Network Devices Configuration Guide

for PacketFence version 6.3.0

Network Devices Configuration Guide

by Inverse Inc.

Version 6.3.0 - Oct 2016
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Table of Contents

About this Guide

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

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

Other sources of information

Administration Guide	Covers PacketFence installation, configuration and administration.
Developers Guide	Covers captive portal customization, VLAN management customization and instructions for supporting new hardware.
NEWS	Covers noteworthy features, improvements and bugfixes by release.
UPGRADE	Covers compatibility related changes, manual instructions and general notes about upgrading.
ChangeLog	Covers all changes to the source code.

These files are included in the package and release tarballs.

Note on Inline enforcement support

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

This technique is usually used when your network hardware doesn't support VLAN enforcement.

List of supported Network Devices

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

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

Switch configuration

Assumptions

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

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

3COM

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
```

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.

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

NJ220

This switch does not support port-security.

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

Alcatel

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
```

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
```

AlliedTelesis

AT8000GS

PacketFence supports the AT8000GS switch using :

- MAC Authentication (mac-only)

- 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
```

Amer

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

▪ linkUp/linkDown

Don't forget to update the startup config!

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

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.

802.1X with MAC Authentication Bypass and VoIP

Note

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

Global config settings:

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

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

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

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

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

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

Port 1 configuration:

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

Brocade

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
```

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

Cisco

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

- linkUp/linkDown

- MAC Notification

- Port Security (with static MACs)

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

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

- MAC Authentication (Cisco's MAC Authentication Bypass or MAB)

- 802.1X (Multi-Host or Multi-Domain)

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

1. 802.1X/MAB

2. Port-Security

3. linkUp/linkDown

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
```

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
```

2950

Those switches 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.

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
```

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`.

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
```

3550 (802.1X with MAB)

Caution

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

Caution

The Catalyst 3550 does **not** support CoA. Minimal IOS required for CoA is 12.2(52)SE. Latest available IOS for 3550 is 12.2(46)SE. Set "Deauthentication Method" to "SNMP" in PacketFence Administration GUI under Network→ 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
```

2960

> **Caution**
>
> For 802.1X and MAB configurations, refer to [this section below](#).

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`

✏️ **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

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`

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.

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
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
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
mab
no snmp trap link-status
```

802.1X on various models of 2960

There's a lot of different versions of the Catalyst 2960 serie. 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.

Port-Security

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`

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

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 the 2960 in this document.

Then add this additionnal configuration on the global level

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

Add the required access lists

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

Then on each controlled interface

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

PacketFence switch configuration

▪ Select the type to *Cisco Catalyst 2960*

▪ 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>/$session_id*

▪ 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.

Downloadable ACLs

The Catalyst 2960 supports RADIUS pushed ACLs which means that you can define the ACLs centrally in PacketFence without configuring them in your switches and their rules will be applied to the switch during the authentication.

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

Add the following configuration setting on the global level

