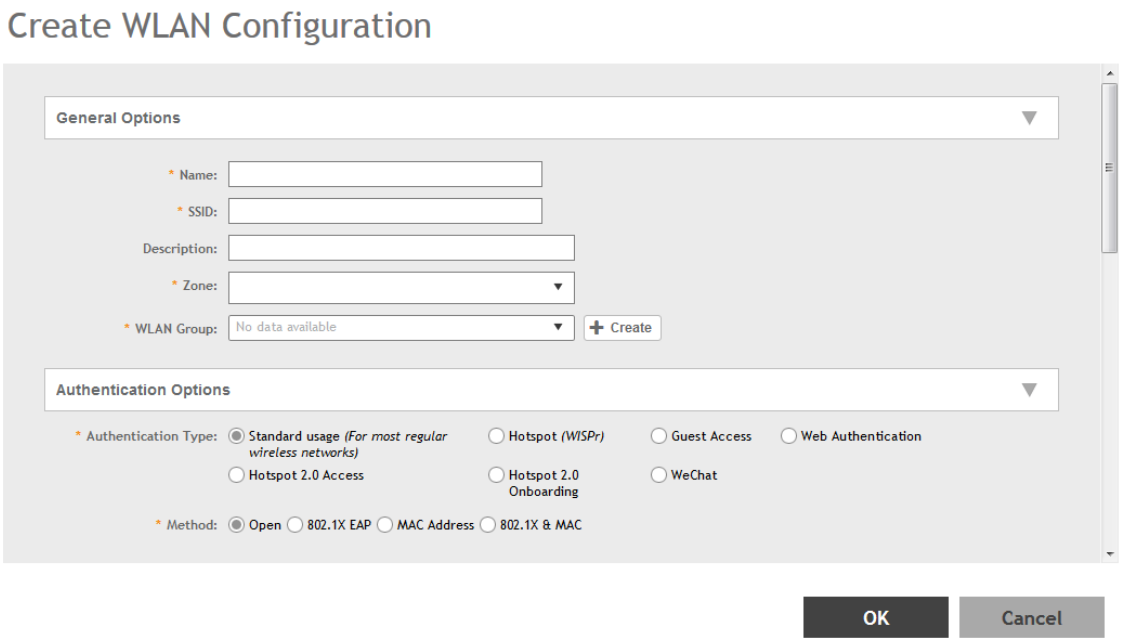
Give both authentication and accounting services an easily identifiable name such as "PacketFence-Auth" and "Packerfence-Acct". This names are purely for identification purposes only.

Now create an SSID with OPEN/MAC athentication.

In the *Wireless LANs* top level menu , from the System tree hierarchy, select the Zone where 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".



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 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.

4.26.7. 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**: The registration VLAN ID
- **Roles → isolation VLAN**: The isolation VLAN ID
- **Roles → Role by Switch Role** can be optionally enabled (see below)
- **RADIUS → Secret passphrase**: `useStrongerSecret`

4.26.8. 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)

4.26.9. 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**: The registration VLAN ID
- **Roles → isolation VLAN**: The 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, change the Deauth method and Web Services Transport to HTTP instead of HTTPS to 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.

4.26.10. Ruckus Roles

Roles Configuration

Ruckus SmartZone allows defining 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)

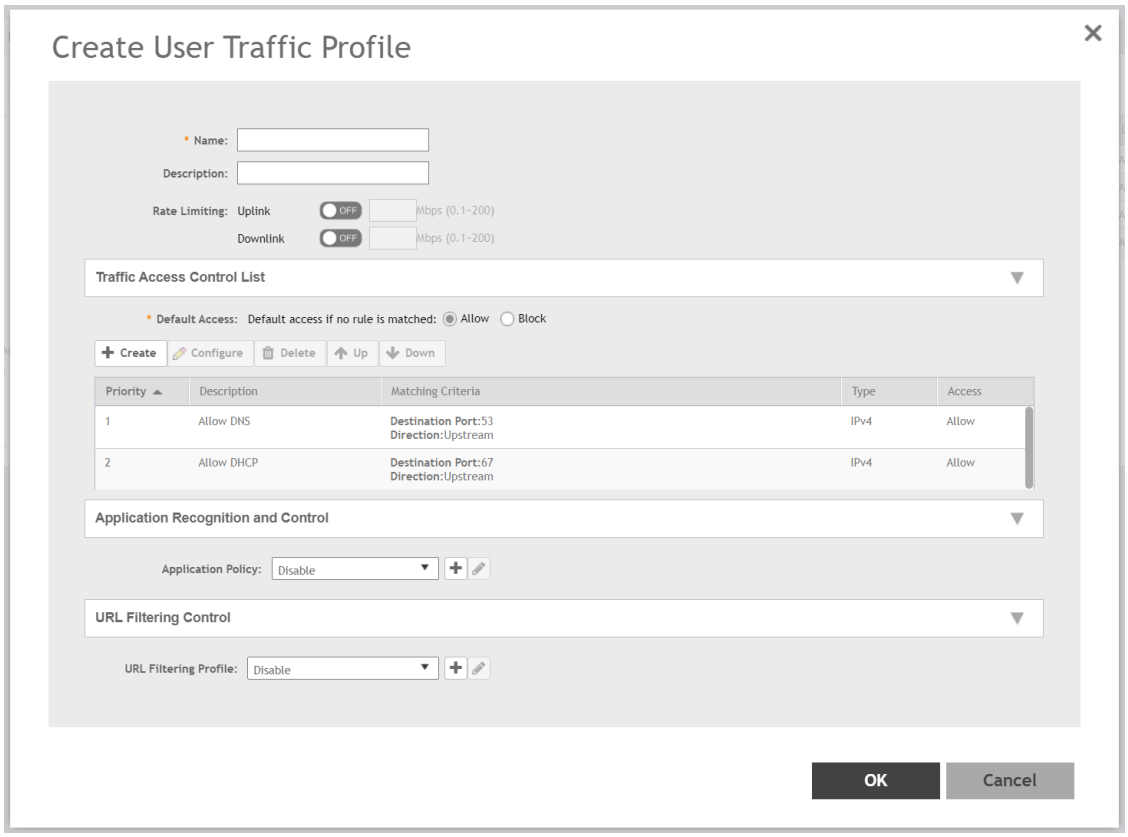
To create and be able to use the role, we need to perform several steps:

```
1 - Create a _User Traffic Profile_
2 - Create a matching _User Role_
```

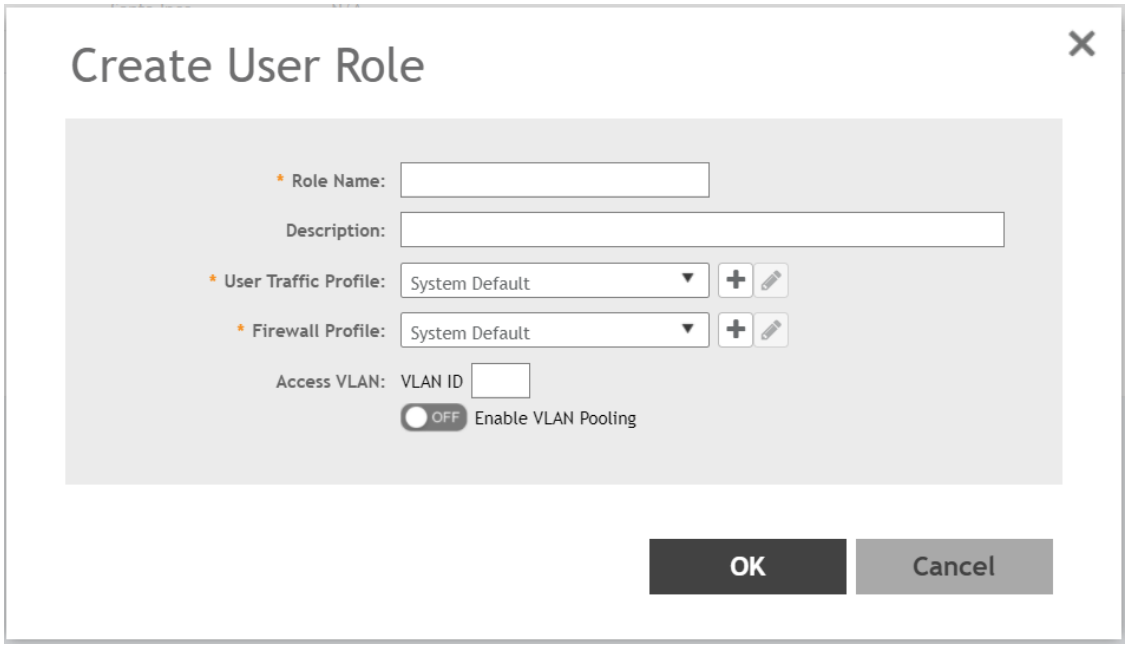
```
3 - Reference the User Role in the RADIUS Authentication server
```

