Grandstream Networks, Inc.

Captive Portal

Authentication via RADIUS

Table of Content

Table of Figures

Table of Tables

SUPPORTED DEVICES

Following table shows Grandstream devices supporting Captive Portal with RADIUS Authentication feature:

Table 1: Supported Devices

Model	Supported	Firmware
GWN7610	Yes	1.0.3.19 or higher
GWN7600	Yes	1.0.3.19 or higher
GWN7000	Yes	1.0.2.75 or higher

INTRODUCTION

Captive Portal feature on GWN76XX Access Points and GWN7000 router allows to define a Portal Web Page that will be displayed on WiFi clients' browsers when attempting to access the Internet.

Once connected to GWN76XX AP, WiFi clients will be forced to view and interact with that landing page by providing authentication if required and accepting the use terms before Internet access is granted.

Captive portal can be used in different environments including airports, hotels, coffee shops, business centers and others offering free WiFi hotspots for Internet users.

This guide describes how to setup the captive portal feature on the GWN76XX series using RADIUS authentication.

The following figure illustrates an example of the landing page feature with RADIUS authentication.

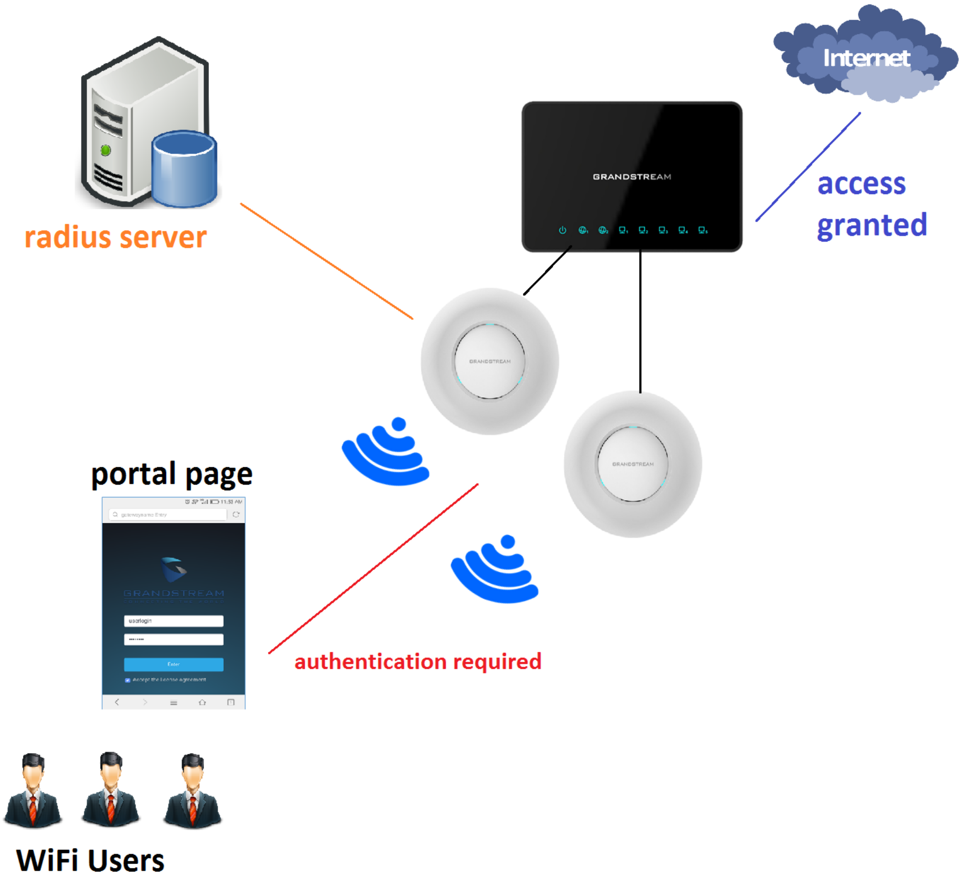


Figure 1: General Architecture

SYSTEM OVERVIEW

In order to configure the captive portal feature on GWN76XX access points with RADIUS authentication, the following requirements should be applied:

- A fully setup and working RADIUS server for authentication (ex: FreeRADIUS).
- GWN76XX Access point with firmware supporting RADIUS. Refer to [SUPPORTED DEVICES].
- Network setup allowing GWN76XX access point and RADIUS server communication.

RADIUS

Auhtentication via RADIUS server is commonly used on enterprise local netoworks, once this option selected the admin needs to configure the IP address and secret to connect the AP (RADIUS Client) to the RADIUS Server.

