



Configuring an Access Point as a Local Authenticator

This chapter describes how to configure the access point as a local authenticator to serve as a stand-alone authenticator for a small wireless LAN or to provide backup authentication service. As a local authenticator, the access point performs LEAP, EAP-FAST, and MAC-based authentication for up to 1000 client devices. This chapter contains these sections:

- [Understand Local Authentication, page 4-2](#)
- [Configure a Local Authenticator, page 4-2](#)

Understand Local Authentication

Many small wireless LANs that could be made more secure with 802.1x authentication do not have access to a RADIUS server. On many wireless LANs that use 802.1x authentication, access points rely on RADIUS servers housed in a distant location to authenticate client devices, and the authentication traffic must cross a WAN link. If the WAN link fails, or if the access points cannot access the RADIUS servers for any reason, client devices cannot access the wireless network even if the work they wish to do is entirely local.

To provide local authentication service or backup authentication service in case of a WAN link or a server failure, you can configure an access point to act as a local authentication server. The access point can authenticate up to 50 wireless client devices using LEAP, EAP-FAST, or MAC-based authentication. The access point performs up to 5 authentications per second.

You configure the local authenticator access point manually with client usernames and passwords because it does not synchronize its database with the main RADIUS servers. You can also specify a VLAN and a list of SSIDs that a client is allowed to use.



Note If your wireless LAN contains only one access point, you can configure the access point as both the 802.1x authenticator and the local authenticator. However, users associated to the local authenticator access point might notice a drop in performance when the access point authenticates client devices.

You can configure your access points to use the local authenticator when they cannot reach the main servers, or you can configure your access points to use the local authenticator or as the main authenticator if you do not have a RADIUS server. When you configure the local authenticator as a backup to your main servers, the access points periodically check the link to the main servers and stop using the local authenticator automatically when the link to the main servers is restored.

**Caution**

The access point you use as an authenticator contains detailed authentication information for your wireless LAN, so you should secure it physically to protect its configuration.

Configure a Local Authenticator

This section provides instructions for setting up an access point as a local authenticator and includes these sections:

- [Guidelines for Local Authenticators, page 4-3](#)
- [Configuration Overview, page 4-3](#)
- [Configuring the Local Authenticator Access Point, page 4-3](#)
- [Configuring Other Access Points to Use the Local Authenticator, page 4-8](#)
- [Configuring EAP-FAST Settings, page 4-9](#)
- [Unblocking Locked Usernames, page 4-11](#)
- [Viewing Local Authenticator Statistics, page 4-11](#)
- [Using Debug Messages, page 4-12](#)

Guidelines for Local Authenticators

Follow these guidelines when configuring an access point as a local authenticator:

- Use an access point that does not serve a large number of client devices. When the access point acts as an authenticator, performance might degrade for associated client devices.
- Secure the access point physically to protect its configuration.

Configuration Overview

You complete four major steps when you set up a local authenticator:

1. On the local authenticator, create a list of access points authorized to use the authenticator to authenticate client devices. Each access point that uses the local authenticator is a network access server (NAS).



Note If your local authenticator access point also serves client devices, you must enter the local authenticator access point as a NAS. When a client associates to the local authenticator access point, the access point uses itself to authenticate the client.

2. On the local authenticator, create user groups and configure parameters to be applied to each group (optional).
3. On the local authenticator, create a list of up to 50 LEAP users, EAP-FAST users, or MAC addresses that the local authenticator is authorized to authenticate.



Note You do not have to specify which type of authentication that you want the local authenticator to perform. It automatically performs LEAP, EAP-FAST, or MAC-address authentication for the users in its user database.

4. On the access points that use the local authenticator, enter the local authenticator as a RADIUS server.



Note If your local authenticator access point also serves client devices, you must enter the local authenticator as a RADIUS server in the local authenticator's configuration. When a client associates to the local authenticator access point, the access point uses itself to authenticate the client.

Configuring the Local Authenticator Access Point

Beginning in Privileged Exec mode, follow these steps to configure the access point as a local authenticator:

	Command	Purpose
Step 1	configure terminal	Enter global configuration mode.
Step 2	aaa new-model	Enable AAA.

