Cloudessa RADIUS Manual

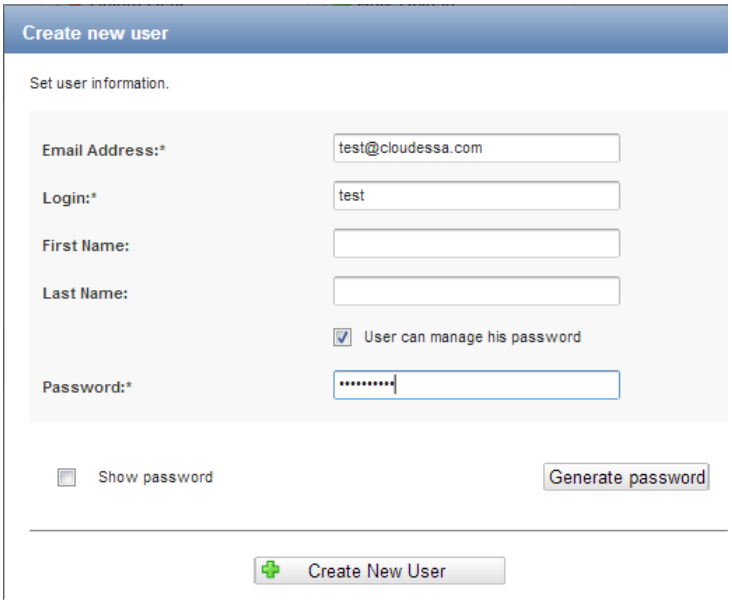
Version 1.16

Chapter 1: 60-second lessons.

Lesson 1: Create a user and a group.

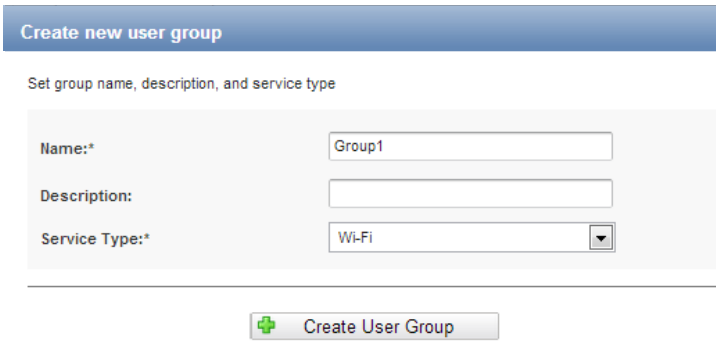
In this lesson you create a group of RADIUS users, and add at least one user to this group. You'll need this for all other lessons.

First create a user:



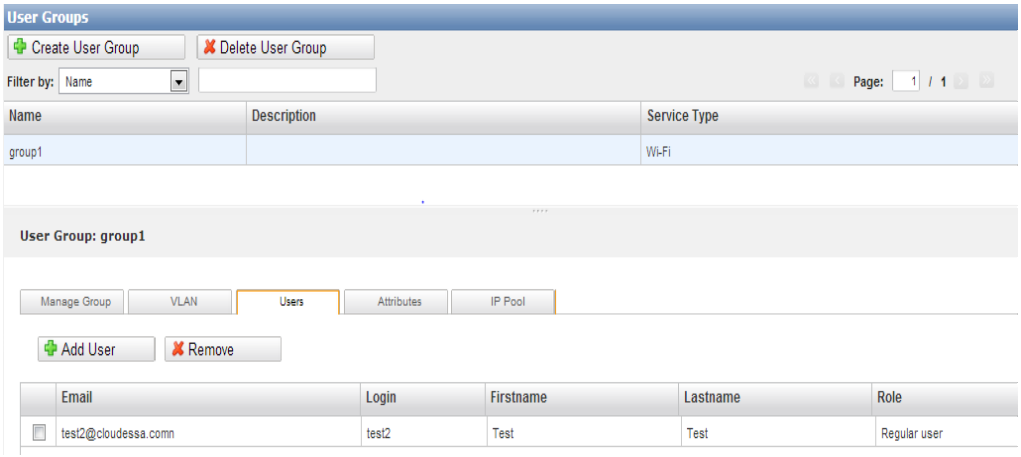
- Go to **Users** and click **Create**
- Specify login as *test*, email as *test2@cloudessa.com* and password as *mypassword*
- Click **OK**

Now create a group:



- Go to **User Groups** and click **Create**
- Specify name as *Group1*
- Select the service this group will be using, such as *Wi-Fi*
- Click **OK**

Now add the user to the group:



- Select *Group1*
- Go to **Users** tab.
- Click **Add user** and select user *test*
- Click **OK**

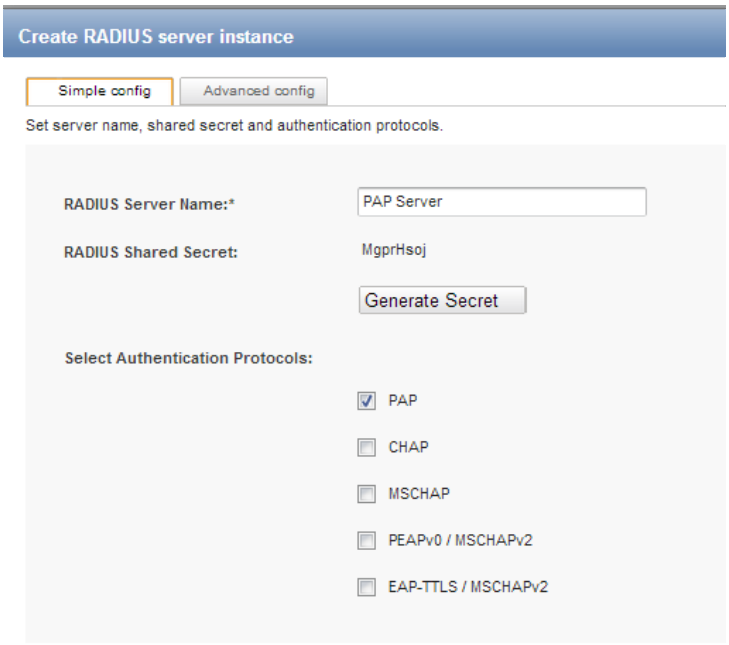
The user will then be displayed as added to the group.

Now we have created user *test* which is a member of *Group1*.

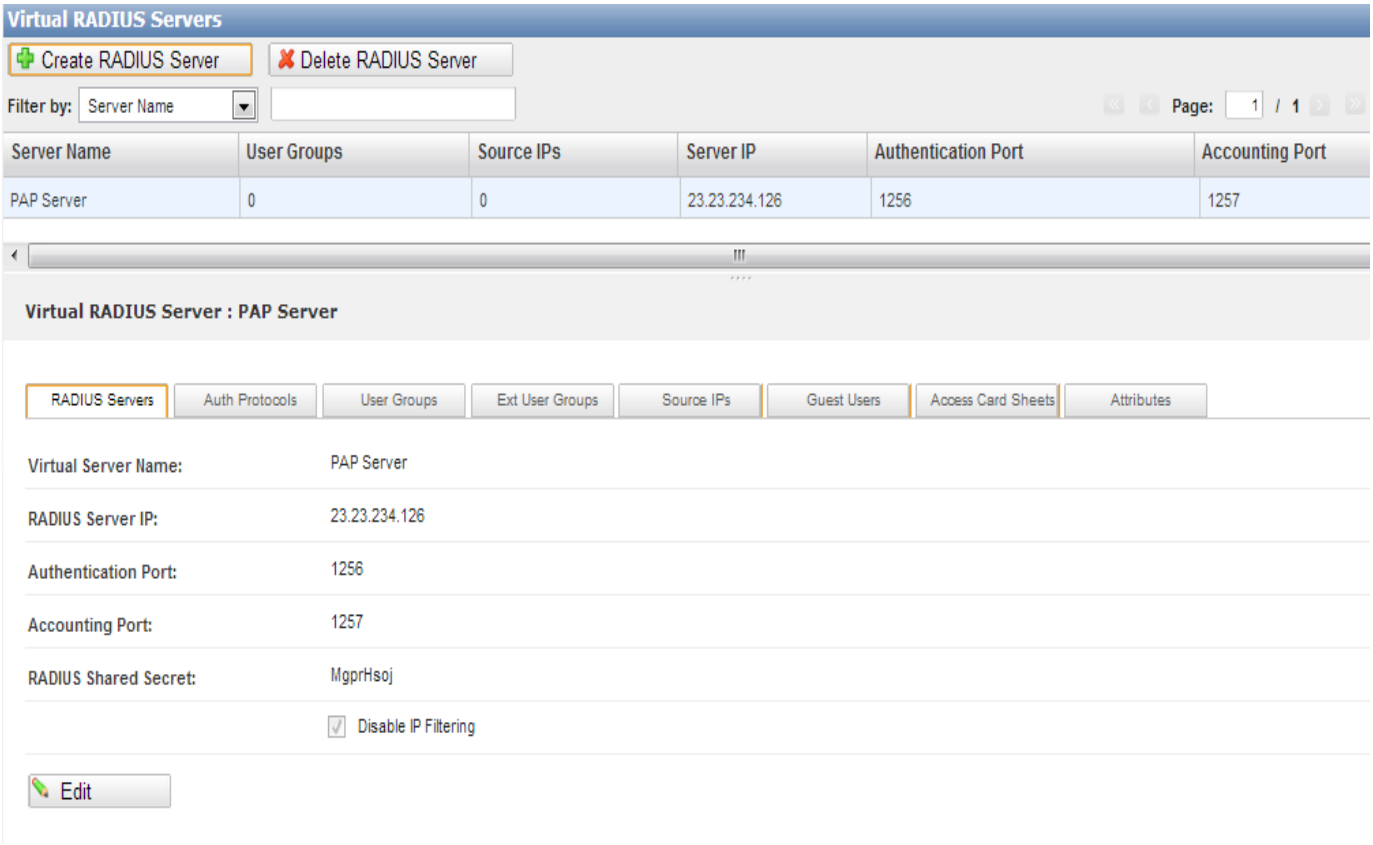
Lesson 2: Create a simple PAP server.

In this lesson we create a simple authentication server that authenticates users using PAP protocol.