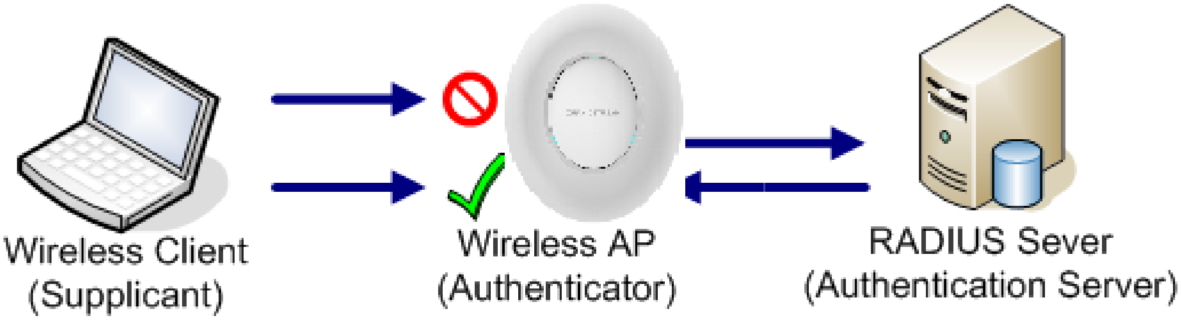


Figure 2: RADIUS Authentication

The supplicant will request to join an SSID, the authenticator will request an identity from the mobile device, the authenticator forwards the identity to the authentication server which will reply with a success or deny.

CAPTIVE PORTAL SETTINGS

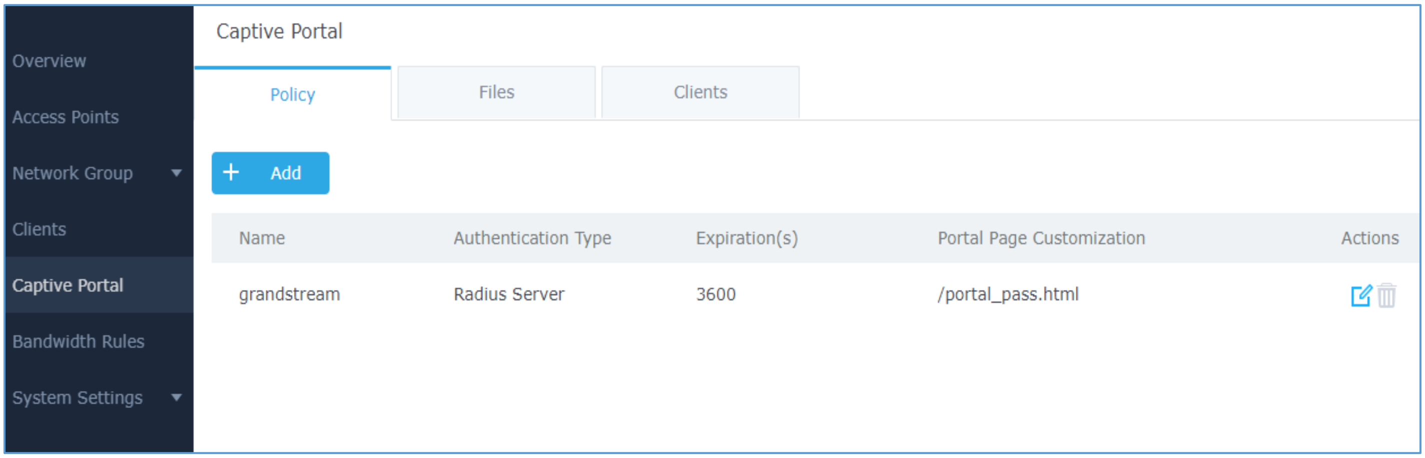
The Captive Portal feature can be configured from the GWN760X web page, by navigating to "**Captive Portal**".

The page contains three tabs: **Policy**, **Files** and **Clients**.

- **Policy Tab**: In this page, users can configure multiple portal policies which then can be assigned to specifc network groups under the menu "**Network Groups**". (For example having non-authentication based portal for temporary guests and setting up an authentication based portal policy for the internal staff).

- **Files Tab**: Under this tab, users could download and upload customized portal landing page to display to the users when they try to connect over the WiFi.

- **Clients Tab**: This tab lists the authenticated clients MAC addresses.



Name	Authentication Type	Expiration(s)	Portal Page Customization	Actions
grandstream	Radius Server	3600	/portal_pass.html	

Figure 3: Captive Portal web GUI menu

Policy Configuration Page

The Policy configuration allows users to configure and customize different captive portal policies which then can be selected on network group configuration page, giving the admin the ability to set different captive portals for each network group.

The following table describes the settings used for Captive Poral feature with RADIUS Authentication Basic:

Table 2: Policy Configuration Page

Field	Description
Name	Enter a name to identify the created policy (ex: Guest Portal).
Expiration	Enter the expiration time for the landing page, this field must contain an integer between 60 or 604800 in minutes. If this field is set to 0 the landing page will never expire.
Authentication Type	Three types of authentication are available: • **No Authentication:** when choosing this option, the landing page feature will not provide any type of authentication, instead it will prompt users to accept the license agreement to gain access to internet. • **RADIUS Server:** Choosing this option will allow users to set a RADIUS server to authenticate connecting clients. In this guide, we will use this Authentication Type. • **Third Authentication:** Choosing this option will allow users to log in using WeChat or Facebook.
RADIUS Server Address	Enter the IP address or the FQDN of the RADIUS server used to authenticate clients.
RADIUS Server Port	Enter the RADIUS server port, by default value is 1812.
RADIUS Server Secret	Enter the shared key between authenticator and RADIUS server.
RADIUS Authentication Method	Choose which method to use for RADIUS Authenticaiton (PAP, CHAP or MS-CHAP).
Portal Page Customization	This option allows users to choose the landing page that will be shown once a client tries to connect to the GWN, three pages are available: • **Portal Default:** This page is used when no authentication is specified, users will have only to accept license agreement to gain access to internet. • **Portal Pass:** This option provides authentication textbox when using RADIUS authentication mode, in order to enter username and password stored in RADIUS database. In this guide, we will use this option. • **Third Auth:** Choose this page when using authentication via WeChat or Facebook.
Landing Page	Select page where authenticated clients will be redirected to. • **Redirect to the original URL:** Sends the authenticated client to the original requested URL. • **Redirect External Page:** Enter URL that you want to promote to connected clients (ex: company's website).