```
ip device tracking
```

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

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

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

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

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

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

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

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

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

You can prevent communications between both networks using these access lists
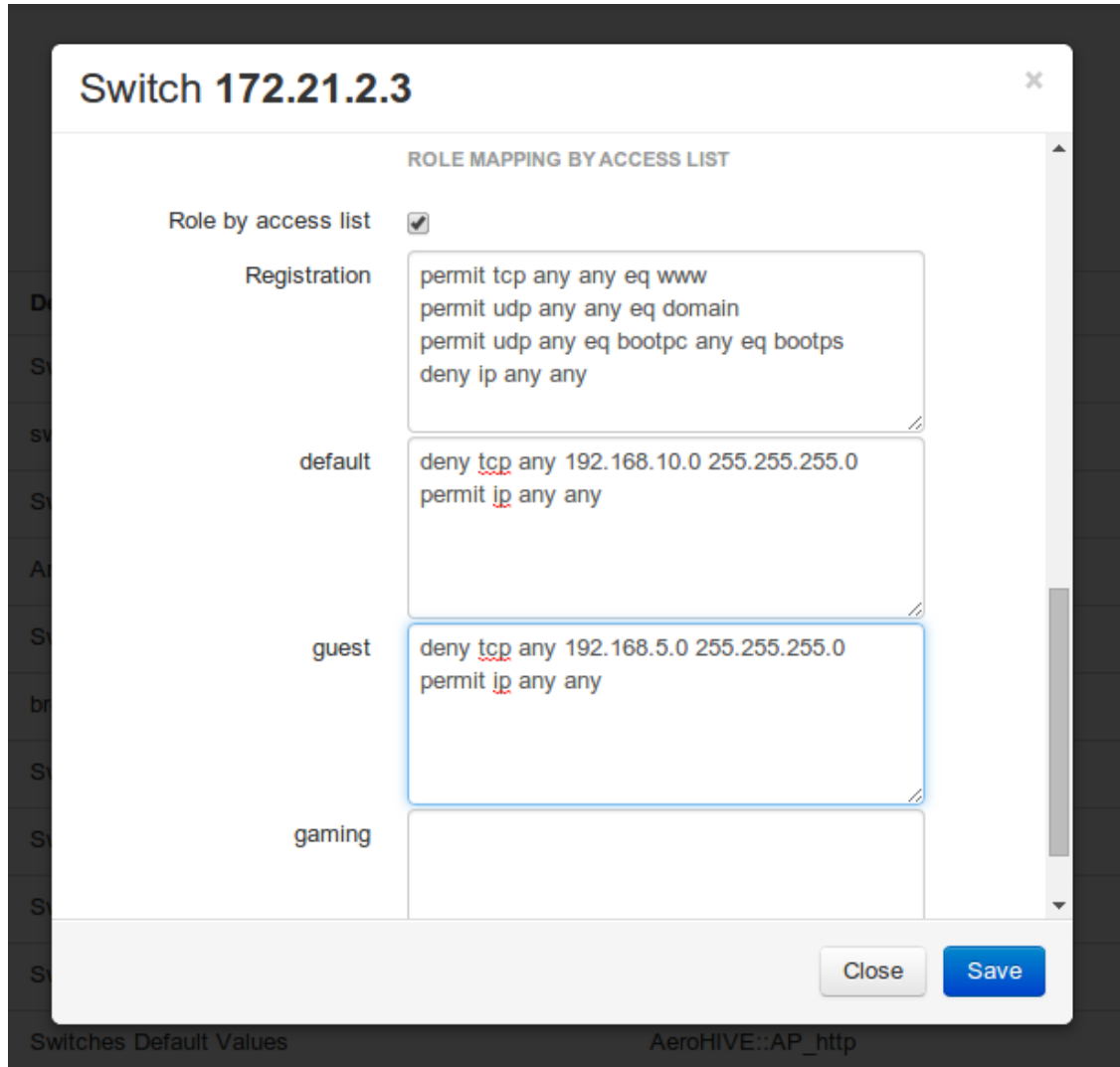
You could also only prevent your guest users from using shared directories
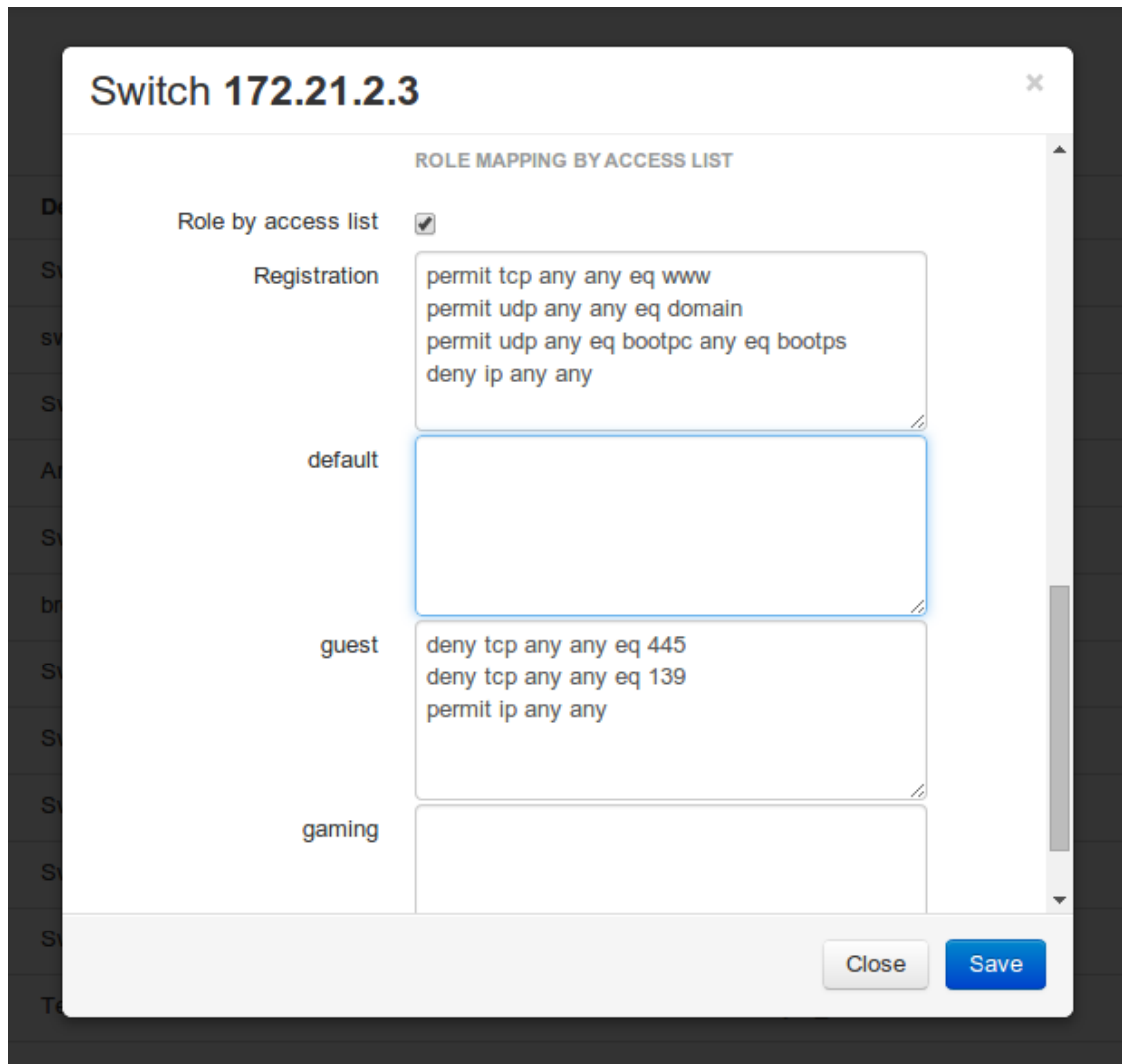
Or also you could restrict your users to use only your DNS server where 192.168.5.2 is your DNS server
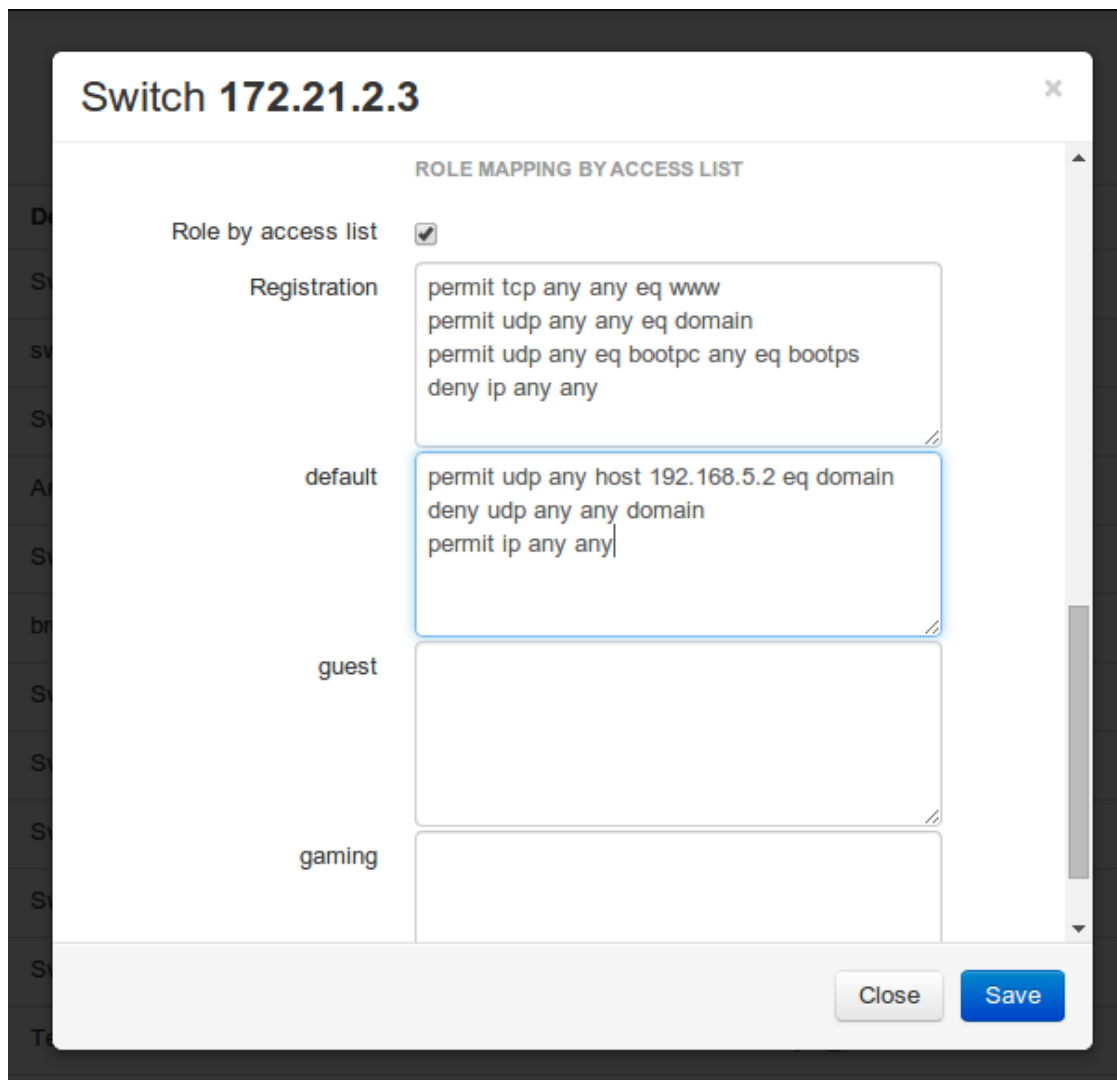
Web auth and Downloadable ACLs

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_captiv_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_captiv_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_captiv_portal
```

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`

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

- …

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
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 Catalyst 2960*

▪ 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>/$session_id*

▪ The URL can contain dynamic parameters, like the MAC address ($mac), the switch IP ($switch_ip), the username ($user_name).

▪ Screenshots of this configuration are available in the Cisco WLC section of this guide.

Note

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

Identity Networking Policy

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

To enable it:

```
authentication display new-style
```

Global config settings:

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

AAA groups and configuration:

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

RADIUS server configuration:

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

CoA configuration:

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

Enable SNMP on the switch:

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

Enable HTTP and HTTPS server:

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

Enable IP device tracking:

```
ip device tracking
```

Fallback ACL:

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

Service Template:

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

Class map:

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

Policy map:

On the 3 following configurations if the RADIUS server is down then we will apply CRITICAL_AUTH_VLAN, DEFAULT_CRITICAL_VOICE_TEMPLATE and CRITICAL-ACCESS service template. If the RADIUS server goes up then it reinitializes the authentication if the port is in IN_CRITICAL_VLAN.

for 802.1X with MAC Authentication fallback:

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

for MAC Authentication only:

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

for 802.1X only:

```
policy-map type control subscriber DOT1X
 event session-started match-all
  10 class always do-until-failure
   10 authenticate using dot1x priority 10
 event authentication-failure match-first
  10 class AAA_SVR_DOWN_UNAUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 authorize
   50 pause reauthentication
  20 class AAA_SVR_DOWN_AUTHD_HOST do-until-failure
   10 activate service-template CRITICAL_AUTH_VLAN
   20 activate service-template DEFAULT_CRITICAL_VOICE_TEMPLATE
   30 activate service-template CRITICAL-ACCESS
   40 pause reauthentication
   50 authorize
  30 class DOT1X_FAILED do-until-failure
   10 terminate dot1x
  40 class DOT1X_NO_RESP do-until-failure
   10 terminate dot1x
  60 class always do-until-failure
   10 terminate dot1x
   20 authentication-restart 10800
 event agent-found match-all
  10 class always do-until-failure
   10 authenticate using dot1x priority 10
 event aaa-available match-all
  10 class IN_CRITICAL_AUTH do-until-failure
   10 clear-session
  20 class NOT_IN_CRITICAL_AUTH do-until-failure
   10 resume reauthentication
 event inactivity-timeout match-all
  10 class always do-until-failure
   10 clear-session
 event authentication-success match-all
  10 class always do-until-failure
   10 activate service-template DEFAULT_LINKSEC_POLICY_SHOULD_SECURE
```

Interface Template (802.1X MAC Authentication):

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

Interface Template (MAC Authentication):

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

Interface Template (802.1X):

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

On each interface for 802.1X with MAC Authentication:

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

On each interface for MAC Authentication:

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

On each interface for 802.1X:

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

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

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

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

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

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

```
dot1x            Authc Success
```

Debug command:

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

```
term mon
debug pre all
```

DHCP Option 82

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

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

On uplink interfaces:

```
ip dhcp snooping trust
```

Router ISR 1800 Series

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

Global config settings:

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

On each interface:

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

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!