	Command	Purpose
Step 3	radius-server local	Enable the access point as a local authenticator and enter configuration mode for the authenticator.
Step 4	nas <i>ip-address</i> key <i>shared-key</i>	Add an access point to the list of units that use the local authenticator. Enter the access point's IP address and the shared key used to authenticate communication between the local authenticator and other access points. You must enter this shared key on the access points that use the local authenticator. If your local authenticator also serves client devices, you must enter the local authenticator access point as a NAS. Note Leading spaces in the key string are ignored, but spaces within and at the end of the key are used. If you use spaces in your key, do not enclose the key in quotation marks unless the quotation marks are part of the key. Repeat this step to add each access point that uses the local authenticator.
Step 5	group <i>group-name</i>	(Optional) Enter user group configuration mode and configure a user group to which you can assign shared settings.
Step 6	vlan <i>vlan</i>	(Optional) Specify a VLAN to be used by members of the user group. The access point moves group members into that VLAN, overriding other VLAN assignments. You can assign only one VLAN to the group.
Step 7	ssid <i>ssid</i>	(Optional) Enter up to 20 SSIDs to limit members of the user group to those SSIDs. The access point checks that the SSID that the client used to associate matches one of the SSIDs in the list. If the SSID does not match, the client is disassociated.
Step 8	reauthentication time <i>seconds</i>	(Optional) Enter the number of seconds after which access points should reauthenticate members of the group. The reauthentication provides users with a new encryption key. The default setting is 0, which means that group members are never required to reauthenticate.
Step 9	block count <i>count</i> time { <i>seconds</i> infinite }	(Optional) To help protect against password guessing attacks, you can lock out members of a user group for a length of time after a set number of incorrect passwords. - count—The number of failed passwords that triggers a lockout of the username. - time—The number of seconds the lockout should last. If you enter infinite, an administrator must manually unblock the locked username. See the “Unblocking Locked Usernames” section on page 4-11 for instructions on unblocking client devices.
Step 10	exit	Exit group configuration mode and return to authenticator configuration mode.

	Command	Purpose
Step 11	user <i>username</i> { password nthash } <i>password</i> [group <i>group-name</i>] [mac-auth-only]	Enter the LEAP and EAP-FAST users allowed to authenticate using the local authenticator. You must enter a username and password for each user. If you only know the NT value of the password, which you can often find in the authentication server database, you can enter the NT hash as a string of hexadecimal digits. To add a client device for MAC-based authentication, enter the client's MAC address as both the username and password. Enter 12 hexadecimal digits without a dot or dash between the numbers as the username and the password. For example, for the MAC address 0009.5125.d02b, enter <i>00095125d02b</i> as both the username and the password. To limit the user to MAC authentication only, enter mac-auth-only. To add the user to a user group, enter the group name. If you do not specify a group, the user is not assigned to a specific VLAN and is never forced to reauthenticate.
Step 12	end	Return to privileged EXEC mode.
Step 13	copy running-config startup-config	(Optional) Save your entries in the configuration file.

This example shows how to set up a local authenticator used by three access points with three user groups and several users:

```

router# configure terminal
router(config)# radius-server local
router(config-radsrv)# nas 10.91.6.159 key 110337
router(config-radsrv)# nas 10.91.6.162 key 110337
router(config-radsrv)# nas 10.91.6.181 key 110337
router(config-radsrv)# group clerks
router(config-radsrv-group)# vlan 87
router(config-radsrv-group)# ssid batman
router(config-radsrv-group)# ssid robin
router(config-radsrv-group)# reauthentication time 1800
router(config-radsrv-group)# block count 2 time 600
router(config-radsrv-group)# group cashiers
router(config-radsrv-group)# vlan 97
router(config-radsrv-group)# ssid deer
router(config-radsrv-group)# ssid antelope
router(config-radsrv-group)# ssid elk
router(config-radsrv-group)# reauthentication time 1800
router(config-radsrv-group)# block count 2 time 600
router(config-radsrv-group)# group managers
router(config-radsrv-group)# vlan 77
router(config-radsrv-group)# ssid mouse
router(config-radsrv-group)# ssid chipmunk
router(config-radsrv-group)# reauthentication time 1800
router(config-radsrv-group)# block count 2 time 600
router(config-radsrv-group)# exit
router(config-radsrv)# user jsmith password twain74 group clerks
router(config-radsrv)# user stpatrick password snake100 group clerks
router(config-radsrv)# user nick password uptown group clerks
router(config-radsrv)# user 00095125d02b password 00095125d02b group clerks mac-auth-only

```

```

router(config-radsrv)# user 00095125d02b password 00095125d02b group cashiers
router(config-radsrv)# user 00079431f04a password 00079431f04a group cashiers
router(config-radsrv)# user carl password 272165 group managers
router(config-radsrv)# user vic password lid178 group managers
router(config-radsrv)# end

```

This example shows how to set up EAP-FAST authentication:

```

Router#show run
Building configuration...

Current configuration : 2119 bytes
!
version 12.3
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
service password-encryption
!
hostname Router
!
enable secret 5 $1$dkOn$EcccqZvFdjoEi3geC66da0
!
ip subnet-zero
!
!
aaa new-model
!
!
aaa group server radius rad_eap
server 192.168.1.66 auth-port 1812 acct-port 1813
!
aaa authentication login eap_methods group rad_eap
aaa session-id common
!
dot11 ssid test-ssid
authentication open eap eap_methods
authentication network-eap eap_methods
authentication key-management wpa
!
!
!
username Cisco password 7 00271A150754
!
bridge irb
!
!
interface Dot11Radio0
no ip address
no ip route-cache
!
encryption mode ciphers aes-ccm tkip
!
ssid test-ssid
!
speed basic-1.0 basic-2.0 basic-5.5 6.0 9.0 basic-11.0 12.0 18.0 24.0 36.0 48.0
54.0
station-role root
bridge-group 1
bridge-group 1 subscriber-loop-control
bridge-group 1 block-unknown-source
no bridge-group 1 source-learning
no bridge-group 1 unicast-flooding
bridge-group 1 spanning-disabled

