



Configuring Local Authentication and Authorization

Cisco CNS Access Registrar (AR) allows user information to be stored in its own internal database or external stores such as an LDAP directory or Oracle database. This chapter describes how to configure Cisco AR to perform authentication and authorization using the Cisco AR internal database and how to verify and troubleshoot a local service and userlist configuration.

In RADIUS, an Access Request packet is a request for authentication and authorization (AA). Authentication checks username and password credentials, while authorization typically involves returning the correct information to allow the service a user is authorized to have. Cisco AR performs AA and returns the appropriate RADIUS attributes in an Access Accept packet.

Configuring a Local Service and UserList

Cisco AR uses services configured under **/Radius/Services** to process RADIUS requests. To process RADIUS access requests locally, you must configure a service and set its type to **local**. A local service references an AR userlist.

The following sections show the commands you enter and the expected responses from the Cisco AR server to do the following:

- [Configuring a Local Service](#)
- [Configuring a Userlist](#)
- [Configuring Cisco AR to Use the Local Service For AA](#)
- [Activating the Configuration](#)

Throughout this chapter, the **aregcmd** commands you enter are shown in **bold** font, and the server responses are shown in smaller plain font as shown in the following:

command you enter

server response

Configuring a Local Service

Cisco AR maintains **Services** under **/Radius**. To configure a local service, complete the following steps:

- Step 1** Use the **add** command at **/Radius/Services** to create a Service.

```
cd /Radius/Services  
[ //localhost/Radius/Services ]
```

```
add SouthBay  
Added SouthBay
```

- Step 2** Change directory to the new service and set its type to local.

```
cd SouthBay  
[ //localhost/Radius/Services/SouthBay ]
```

```
set type local  
Set Type local
```

- Step 3** Use the **set** command to associate a userlist with the service.

```
set userlist SouthUsers  
Set UserList SouthUsers
```

Configuring a Userlist

Cisco AR maintains **UserLists** under **/Radius**. To configure a userlist, complete the following steps:

- Step 1** Use the **add** command at **/Radius/UserLists** to create a userlist.

```
cd /Radius/UserLists  
[ //localhost/Radius/UserLists ]
```

```
add SouthUsers  
Added SouthUsers
```

- Step 2** Change directory to the userlist and add users.

```
cd SouthUsers  
[ //localhost/Radius/UserLists/SouthUsers ]
```

add user1

```
Added user1
```

Step 3 Change directory to each user you add and set the user's password.

cd user1

```
[ //localhost/Radius/UserLists/SouthUsers/user1 ]
```

set Password test

```
Retype password to confirm:
```

```
Set Password <encrypted>
```

Configuring Cisco AR to Use the Local Service For AA

To configure Cisco AR to use the local service for authentication and authorization, enter commands to set the DefaultAuthenticationService and DefaultAuthorizationService to the service you created, as shown in the following:

cd /Radius

```
[ //localhost/Radius ]
```

set DefaultAuthenticationService SouthBay

```
Set DefaultAuthenticationService SouthBay
```

set DefaultAuthorizationService SouthBay

```
Set DefaultAuthorizationService SouthBay
```

Activating the Configuration

To activate the configuration changes you have made, enter the **save** command:

save

```
Validating //localhost...
```

```
Saving //localhost...
```

After you issue the **save** command, Cisco AR attempts to validate the configuration, checks for all required properties, and ensures there are no logic errors. If the validation is successful, Cisco AR saves the configuration to the MCD database.

Troubleshooting the Local Service and UserList Configuration

Before you begin troubleshooting, ensure that the current configuration is valid and active. To ensure that any configuration changes you have made are valid and stored in the database, you must issue the **save** command.

save

```
Validating //localhost...
Saving //localhost...
```

To ensure that the current configuration is active, issue the **reload** command.

reload

```
Reloading Server 'Radius'...
Server 'Radius' is Running, its health is 10 out of 10
```

Verifying the Configuration

This section lists steps you can take to verify the configuration changes you have made.

Step 1 Check to see that the UserList exists under the service.

Is /Radius/Services/SouthBay

```
[ /Radius/Services/SouthBay ]
Name = SouthBay
Description =
Type = local
IncomingScript~ =
OutgoingScript~ =
OutagePolicy~ = RejectAll
OutageScript~ =
UserList = SouthUsers
```

Step 2 Check to see that user **user1** exists under the SouthUsers userlist.