Redirect External Page URL	When setting the landing page to (Redirect External Page), enter the URL where to redirect authenticated clients.
Enable HTTPS	Check this box in order to enable captive portal over HTTPS.
Pre Authentication Rules	From this menu, users can set mathing rules in order to allow certain types of traffic before authentication happens or simply allow the traffic for non authenticated end points.
Post Authentication Rules	This tool can be used to block certain type of traffic to authenticated clients, anything else is allowed by default. (Ex: Setting a rule that matches HTTP will ban all authenticated clients to not access web server that are based on HTTP).

Landing Page Redirection

This feature can be configured using the option “Redirect External Page URL” under the policy settings, and could be useful in the case the network admin wants to force all connected guest clients to be redirected to a certain URL (ex: company’s website) for promotion and advertisement purposes.

Note: Supported on GWN7600 Access Points only.

Pre-Authentication Rules

Using this option, users can set rules to match traffic that will be allowed for connected WiFi users before authentication process. This can be needed for example to setup Facebook authentication where some traffic should be allowed to Facebook server(s) to process the user’s authentication. Or simply to be used to allow some type of traffic for unauthenticated users.

Note: Supported on GWN7600 Access Points only.

Post-Authentication Rules

On the other hand, post authentication rules are used to match traffic that will be banned for WiFi clients after authentication. As an example, if you want to disallow connected WiFi clients to issue Telnet or SSH traffic after authentication then you can set post authentication rules to match that traffic and once a connected client passes the authentication process they will be banned from issuing telnet and SSH connections.

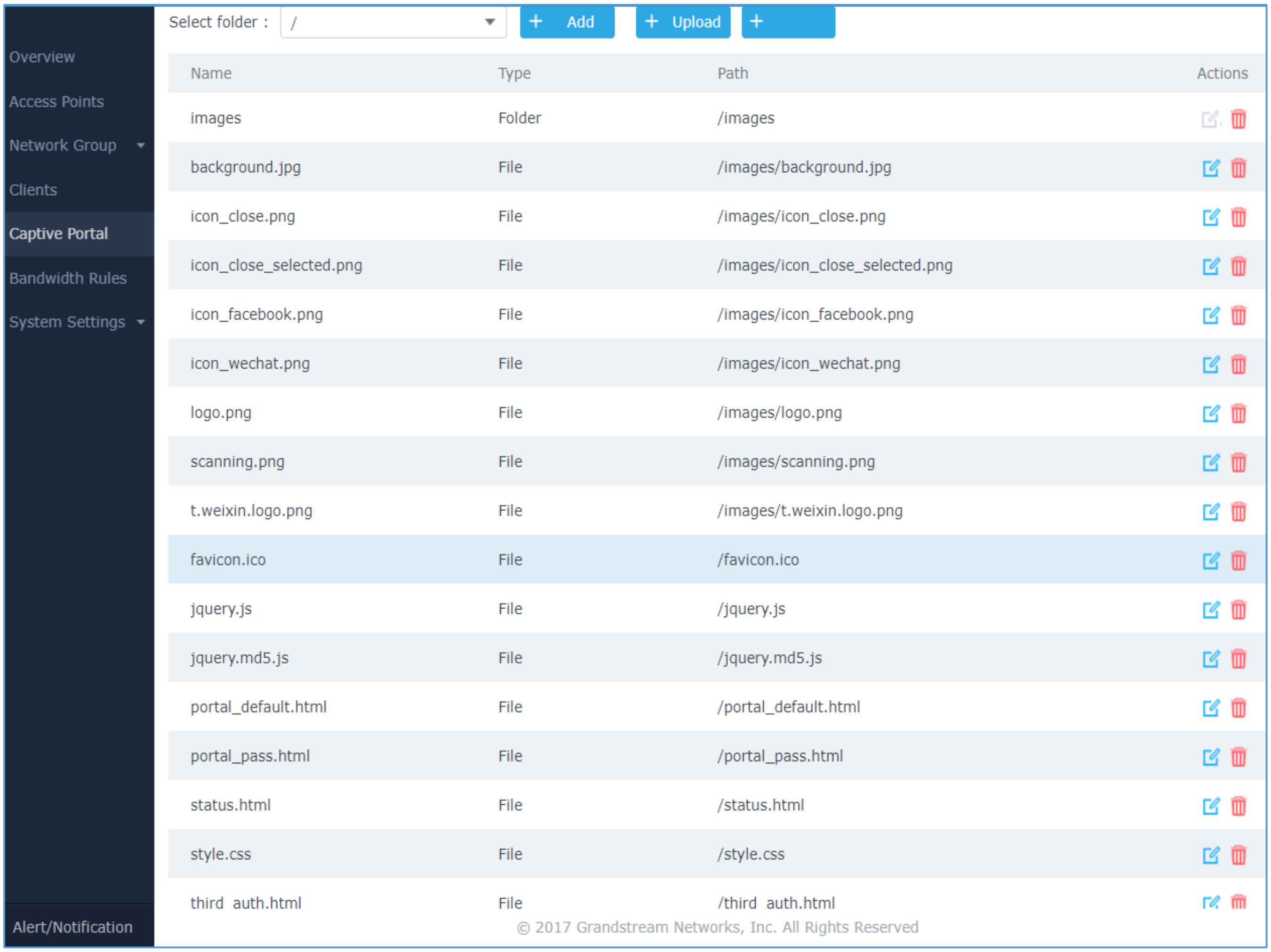
Note: Supported on GWN7600 Access Points only.