DES3526 / 3550

Global config settings

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

On each interface:

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

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
```

Dell

Force 10

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

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
```

PowerConnect 3424

PacketFence supports this switch using linkUp/linkDown traps.

Global config settings

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

On each interface:

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

EdgecorE

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

PacketFence also supports MAC authentication on the Edge-corE 4510

3526XA and 3528M

Global config settings

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

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
!
```

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!

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 behaviour. 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.

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

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

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

Extreme Networks

PacketFence supports Extreme Networks switches using:

- linkUp/linkDown

- MAC Address Lockdown (Port Security)

- Netlogin - MAC Authentication

- Netlogin - 802.1X

Don't forget to save the configuration!

All Extreme XOS based switches

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

MAC Address Lockdown (Port-Security)

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

Global config settings without Voice over IP (VoIP):

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

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

Global config settings with Voice over IP (VoIP):

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

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

MAC Authentication

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 12345
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

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 12345
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
```

Note

You can mix the MAC Authentication and 802.1X on the same switchport. If the device fails 802.1X authentication, it will roll back to the MAC Authentication.

Foundry

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.

Huawei

AC6605 Controller

PacketFence supports this controller with the following technologies:

- Wireless 802.1X

- Wireless MAC Authentication

Controlleur configuration

Setup NTP server:

```
<AC>system-view
[AC] ntp-service unicast-server 208.69.56.110
```

Setup the radius serveur (@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 globaly:

```
<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 globaly:

```
<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
```

H3C

S5120 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
```

HP

E4800G and E5500G Switch series

These are re-branded 3Com switches, see under the [3Com section](#) for their documentation.

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`.

2500 Series

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

On 2500'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.

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

2600 Series and 3400cl Series

Port-Security

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

On 2600's, 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 use_stong_secret
```

Since HP now supports server-group, let's create a group for the MAC authentication. Another one can be used for management access:

```
aaa server-group radius "packetfence" host 192.168.1.5
aaa server-group radius "management" host 10.0.0.15
```

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

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

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)

2610

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)

4100, 5300, 5400 Series

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 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 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
```

Huawei

PacketFence supports the S5710 switch from Huawei.

Basic configuration

```
l2protocol-tunnel user-defined-protocol 802.1X protocol-mac 0180-c200-0003 group-
mac 0100-0000-0002
domain pf

dot1x enable
dot1x dhcp-trigger

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
radius-server authorization 192.168.1.5 shared-key cipher <yourSecret>

aaa
 authentication-scheme abc
  authentication-mode radius
 accounting-scheme abc
  accounting-mode radius
 domain pf
  authentication-scheme abc
  accounting-scheme abc
  radius-server packetfence

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

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
```

802.1X

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

IBM

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

PacketFence configuration

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

Definition:

```
IP: This will be the IP of the IBM StackSwitch G8052 switch on the management
 network
Description: IBM StackSwitch G8052
Type: IBM RackSwitch G8052
Mode: Production
Deauthentication: SNMP
Dynamic Uplinks: Checked
```

Roles:

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

Radius:

```
Secret Passphrase: useStrongerSecret
```

Snmp:

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

Click Save to add the switch

Intel

Express 460 and Express 530

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

▪ linkUp/linkDown

Exact command-line configuration to be contributed...

Juniper

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

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

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

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;
        }
    }
}
```

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

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"
```

802.1X configuration

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

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"
```

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

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!

Linksys

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

▪ linkUp/linkDown

Don't forget to update the startup config!

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
```

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.

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!

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 functionnality 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
```

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

---

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.

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
```

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
```

SMC

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
```

TigerStack 6224M

Supports linkUp/linkDown mode

Global config settings

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

Wireless Controllers and Access Point Configuration

Assumptions

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

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

Unsupported Equipment

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

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

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

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

- The appropriate VLANs must exist

- Allow controller to honor VLAN assignments from AAA (sometimes called AAA override)

- Put your open SSID (if any) in MAC-Authentication mode and authenticate against the FreeRADIUS hosted on PacketFence

- Put your secure SSID (if any) in 802.1X mode and authenticate against FreeRADIUS hosted on PacketFence.

- On registration / isolation VLANs the DHCP traffic must reach the PacketFence server

- On your production VLANs a copy of the DHCP traffic must reach PacketFence where a pfdhcplistener listens (configurable in `pf.conf` under `interfaces`)

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

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

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

AeroHIVE

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

AAA Client Settings

In the HVM, go to **Configuration → AAA Authentication → AAA Client Settings**, and insert the proper properties:

- Give a RADIUS Name

- Add a RADIUS server with Authentication as the server type and primary as the role

- Make sure Permit Dynamic Change of Authorization is ticked (RFC 3576)

Public SSID

Again in the HVM, go to **Configuration → SSIDs**, and create a new SSID with the following:

- Give a Profile Name and an SSID Name

- Choose Open as the Access Security

- Select Enable MAC Authentication

- Select your RADIUS server from the RADIUS Server dropdown list

Secure SSID

In the HVM, go to **Configuration → SSIDs**, and create a new SSID with the following :

- Give a Profile Name and an SSID Name

- Choose WPA2 Enterprise as the Access Security

- Select WPA2-802.1X as the key management

- Select CCMP as the encryption method

- Select your RADIUS server from the RADIUS Server dropdown list

Roles (User Profiles)

Since PacketFence 3.3.0, we now support user profiles on the AeroHIVE hardware. To build a User Profile, go to **Configuration → User Profiles**, and create what you need. When you define the switch definition in PacketFence, the role will match the User Profile attribute number. Example

```
roles=CategoryStudent=1;CategoryStaff=2
```

And in the AeroHIVE configuration, you have :

```
StudentProfile attribute number 1
StaffProfile attribute number 2
```

Last step is to allow the User Profile to be returned for a particular SSID. Go to **Configuration → SSIDs → Your_SSID → User Profiles for Traffic Management**, and select the User Profiles you will return for the devices.

In version 6 or later of the HiveOS, we do return VLAN ID matching the number that the **User Profile** has. Create your **User Profile** in the HiveManager as usual, assign the matching VLAN, and in PacketFence configuration add the wanted VLAN ID in the section **Roles by VLAN**.

Caching and Roaming

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 recognise the ahConnectionChangeEvent and will change the location of the node in his base.

External captive portal

First configure the AAA server as described in the section above in the Hive Manager.

Portal configuration

- Go in **Configuration → Authentication → Captive Web Portals** and create a new portal

- Select Select **Registration Type** = **External Authentication**

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Access Point Configuration   84

▪ Go in the section **Captive Web Portal Login Page Settings** set the **Login URL** to http://pf_ip/ and **Password Encryption** to **No Encryption**

▪ Use the **User Profiles** to define your web authentication VLAN

▪ In PacketFence configuration make sure to unselect every **Roles by** in the tab **Roles** while adding the switch, also please select the switch type **Aerohive AP with web auth**

External portal SSID

Again in the Hive Manager, go to **Configuration → SSIDs**, and create a new SSID with the following:

▪ Give a Profile Name and an SSID Name

▪ Choose Open as the Access Security

▪ Select Enable Captive Web Portal

▪ Select your RADIUS server from the RADIUS Server dropdown list

In the guided configuration you now be able to select your new SSID, the Portal you want to use and the AAA server.

Anyfi

In this section, we cover the basic configuration of the Anyfi Gateway to create a hotspot SSID available on all access points.

This does not cover the configuration of other Anyfi network elements such as the Controller. Please refer to [Anyfi Networks' website](http://anyfi.net) for relevant documentation.

In this configuration eth0 will be the management interface of the Anyfi Gateway and eth1 will be the interface that will bridge the tagged packets to your network.

Interfaces configuration

```
interfaces {
    bridge br0 {
        ...
    }
    ethernet eth0 {
        description "Management network"
        address 192.168.0.20/24
    }
    ethernet eth1 {
        description "Wi-Fi client traffic"
        bridge-group {
            bridge br0
        }
    }
}
```

MAC authentication

This section will allow you to configure the *Anyfi-Hotspot* SSID that will use MAC authentication.