First lets create a virtual RADIUS server:

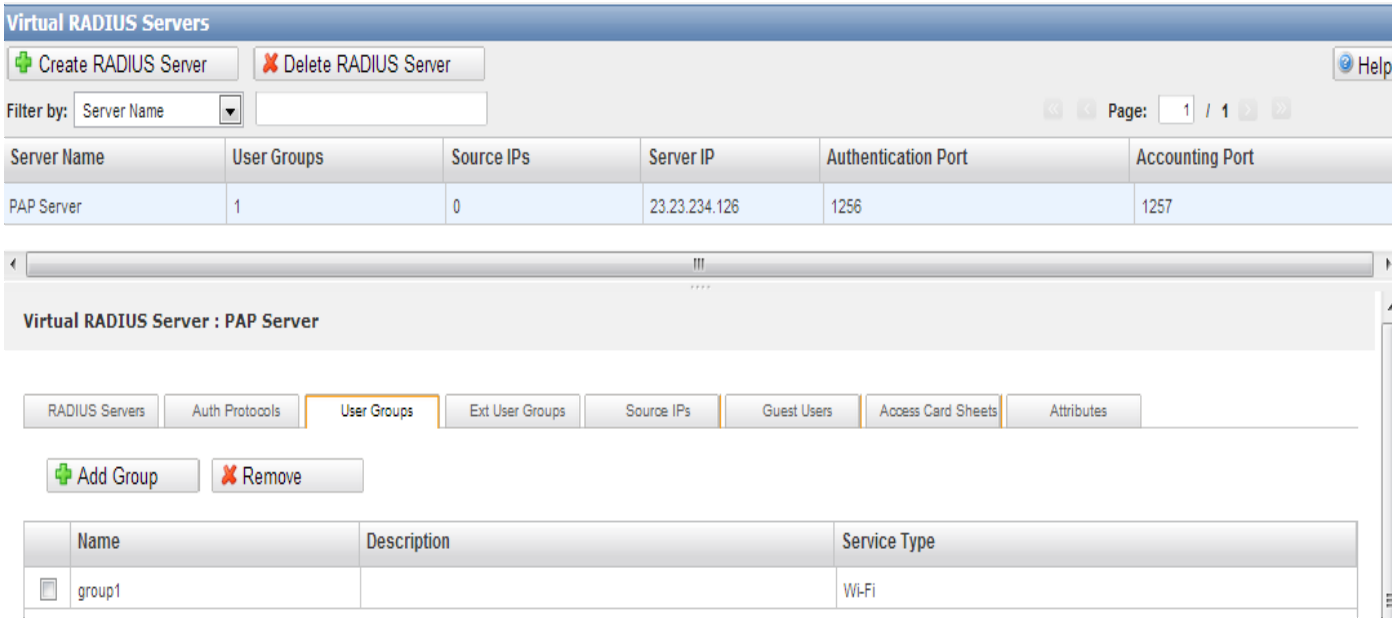


- Go to **Virtual Servers**, click **Create**
- In the pop-up window set server name to **PAP Server** and protocol to **PAP**
- Click **OK**. Now the server is created
- Now click on the server entry to see the **IP address**, the **shared secret** as well as the **authentication and accounting port numbers** for the server. You need this information to configure your RADIUS client



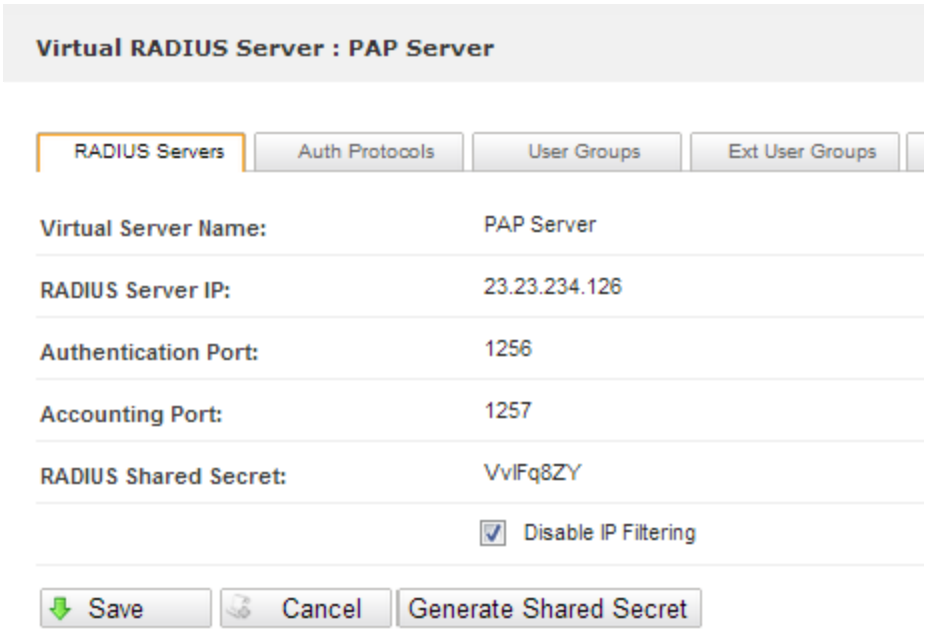
Now we need to specify user groups that have access to the RADIUS server.

- Select *PAP Server* in the **Virtual Servers** table
- Go to **User Groups** tab
- Click **Add Group** and select *Group1* (we have created it in Lesson 1)



Now let us specify that the server will accept PAP requests from all sources.

- Select *PAP Server* in the **Virtual Servers** table
- Click **Edit**
- Set **Disable IP filtering** checkbox



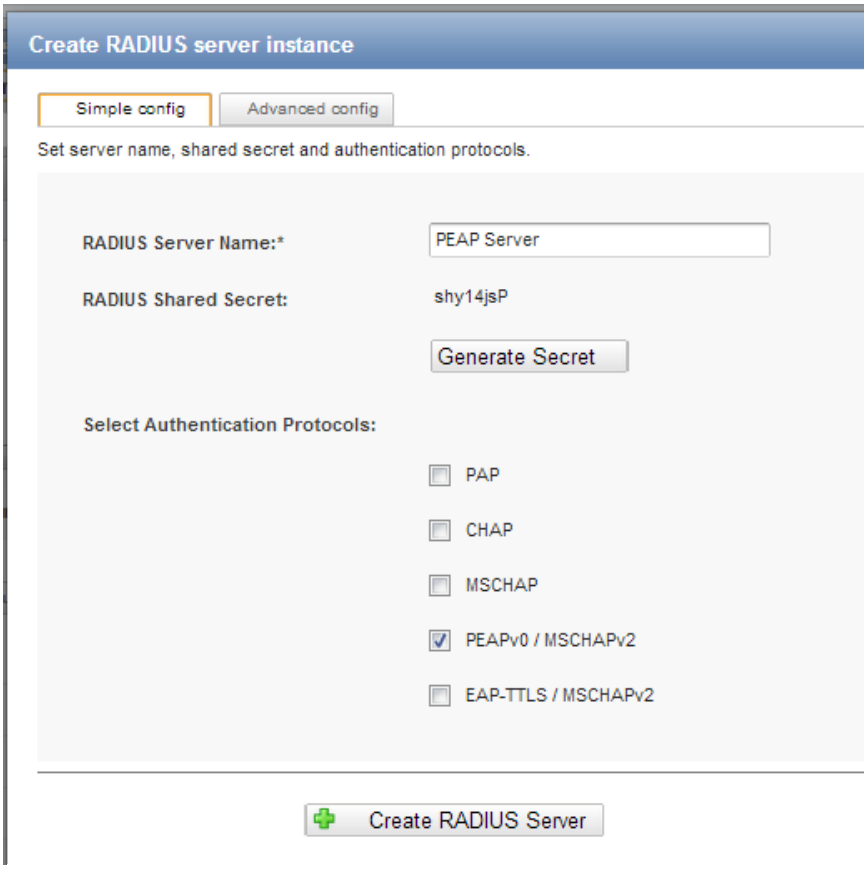
Now the PAP server is running and authenticating users from `Group1`.

Lesson 3: Create a simple WPA2-Enteprise/PEAP server.

PEAP is a protocol widely used to secure Wi-Fi.

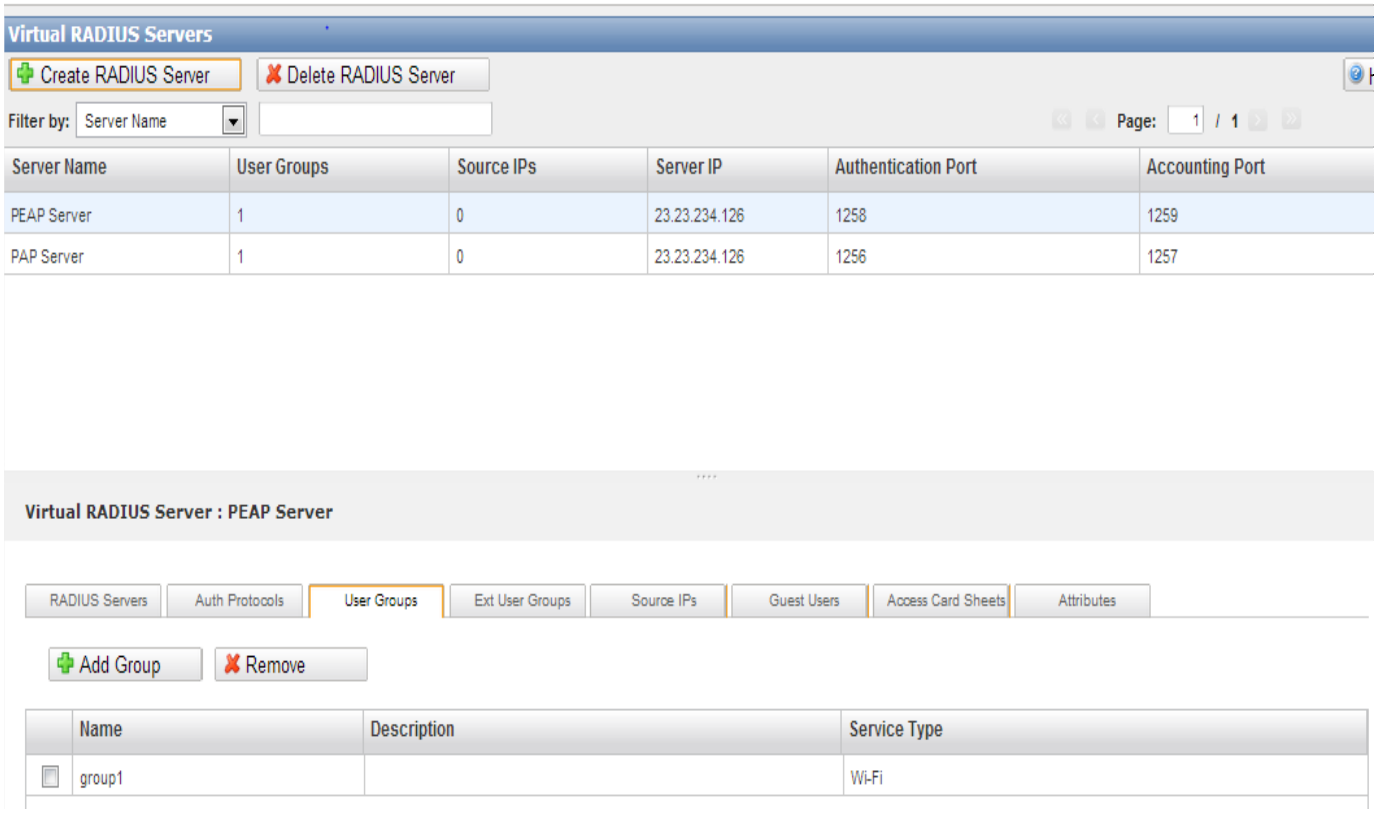
In this lesson we create a simple PEAP server.

- Go to **Virtual Servers**, click **Create**
- In the pop-up window set server name to *PEAP Server* and protocol to *PEAPv0/MSCHAPv2*
- Click **OK**. Now the server is created
- Now click the server entry to see the **IP address** as well as the **authentication and accounting port numbers** for the server. You need this information to configure your RADIUS client



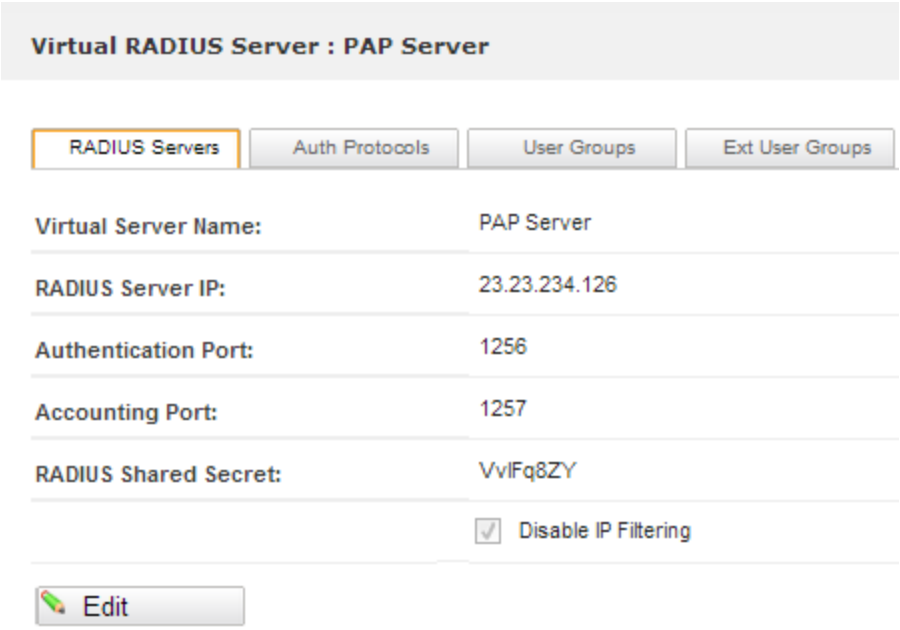
Now we need to specify user groups that can authenticate against the RADIUS server.