Files Configuration Page

Files configuration page allows to view and upload HTML pages and related files (images…).

The captive portal uses portal_default.html as default portal page. When using RADIUS authentication, users need to select **portal_pass.html** as the portal page to let the user login via RADIUS.

The following figure shows default files used for Captive Portal in GWN Access point.



Name	Type	Path	Actions
images	Folder	/images	✎ 🗑
background.jpg	File	/images/background.jpg	✎ 🗑
icon_close.png	File	/images/icon_close.png	✎ 🗑
icon_close_selected.png	File	/images/icon_close_selected.png	✎ 🗑
icon_facebook.png	File	/images/icon_facebook.png	✎ 🗑
icon_wechat.png	File	/images/icon_wechat.png	✎ 🗑
logo.png	File	/images/logo.png	✎ 🗑
scanning.png	File	/images/scanning.png	✎ 🗑
t.weixin.logo.png	File	/images/t.weixin.logo.png	✎ 🗑
favicon.ico	File	/favicon.ico	✎ 🗑
jquery.js	File	/jquery.js	✎ 🗑
jquery.md5.js	File	/jquery.md5.js	✎ 🗑
portal_default.html	File	/portal_default.html	✎ 🗑
portal_pass.html	File	/portal_pass.html	✎ 🗑
status.html	File	/status.html	✎ 🗑
style.css	File	/style.css	✎ 🗑
third auth.html	File	/third auth.html	✎ 🗑

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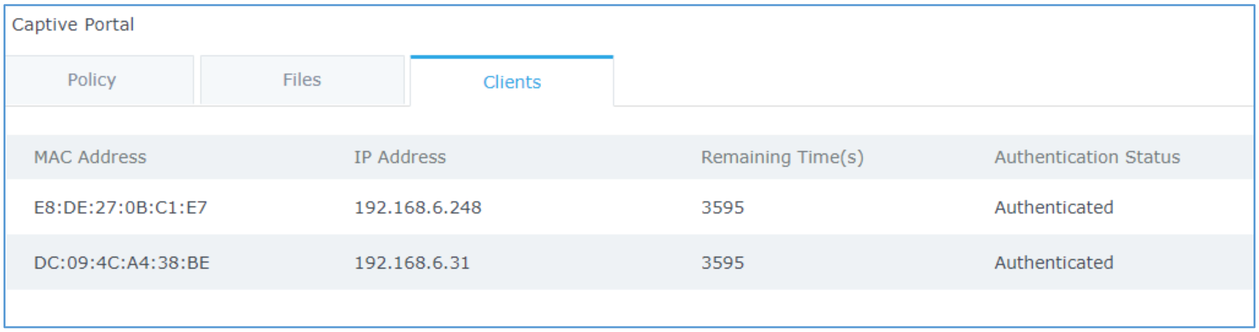
Figure 4: Files Web Page

- Click ✎ to upload a new web page.
- Click ⊕ Add Folder to add a new folder.
- Click ⊕ Upload to upload files to the selected folder.
- Folder can be selected from the dropdown list. Select folder : /images ▾

Clients Page

For Information Purposes Clients page lists MAC addresses of authenticated devices using captive portal. As we can see on the below figure, two WiFi clients have been authenticated and granted internet access from the GWN7610 access points:

- ✓ Client 1 → ***E8:DE:27:0B:C1:E7***
- ✓ Client 2 → ***DC:09:4C:A4:38:BE***



MAC Address	IP Address	Remaining Time(s)	Authentication Status
E8:DE:27:0B:C1:E7	192.168.6.248	3595	Authenticated
DC:09:4C:A4:38:BE	192.168.6.31	3595	Authenticated

Figure 5: Client Web Page

CONFIGURATION STEPS

In this section, we will provide the steps needed to setup basic captive portal policy supporting RADIUS authentication with FreeRADIUS server.

Installing FreeRADIUS

FreeRADIUS includes a RADIUS server, a BSD licensed client library, a PAM library, and an Apache module. In most cases, the word *FreeRADIUS* refers to the RADIUS server.