The detailed steps are as follow:

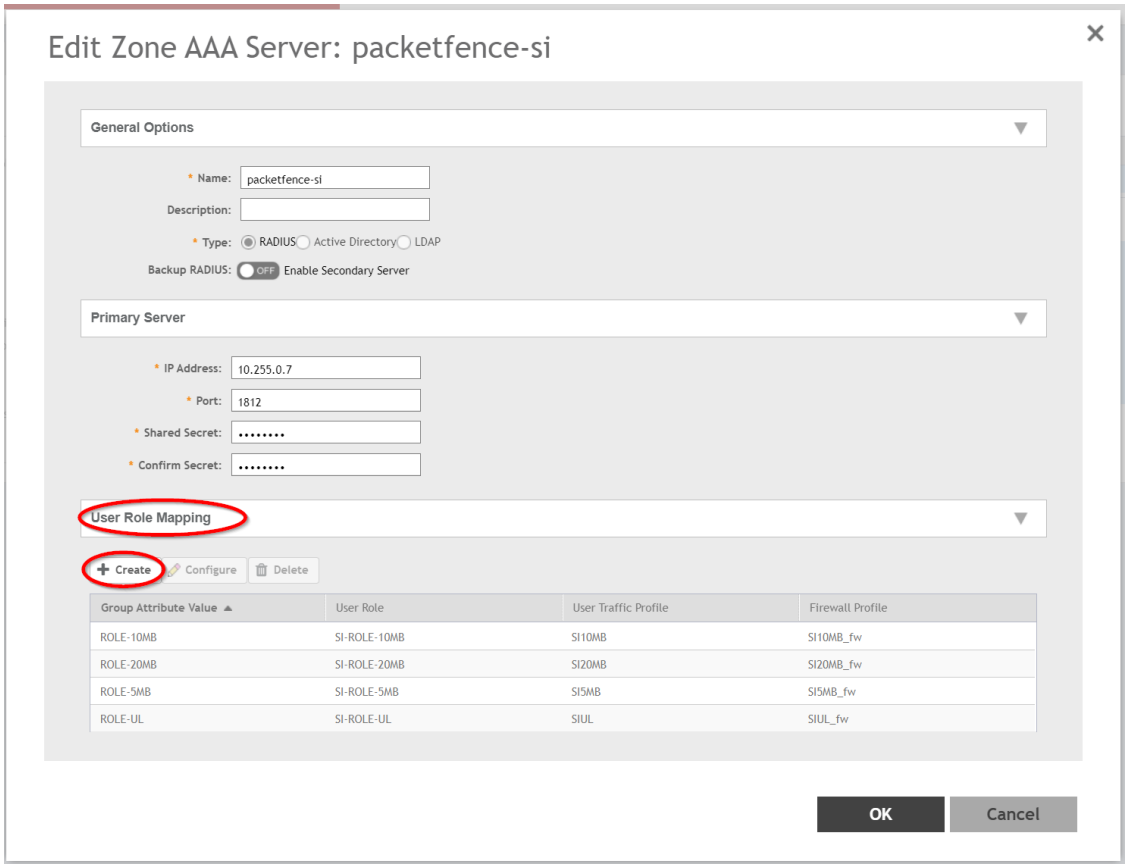
Go to *Services & Profiles* → *Access Control* on the left menu and then click on the *User Traffic* tab. On this page, optionally select a Domain/Zone, click the "Create" button and give the new UTP name. Define any additional parameters such as Uplink/Downlink rate limits, define any ACLs that might be needed for that role and also select, if needed, an Application Recognition and Control policy and URL Filtering Control policies.



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. Choose any meaningful name. Also select the User Traffic Profile defined in the previous step as well as, optionally, a Firewall Profile.

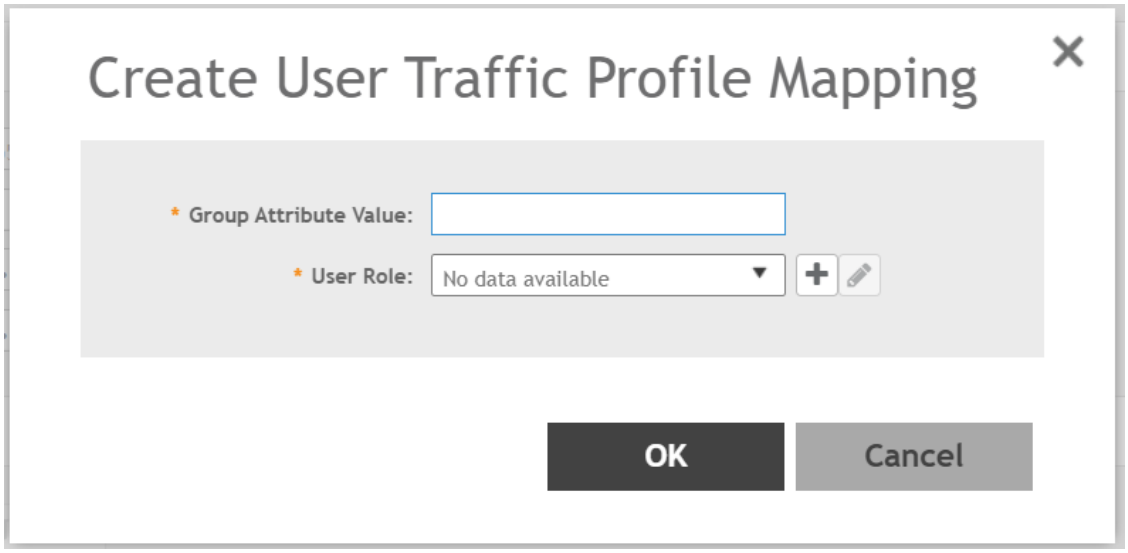


Finally, under *Configuration* → *Service and Profiles* → *Authentication*, select the RADIUS server created previously (Either in Proxy or NON-Proxy mode). Then, under the *User Role Mapping* section, click on *Create*.



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.



Repeat all the steps above for as many different roles as needed. Keep in mind that different roles can be defined on SmartZone than those on PacketFence. For example, on SmartZone there might be roles called "10Mbps", "20Mbps" and so on (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 use *role by switch role* and add the same name as in the *Group Attribute* 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.