- Select *PEAP Server* in the **Virtual RADIUS Server** table
- Go to **User Groups** tab
- Click **Add Group** and select *Group1* (we have created it in Lesson 1)



Now lets specify that the server will accept PEAP requests from all sources.

- Select *PEAP Server* in the server table
- Click **Edit**
- Set **Disable IP filtering**



Now the PEAP server is running and authenticating users from Group1.

Lesson 4: Restrict access by source IP addresses.

For security reasons it is important to restrict access to the server to a set of allowed source IP addresses.

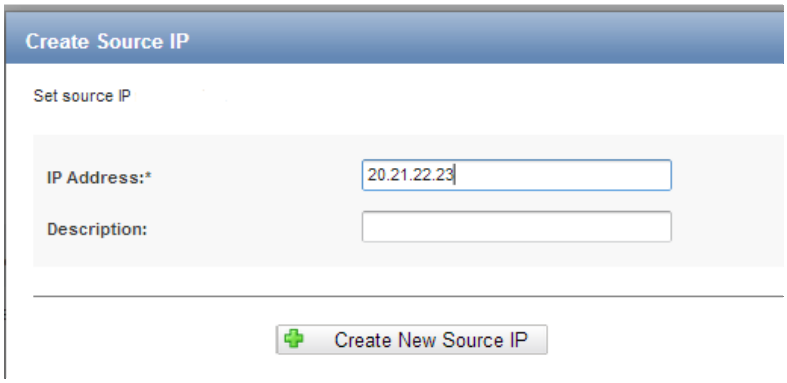
In this lesson we learn how to restrict access to Cloudessa by source IP address.

The server will then only accept a RADIUS request if it comes from one of the allowed source IP addresses.

Note: if your RADIUS client or Network Access Server is behind a firewall, then the source IP address that Cloudessa will see is the IP address of the firewall.

Let us assume that the ip address of your firewall is *20.21.22.23*.

First lets create a source IP address.

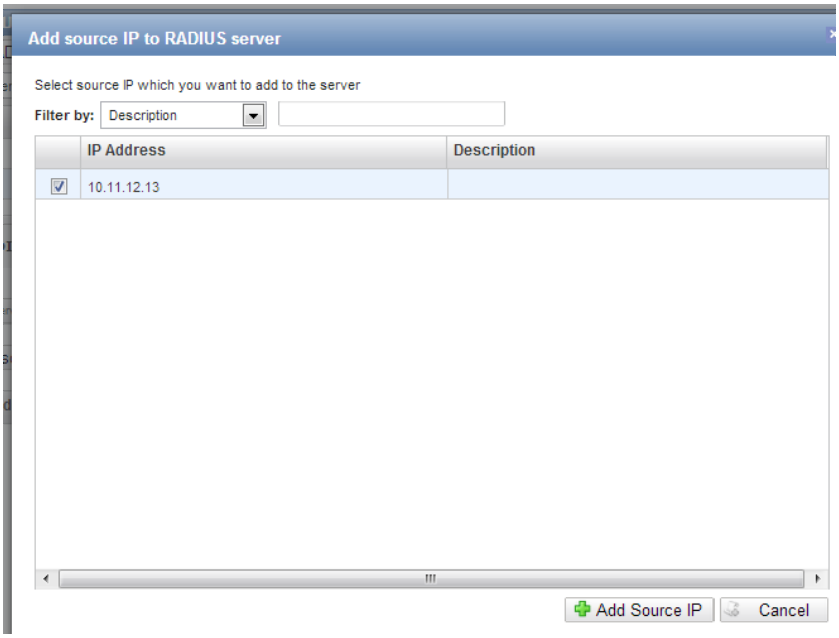


- Go to **Src IP Addresses**, click **Create**
- In the pop-up window set the IP address to *20.21.22.23*
- Click **OK**. Now the source IP address is created

\

Now we need to add this source IP address as allowed for the *PAP server* we created in Lesson 2.

- Select *PAP Server* in the server table
- Click *Edit*, unset **Disable IP filtering** checkbox, and click **Save**
- Go to **Src IP Addresses** tab
- Click **Add src IP address**, and select *Gateway1*

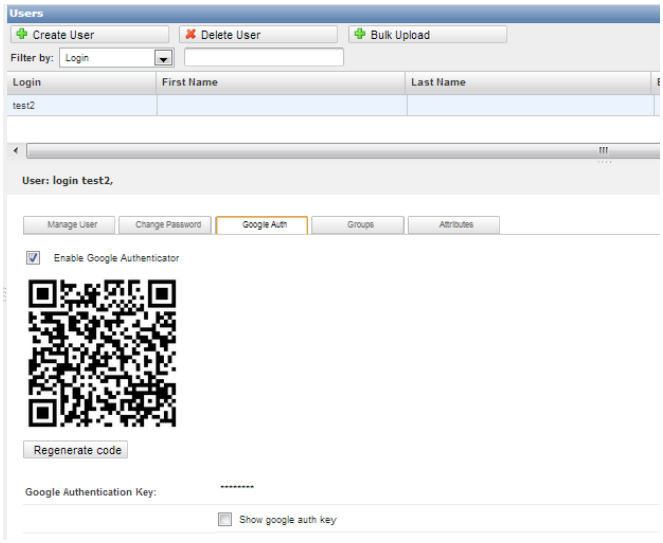


Now *PAP Server* is running and accepting only requests that come from the ip address *20.21.22.23*.

Lesson 5: Enable Two-factor authentication.

To enable two-factor authentication for user *test*.

- Select user *test* in the **Users** panel
- Select **Google Auth** tab
- Set **Enable Google Authenticator**. A bar code will be generated



Now one needs to setup the smartphone for the user.

- Download Google Authenticator app for

  iPhone http://itunes.apple.com/us/app/google-authenticator/id388497605?mt=8

  Android https://play.google.com/store/search?q=google+authenticator

  WindowsPhone http://www.windowsphone.com/en-US/apps/021dd79f-0598-e011-986b-78e7d1fa76f8

  Blackberry http://m.google.com/authenticator

- Scan user barcode into Google Authenticator app

- The app will start displaying temporary six-digit codes

To perform two-factor authentication into Cloudessa RADIUS

- use the password composed of your regular password and the six digit code, separated by a comma

As an example:

login: *test*

password: *mypassword,315425*

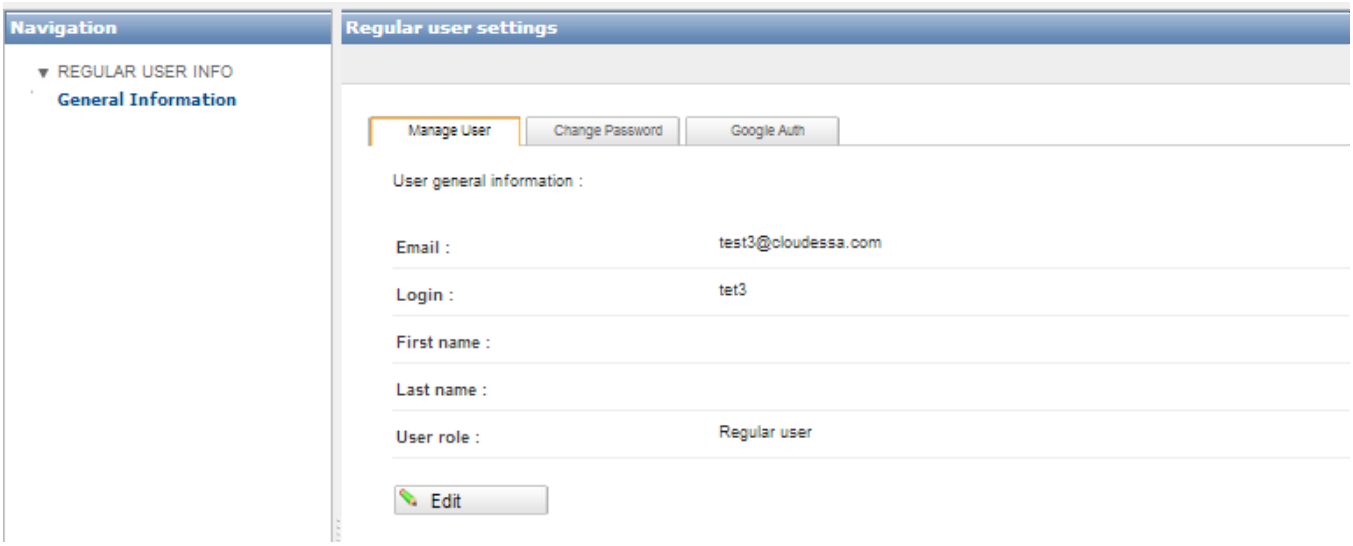
Lesson 6: Let users change and reset passwords.

Cloudessa enables regular RADIUS users to change their passwords using a simple web interface.

If you do not want a particular user to be able to change or reset his password, you can unset **Allow user to manage his password** checkbox in the user settings tab.

To access the simple web interface for user `test` created in Lesson 1.

- Go to Cloudessa login page https://app.cloudessa.com/account/login
- Enter user email *test@cloudessa.com`* and password *mypassword*
- You will be presented with the simple web interface panel.



To change user password

- Select to the **Set Password** panel
- Set the new password

If the user needs to reset her password

- User clicks on the `Reset password` link included in **Cloudessa login page** https://app.cloudessa.com/account/login

- Password reset instructions are emailed to the user

Lesson 7: Manage RADIUS attributes.

Cloudessa lets you set RADIUS attributes that the virtual server will return in RADIUS response messages. You can set return attributes for a server, a user group or a particular user.

As an example, to return *Framed-IP-Address*\ attribute value of *12.13.14.15* for user *test* created in Lesson 1

- Select user *test* in the **Users** panel
- Select **Attributes** tab and click **Add**
- Select *RFCs* dictionary
- Select *Framed-IP-Address* attribute and set attribute value to *12.13.14.15*
- Click **OK**

Note: for a particular authentication request, Cloudessa RADIUS first identifies the user, the user group and the virtual RADIUS server, and then adds up the corresponding three sets of attributes. If the same attribute value is set for the user, the user group and/or the RADIUS server, then the user group attribute overrides the server attribute, and the user attribute overrides the user group attribute.

Lesson 8: Create guest login.

To give your guest *guest1@gmail.com* a temporary login into the *PEAP server* created in Lesson 3.