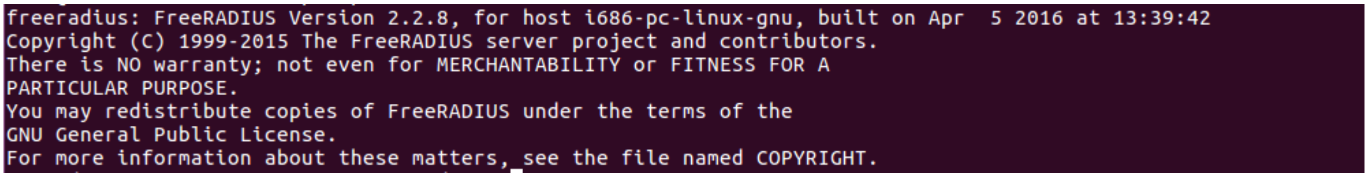
FreeRADIUS is the most widely deployed RADIUS server in the world. It is the basis for multiple commercial offerings. It supplies the AAA needs of many Fortune-500 companies and Tier 1 ISPs.

It is also widely used for Enterprise Wi-Fi and IEEE 802.1X network security, particularly in the academic community, including eduroam.

The following steps summarize simple installation procedure on Linux Debian based machines.

1. Run as root the command **#apt-get install freeradius** in order to install the server along with all its necessary dependencies.

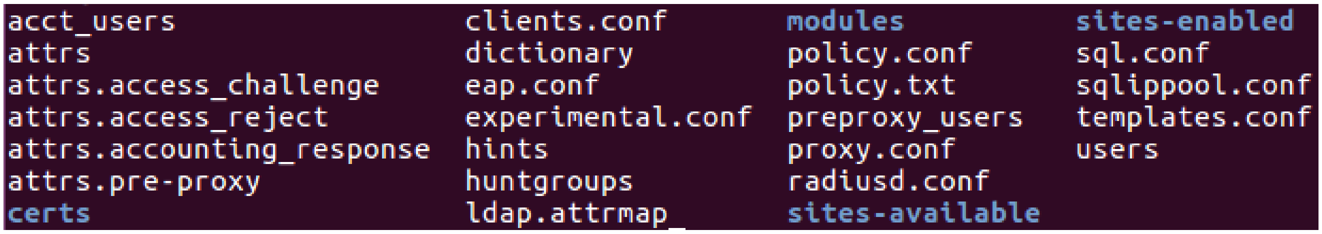
2. After this is done you can verify succefull installation by checking the version of the server using the command : **$sudo freeradius -v** following screenshot shows that we are using version 2.2.8.



```
freeradius: FreeRADIUS Version 2.2.8, for host i686-pc-linux-gnu, built on Apr  5 2016 at 13:39:42
Copyright (C) 1999-2015 The FreeRADIUS server project and contributors.
There is NO warranty; not even for MERCHANTABILITY or FITNESS FOR A
PARTICULAR PURPOSE.
You may redistribute copies of FreeRADIUS under the terms of the
GNU General Public License.
For more information about these matters, see the file named COPYRIGHT.
```

3. You can run the command sudo **$freeradius -CX** in order to run a quick config check. The output shoud display **Configuration appears to be OK.**

4. All the configuration files are located at the directory **/etc/freeradius**. The following screenshot shows the list of the available files.



```
acct_users                 clients.conf       modules          sites-enabled
attrs                      dictionary         policy.conf      sql.conf
attrs.access_challenge     eap.conf           policy.txt       sqlippool.conf
attrs.access_reject        experimental.conf  preproxy_users   templates.conf
attrs.accounting_response  hints              proxy.conf       users
attrs.pre-proxy            huntgroups         radiusd.conf
certs                      ldap.attrmap       sites-available
```

5. The following files are the most important ones for the configuration:

- **radiusd.conf:** This is the main configuration files of FreeRADIUS to tune the parameters of the running instance.

- **clients.conf:** On this file we can add the list of authorized clients (clients means the authenticators and should not be confused with WiFi clients, i.e. clients in FreeRADIUS configuration are your Access Points and Switches that are between the server and end devices).
- **eap.conf:** On this file we can choose the eap method used for authentication (defaults to eap-md5).

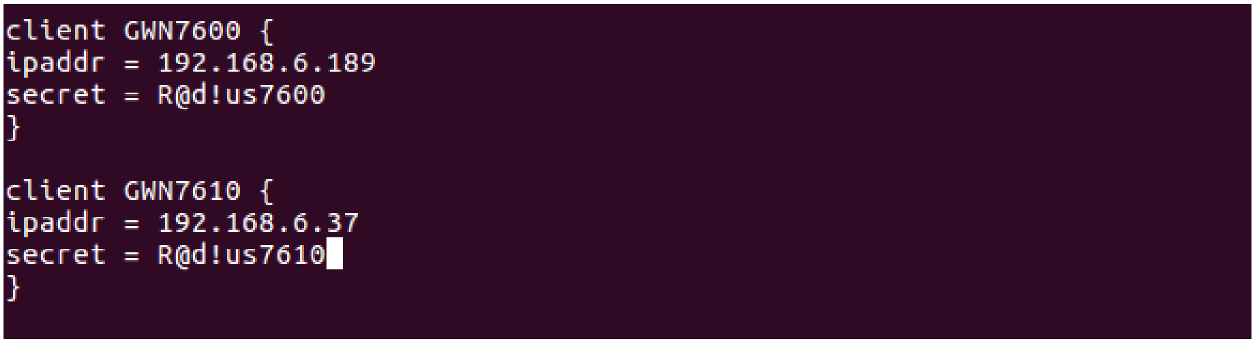
Adding Clients (APs)

Next, we will include the list of authentication clients which are the access points relaying the requests back and forward between WiFi stations and the RADIUS server.