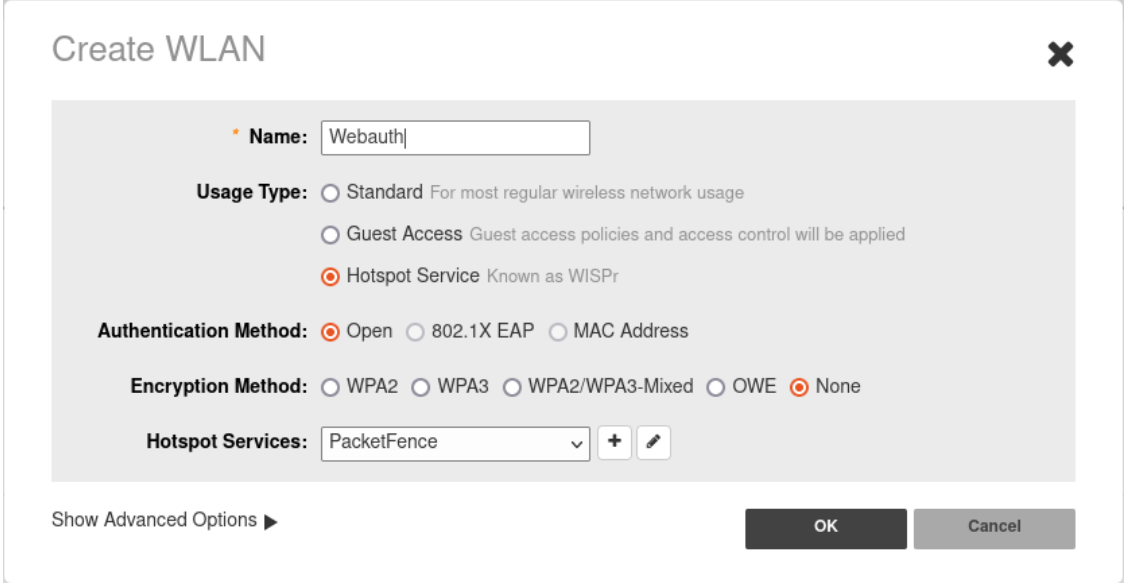
4.27. Ruckus Unleashed

Web Authentication

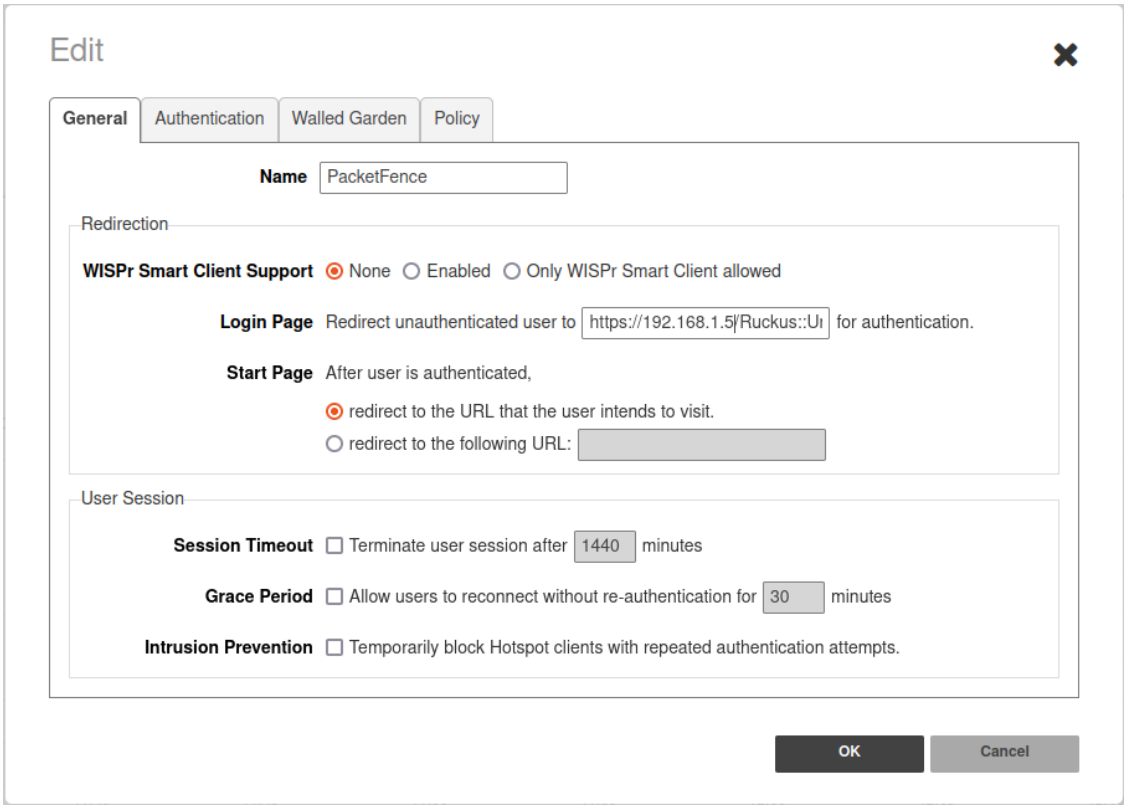
In order to use PacketFence as an external captive portal for web authentication, you will need to first configure your RADIUS authentication and accounting server (see steps above).

Hotspot configuration

Create a new Wi-Fi network, define the SSID name, select Usage Type as "Hotspot Service", the Authentication Method to "Open" and the Encryption Method to "None".

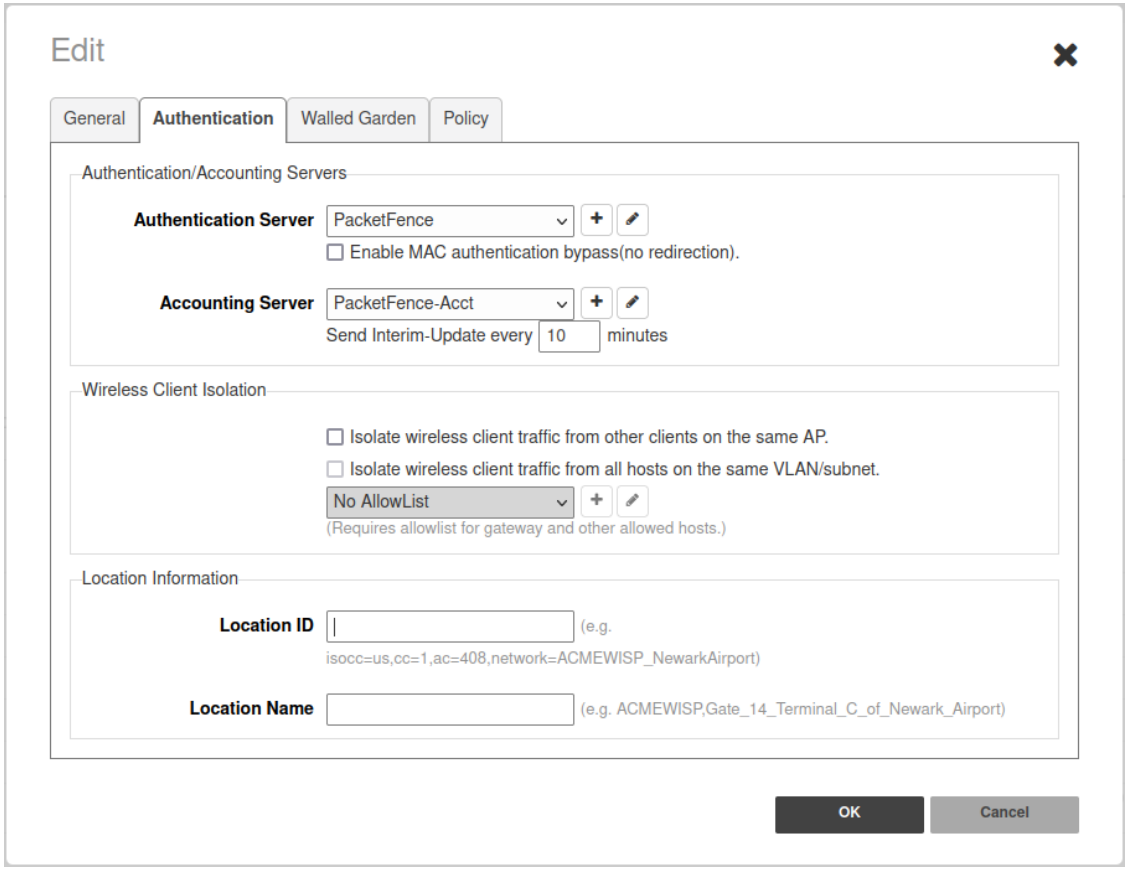


Configure the Hotspot service profile to redirect devices to your PacketFence portal. Click on the + next tro Hotspot Services.