SSID configuration

```
service {
    anyfi {
        gateway anyfi-hotspot {
            accounting {
                radius-server 192.168.0.5 {
                    port 1813
                    secret useStrongerSecret
                }
            }
            authorization {
                radius-server 192.168.0.5 {
                    port 1812
                    secret useStrongerSecret
                }
            }
            bridge br0
            controller <Anyfi Controller's IP or FQDN>
            isolation
            nas {
                identifier anyfi
                port 3799
            }
            ssid Anyfi-Hotspot
        }
    }
}
```

802.1X

This section will allow you to configure the *Anyfi-Secure* SSID that will authenticate users using 802.1X.

SSID configuration

```
service {
    anyfi {
        gateway secure-gw {
            accounting {
                radius-server 192.168.0.5 {
                    port 1813
                    secret useStrongerSecret
                }
            }
            authentication {
                eap {
                    radius-server 192.168.0.5 {
                        port 1812
                        secret useStrongerSecret
                    }
                }
            }
            bridge br0
            controller <Anyfi Controller's IP or FQDN>
            isolation
            nas {
                identifier anyfi
                port 3799
            }
            ssid Anyfi-Secure
            wpa2 {
            }
        }
    }
}
```

Avaya

Wireless Controller (WC)

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

Aruba

All Aruba OS

In this section, we cover the basic configuration of the Aruba wireless controller for PacketFence via the web GUI. It was done on an Aruba Controller 200 software version ArubaOS 5.0.3.3, tested on a Controller 600 with ArubaOS 6.0 but it should apply to all Aruba models.

> **Caution**
>
> If you are already using your Aruba controllers and don't want to impact your users you should create new AAA profiles and apply them to new SSIDs instead of modifying the default ones.

> **Note**
>
> Starting with PacketFence 3.3, Aruba supports role-based access control. Read the Administration Guide under "Role-based enforcement support" for more information about how to configure it on the PacketFence side.

AAA Settings

In the Web interface, go to **Configuration → Authentication → RADIUS Server** and add a RADIUS server named "packetfence" then edit it:

- Set Host to PacketFence's IP (192.168.1.5)

- Set the Key to your RADIUS shared secret (useStrongerSecret)

- Click Apply

Under **Configuration → Authentication → Server Group** add a new Server Group named "packetfence" then edit it to add your RADIUS Server "packetfence" to the group. Click Apply.

Under **Configuration → Authentication → RFC3576** add a new server with PacketFence's IP (192.168.1.5) and your RADIUS shared secret (useStrongerSecret). Click Apply. Under **Configuration → Authentication → L2 Authentication** edit the MAC Authentication Profile called "default" then edit it to change the Delimiter to dash. Click Apply.

Under **Configuration → Authentication → L2 Authentication** edit the 802.1X Authentication Profile called "default" then edit it to uncheck the Opportunistic Key Caching under Advanced. Click Apply.

Under **Configuration → Authentication → AAA Profiles** click on the "default-mac-auth" profile then click on MAC Authentication Server Group and choose the "packetfence" server group. Click Apply. Move to the RFC3576 server sub item and choose PacketFence's IP (192.168.1.5) click add then apply.

Under **Configuration → Authentication → AAA Profiles** click on the "default-dot1x" profile then click on 802.1X Authentication Server Group and choose the "packetfence" server group. Click Apply. Move to the RFC3576 server sub item and choose PacketFence's IP (192.168.1.5) click add then apply.

Public SSID

In the Web interface, go to **Configuration → AP Configuration** then edit the "default" AP Group. Go in **Wireless LAN → Virtual AP** create a new profile with the following:

- AAA Profile: default-mac-auth

- SSID Profile: Select NEW then add an SSID (PacketFence-Public) and Network authentication set to None

Secure SSID

In the Web interface, go to **Configuration → AP Configuration** then edit the "default" AP Group. Go in **Wireless LAN → Virtual AP** create a new profile with the following:

- AAA Profile: default-dot1x

- SSID Profile: Select NEW then add an SSID (PacketFence-Secure) and Network authentication set to WPA2

Roles

Since PacketFence 3.3.0, we now support roles for the Aruba hardware. To add roles, go in **Configuration → Access Control → User Roles → Add**. You don't need to force a VLAN usage in the Role since we send also the VLAN ID along with the Aruba User Role in the RADIUS request. Refer to the Aruba User Guide for more information about the Role creation.

WIPS

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

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

Aruba Controller 200

In this section, we cover the basic configuration of the Aruba Controller 200 for PacketFence using the command line interface. We suggest you to use the instructions above for the Web GUI instead.

VLAN definition

Here, we create our PacketFence VLANs, and our AccessPoint VLAN (VID 66). It is recommended to isolate the management of the thin APs in a separate VLAN.

```
vlan 2
vlan 3
vlan 5
vlan 10
vlan 66
```

AAA Authentication Server

```
aaa authentication-server radius "PacketFence"
    host 192.168.1.5
    key useStrongerSecret
aaa server-group "Radius-Group"
 auth-server PacketFence
```

AAA Profiles

```
aaa profile "default-dot1x"
    authentication-dot1x "default"
    dot1x-default-role "authenticated"
    dot1x-server-group "Radius-Group"
    radius-accounting "Radius-Group"
aaa profile "PacketFence"
    authentication-mac "pf_mac_auth"
    mac-server-group "Radius-Group"
    radius-accounting "Radius-Group"
```

WLAN SSIDs: profiles and virtual AP

```
wlan ssid-profile "PacketFence-Public"
    essid "PacketFence-Public"
wlan ssid-profile "PacketFence-Secure"
    essid "PacketFence-Secure"
    opmode wpa2-aes
wlan virtual-ap "Inverse-Guest"
    aaa-profile "PacketFence"
    ssid-profile "PacketFence-Public"
wlan virtual-ap "Inverse-Secure"
    aaa-profile "default-dot1x"
    ssid-profile "PacketFence-Secure"
ap-group "Inverse"
    virtual-ap "Inverse-Guest"
    virtual-ap "Inverse-Secure"
    ids-profile "ids-disabled"
```

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
```

Belair Networks (now Ericsson)

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.

Brocade

RF Switches

See the [Motorola RF Switches](#) documentation.

Wireless Controllers and
Access Point Configuration

Cisco

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:

Wireless Controllers and
Access Point Configuration

```
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
```

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
```

Aironet (WDS)

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

Wireless LAN Controller (WLC) or Wireless Services Module (WiSM)