- Go to the **Guest Users** tab
- Click **Create Guest User**
- Enter guest email *guest1@gmail.com*
- Set the **Expiration date** to, e.g., *May 1, 2013*
- Click **OK**

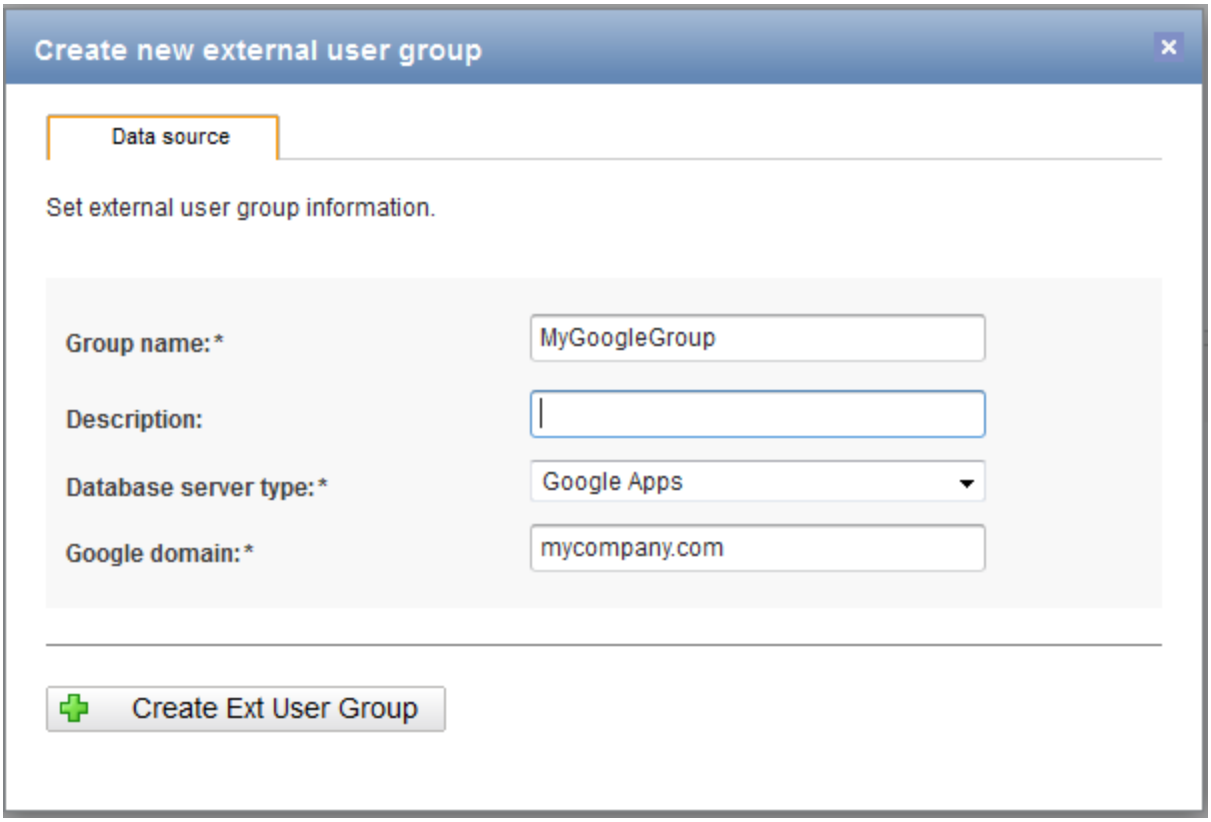
Lesson 9: Authenticate users using Google Apps.

In this lesson you learn how to authenticate users using their Google Apps usernames and passwords.

Lets suppose you have Google Apps for the domain *mycompany.com.* You want to give your Google Apps users access into the *PAP server* created in Lesson 4.

First create an external user group that will map to Google Apps

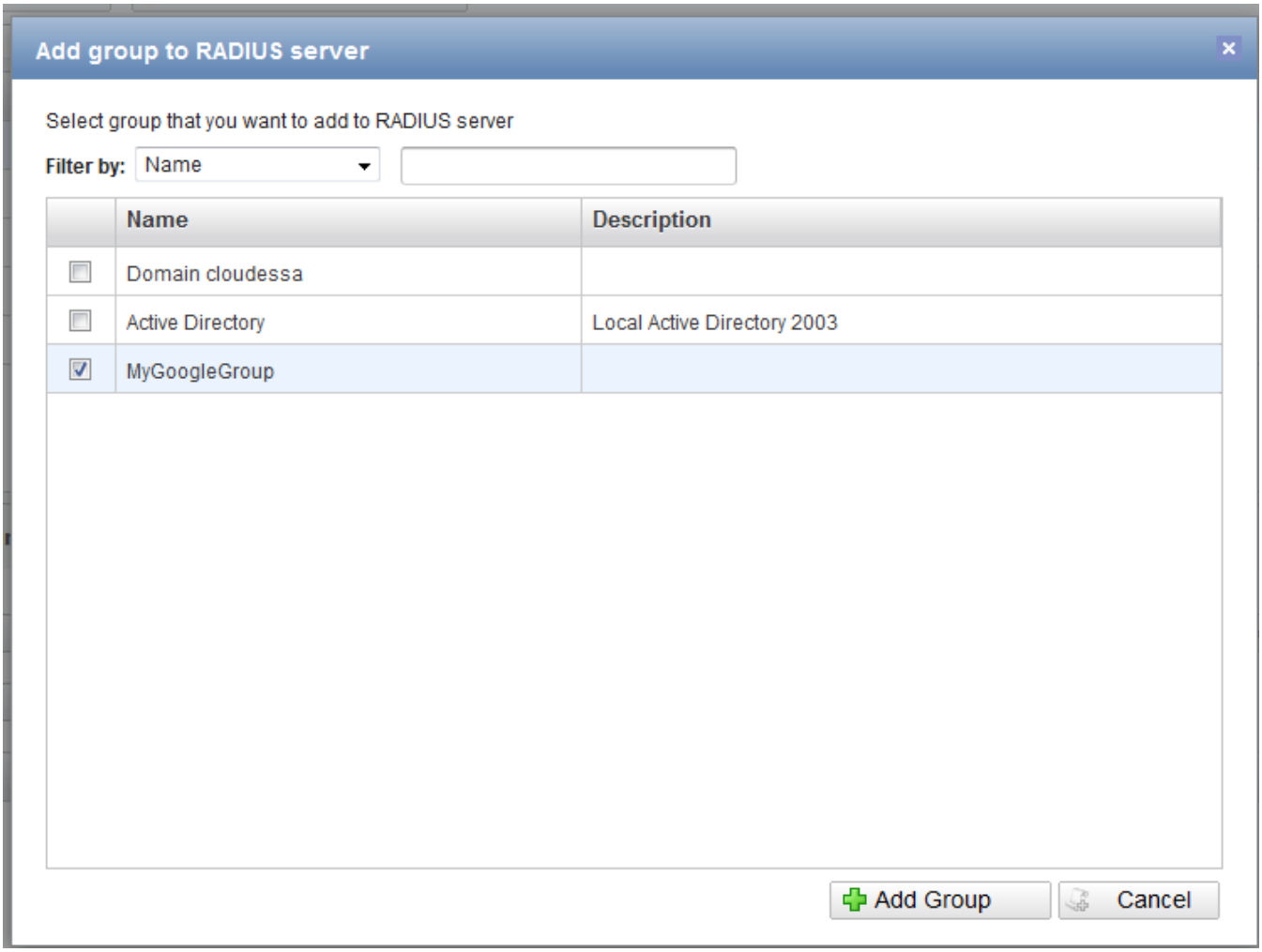
- Go to the **External User Groups** menu
- Click **Create Ext User Group**
- Type *MyGoogleGroup* as group name
- Choose *Google Apps* as **Database Server Type**
- Enter *mycompany.com* as **Google Domain**
- Click **Create Ext User Group**



Second attach the group to the *PAP Server*

- *Go to* **Virtual RADIUS Servers**
- Select *PAP Server*
- Go to **Ext User Groups** tab
- Click **Add Group**
- Choose *Google* group

- Click **Add Group**



Section 2: Users and Groups.

2.1 Users.

Cloudessa supports the following user roles:

- *Primary Admin (root)* manages all Cloudessa features. Primary Admin can not be deleted.
- *Admins* manage all Cloudessa features, authenticate against virtual RADIUS servers and access the full web interface. An admin can be deleted by the primary admin. An admin can create another admin.
- *Users* can use Cloudessa RADIUS server for authentication, authorization and audit. They can also optionally manage their passwords through the web interface, if permitted by the administrator.
- *User Managers* can use Cloudessa RADIUS server for authentication , as well as create, remove and manage RADIUS users.
- *Guest Users* can have temporary guest access to the Cloudessa RADIUS server for authentication, authorization and audit.

Users have two important artributes:

- *email* is used to identify the users to the web interface
- *RADIUS login* is used to identify the user during the RADIUS authentication session

If the administrator sets the *"User Can Manage his password"* flag for the user, the user can use web interface to change and reset her password.

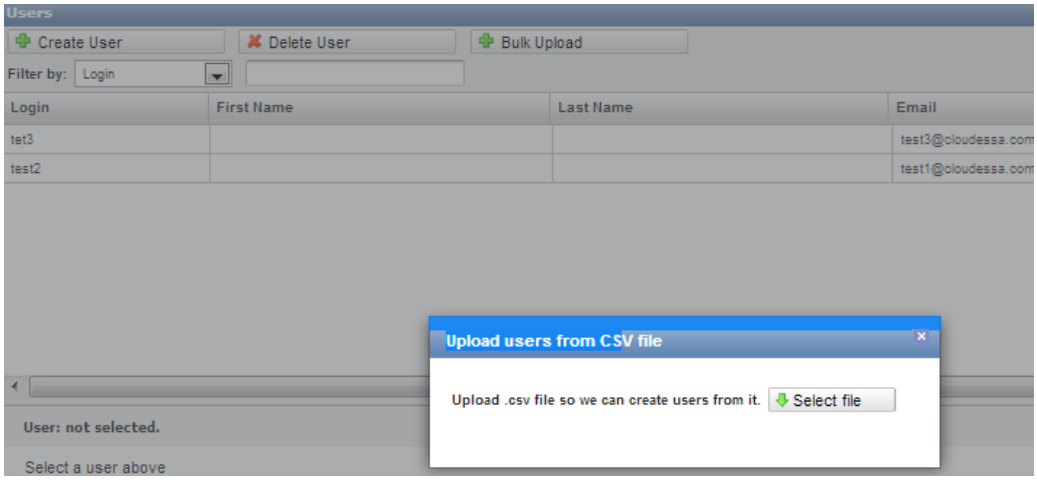
Note that the same password is used both for the web interface and for the RADIUS server.

2.2 Bulk User Import.

Cloudessa allows admins to perform bulk user import and creation using a CSV file. The CSV file shall contain a set of lines in the following format "*username, password*".