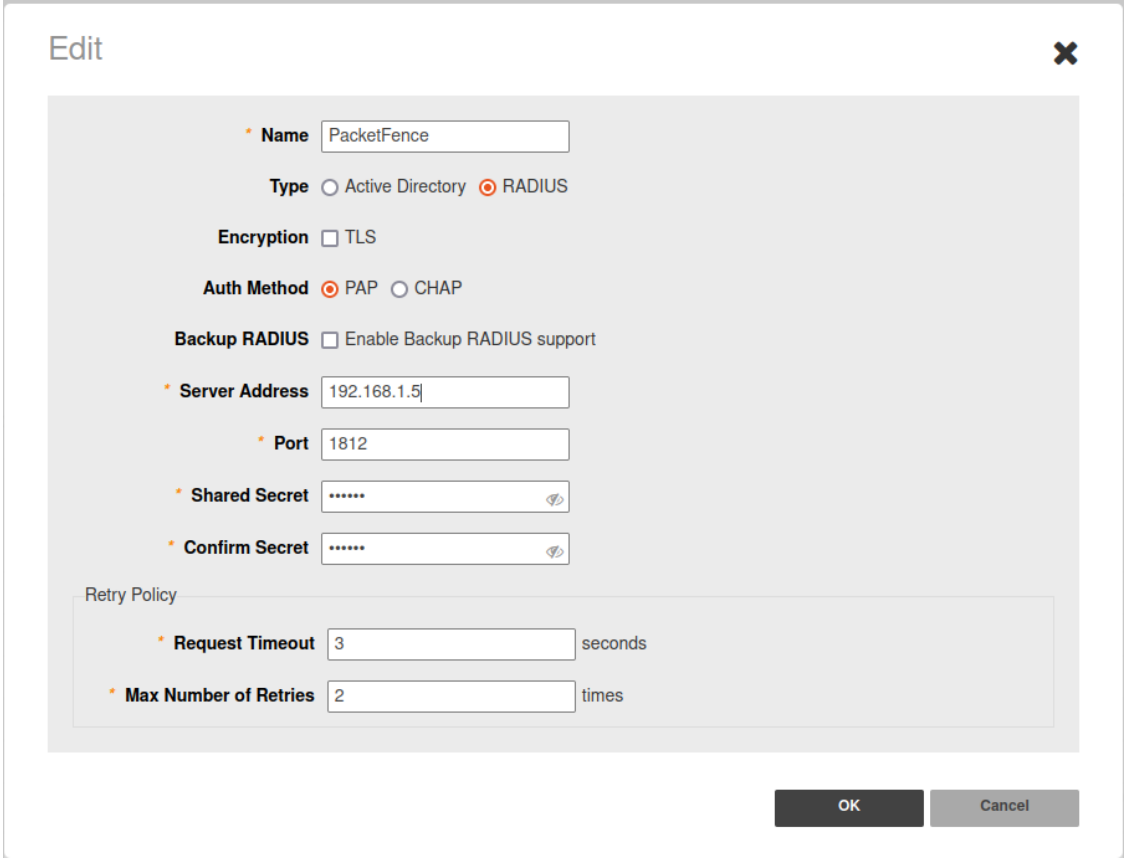



```
1 - Name of your Hotspot service
2 - Login Page: URL of PacketFence portal interface
(http://192.168.1.5/Ruckus::Unleashed)
3 - Start Page: redirect to the URL that the user intends to visit.
```

In the Authentication Tab, click + next to Authentication server and define the RADIUS server.



In the Authentication Tab, click + next to Accounting server and define the RADIUS server.

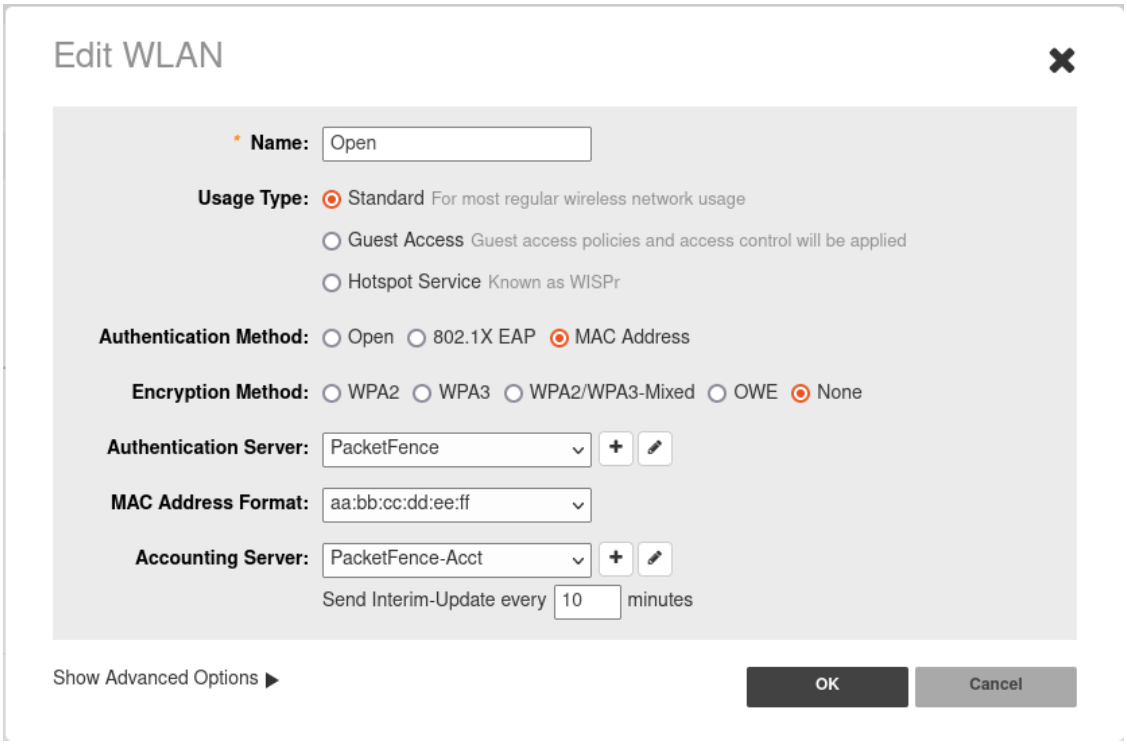


Save your configuration.