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

- First, globally define the FreeRADIUS server running on PacketFence (PacketFence's IP) and make sure *Support for RFC 3576* is enabled (if not present 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
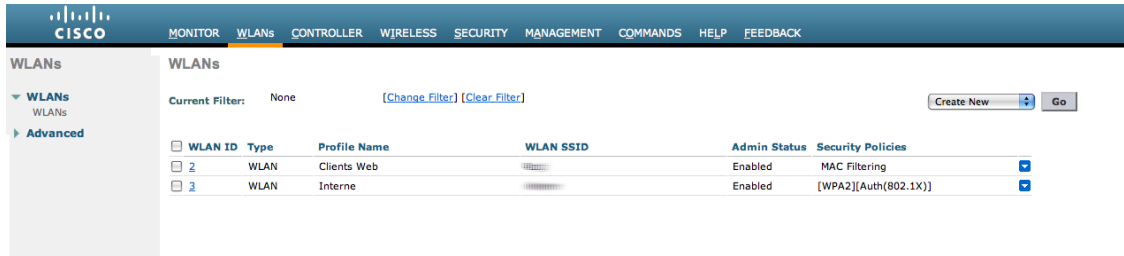
- In the secure SSID, make sure 802.1X is enabled and select the appropriate encryption for your needs (recommended: WPA + WPA2)
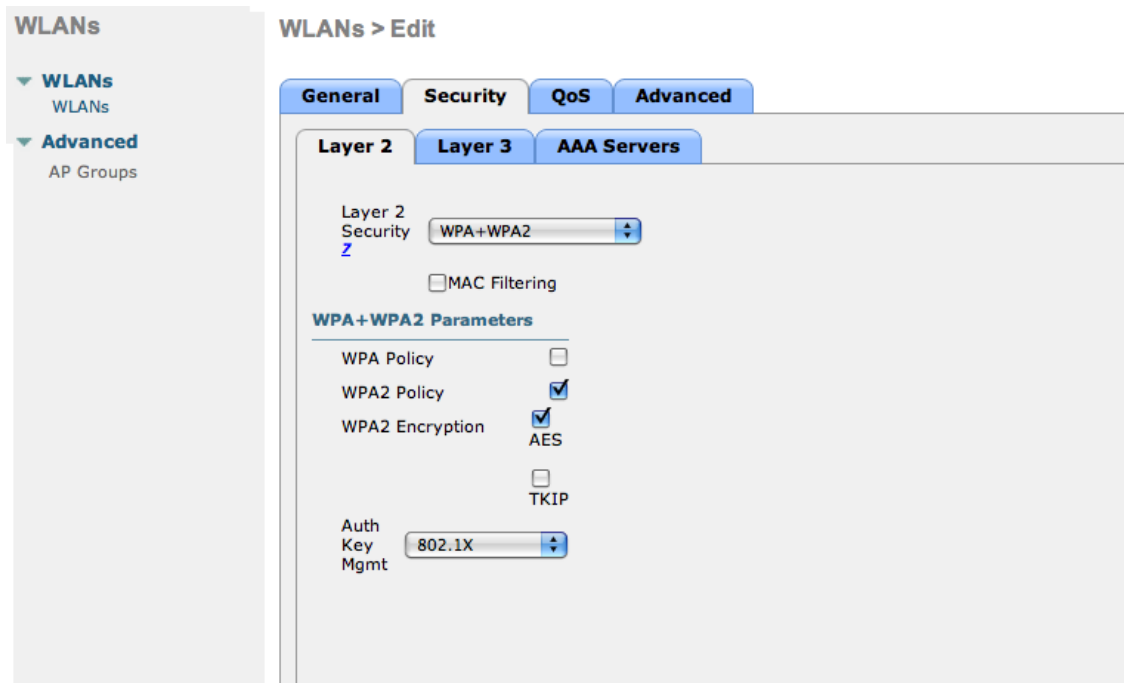
- No layer 3 security
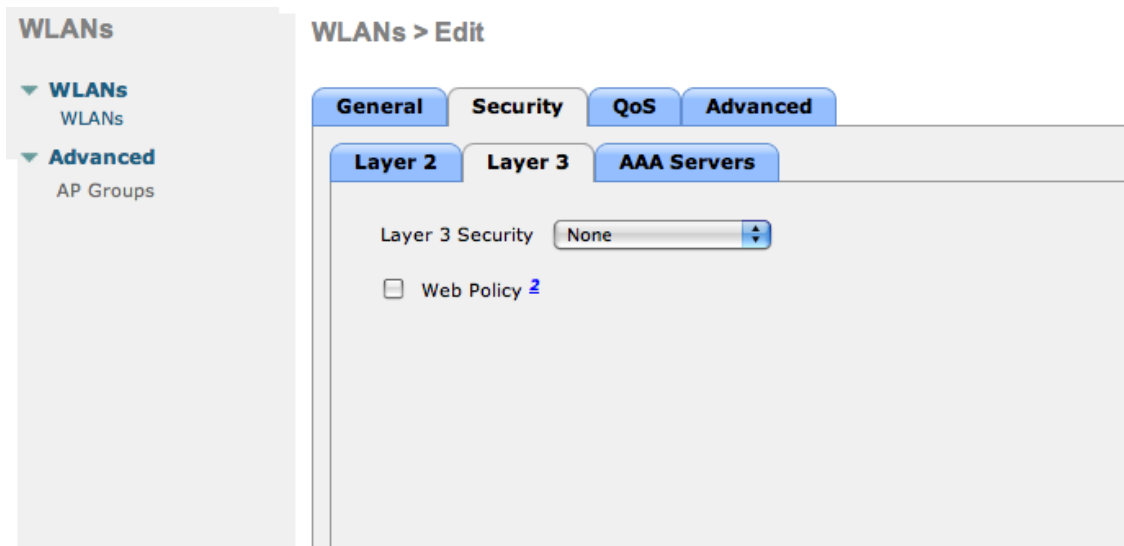
Wireless Controllers and
Access Point Configuration

▪ We set the IP of the FreeRADIUS server
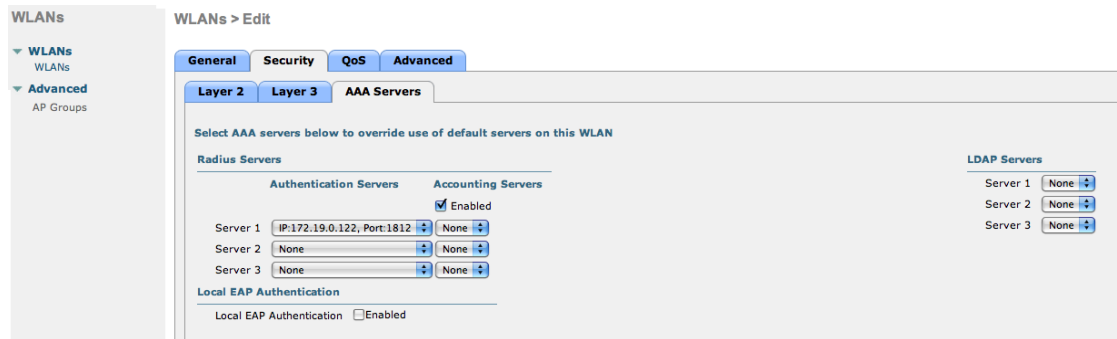
▪ VERY IMPORTANT: Allow AAA override (this allows VLAN assignment from RADIUS)
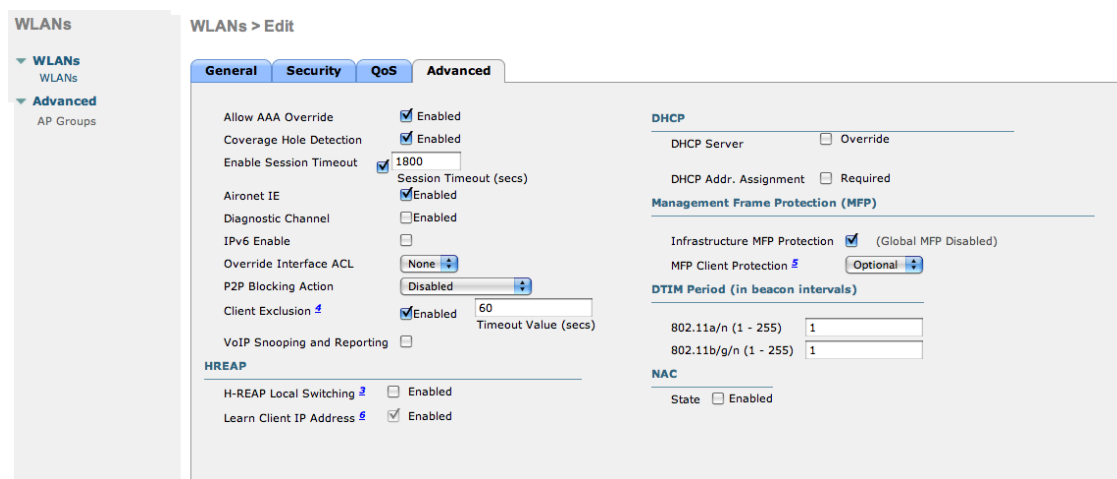
▪ Edit the non-secure SSID: Enable MAC authentication at level 2
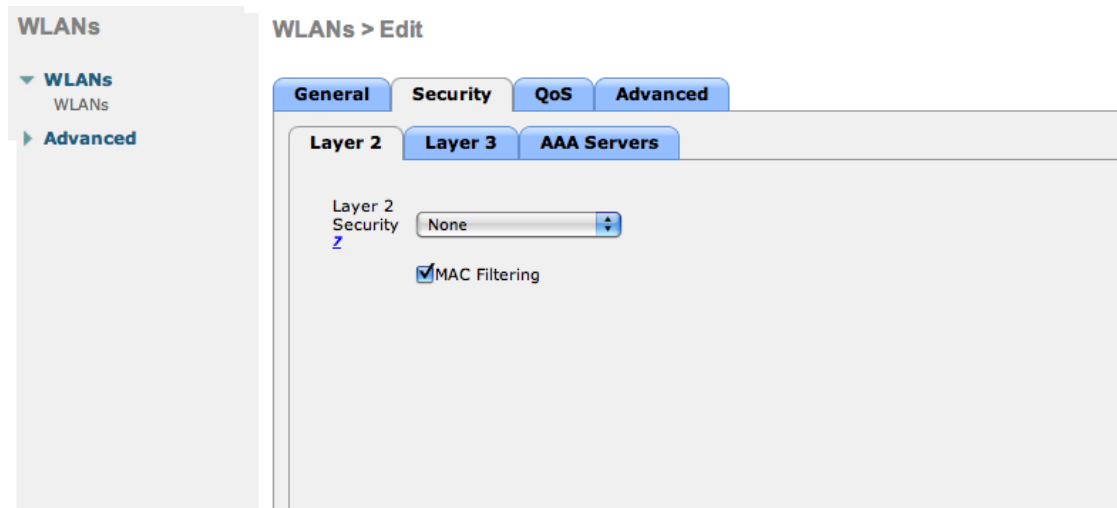
▪ Nothing at level 3
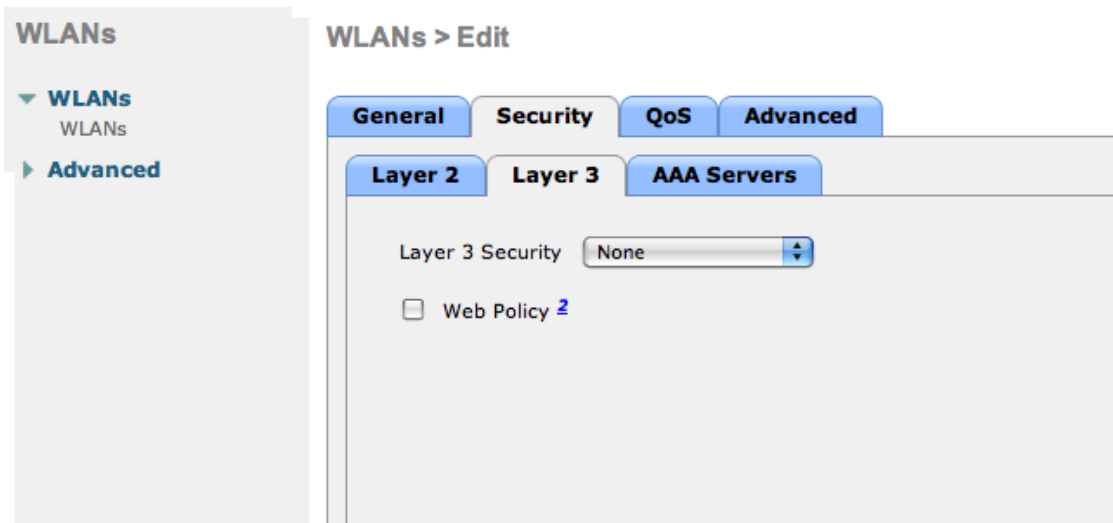
Wireless Controllers and
Access Point Configuration