To do so, access to the file **clients.conf** and add each client as the following format:

```
client Client_IDENTIFIER {
 ipaddr = IP_Address_of_AP
 secret = Shared_Secret
 }
```

Following figure shows that we have added two GWN76XX access points as authenticators for the freeraiuds server.



```
client GWN7600 {
ipaddr = 192.168.6.189
secret = R@d!us7600
}

client GWN7610 {
ipaddr = 192.168.6.37
secret = R@d!us7610
}
```

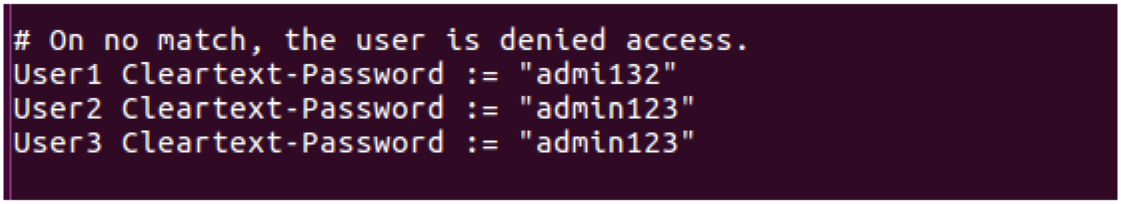
After this, save the file and let’s add some users in the FreeRADIUS database.

Adding WiFi Users

To add users, edit the file named users under the configuration folder **/etc/freeradius**. At the bottom of the file, create new WiFi users and assgin usernames and passwords as the following examples show:

Syntax:

```
USERNAME Cleartext-Password := “PASSWORD”
```



```
# On no match, the user is denied access.
User1 Cleartext-Password := "admi132"
User2 Cleartext-Password := "admin123"
User3 Cleartext-Password := "admin123"
```

Once this is done, save the file and run the following command to check if the server is operational.

```
$radtest User1 admin123 127.0.0.1 0 testing123
```

The results should be something like following:

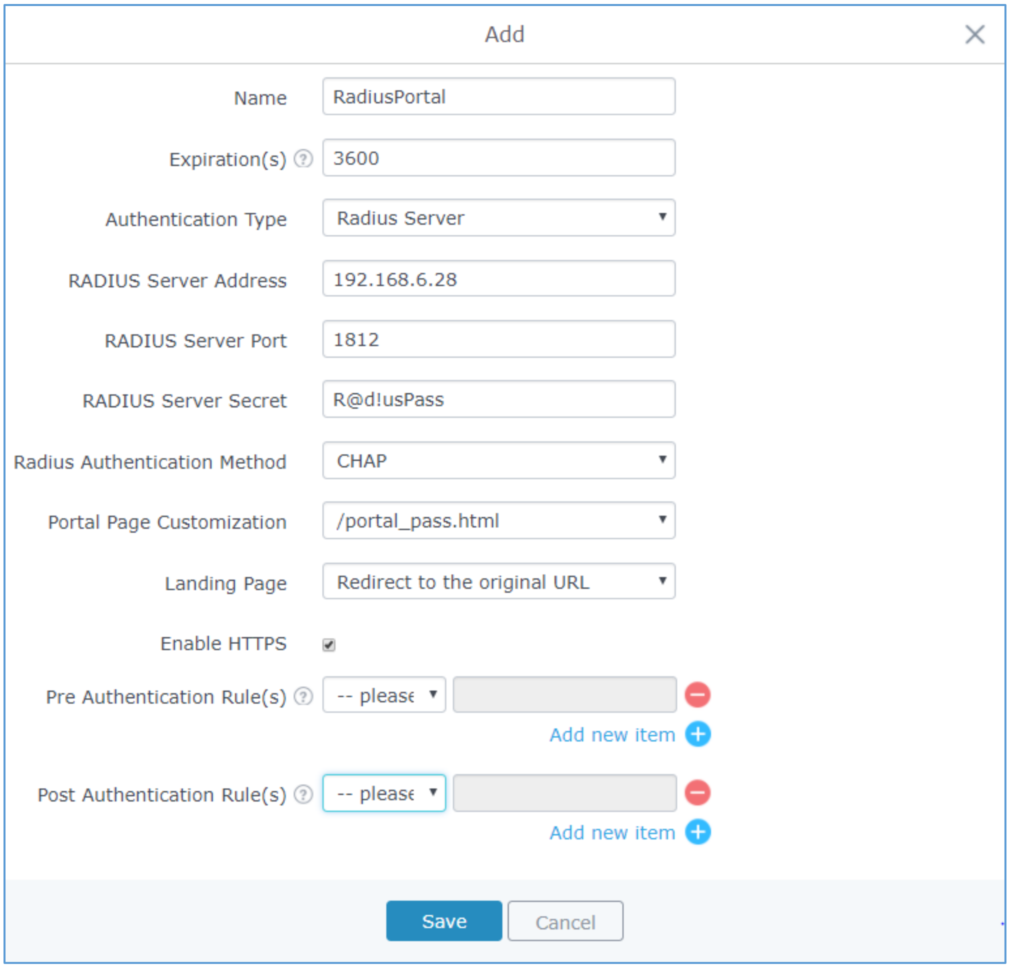
```
User-Name = "User1"
User-Password = "admin123"
NAS-IP-Address = 192.168.x.x
NAS-Port = 0
Message-Authenticator = 0x00000000000000000000000000000000
rad_recv: Access-Accept packet from host 127.0.0.1 port 1812, id=156, length=20
```

Now that the server is configured, you can stop the server using the command **$service freeradius stop** and run it again on debug mode in order to see the log mesages when requests are handled by the server, to run the server in debug mode run the command **#freeradius -X**.