Is /Radius/UserLists/SouthUsers

```
[ /Radius/UserLists/SouthUsers ]
Entries 1 to 1 from 1 total entries
Current filter: <all>
Name = SouthUsers
Description =
user1/
```

Step 3 Turn on debugging.

trace /r 5

```
Traced "/Radius: Trace level is set to 5"
```

Step 4 Use **radclient** to send an Access-Request for user **user1**.

simple user1 test

The debugging output will be sent to the file **name_radius_1_log** in the **/opt/CSCOAr/logs** directory. The following example shows items you should expect in a successful Access-Request.



Note Lines of interest are in **bold font**.

```
04/23/2003 18:34:35: P1144: Packet received from 127.0.0.1
04/23/2003 18:34:35: P1144: Trace of Access-Request packet
04/23/2003 18:34:35: P1144:     identifier = 4
04/23/2003 18:34:35: P1144:     length = 62
04/23/2003 18:34:35: P1144:     reqauth = f5:37:f7:04:99:85:c7:63:8f:bc:f4:44:ab:03:4e:1a
04/23/2003 18:34:35: P1144:     User-Name = user1
04/23/2003 18:34:35: P1144:     User-Password = 59:fb:2e:a9:34:de:0e:15:60:8d:4b:64:77:6a:57:d8
04/23/2003 18:34:35: P1144:     NAS-Port = 2
04/23/2003 18:34:35: P1144:     NAS-Identifier = localhost
04/23/2003 18:34:35: P1144: Using Client: localhost (127.0.0.1)
04/23/2003 18:34:35: P1144: Using NAS: localhost (127.0.0.1)
04/23/2003 18:34:35: P1144: Request is directly from a NAS: TRUE
04/23/2003 18:34:35: P1144: Authenticating and Authorizing with Service SouthBay
04/23/2003 18:34:35: P1144: Getting User user1's UserRecord from UserList SouthUsers
04/23/2003 18:34:35: P1144: User user1's password matches
04/23/2003 18:34:35: P1144: No default Remote Session Service defined.
04/23/2003 18:34:35: P1144: Trace of Access-Accept packet
04/23/2003 18:34:35: P1144:     identifier = 4
04/23/2003 18:34:35: P1144:     length = 20
04/23/2003 18:34:35: P1144:     reqauth = 36:88:34:0c:cc:ea:9e:d8:6d:f5:14:f7:ab:26:e7:f6
04/23/2003 18:34:35: P1144: Sending response to 127.0.0.1
04/23/2003 18:34:35: Log: Request from localhost (127.0.0.1): User user1 accepted
```

The following example shows a trace for an unsuccessful Access-Request due to an invalid password.



Note Lines of interest are in **bold font**.

```
04/23/2003 19:05:13: P1527: Packet received from 127.0.0.1
04/23/2003 19:05:13: P1527: Trace of Access-Request packet
04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527:
04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527:
04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527: Using Client: localhost
(127.0.0.1)
04/23/2003 19:05:13: P1527: Using NAS: localhost (127.0.0.1)
04/23/2003 19:05:13: P1527: Request is directly from a NAS: TRUE
04/23/2003 19:05:13: P1527: Authenticating and Authorizing with Service SouthBay
04/23/2003 19:05:13: P1527: Getting User user1's UserRecord from UserList SouthUsers
04/23/2003 19:05:13: P1527: User user1's password does not match
04/23/2003 19:05:13: P1527: Rejecting request
04/23/2003 19:05:13: P1527: Rejecting request
04/23/2003 19:05:13: P1527: Trace of Access-Reject packet
04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527:
04/23/2003 19:05:13: P1527:04/23/2003 19:05:13: P1527: Sending response to 127.0.0.1
04/23/2003 19:05:13: Log: Request from localhost (127.0.0.1): User user1 rejected (UserPasswordInvalid)
```

If a user's password is invalid, reset the password to ensure it was entered correctly. Also check that the shared secret being used by the RADIUS client and the Cisco AR server match.

Configuring Return Attributes and Check-Items

Cisco AR supports RADIUS check item attributes at the user and group levels. You can configure Cisco AR to check for attributes that must be present or attributes that must not be present in the Access-Request packet for successful authentication. For a complete list of attributes supported in Cisco AR, refer to [Appendix C, “RADIUS Attributes”](#).

When using check item attributes, Cisco AR rejects Access-Requests if either of the following conditions exist:

- Any configured check item attributes are not present in the Access-Request packet
- Any Access-Request packet's check item attribute values do not match with those configured check item attribute values

Configuring Per User Return Attributes

User return attributes are attributes that are specific for a given user each time they log in. To configure a user's return attributes, change directory to the user's Attributes subdirectory and configure the desired attributes.

```
cd /Radius/UserLists/SouthUsers/User1/Attributes
```

```
[ //localhost/Radius/UserLists/SouthUsers/user1/Attributes ]
```

```
set Session-Timeout 60
```

```
Set Session-Timeout 60
```

```
set Callback-Number 5551234
```

```
Set Callback-Number 5551234
```

Configuring Per User Check-Items

Check Items are a way to check that certain attribute/values exist in a user's access-request. If the attribute/values are not present in the access-request, the Cisco AR server rejects the access-request.