- We set the IP of the FreeRADIUS server
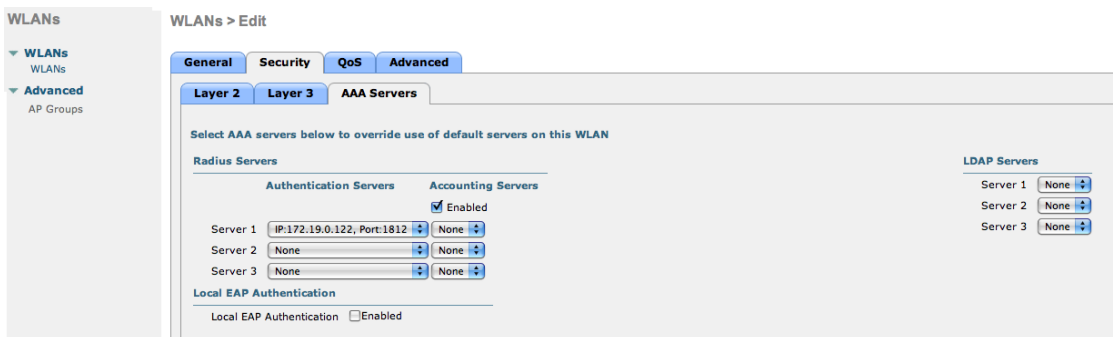
- VERY IMPORTANT: Allow AAA override (this allows VLAN assignment from RADIUS)
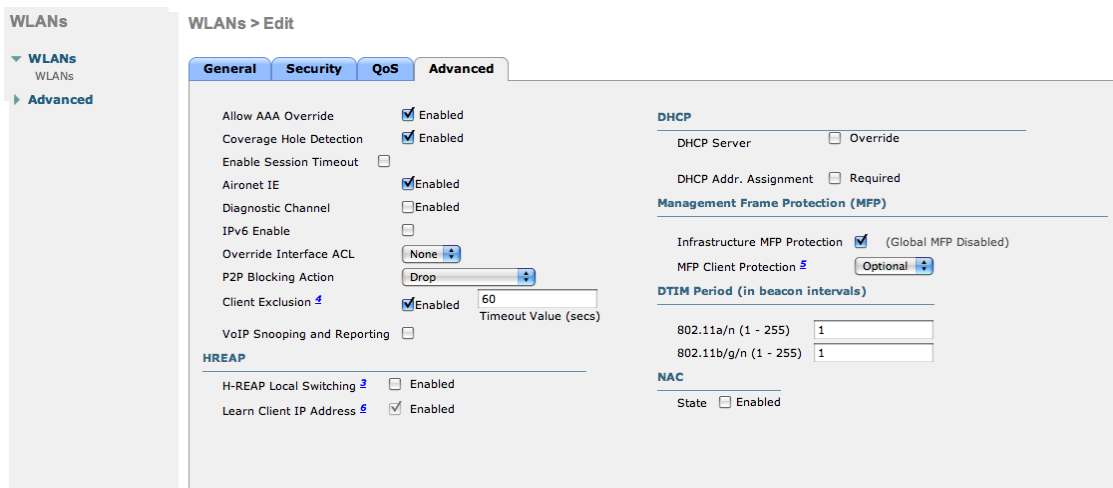
- Finally, in *Controller > Interfaces* tab, create an interface per VLAN that could be assigned

You are good to go!

Wireless LAN Controller (WLC) Web Auth

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

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

- First, globally define the FreeRADIUS server running on PacketFence (PacketFence's Administration Interface) and make sure *Support for RFC 3576* is enabled (if not present it is enabled by default)

- Then we create a SSID:
  - OPEN SSID: non-secure with MAC authentication only

Wireless Controllers and
Access Point Configuration

Wireless Controllers and
Access Point Configuration

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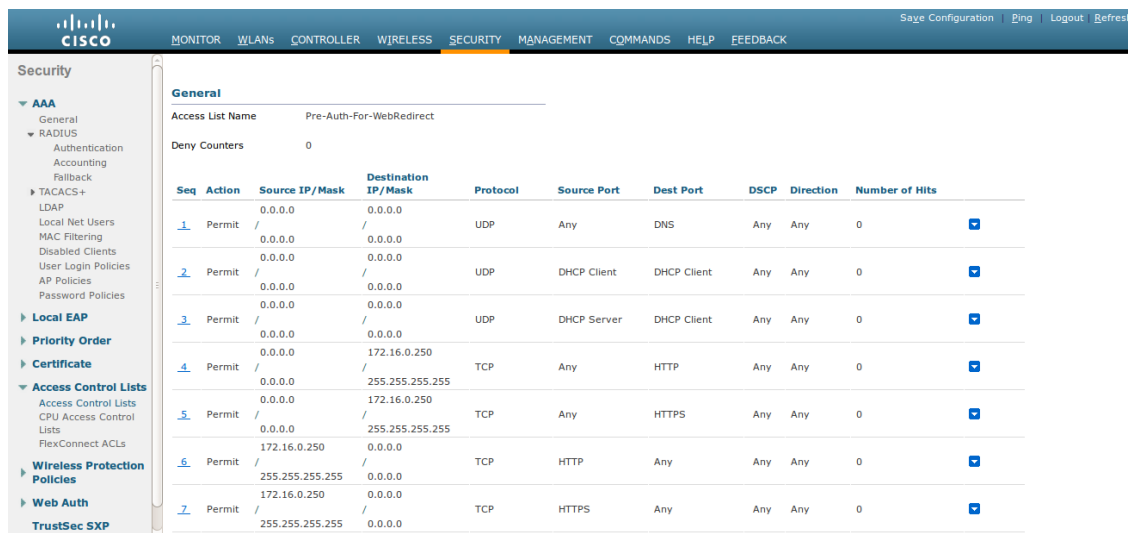
- Then the last step is to configure the WLC in PacketFence. Role by Web Auth URL

Wireless Controllers and
Access Point Configuration

Role definition

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.

D-Link

DWL Access-Points and DWS 3026

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

Extricom

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**.