Configuring RADIUS Authentication for Captive Portal

After setting up the RADIUS server and making sure that it is running properly, users could configure captive portal feature under the GWN76XX web GUI menu by following below steps:

1. First, access the web GUI menu **Captive Portal.**
2. Under the policy tab, click on Add button to create new portal policy.
3. Set the name of the policy (in our example we named it RadiusPortal).
4. Then on **Authentication type** choose “RADIUS Server” and set the IP and listening port of the configured server. (FreeRADIUS default listening port for authentication is 1812).
5. Enter the RADIUS shared secret which was configured for the Access point under **clients.conf** file (In this example, we set it to R@d!usPass).
6. Select **portal_pass** as portal page to allow users to under their username and password.
7. From here you can leave the rest to default, following screenshot shows the configuration.



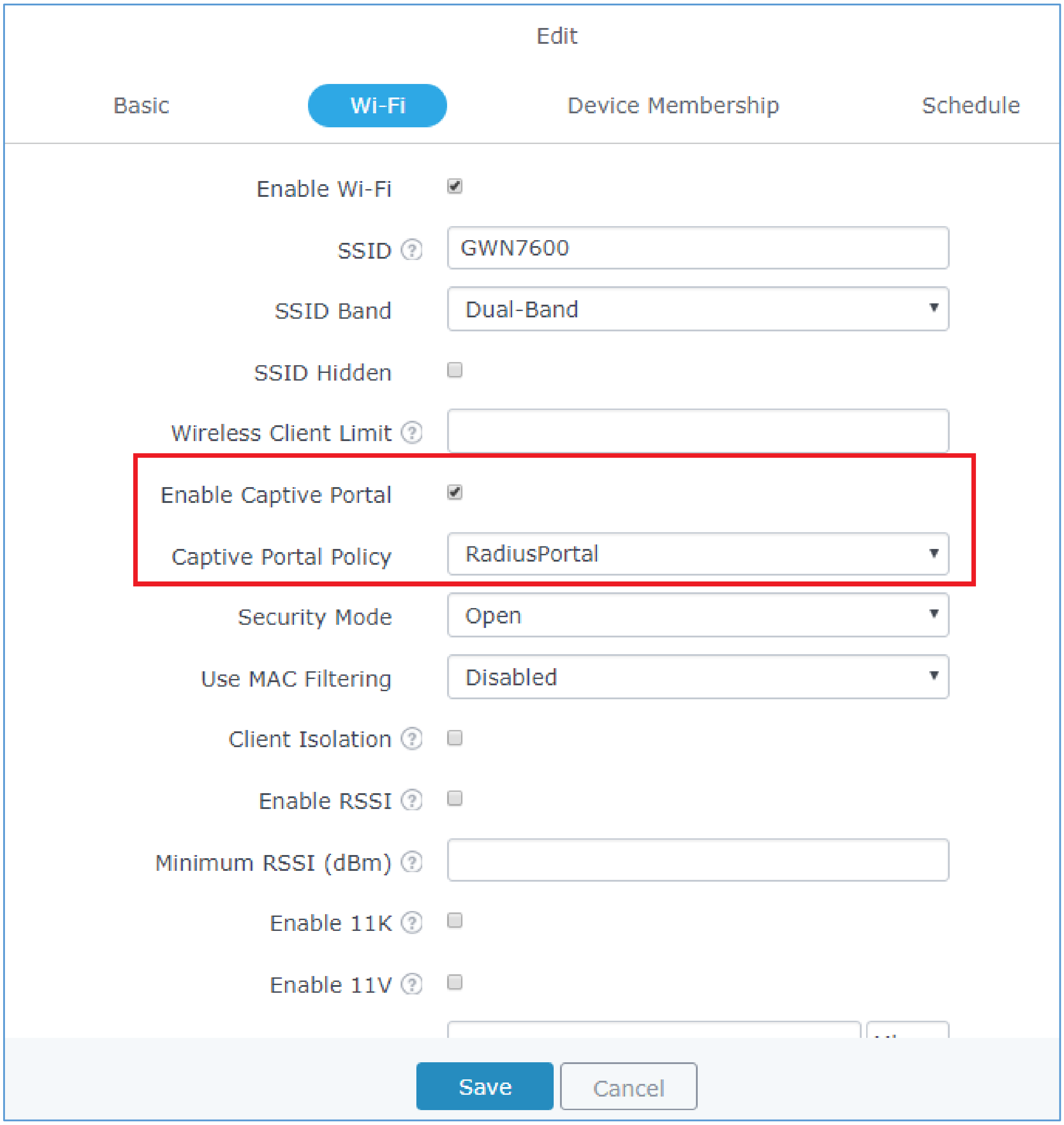
Name	RadiusPortal
Expiration(s)	3600
Authentication Type	Radius Server
RADIUS Server Address	192.168.6.28
RADIUS Server Port	1812
RADIUS Server Secret	R@d!usPass
Radius Authentication Method	CHAP
Portal Page Customization	/portal_pass.html
Landing Page	Redirect to the original URL
Enable HTTPS	☑
Pre Authentication Rule(s)	-- please
Post Authentication Rule(s)	-- please

Figure 6: GWN7600 Captive Portal with RADIUS

8. After this save and apply to complete the settings.

Now, the next step is to enable this portal on the network group.