To check that an access-request for `user1` has the Calling-Station-Id attribute set to 5555678, enter the following:

```
cd /Radius/UserLists/SouthUsers/User1/CheckItems
```

```
[ //localhost/Radius/UserLists/SouthUsers/user1/CheckItems ]
```

```
set Calling-Station-Id 5555678
```

```
Set Calling-Station-Id 5555678
```

Be sure to **save** your configuration to preserve your changes.

Verifying the Per User Return Attributes and Check-Items Configuration

A successful request will produce a trace similar to the following:

```

04/24/2003 14:08:07: P1539: Packet received from 127.0.0.1
04/24/2003 14:08:07: P1539: Trace of Access-Request packet
04/24/2003 14:08:07: P1539:   identifier = 1
04/24/2003 14:08:07: P1539:   length = 71
04/24/2003 14:08:07: P1539:   reqauth = d6:86:c5:1e:0e:a0:20:4f:9a:1a:2c:35:27:16:23:36
04/24/2003 14:08:07: P1539:   User-Name = user1
04/24/2003 14:08:07: P1539:   User-Password = 99:dc:4a:22:ef:f6:8b:90:a2:3a:50:f0:a6:03:6e:b3
04/24/2003 14:08:07: P1539:   NAS-Port = 1
04/24/2003 14:08:07: P1539:   Calling-Station-Id = 5555678
04/24/2003 14:08:07: P1539:   NAS-Identifier = localhost
04/24/2003 14:08:07: P1539: Using Client: localhost (127.0.0.1)
04/24/2003 14:08:07: P1539: Using NAS: localhost (127.0.0.1)
04/24/2003 14:08:07: P1539: Request is directly from a NAS: TRUE
04/24/2003 14:08:07: P1539: Authenticating and Authorizing with Service SouthBay
04/24/2003 14:08:07: P1539: Getting User user1's UserRecord from UserList SouthUsers
04/24/2003 14:08:07: P1539: User user1's password matches
04/24/2003 14:08:07: P1539: Processing User user1's check items
04/24/2003 14:08:07: P1539: Merging User user1's Attributes into response Dictionary
04/24/2003 14:08:07: P1539: Merging attributes into the Response Dictionary:
04/24/2003 14:08:07: P1539:   Adding attribute Callback-Number, value = 5551234
04/24/2003 14:08:07: P1539:   Adding attribute Session-Timeout, value = 60
04/24/2003 14:08:07: P1539: No default Remote Session Service defined.
04/24/2003 14:08:07: P1539: Trace of Access-Accept packet
04/24/2003 14:08:07: P1539:   identifier = 1
04/24/2003 14:08:07: P1539:   length = 35
04/24/2003 14:08:07: P1539:   reqauth = cc:2d:51:71:b5:49:0e:e6:f1:eb:1c:61:51:7a:f1:cb
04/24/2003 14:08:07: P1539:   Callback-Number = 5551234
04/24/2003 14:08:07: P1539:   Session-Timeout = 60
04/24/2003 14:08:07: P1539: Sending response to 127.0.0.1
04/24/2003 14:08:07: Log: Request from localhost (127.0.0.1): User user1 accepted

```

Configuring Profiles to Group Attributes

You can use the Cisco AR profile object to group attributes. For example, you might want to group attributes for all PPP users. All PPP users could then be assigned the profile and the attributes contained in the profile would be returned in their access-accepts.

Step 1 Change directory to **/Radius/Profiles** and add a profile.

```
cd /Radius/Profiles
```

```
[ //localhost/Radius/Profiles ]
```

```
add PPP-Profile
```

```
Added PPP-Profile
```

Step 2 Change directory to the new profile, then change directory to the profile's Attributes subdirectory.

```
cd PPP-Profile
```

```
[ //localhost/Radius/Profiles/PPP-Profile ]
```

cd Attributes

```
[ //localhost/Radius/Profiles/PPP-Profile/Attributes ]
```

Step 3 Configure the desired attributes for the profile.

set Service-Type Framed

```
Set Service-Type Framed
```

set Framed-Protocol PPP

```
Set Framed-Protocol PPP
```

**Note**

When you need to set an attribute to a value that includes a space, you must double-quote the value, as in the following: *set Framed-Route "192.168.1.0/24 192.168.1.1"*

Step 4 Assign the profile to a user by setting the user's BaseProfile attribute to the desired profile.

cd /Radius/UserLists/SouthUsers/User1

```
[ //localhost/Radius/UserLists/SouthUsers/user1 ]
```

set BaseProfile PPP-Profile

```
Set BaseProfile PPP-Profile
```

Configuring Return Attributes and Check-Items Using UserGroup

A profile may also be assigned to a UserGroup. You assign a profile to a group by setting the group's BaseProfile attribute to the desired profile.