To bulk upload users, one shall

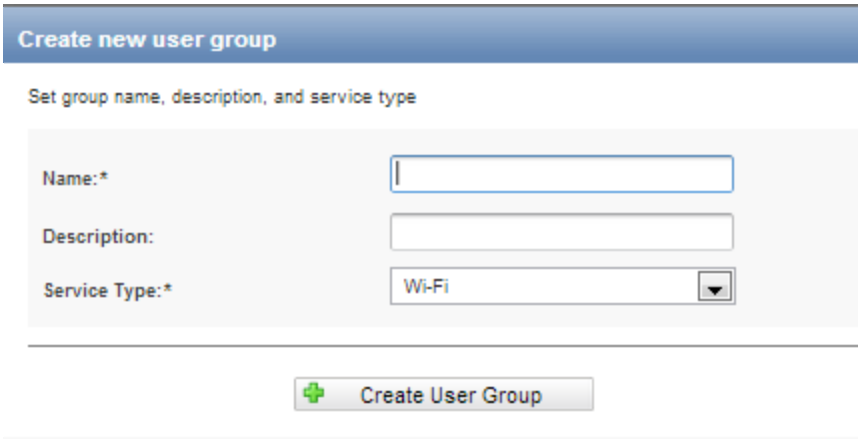
- Click the **Bulk Upload** button in the web interface
- Choose the CSV file to upload
- Click **OK**



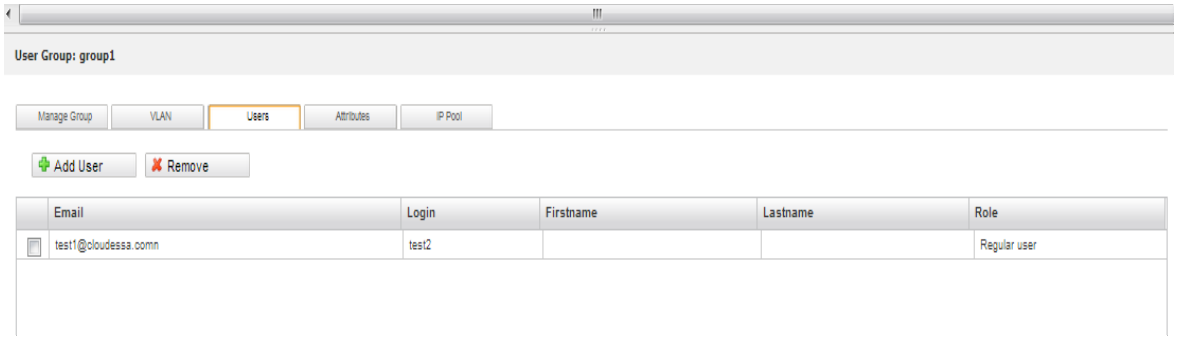
2.3 User Groups.

A user group includes group name, description, and the service type that this group is provided access to. Currently the available services are *Wi-Fi*, *VPN*, *SSH*, *Local login*, and *Other*.

To create a group one clicks on the **Create User Group** button in the **User Groups** menu.



The user membership in the group can be managed from the **Users** tab.



When a user group is added to a virtual RADIUS server, all users in this group are permitted to authenticate against this server and can access services protected by the server.

There is one default group “All Users”. This group includes all users.

2.4 External User Groups Overview.

External User Groups are used to authenticate against external user stores, such as Google Apps, LDAP, Active Directory, or databases such as MySQL, Oracle or DB2.

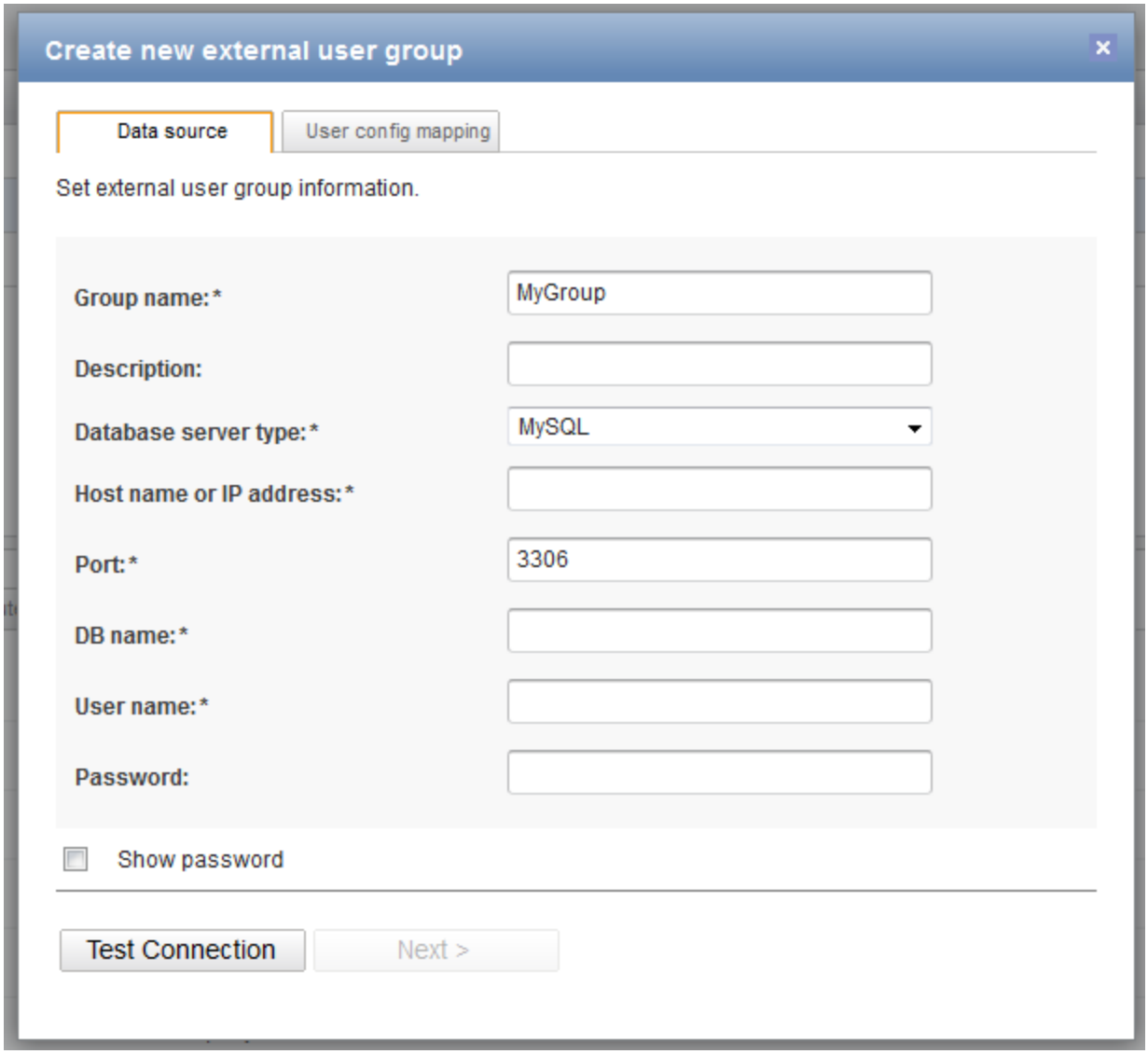
Each External User Group corresponds to a particular external user store.

- When multiple external user groups are added to a virtual server and a user tries to authenticate, then all internal and external groups are tried in a sequence.
- If at least one group includes the user and authentication against this group succeeds then the user is allowed to authenticate against the virtual server.

This means that in order for the user authentication to succeed success at least one external or internal group need to return success for authentication of this user.

To create an external user group,

- Go to **External User Groups** menu
- Click the **Create Ext User Group** button.

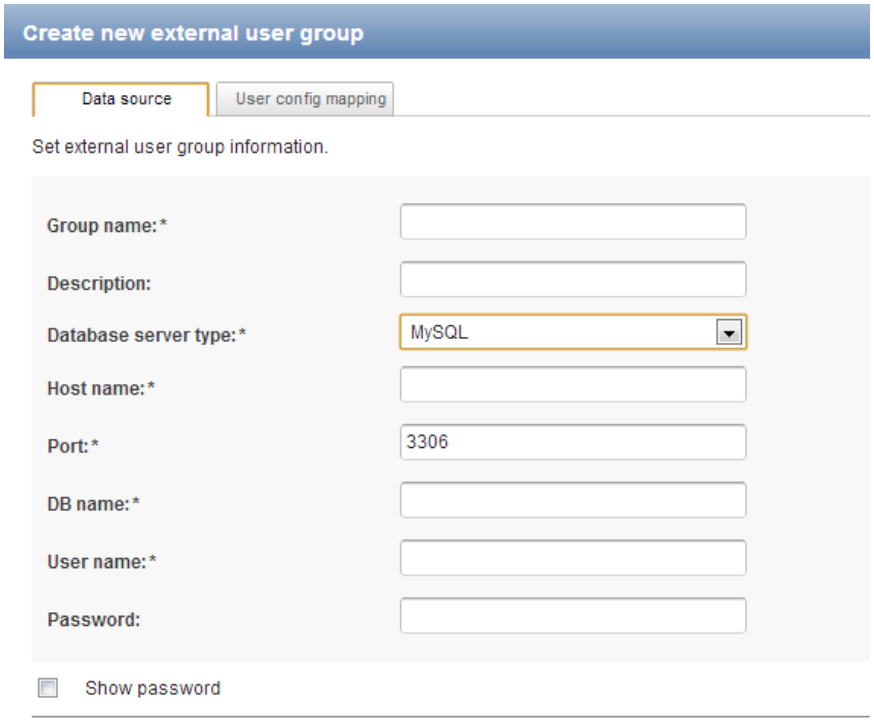


Depending on the user store, different parameters are required to set up an External User Group.

2.5 External User Groups: SQL Databases

For SQL databases, such as MySQL, Oracle or DB2 the following parameters are required:

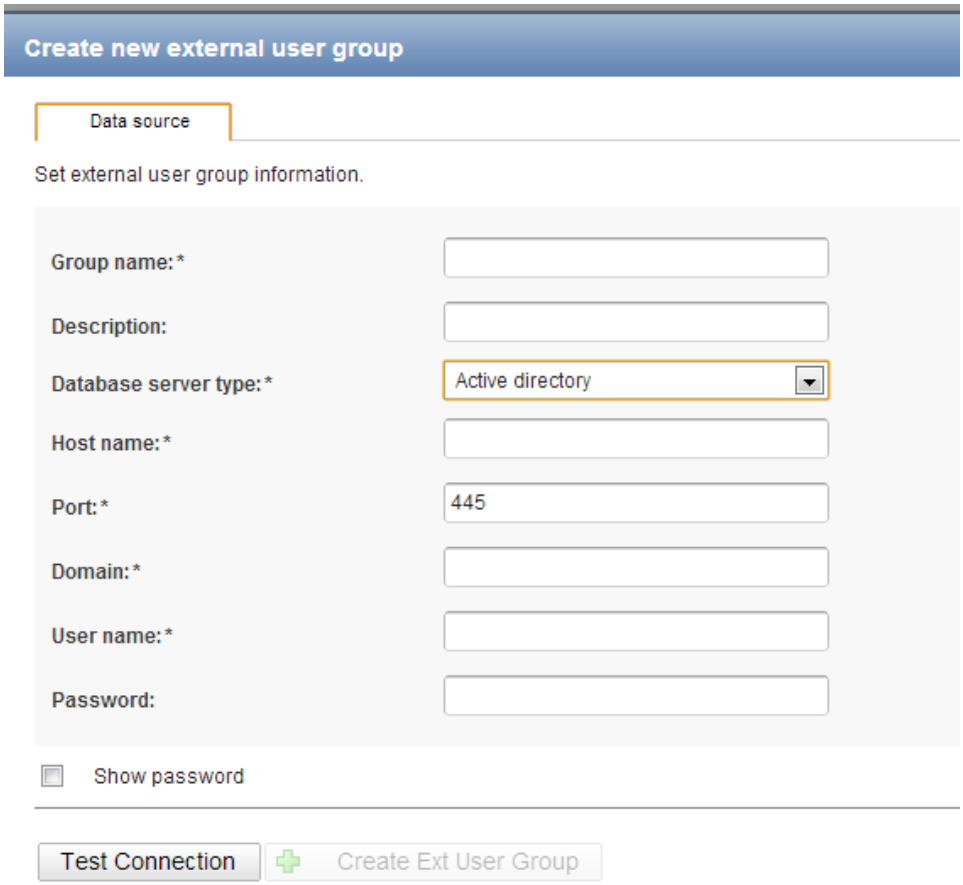
- Host name - domain name or IP address of the database server
- Port - port on the database server, the default port is preset (such as 3006 or MySQL)
- DB Name - name of the database
- User name - username to connect to the database
- Password - password used to connect to the database