For this, users should go to the menu **Network Groups** and edit the desired network group then go to **WiFi settings** tab and enable the captive portal Checkbox to select the created policy before saving and applying the new configuration.



Edit

Enable Wi-Fi ☑

SSID: GWN7600

SSID Band: Dual-Band

SSID Hidden ☐

Wireless Client Limit:

Enable Captive Portal ☑

Captive Portal Policy: RadiusPortal

Security Mode: Open

Use MAC Filtering: Disabled

Client Isolation ☐

Enable RSSI ☐

Minimum RSSI (dBm):

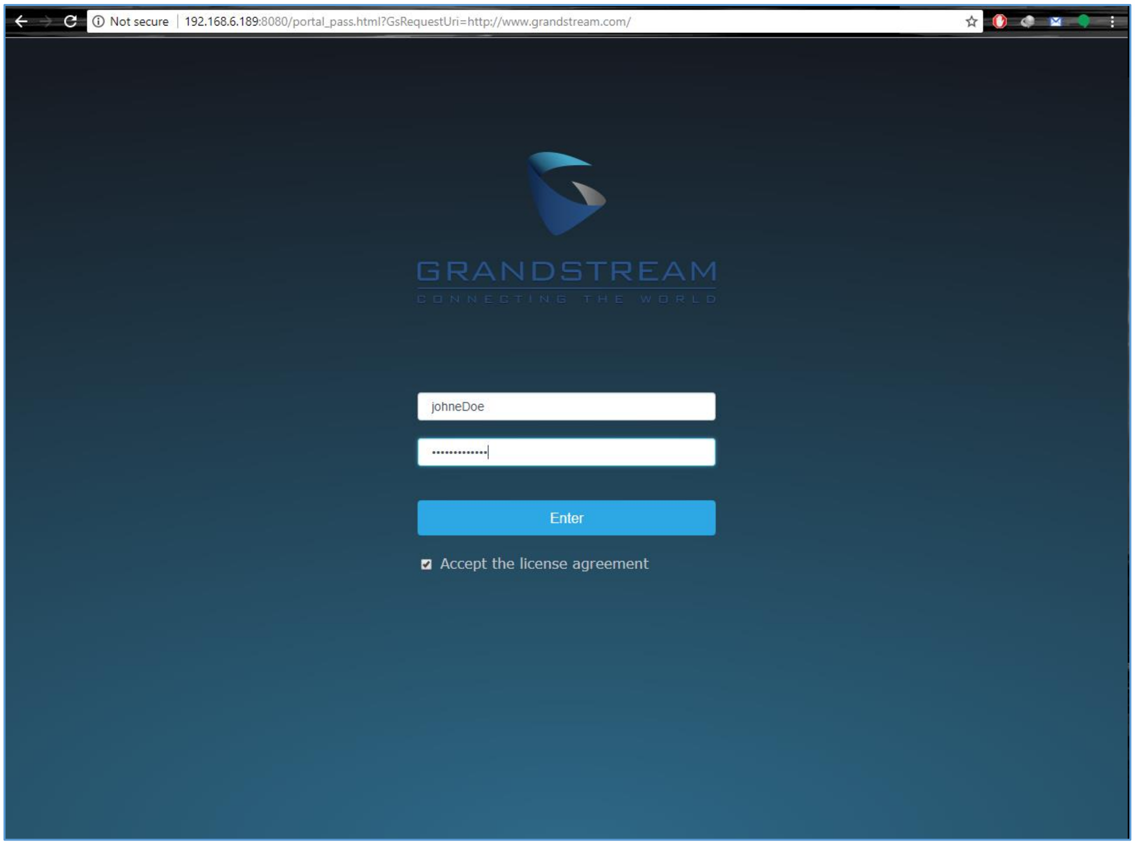
Enable 11K ☐

Enable 11V ☐

Figure 7: Enable Captive Portal on Network Group

At this stage, our GWN76XX access points is ready to receive authentication requests from WiFi clients and hand them over to the RADIUS server.

The default portal page is shown to provide his credentials as shown on the following figure:



Not secure | 192.168.6.189:8080/portal_pass.html?GsRequestUri=http://www.grandstream.com/

johneDoe

••••••••••••••

☑ Accept the license agreement

Figure 8: Captive Portal Authentication via RADIUS

Authenticated clients will get access to the Internet and be listed on the Clients tab under Captive Portal menu.

After successful authentication, clients will be directed either to the original requested URL or a specific Configured URL depending on the option configured under **Captive Portal→Policy→Redirect External Page URL.**