4.27.1. MAC Authentication

Open SSID

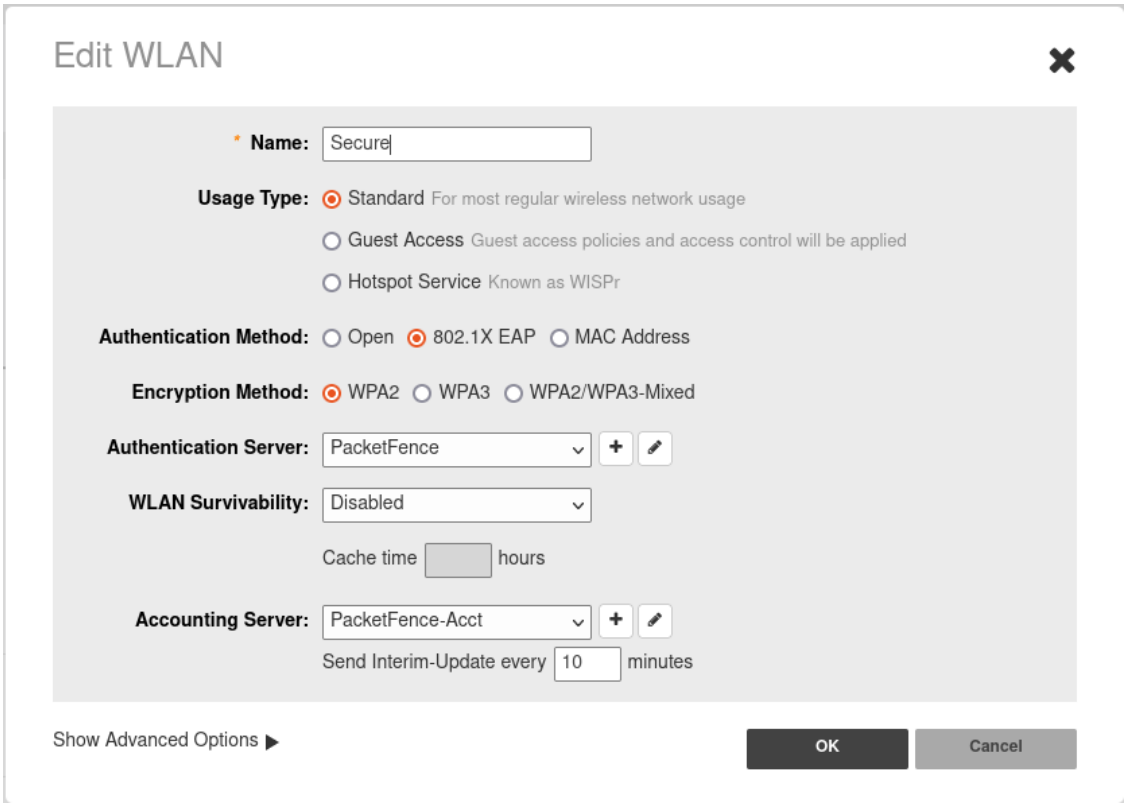
- Enter a Name/SSID
- Select **Standard** as the Type
- Select **MAC Address** as the authentication method
- Select **Open** as the encryption method
- Select the proper RADIUS server as the authentication server
- Select the proper RADIUS server as the accounting server



4.27.2. 802.1X Configuration

Secure SSID

- Enter a Name/SSID
- Select **Standard** as the Type
- Select **802.1X EAP** as the authentication method
- Select **WPA2** as the encryption method
- Select the proper RADIUS server as the authentication server
- Select the proper RADIUS server as the accounting server
- In Advanced Options → WLAN Priority check "Enable Dynamic VLAN"