2.6 External User Groups: Active Directory.

For Microsoft Active Directory, the following parameters are required

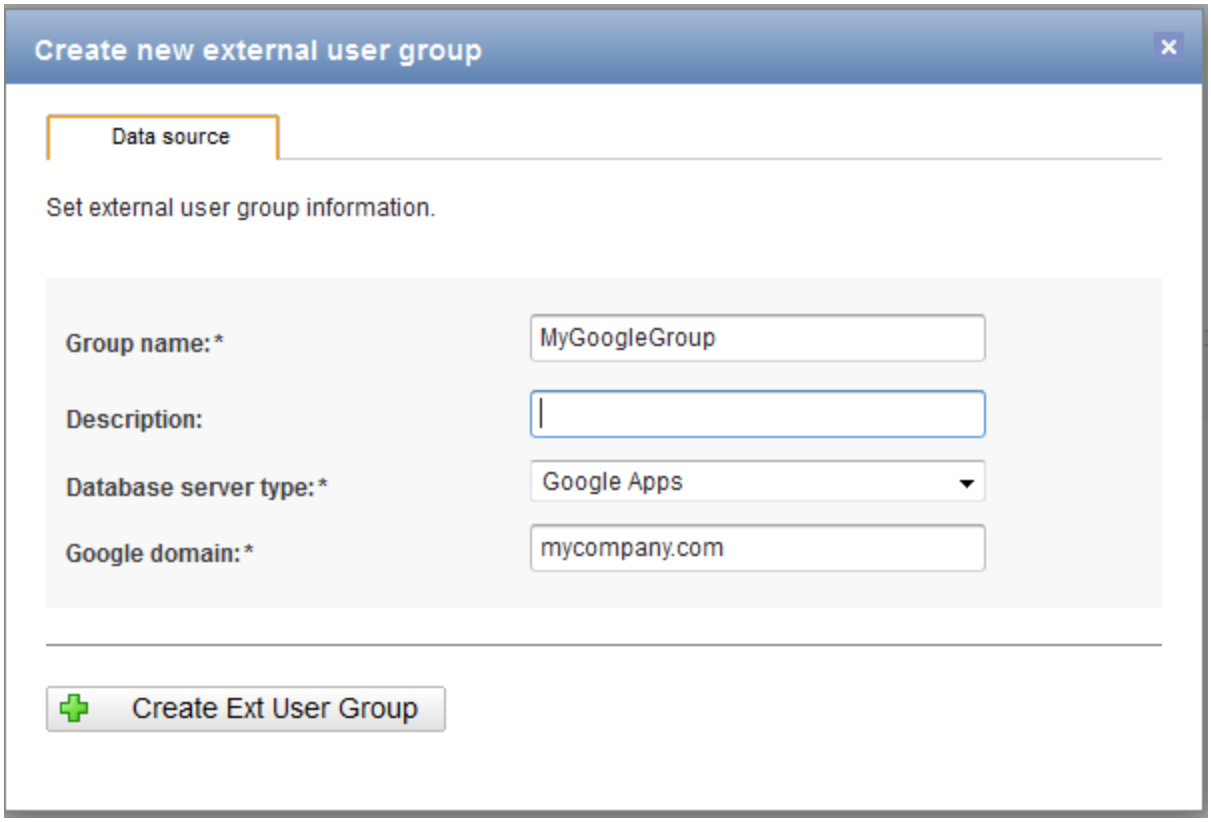
- *Host name* - domain name or IP address of the Active Directory host
- *Port* - port on the Active Directory host, the default is 445
- *Domain* - Windows domain
- *User name* - user name to connect to Active Directory
- *Password* - password to connect to Active Directory



2.7 External User Groups: Google Apps

Cloudessa allows to create an external user group that is mapped to all users from a Google Apps Domain. This means that you can use Google Apps usernames and passwords to authenticate your VPN and Wi-Fi users using PAP and EAP-TTLS protocols.

To create an external user group for Google Apps, go to **External User Groups** click the **Create Ext User Group** button and choose *Google Apps* as an external user group type.



The following parameters are required

- *Google Domain* - domain name for your Google Apps such as *mycompany.com*

You can use Google Apps authentication with PAP, and EAP-TTLS/PAP protocols. Create a Virtual RADIUS server with PAP or EAP-TTLS/PAP protocols enabled and attach the external user group to this server.

- PAP protocol is normally used to authenticate your VPN users
-
- EAP-TTLS/PAP is used to to authenticate your Wi-Fi users.

Windows 8, Android, Linux, and iOS support EAP-TTLS/PAP protocol for Wi-Fi connections. For older versions of Windows you need to use a third party EAP-TTLS client, such as

- www.securew2.com (commercial) or
- Intel Pro Wireless (free client for Intel Centrino platform).

Section 3: Virtual RADIUS Servers.

3.1 RADIUS Server Basics.

Cloudessa allows to create multiple Virtual RADIUS servers. Each virtual RADIUS server corresponds to what used to be a dedicated software or hardware RADIUS server.

Each Virtual RADIUS Server is described by three parameters

- *RADIUS Authentication Port* - the server listens on this port for incoming authentication requests
- *RADIUS Accounting Port* - the server listens on this port for incoming accounting requests
- *RADIUS Secret* - communications with the server are protected using this secret.

To configure your Access Point, Network Access Server, VPN or other RADIUS-enabled hardware or software to communicate with Cloudessa, you need to enter these three pieces of information into your RADIUS-enabled hardware or software.

3.2 Creating a Virtual RADIUS Server - Simple Config.

To create a Virtual RADIUS Server use **Create RADIUS Server** Dialog in **Virtual RADIUS Servers** menu.

The **Simple Config** tab includes widely used protocols:

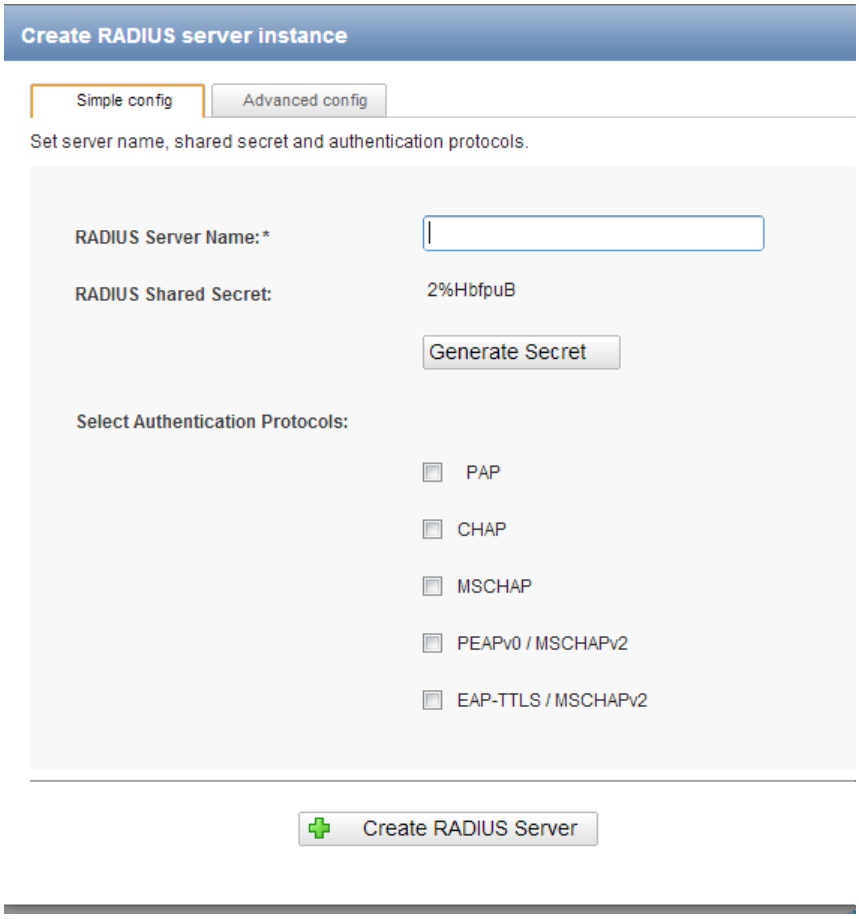
PAP, *CHAP*, and *MSCHAP* are the protocols frequently used by hardware network devices, such as VPNs an Routers.

PEAPv0/MSCHAPv2 is widely used EAP-based protocol used to secure WiFi.

EAP-TTLS / MSCHAPV2 is another widely used EAP-based protocol used to secure WiFi.

To create a Virtual RADIUS Server

- Click **Create Virtual RADIUS Server**
- Specify server name
- *RADIUS secret* is automatically generated, you can regenerate it by pressing **Generate Secret** button.
- Choose protocol
- Click **Create RADIUS Server** button.



3.3 Creating a Virtual RADIUS Server - Advanced Config.

The Advanced Config tab includes all protocols supported by Cloudessa

PAP, *CHAP*, and *MSCHAP* are the protocols frequently used by hardware network devices, such as VPNs an Routers.

Cisco *LEAP* is EAP-based protocol designed by Cisco, which is used to secure Wi-Fi.

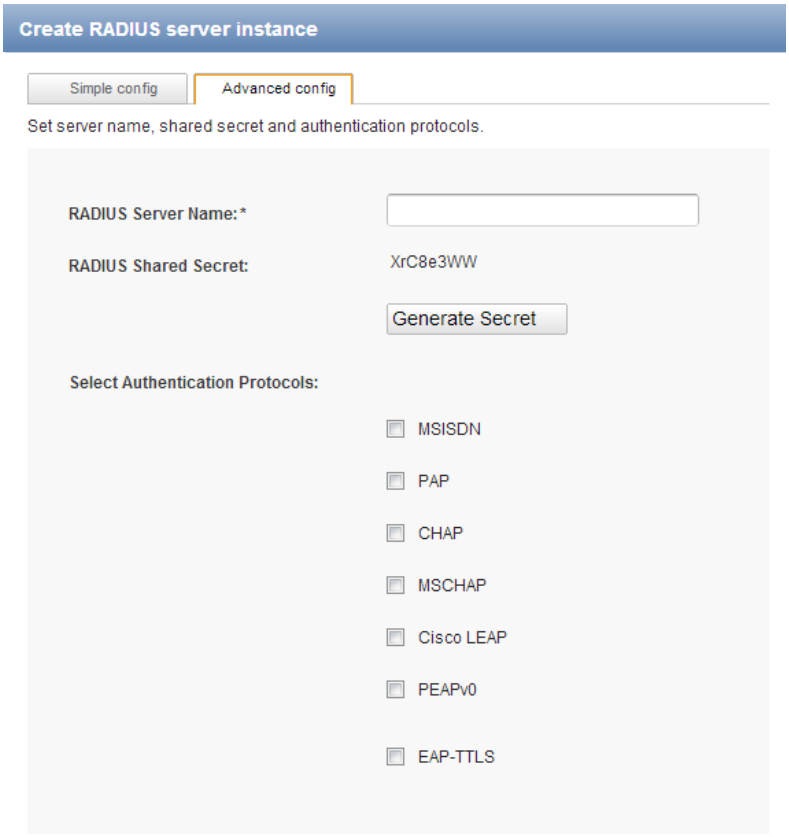
PEAPv0 is widely used EAP-based protocol used to secure WiFi. Once you select *PEAPv0* you can select *MD5* or *MSCHAPv2* as inner authentication protocols.

EAP-TTLS is another widely used EAP-based protocol used to secure WiFi. Once you select *PEAPv0* you can select PAP, CHAP, MSCHAP, MSCHAPv2, and MD5 as inner authentication protocols.

EAP-TTLS / MSCHAPV2 is another widely used EAP-based protocol used to secure WiFi.

To create a virtual RADIUS server:

- Click **Create Virtual RADIUS Server**
- Select server name
- *RADIUS secret* is automatically generated, you can regenerate it by pressing **Generate Secret** button.
- Choose protocol
- Click **Create RADIUS Server** button.