Hostapd

OpenWRT

In this section, we cover the basic configuration of the OpenWRT access point (Hostapd software). Hostapd must have been compiled with dynamic vlan support and you need to create a file /etc/config/hostapd.vlan that contain:

- wlan0.#

And you need to replace the /lib/wifi/hostapd.sh script file with the one included in /usr/local/pf/addons/hostapd

Open SSID

Configure your SSID using uci command:

```
uci add_list wireless.@wifi-iface[0]=wifi-iface
uci add_list wireless.@wifi-iface[0].device=radio0
uci add_list wireless.@wifi-iface[0].mode=ap
uci add_list wireless.@wifi-iface[0].ssid=OpenWrt-OPEN
uci add_list wireless.@wifi-iface[0].network=lan
uci add_list wireless.@wifi-iface[0].encryption=none
uci add_list wireless.@wifi-iface[0].auth_server=192.168.1.5
uci add_list wireless.@wifi-iface[0].auth_port=1812
uci add_list wireless.@wifi-iface[0].auth_secret=useStrongerSecret
uci add_list wireless.@wifi-iface[0].dynamic_vlan=2
uci add_list wireless.@wifi-iface[0].vlan_file=/etc/config/hostapd.vlan
uci add_list wireless.@wifi-iface[0].vlan_tagged_interface=eth0
uci add_list wireless.@wifi-iface[0].radius_das_port=3799
uci add_list wireless.@wifi-iface[0].radius_das_client='192.168.1.5
 useStrongerSecret'
uci add_list wireless.@wifi-iface[0].macfilter=2
```

Secure SSID

Configure your SSID using uci command:

```
uci add_list wireless.@wifi-iface[0]=wifi-iface
uci add_list wireless.@wifi-iface[0].device=radio0
uci add_list wireless.@wifi-iface[0].mode=ap
uci add_list wireless.@wifi-iface[0].ssid=OpenWrt-SECURE
uci add_list wireless.@wifi-iface[0].network=lan
uci add_list wireless.@wifi-iface[0].auth_server=192.168.1.5
uci add_list wireless.@wifi-iface[0].auth_port=1812
uci add_list wireless.@wifi-iface[0].auth_secret=useStrongerSecret
uci add_list wireless.@wifi-iface[0].dynamic_vlan=2
uci add_list wireless.@wifi-iface[0].vlan_file=/etc/config/hostapd.vlan
uci add_list wireless.@wifi-iface[0].vlan_tagged_interface=eth0
uci add_list wireless.@wifi-iface[0].radius_das_port=3799
uci add_list wireless.@wifi-iface[0].radius_das_client='192.168.1.5
 useStrongerSecret'
uci add_list wireless.@wifi-iface[0].encryption=wpa2
uci add_list wireless.@wifi-iface[0].acct_server=192.168.1.5
uci add_list wireless.@wifi-iface[0].acct_port=1813
uci add_list wireless.@wifi-iface[0].acct_secret=s3cr3t
uci add_list wireless.@wifi-iface[0].nasid=ubiquiti
```

Then launch *uci commit wireless* and *wifi* command to enable your configuration

Hostapd (software)

To configure Hostapd software you can use the same configuration parameters above in the configuration file.

Meraki

In this section, we will cover the configuration of the Meraki controller to use Web authentication.

> **Caution**
>
> There is currently no way to reevaluate the access of the device using PacketFence. This means that there is no real-time action when trying to isolate a device. The RADIUS reauthentication delay will determine the maximum response time of the access reevaluation.

First create a new SSID and then edit its settings.

Configure it as seen in the screenshot below.

Note

Make sure to configure your RADIUS server so it's accessible externally under a domain name or a public IP address. Replace `pf.domain.net` by what you will configure. The only port needed is 1812 in UDP. Refer to the Meraki documentation for more details.

Next, just below, configure the options for the users access as shown in the screenshot below.

Where 192.168.1.5 is the IP address of your PacketFence server.

Note

Make sure you select bridge mode so your users are not NATed through your AP. If you need the devices to be on another VLAN, modify the VLAN tagging of the SSID.

Next go in **Wireless→Configure→Splash page**. Select the **Custom splash URL** and configure the URL pointing to your PacketFence server.

> **Note**
>
> Even if you enabled the bridge mode on the access point, it will still send a NATed IP address during the initial HTTP request. To workaround this you will need to forward the DHCP traffic of the network your nodes are connected to so PacketFence has the proper IP information of the devices.

Once you have configured the Meraki, you will need to configure it in the PacketFence switches. You will need to create an entry for the public IP address of your cloud controller and one for the MAC address of your AP. Here is the resulting configuration for switches.conf.

```
[1.1.1.1]
description=Meraki Cloud controller
type=Meraki::AP_http
radiusSecret=useStrongerSecret
mode=production
```

```
[00:11:22:33:44:55]
description=Meraki local access point
type=Meraki::AP_http
radiusSecret=useStrongerSecret
mode=production
```

RFC 5176

WebAuth

> **Note**
>
> While using the WebAuth mode on the Meraki controller with a version superior to X.X, you need to use "Role mapping by Switch Role" and "Role by Web Auth URL" in the tab *Roles* from the switch configuration.

Configure your SSID as shown below:

Wireless Controllers and
Access Point Configuration

Note

It is mandatory that you use the Airespace-ACL-Name as "RADIUS attribute specifying group policy name".

The switch module to use for this configuration is "Meraki cloud controller V2".

Next, configure the roles for the devices on your network. Go in *Network-wide→Group policies*, then you will be able to create policies that can be configured as roles in the switch configuration of PacketFence. Creation of the policy `Guest`:

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

Role by Switch Role ✔

registration	registration
isolation	isolation
macDetection	macDetection
inline	inline
default	Authorized devices
guest	Guest
gaming	
voice	voice

Role by Web Auth URL ✔

registration	http://172.20.20.66/$session_id
isolation	
macDetection	
inline	
default	
guest	
gaming	
voice	

VLAN enforcement

Note

VLAN assignment in MAC authentication does not work at the moment, you can look through lib/pf/Switch/Meraki/AP_http_V2.pm in the `BUGS AND LIMITATIONS` part or use the following method. Note that this method will be considered as deprecated when the Meraki firmware is fixed.

If you want to run the Meraki in VLAN assignment, you will need to use the Group policies, create a group policy under *Network-wide→Group policies* and change the setting `VLAN` to `Tag VLAN`, insert the VLAN number of your registration VLAN and save the policy.

In the configuration of PacketFence, use "Role mapping by Switch Role" instead of "Role by VLAN ID".

Switch MS220-8

Note

You should already have one port setup as Uplink, using a mode trunk, with at least your Registration and Production VLAN allowed on it.

The Meraki switch offer configuration for VLAN enforcement only.

You will need to access the Meraki dashboard to configure your switch. When you reach it you will need first to create a policy. You can create a "MAC authentication bypass" or a "802.1X" policy. Depending if you want to authenticate user via dot1x or MAB. You cannot combine both neither use a fallback mode on the same port, each port with a policy applied will be exclusive to MAB or dot1x.

To access the policy creation go to *Switch→Access policies* in the Meraki dashboard menu. From there create a new policy, use the exemple below to create your policy.

Access policies

Name	Redirect

RADIUS servers ⓘ

#	Host	Port	Secret			Actions	
1	192.168.1.5	1812	••••••••••••••	⊙	✥ ✕	Test	

Add a server

RADIUS testing ⓘ	RADIUS testing enabled ▼
Access policy type	802.1X ▼
Guest VLAN ⓘ	Disabled
Voice VLAN clients	Require authentication ▼
Switch ports	There is currently 1 Switch port using this policy

Remove this access policy

Name	Redirect-MAB

RADIUS servers ⓘ

#	Host	Port	Secret			Actions	
1	192.168.1.5	1812	••••••••••••	⊙	✥ ✕	Test	

Add a server

RADIUS testing ⓘ	RADIUS testing enabled ▼
Access policy type	MAC authentication bypass ▼
Guest VLAN ⓘ	Disabled
Voice VLAN clients	Require authentication ▼
Switch ports	There is currently 1 Switch port using this policy

Remove this access policy

You now need to apply one of your policies to ports. To do so, go to *Switch→Switch ports* and chose your options. To add a policy you created earlier, select it in the drop down list in `Access policy`. You need to configure the port in "mode access", the default access VLAN is not important if your VLANs are properly configured on PacketFence.