4.28. 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
```

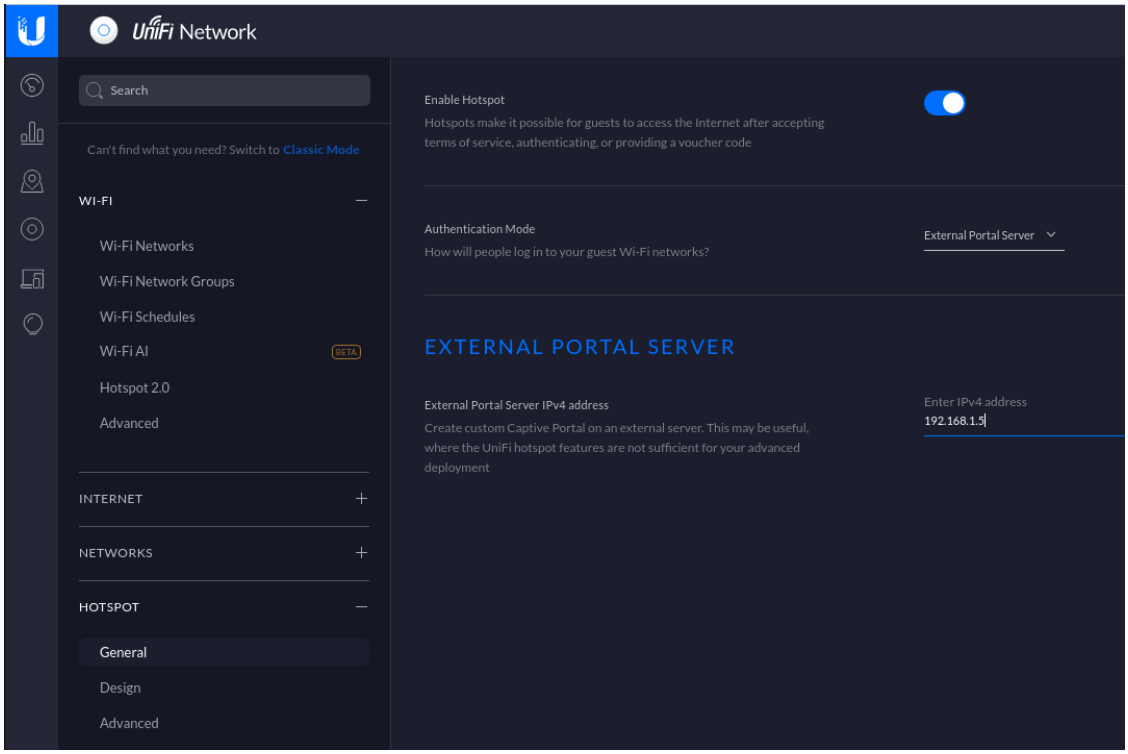
4.29. Ubiquiti

4.29.1. Web Authentication

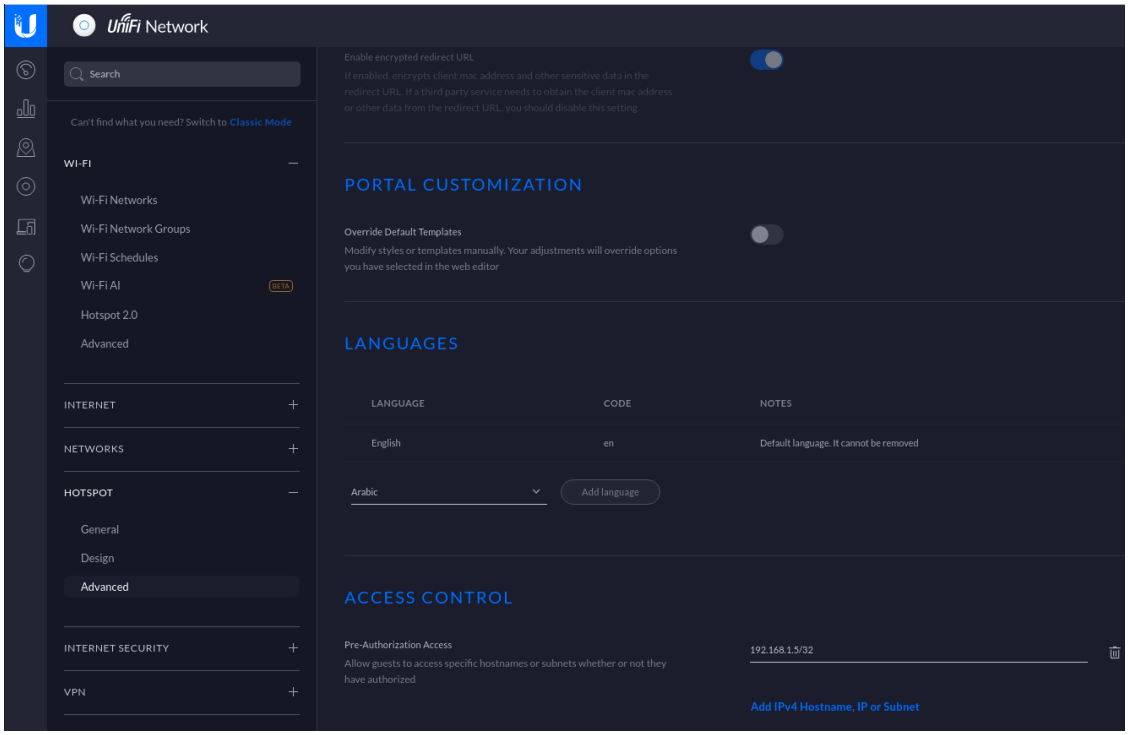
Unifi side

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:



Next, you must allow the device to reach the portal. Go in *Settings* → *hotspot* → *advanced* and configure it as shown below:

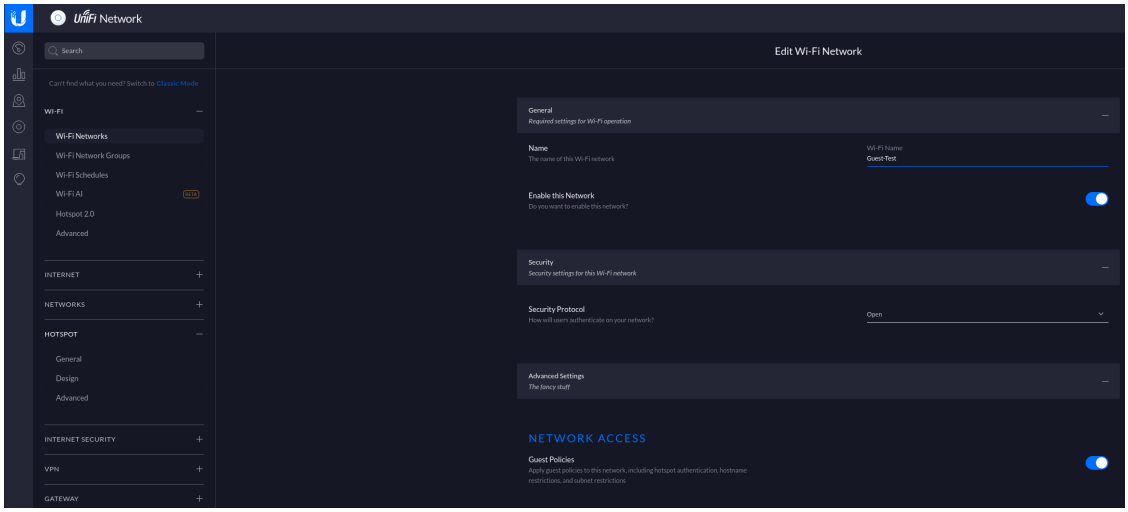


Make sure you enabled *Enable Guest Portal*, and that you've set *External portal server*.

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:



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 :

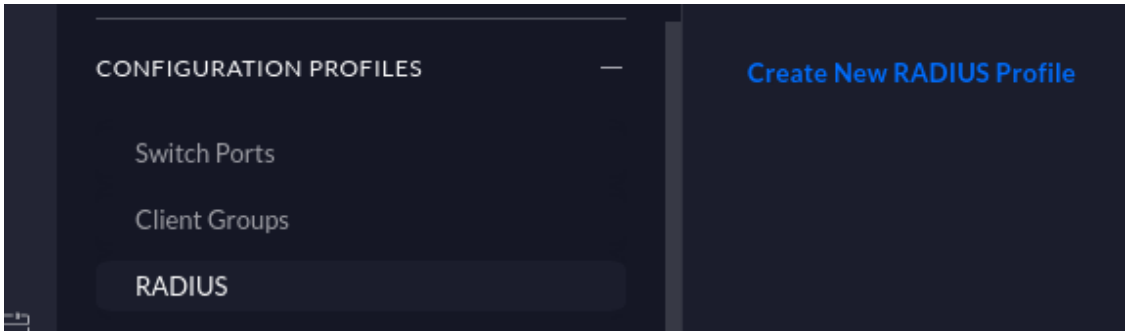
- **wsTransport** is the protocol used to connect to port 8443 of the Unifi controller and should be HTTPS. This is configured in the 'Web Services' tab of the switch.