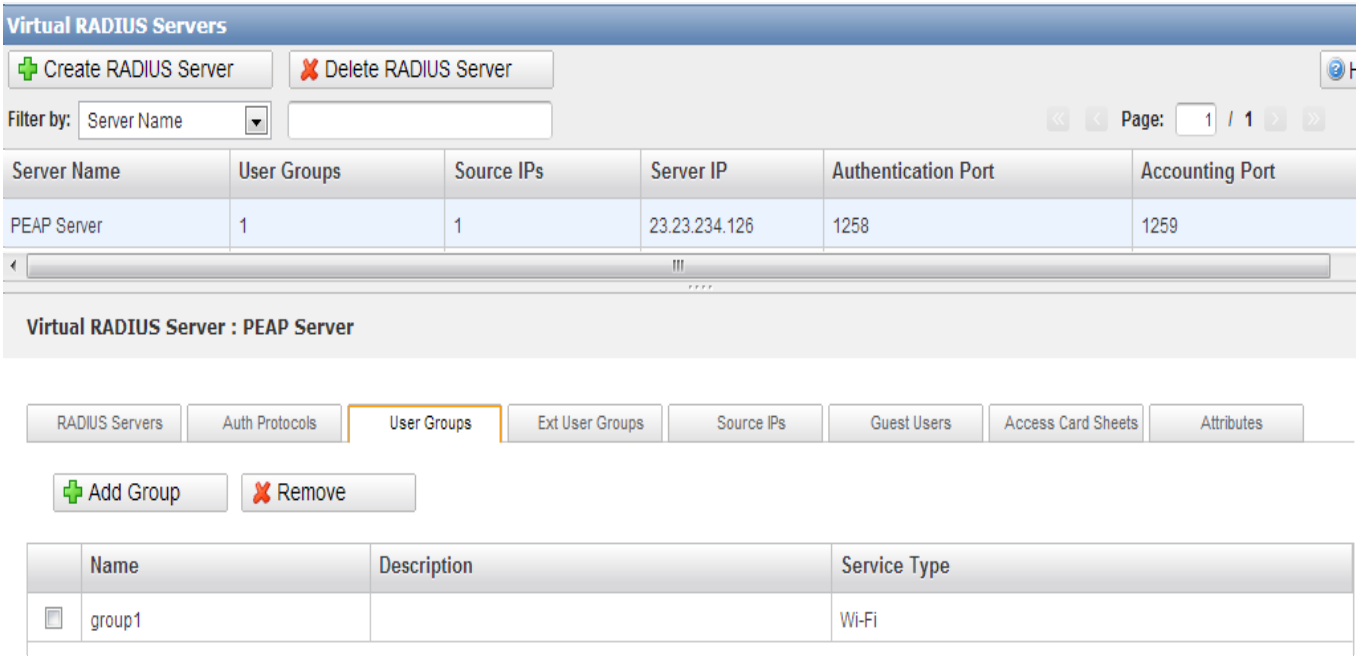
3.3 Permitting user groups to authenticate against the server.

Once you created a Virtual RADIUS server\, you need to specify which user groups (internal or external) can authenticate against this server.

To add a user group to a Virtual RADIUS server server.

- Select the server in the **Virtual RADIUS Servers** table
- Select the **User Groups** tab
- Click **Add Group** button

Note: in order for the user to be able to authenticate against a virtual RADIUS server, the user must belong to one of the user groups added to the server.

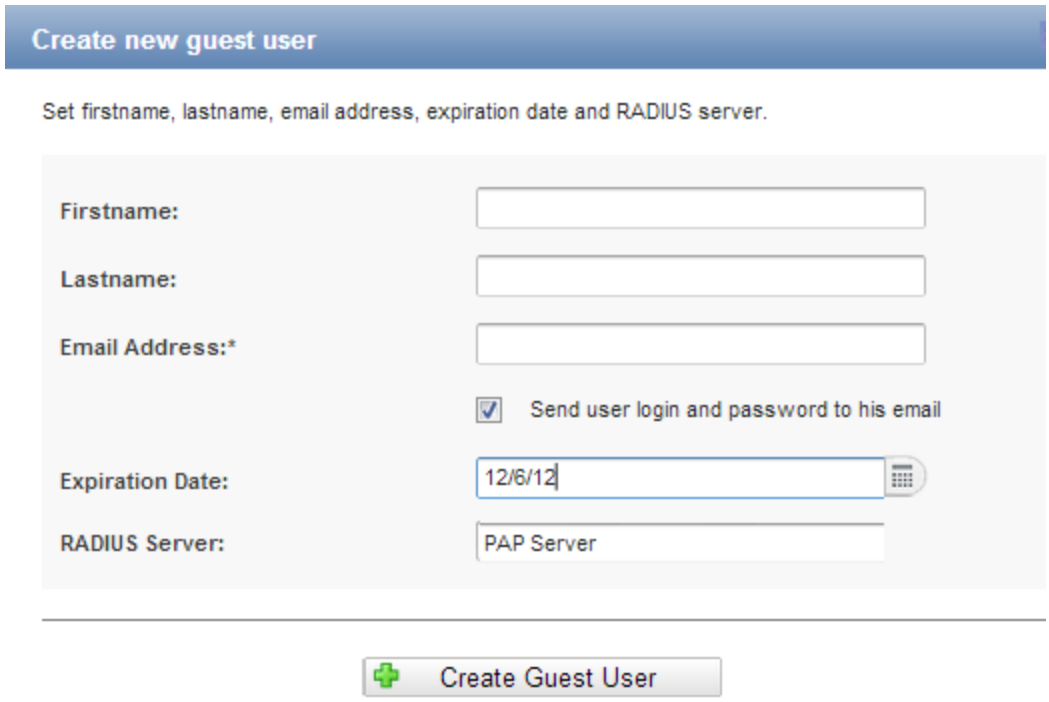


Section 4: Guest access.

4.1 Guest Users.

A guest user is a temporary user account which has an expiration date. It can used to provide access to a single virtual RADIUS server. Guest users are not allowed to access multiple servers.

To create a guest user, **Create New Guest User** dialog is used



The *expiration date* is the last day when the user is allowed to login.

If the **Send user login and password to his email** checkbox is set, the temporary login and password are emailed to the user.

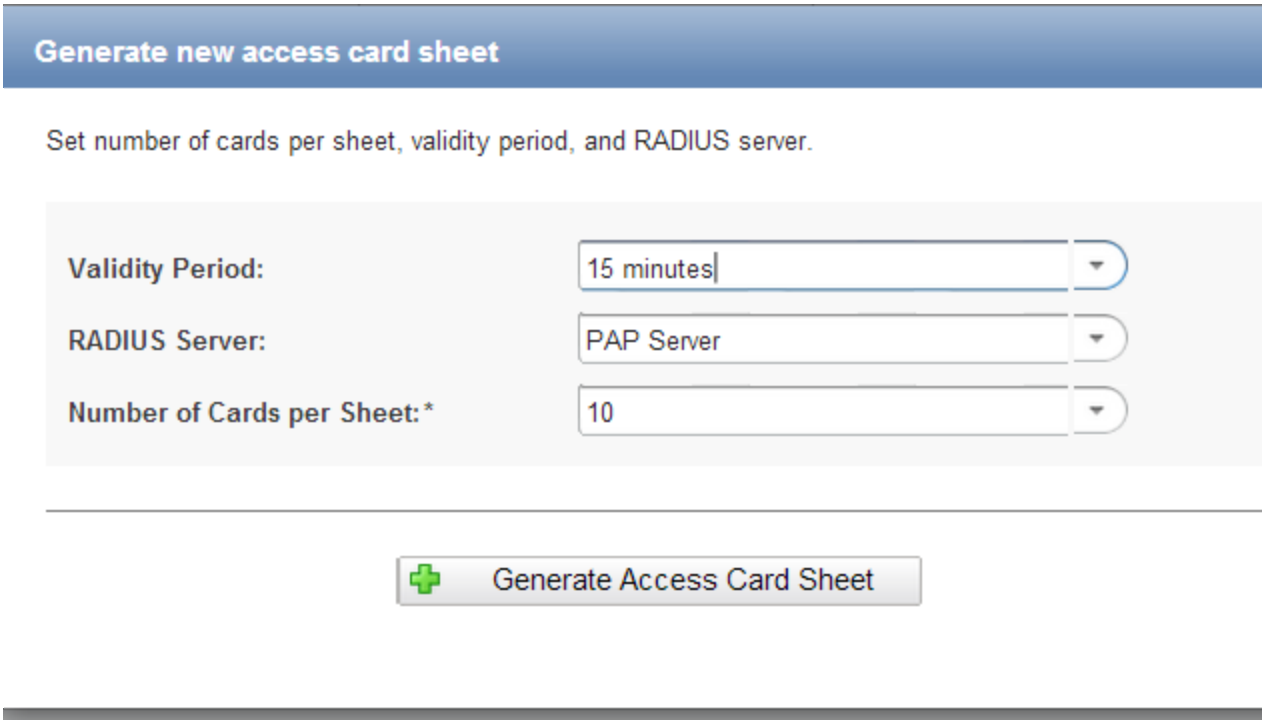
The RADIUS server is the server the guest user has access to. A guest user can only have access to a single virtual RADIUS server.

4.2 Access Card sheets.

An access card is a printable temporary access card that includes a temporary login and password. A sheet of access cards can be generated and then printed.

An access card can be used to provide access to a single virtual RADIUS server.

To create an access card sheet, user “Create New Access Card Sheet” dialog



Once the user is authenticated the user has access for *Validity Period* which starts from the first time the user authenticated. The virtual server will send the *Session-Timeout* attribute back to the wireless Access Point or Network Access Server, in order to disconnect the user after the validity period expires. During the validity period the user may authenticate multiple times.

The *RADIUS server* is the server the card provides access to.

The *Number of cards per sheet* is the number of cards printed in a single card sheet.

Section 5. Two-factor authentication.

5.1 Two-factor authentication basics.

Cloudessa utilizes Google Authenticator smartphone application that generates temporary PIN codes each 30 seconds.

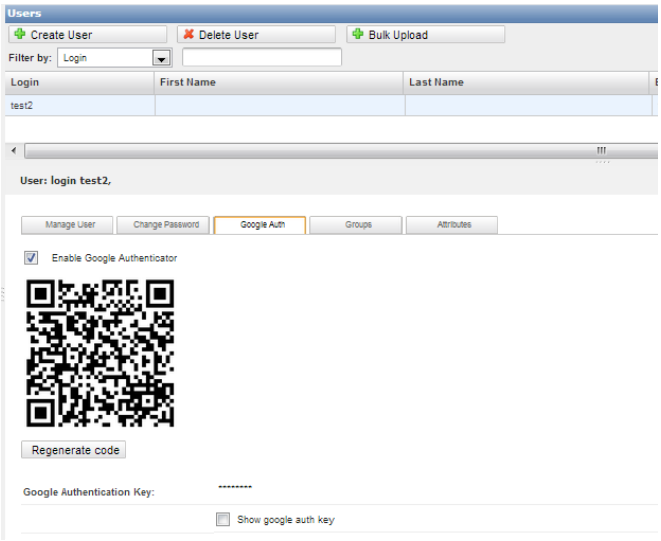
To authenticate to a virtual RADIUS server or to the Web UI, the user needs to posess two factors: the password and the temporary PIN. Therefore, without the smartphone the user can not authenticate, even if user password is stolen.

5.2 Enabling Two-Factor Authentication for a particular user.

Two-factor authentication is enabled on per-user basis. Once two-factor authentication is enabled for a particular user, both RADIUS access and Web UI access for this user will require the second authentication factor (PIN code).