Wireless Controllers and
Access Point Configuration

Update 1 port   ✕

Switch ports:	88:15:44:04:bd:56/2

Name:

Tags: `eg. "email-alerts phone"`

Enabled: `enabled ▼`

RSTP: `enabled ▼`

STP guard: `disabled ▼`

PoE: `enabled ▼`

Link: ⓘ `auto ▼`

Port schedule: `Unscheduled ▼`

Isolation: `disabled ▼`

Type: `access ▼`

Access policy: `Redirect ▼`

VLAN: `2`

Voice VLAN: ⓘ `4`

Cancel   **Update 1 port**

Mikrotik

This configuration has been tested on Access Point OmniTIK U-5hnD with RouterOS v6.18 and only MAC-Authentication is available now. The only deauthentication method available is SSH, so create an account in the Mikrotik AP and fill the information in PacketFence switch configuration. Also don't forget to use the pf account to ssh on the Access Point to receive the ssh key.

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
```

HP

ProCurve Controller MSM710

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

Meru

Meru Controllers (MC)

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

Disable PMK Caching

If you are running a WPA2 SSID, you may need to disable PMK caching in order to avoid deauthentication issues. This is true if you are running AP 300s using any 5.0 versions including 5.0-87, or any versions below 4.0-160.

Here are the commands to run to disable the PMK caching at the AP level. First, login the AP, and run this command to see which radios are broadcasting your SSID. vap display

Second, disable the PMK caching on those radios. radio pmkid radio00 disable

You can also add those commands to the AP bootscript. Contact your Meru support representative for that part.

VLAN Definition

Here, we create our PacketFence VLANs for client use. Go to **Configuration → Wired → VLAN**, and select Add.

▪ VLAN Name is the human readable name (ie. RegistrationVLAN)

▪ Tag is the VLAN ID

▪ Fast Ethernet Interface Index refers to the controller's ethernet interface

▪ IP Address – An IP address for this controller on this VLAN

▪ Netmask – Network mask for this VLAN

▪ IP Address of the default gateway – Wired IP router for this VLAN

▪ Set the Override Default DHCP server flag to off

▪ Leave the DHCP server IP address and the DHCP relay Pass-Through to default

Click **OK** to add the VLAN.

AAA Authentication Server

Here, we create our PacketFence RADIUS server for use. Under **Configuration → Security → Radius**, select **Add**.

- Give the RADIUS Profile a name
- Write a description of the profile
- Give the RADIUS IP, RADIUS Secret and the RADIUS authentication port
- Select Colon for the MAC address delimiter
- Select MAC Address as the password type

Click **OK** to add the RADIUS profile.

AAA Accounting Server

Here, we create our PacketFence RADIUS server for use. Under **Configuration → Security → Radius**, select **Add**.

- Give the RADIUS Profile a name
- Write a description of the profile
- Give the RADIUS IP, RADIUS Secret and the RADIUS accounting port
- Select Colon for the MAC address delimiter
- Select MAC Address as the password type

Click **OK** to add the RADIUS accounting profile.

AAA Profiles – Open SSID

Here, we create our wireless security profiles for use. Under **Configuration → Security → Profile**, select **Add**.

- Give the security profile a name
- Select Clear as the L2 Modes Allowed
- Leave Data Encrypt empty
- Disable the Captive Portal
- Enable the Mac Filtering

Click **OK** to save the profile.

MAC Filtering

When using the OpenSSID, you need to activate the mac filtering. Under **Configuration → Mac Filtering**:

- Set ACL Environment State to Permit list enabled
- Select your RADIUS profile

AAA Profiles – Secure SSID

Here, we create our wireless security profiles for use. Under **Configuration → Security → Profile**, select **Add**.

- Give the security profile a name

- Select WPA2 as the L2 Modes Allowed

- Select CCMP-AES for Data Encrypt

- Select your PacketFence RADIUS Authentication Profile

- Disable the Captive Portal

- Enable the 802.1X network initiation

- Leave the Mac Filtering to off

Click **OK** to save the profile.

WLAN SSIDs

Here, we create our SSID and tie it to a security profile. Under **Configuration → Wireless → ESS**, select **Add**.

- Give the ESS profile a name, and enable it

- Write an SSID name

- Select your security profile name previously created

- Select your PacketFence RADIUS Accounting Profile (if you want to do accounting)

- Enable the SSID Broadcast

- Make the new AP to join the ESS

- Set the tunnel interface type to RADIUS and Configured VLAN

- Select the registration VLAN for the VLAN Name

Click **OK** to create the SSID. Repeat those steps for the open and secure SSID by choosing the right security profile.

WLAN SSIDs – Adding to access point

Here, we tie our SSIDs to access points. Under **Configuration → Wireless → ESS**, select the SSID you want to add to your aps. Then, select the **ESS-AP Table**, and click **Add**.

- Select the AP ID from the drop down list

- Click **OK** to associate the SSID with this AP

Roles (Per-User Firewall)

Since PacketFence 3.3.0, we now support roles (per-user firwall 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.

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.

WiNG (Firmware >= 5.0)

AAA Policy (RADIUS server)

First, we need to build the AAA Policy. Under **Configuration → Wireless → AAA Policy**, click on the **Add** button at the bottom right. Configure the RADIUS profile like the following:

- Host: Choose IP Address in the drop down, and put the RADIUS server (PF) IP

- Insert a RADIUS secret passphrase

- Select "Through Wireless Controller" Request Mode

Caution

Since we are using RADIUS Dynamic Authorization, we need to enable the RADIUS accounting. Under the RADIUS accounting tab, click the Add button at the bottom right, and insert the proper values.

Open SSID

Under **Configuration → Wireless → Wireless LANs**, click on the **Add** button at the bottom right. Under Basic Configuration:

- Profile Name : Give a convenient name

- SSID: This is the ESSID name

- Ensure that the WLAN Status is set to enable

- Select Single VLAN as VLAN assignment technique

- Ensure that "Allow RADIUS Override" is selected

Security configuration:

- Select MAC as authentication type

- Select your AAA Policy previously created

- Ensure that you selected Open as the Encryption

Accounting configuration:

- Make sure you select "Enable RADIUS Accounting"

- Select the previously configured AAA Policy

Advanced configuration:

- Make sure you select RADIUS Dynamic Authorization

Secure SSID

Under **Configuration → Wireless → Wireless LANs**, click on the **Add** button at the bottom right. Under Basic Configuration:

- Profile Name : Give a convenient name

- SSID: This is the ESSID name

- Ensure that the WLAN Status is set to enable

- Select Single VLAN as VLAN assignment technique

- Ensure that "Allow RADIUS Override" is selected

Security configuration:

- Select EAP as authentication type

- Select your AAA Policy previously created

- Ensure that you selected WPA/WPA2-TKIP as the Encryption

- Unselect everything under Fast Roaming (Disable caching)

Accounting configuration:

- Make sure you select "Enable RADIUS Accounting"

- Select the previously configured AAA Policy

Advanced configuration:

- Make sure you select RADIUS Dynamic Authorization

Profile (WLAN Mapping)

You have multiple options here. Either, you create a general AP profile, and you assign it to your Aps, or you modify the AP device configuration to map the WLAN to the radio interfaces. For the purpose of this document, we will modify the general profile. Under **Profiles → default-apXXX** (where XXX is your AP model), in **Interface → Radios**, edit the existing radios settings. Go to the **WLAN Mapping** tab, select the two SSIDs and click on the **<<** button.

Profile (Management)

Here, we can configure our SNMP community strings. Located in **Configuration → Management →
Management Policy**. Again, you can modify the default one, or you can create a brand new Policy.

VLANs

You need to ensure that the uplink interface of the controller is configured as a trunk, and that all
the necessary VLANs are created on the device. This is configured under **Device → rfsXXXX-MAC**
(where XXXX is your controller series, and MAC is the latest 3 octets of its mac address). Edit the
device configuration, and go to **Interface → Ethernet Ports**. Ensure that the up1 interface is set as
trunk, with all the allowed VLANs. Next, create the VLAN under **Interface → Virtual Interfaces**.

Roles (Per-User Firewall)

Since PacketFence 3.3.0, we now support roles for the Motorola hardware using WiNGS 5.x. To
add roles, go in **Configuration → Security → Wireless Client Roles**. First create a global policy that
will contain your roles. Next, create your Roles by clicking on the **Add** button on the bottom right. It
is important to configure the Group Configuration line properly by setting the string name that we
will use in the RADIUS packet. For exemple, 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
...
```

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**.

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 addres, 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 (Firmware 9.3.0.0.83)

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.

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)
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

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
```

Xirrus

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::AP_http

- 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

Additional Information

For more information, please consult the mailing archives or post your questions to it. For details, see:

- packetfence-announce@lists.sourceforge.net: Public announcements (new releases, security warnings etc.) regarding PacketFence

- packetfence-devel@lists.sourceforge.net: Discussion of PacketFence development

- packetfence-users@lists.sourceforge.net: User and usage discussions

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 (http://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.

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