Step 1 Change directory to **/Radius/UserGroups** and add a UserGroup.

cd /Radius/UserGroups

```
[ //localhost/Radius/UserGroups ]
```

add PPP-Group

```
Added PPP-Group
```

Step 2 Change directory to the new UserGroup and add Return Attributes.

cd PPP-Group

```
[ //localhost/Radius/UserGroups/PPP-Group ]
```

cd Attributes

```
[ //localhost/Radius/UserGroups/PPP-Group/Attributes ]
```

set Service-Type Outbound

```
Set Service-Type Outbound
```

Step 3 Change directory to the UserGroups' Check-Items subdirectory and add CheckItems.

cd ../CheckItems/

```
[ //localhost/Radius/UserGroups/PPP-Group/CheckItems ]
```

set Service-Type Framed

```
Set Service-Type Framed
```

Step 4 Assign the UserGroup to a User.

cd /Radius/UserLists/SouthUsers/User2

```
[ //localhost/Radius/UserLists/SouthUsers/user2 ]
```

set Group PPP-Group

```
Set Group PPP-Group
```

Return Attribute Precedence

Because there are multiple ways of returning attributes, you might at some time have an attribute clash. In case of an attribute clash, the attribute precedence is as follows (from highest to lowest):

1. User attribute
2. User profile
3. UserGroup attribute
4. UserGroup profile

aregcmd Command Performance

You can impact **aregcmd** command performance and server response time by having Cisco AR userlists that contain more than 10,000 users. Cisco AR userlists were not designed to contain 10,000 users in any one list.

If you must provide service for groups greater than 10000 users, Cisco recommends that you use an external data store such as an LDAP directory or an Oracle database. If you are unable to use an external data store, create multiple userlists instead, keeping each userlist under 10,000 users.

Multiple userlists require multiple services (one for each userlist), because a service cannot reference more than one userlist. The multiple services can then be combined using the Service Grouping feature with ResultRule, OR, as follows:

```
[ //localhost/Radius/Services/GroupService ]
  Name = GroupService
  Description =
  Type = group
  IncomingScript~ =
  OutgoingScript~ =
  ResultRule = OR
  GroupServices/
  1. UserService1
  2. UserService2
  3. UserService3
```

UserDefined1 Property

The UserDefined1 property of a user object is a free text field. You can use the UserDefined1 property to store additional user information much like the Description property, but its most powerful use is to pass information to an extension point script. The value set in the UserDefined1 property is automatically set to the environment variable of the same name during authentication. Any extension point script that subsequently runs has access the value in that property.

```
[ //localhost/Radius/UserLists/Default/bob ]
  Name = bob
  Description =
  Password = <encrypted>
  AllowNullPassword = FALSE
  Enabled = TRUE
  Group~ =
  BaseProfile~ =
  AuthenticationScript~ =
  AuthorizationScript~ =
  UserDefined1 =
  Attributes/
  CheckItems/
```

Access-Request Logging

By default, Cisco AR logs all dropped and rejected requests in the name_radius_1_log file. The following are examples of log entries for dropped or rejected requests.

```
04/25/2003 17:38:11 name/radius/1 Warning Protocol 0 Request from localhost (127.0.0.1):
User user1 rejected (UserPasswordInvalid)
```

```
04/25/2003 18:05:12 name/radius/1 Warning Protocol 0 Packet from 128.107.132.106: that
address is not in the Clients list <unknown user>
```

To log all accepted requests as well, set the LogServerActivity advanced property to TRUE:

```
set /Radius/Advanced/LogServerActivity TRUE
```

```
Set /Radius/Advanced/LogServerActivity TRUE
```

```
save
```

```
Validating //localhost...
```

```
Saving //localhost...
```

```
reload
```

```
Reloading Server 'Radius'...
```

```
Server 'Radius' is Running, its health is 10 out of 10
```

Access-Accept packets are now logged as well:

```
04/25/2003 18:22:32 name/radius/1 Activity Protocol 0 Request from localhost (127.0.0.1):
User user2 accepted
```