To enable two-factor authentication for a particular user,

- select this user, select the **Google Authenticator** tab, and then select **Enable Google Authenticator**.
- User *secret master key* will be displayed as a bar code.
- This bar code needs to be scanned into the user smartphone (see the next section)



The *master key* can be regenerated by pressing **Regenerate Code** button.

As an option the *master key* can be displayed as a string. This feature is used for smartphones that do not have cameras and, therefore, can not scan the barcode. To display the code as a string, select the **Show Auth Key** checkbox.

5.3 Installing Google Authenticator.

To install Google Autnenticator on a smartphone:

- Download Google Authenticator app for

  iPhone http://itunes.apple.com/us/app/google-authenticator/id388497605?mt=8

  Android https://play.google.com/store/search?q=google+authenticator

  WindowsPhone http://www.windowsphone.com/en-US/apps/021dd79f-0598-e011-986b-78e7d1fa76f8

  Blackberry m.google.com/authenticator
- Scan user barcode into Google Authenticator app
- The app will start displaying temporary six-digit codes

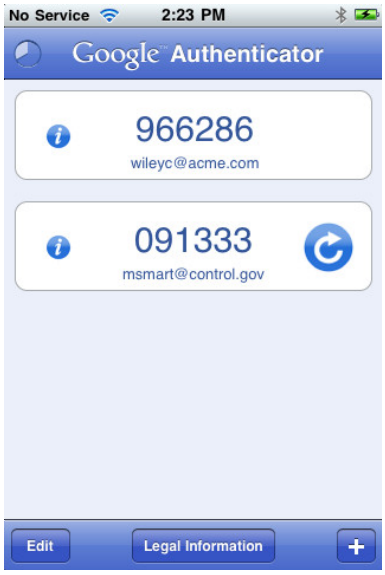
5.4 Scanning Bar Code into Google Authenticator.

To scan user barcode onto the Google Authenticator app

- open the Google authenticator app
- press + button, and then **Scan BarCode** button.
- Point the smartphone camera at the bar code, and press anywhere on the screen

If the smartphone does not include a camera, click + button, select **Time Based** and then manually type in the **Google Auth Key** string.

Once the bar code is scanned, the app will start displaying temporary 6-digit PINS.



5.5 Using Google Authenticator to log in to the Web Interface.

Once Google Authenticator is enabled for a particular user, two factor authentication is enabled both for RADIUS and for Web Interface.

To login into Web Interface

- Enter *username* and *password*
- A field prompting for the *PIN code* is displayed
- Read the *PIN code* from the smartphone and enter it

5.6 Using Google Authenticator to authenticate against a Virtual RADIUS server.

To authenticate against a virtual RADIUS server

- read the *temporary PIN* from the smartphone
- use in place of the regular password the following combination

Regular Password then comma then temporary PIN

For instance:

MyPassword,123456

Section 6. Securing Access To a Virtual RADIUS Server.

6.1 Introduction to Source IP Addresses.

To make sure that only authorized users have access to a virtual RADIUS server, it is important to restrict access to a set of permitted source IP addresses.

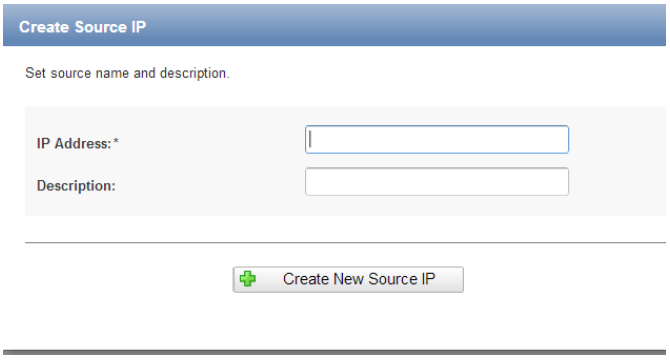
Typically an enterprise will use firewalls and gateways to separate the enterprise network from the public internet.

When Cloudessa receives a RADIUS request from a user authenticating to a Network Access Server (NAS), Wireless Access Point or enterprise VPN, the source IP address in the RADIUS request will typically be the source IPaddress of the firewall.

6.2 Defining Source IP addresses.

To secure your virtual RADIUS server, you first define the Source IP addresses for your organization.

- Obtain information about your organization public firewall and/or gateway IP addresses from your enterprise IT administrator
- For each IP address create a *Source IP address* entry using the **Create Source IP** dialog

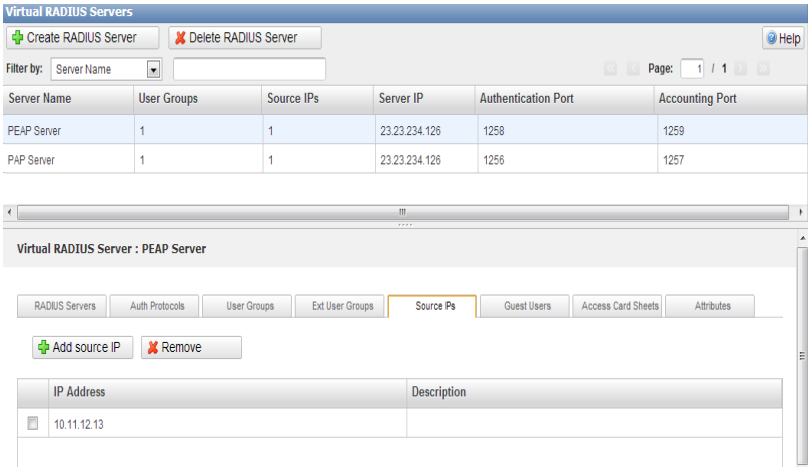


6.3 Adding Source IP addresses to RADIUS Server.

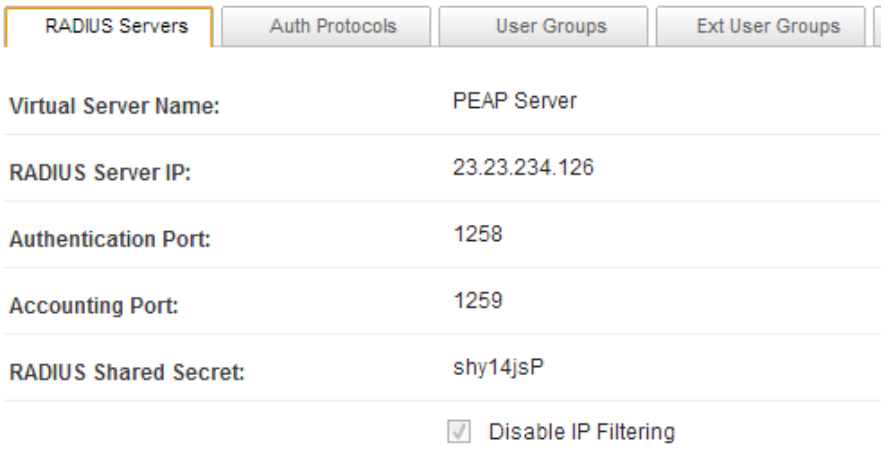
To allow a request from a particular *Source IP address* to be authenticated against a particular RADIUS Server.

- Select the RADIUS server
- Select the **Source IP** tab

- Click **Add Source IP**
- Choose the *Source IP* to add



You can disable the Source IP address checking by setting the **Disable IP filtering** checkbox for the server.



Section 7. Using Vendor Specific Attributes.

7.1 Vendor Specific Attribute Basics.

Vendor-Specific Attributes are pieces of information that the RADIUS server returns back to the Network Authentication Server or Wireless Access Point after the user has authenticated. Each Vendor Specific Attribute includes a name, and then a value, which could be an integer, a string or another value type.

Vendor specific attributes are typically used to control user session, such as session expiration time or the virtual network (VLAN) that the user is placed into.

RADIUS-enabled hardware and software solutions coming from different vendors typically have sets of vendors specific attributes, this sets are denoted as *dictionaries.* Also, there are Vendor Specific Attributes specified in public standards and RFCs.

Cloudessa works to constantly update the sets of vendor specific attributes available in the product.

7.2 User, Group and Virtual Server attributes.

You can assign a Vendor Specific Attribute value to a user, a group of users or a virtual RADIUS server.

When an authentication request comes to authenticate a particular user against a particular server, and if the authentication request is successful, the vendor attributes are added up:

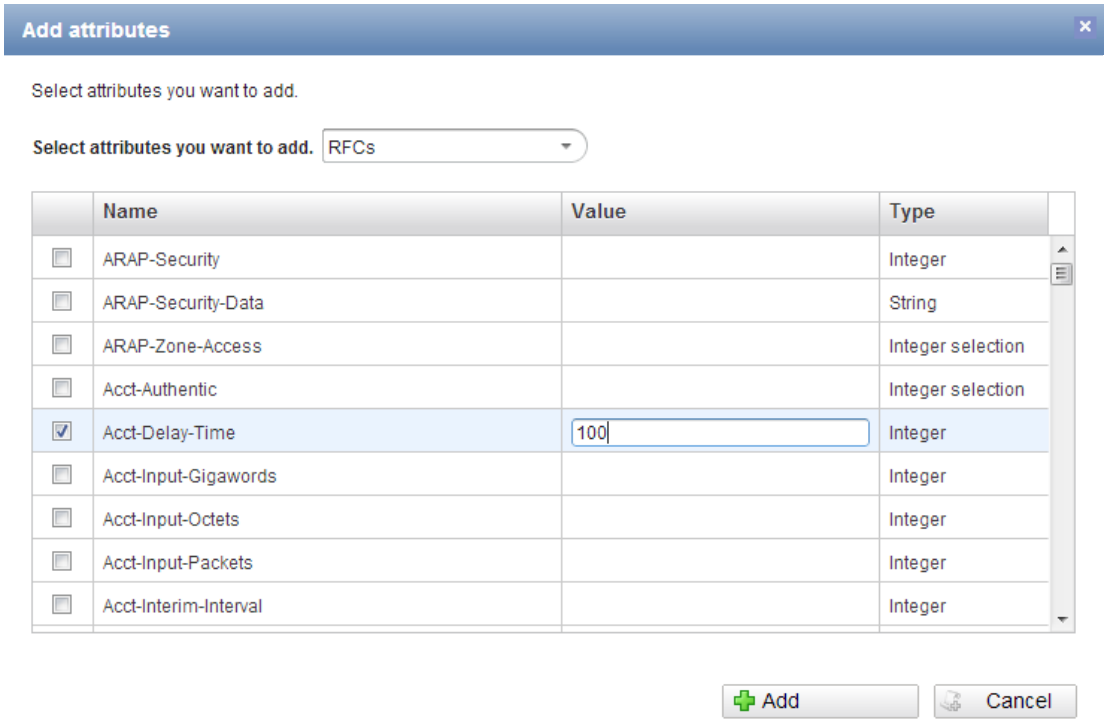
- Attributes of the user
- Attributes of all groups that the user has access to
- Attributes of the virtual server

The resulting attributes are then returned to in the authentication success message.

7.3 Adding a Vendor Specific Attribute to a User, Group or Virtual Server.

To add attribute to a user, a group, or a virtual server:

- Select the a user, a group or a virtual server
- Select *Dictionary*
- Select attributes you want to set and set the value for each attribute
- Click **Add**



Section 8. Using IP Pools.

8.1 IP Pool basics.

IP pools are used to assign IP addresses to devices which authenticate against a RADIUS Server.

IP addresses are assigned from pools of IP addresses. An IP address pool is defined by a range of IP addresses starting from a particular start address and ending with the end address.

An IP address is assigned to a device when the device is authenticated and is released when the RADIUS accounting message is received from the device specifying that the device disconnected.

To avoid IP address leakage one sets the IP entry maximum lifetime. After this time period, the IP address may be returned to the pool even if the accounting stop message was not received. The server will use this forced return strategy as the last resort, when there are no more free IP addresses available in the pool.