- **wsUser** is a valid administrator username on your Unifi controller. This is configured in the 'Web Services' tab of the switch.
- **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.

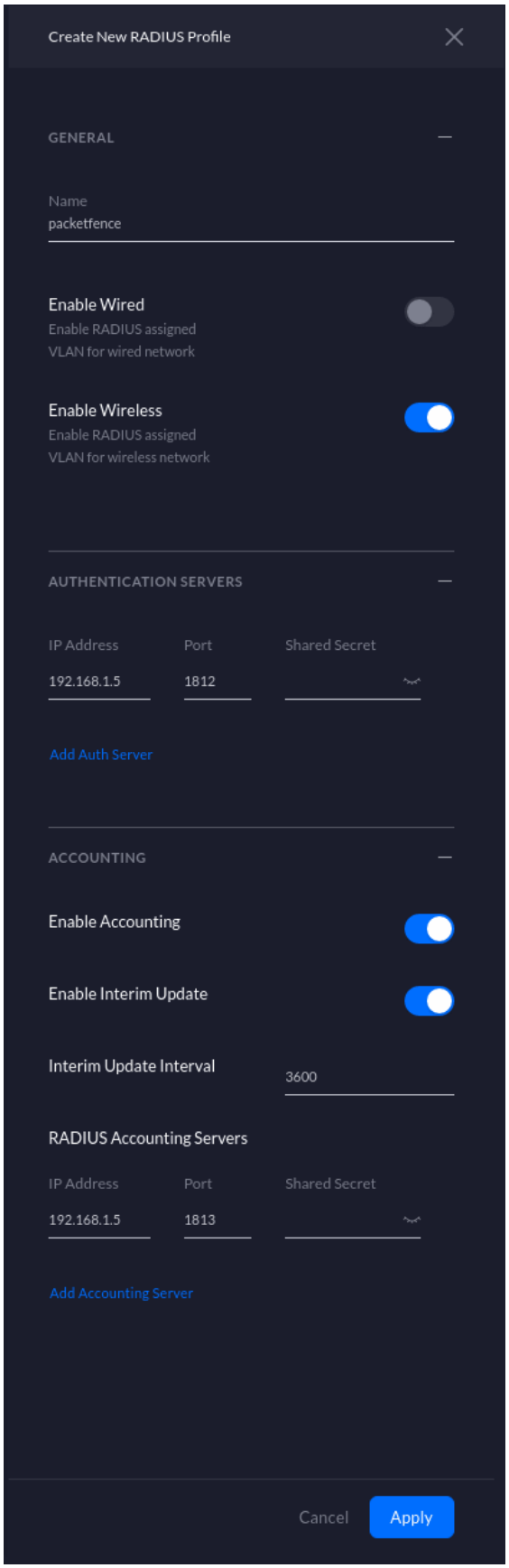
4.29.2. VLAN Enforcement

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.

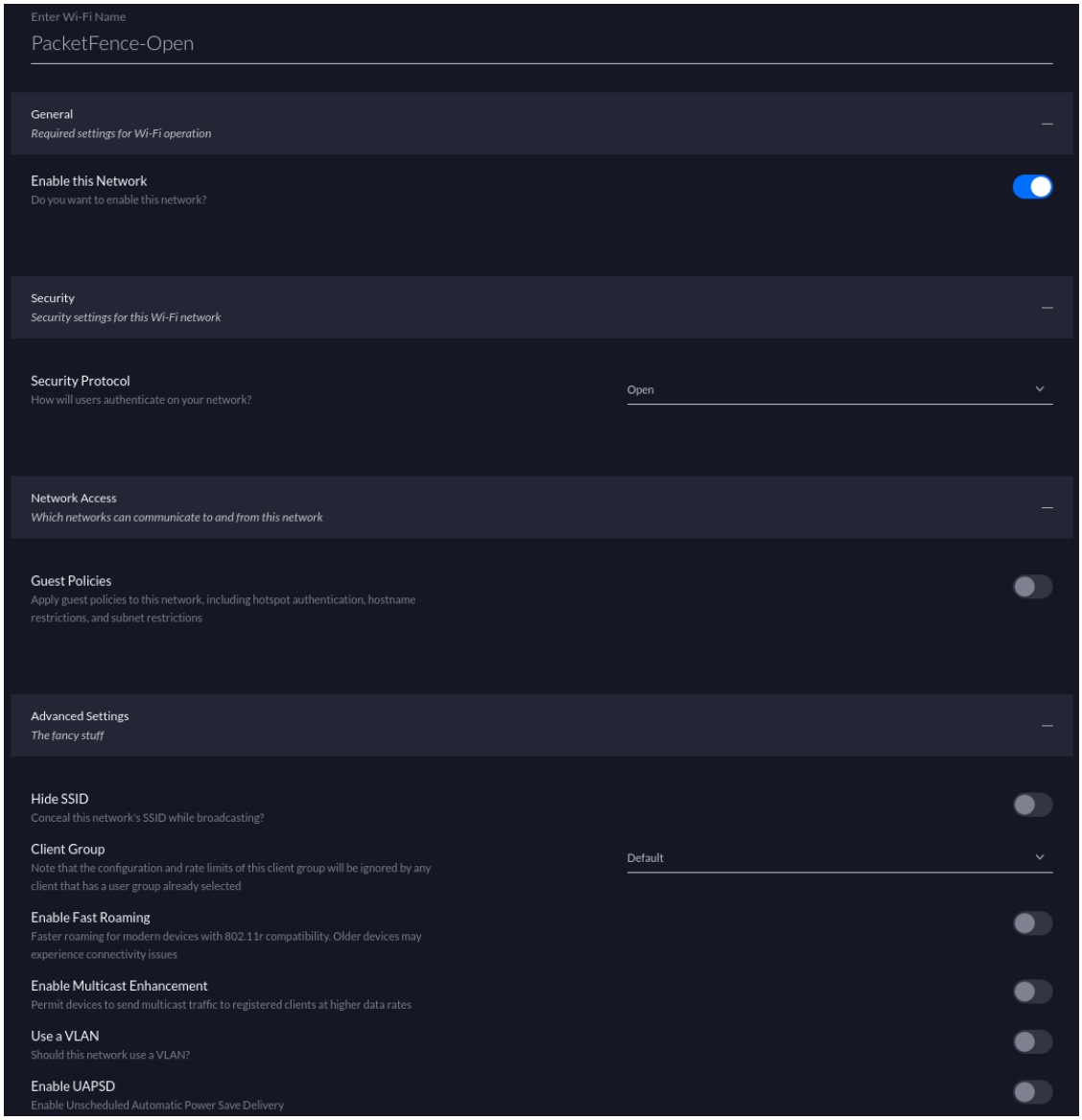
AAA Configuration

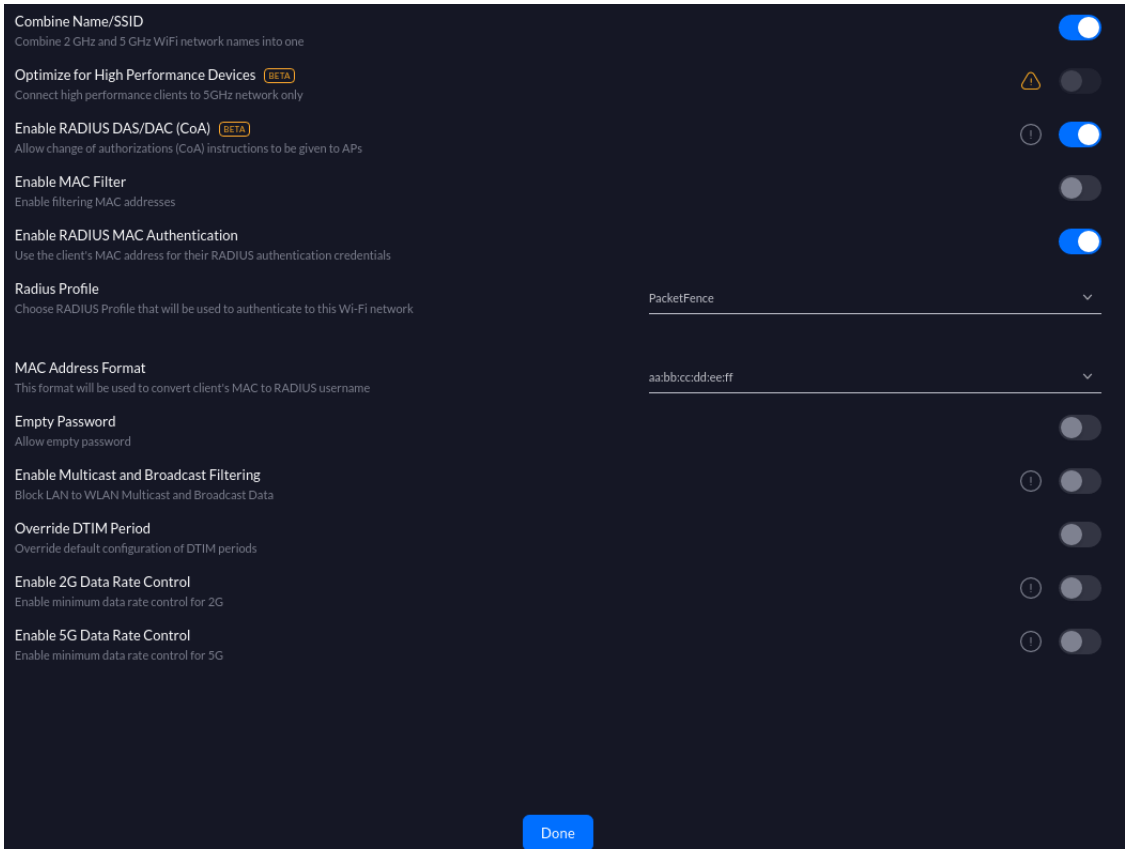



Create New RADIUS Profile
GENERAL
Name
packetfence
Enable Wired
Enable RADIUS assigned
VLAN for wired network
Enable Wireless
Enable RADIUS assigned
VLAN for wireless network
AUTHENTICATION SERVERS
IP Address
Port
Shared Secret
192.168.1.5
1812
Add Auth Server
ACCOUNTING
Enable Accounting
Enable Interim Update
Interim Update Interval
3600
RADIUS Accounting Servers
IP Address
Port
Shared Secret
192.168.1.5
1813
Add Accounting Server
Cancel
Apply

Open SSID

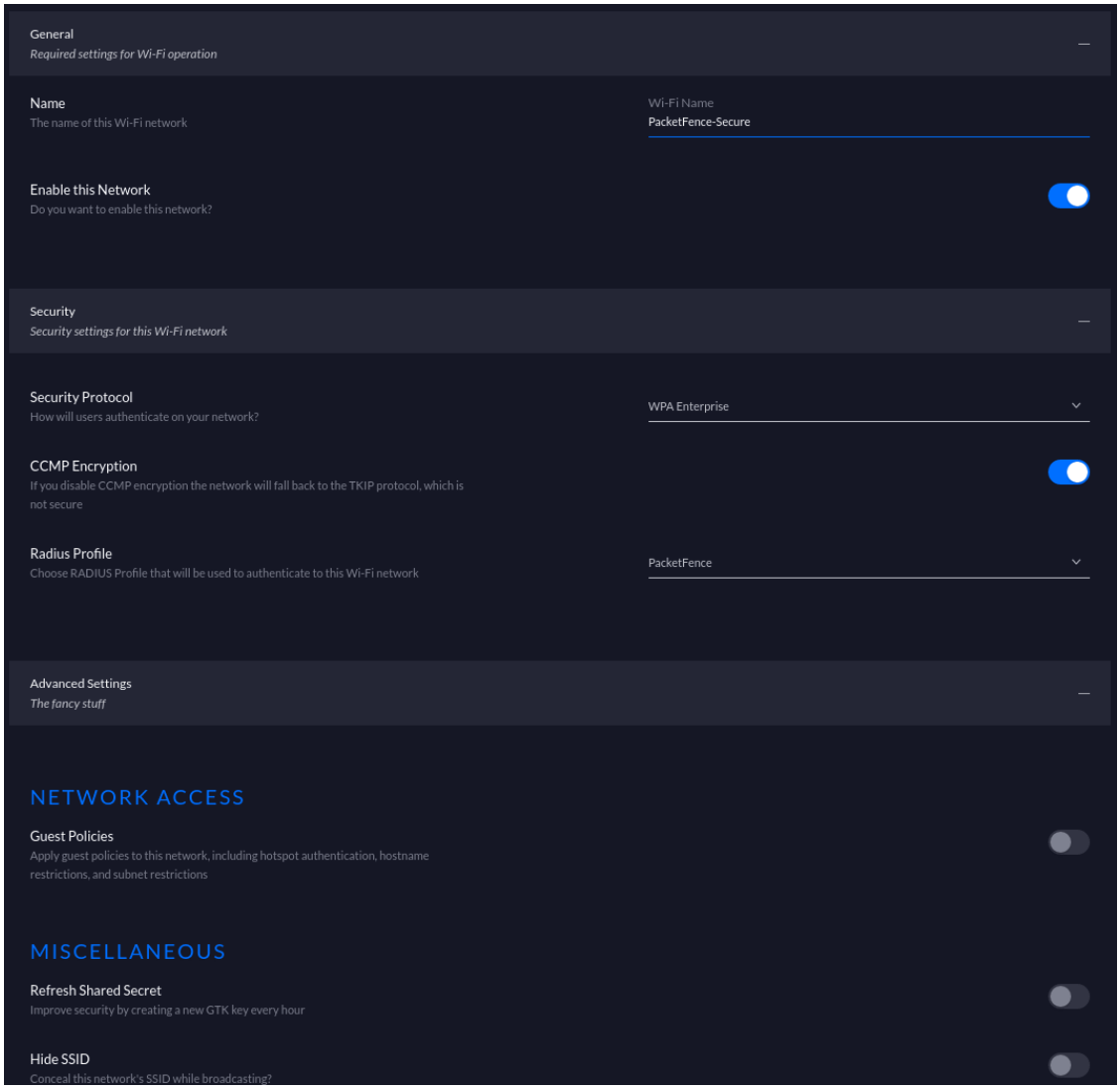
Create a open profile:

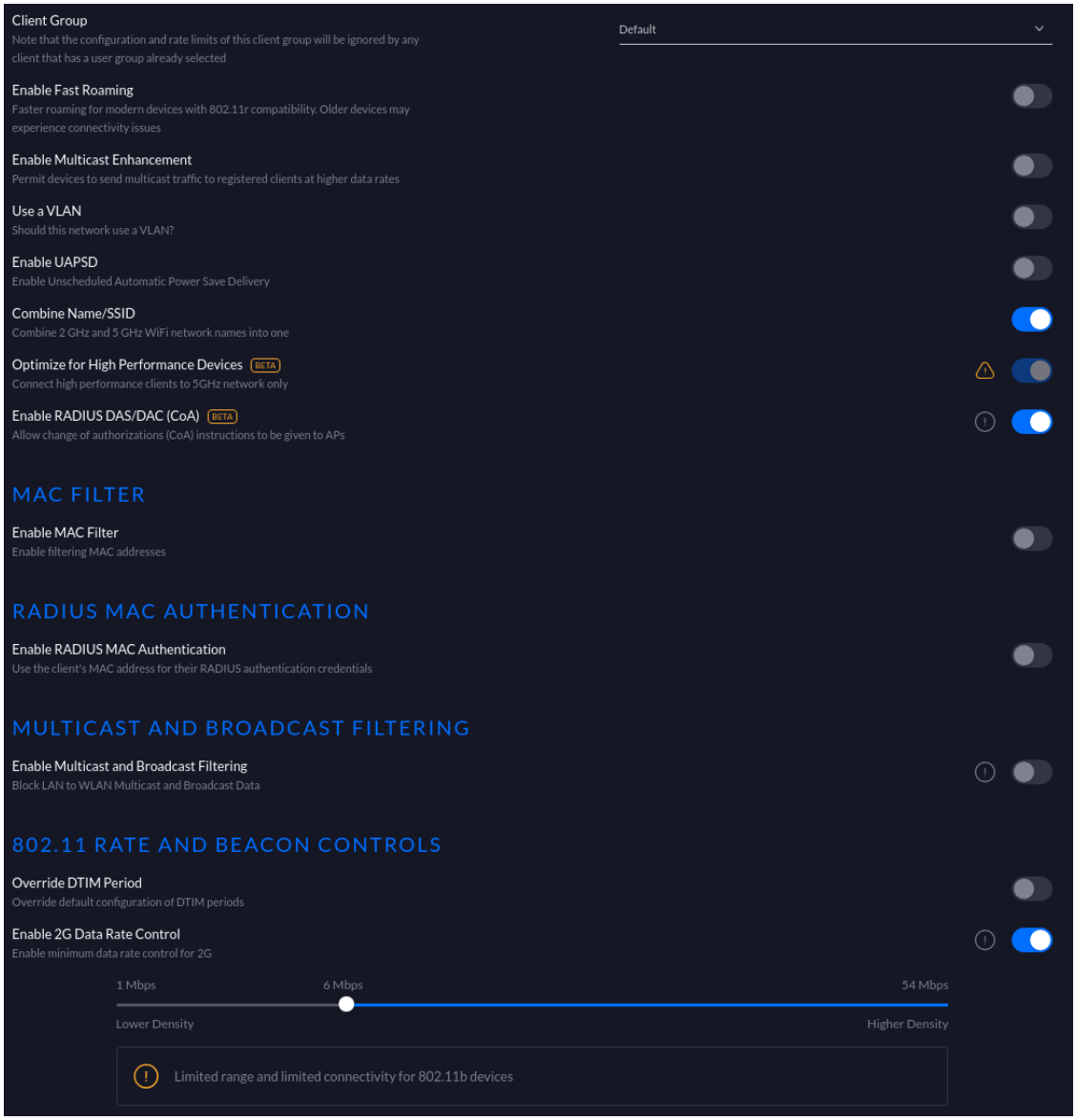




Secure SSID

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?



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.

4.30. Xirrus

4.30.1. 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.

5. VPN Configuration

5.1. Cisco ASA

5.1.1. 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
```

5.2. OpenVPN

PacketFence support OpenVPN with PAP authentication.

5.2.1. 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
defacctiniterminterval=0
```

```
server
{
        acctport=1813
        authport=1815
        name=192.168.0.5
        retry=1
        wait=30
        sharedsecret=secret
}
```

5.2.2. 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.

6. Firewall Configuration

6.1. Palo Alto firewall

6.1.1. 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*

7. 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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