```

```
!  
interface FastEthernet0  
no ip address  
no ip route-cache  
duplex auto  
speed auto  
bridge-group 1  
no bridge-group 1 source-learning  
bridge-group 1 spanning-disabled  
!  
interface BVI1  
ip address 192.168.1.66 255.255.255.0  
no ip route-cache  
!  
ip http server  
no ip http secure-server  
ip http help-path http://www.cisco.com/warp/public/779/smbiz/prodconfig/help/eag  
ip radius source-interface BVI1  
!  
radius-server local  
eapfast authority id 12345678901234567890123456789012  
eapfast authority info sample_eap-fast  
eapfast server-key primary 7 41754A0073F16A0E093EA2089A3FDECD32  
nas 192.168.1.66 key 7 110A1016141D  
group EAP_FAST-usr  
eapfast pac expiry 30 grace 120  
!  
user cisco nthash 7 06532C791C1E2F4856364128295C7C0E007A6661723723422656050A09  
760D2F51  
!  
radius-server host 192.168.1.66 auth-port 1812 acct-port 1813 key 7 060506324F41  
!  
control-plane  
!  
bridge 1 route ip  
!  
!  
!  
line con 0  
transport preferred all  
transport output all  
line vty 0 4  
transport preferred all  
transport input all  
transport output all  
line vty 5 15  
transport preferred all  
transport input all  
transport output all  
!  
end
```

Configuring Other Access Points to Use the Local Authenticator

You add the local authenticator to the list of servers on the access point the same way that you add other servers. For detailed instructions on setting up RADIUS servers on your access points, see [Chapter 7, “Configuring RADIUS Servers.”](#)



Note

If your local authenticator access point also serves client devices, you must configure the local authenticator to use itself to authenticate client devices.

On the access points that use the local authenticator, use the **radius-server host** command to enter the local authenticator as a RADIUS server. The order in which the access point attempts to use the servers matches the order in which you enter the servers in the access point configuration. If you are configuring the access point to use RADIUS for the first time, enter the main RADIUS servers first, and enter the local authenticator last.



Note

You must enter **1812** as the authentication port and **1813** as the accounting port. The local authenticator listens on UDP port 1813 for RADIUS accounting packets. It discards the accounting packets but sends acknowledge packets back to RADIUS clients to prevent clients from assuming that the server is down.

Use the **radius-server deadtime** command to set an interval during which the access point does not attempt to use servers that do not respond, thus avoiding the wait for a request to time out before trying the next configured server. A server marked as dead is skipped by additional requests for the duration of minutes that you specify, up to 1440 (24 hours).

This example shows how to set up two main servers and a local authenticator with a server deadtime of 10 minutes:

```
router(config)# aaa new-model
router(config)# radius-server host 172.20.0.1 auth-port 1000 acct-port 1001 key 77654
router(config)# radius-server host 172.10.0.1 auth-port 1645 acct-port 1646 key 77654
router(config)# radius-server host 10.91.6.151 auth-port 1812 acct-port 1813 key 110337
router(config)# radius-server deadtime 10
```

In this example, if the WAN link to the main servers fails, the access point completes these steps when a LEAP-enabled client device associates:

1. It tries the first server, times out multiple times, and marks the first server as dead.
2. It tries the second server, times out multiple times, and marks the second server as dead.
3. It tries and succeeds using the local authenticator.

If another client device needs to authenticate during the 10-minute dead-time interval, the access point skips the first two servers and tries the local authenticator first. After the dead-time interval, the access point tries to use the main servers for authentication. When setting a dead time, you must balance the need to skip dead servers with the need to check the WAN link and begin using the main servers again as soon as possible.

Each time the access point tries to use the main servers while they are down, the client device trying to authenticate might report an authentication timeout. The client device retries and succeeds when the main servers time out and the access point tries the local authenticator. You can extend the timeout value on Cisco client devices to accommodate expected server timeouts.

To remove the local authenticator from the access point configuration, use the **no radius-server host hostname | ip-address** global configuration command.

Configuring EAP-FAST Settings

The default settings for EAP-FAST authentication are suitable for most wireless LANs. However, you can customize the credential timeout values, authority ID, and server keys to match your network requirements.

Configuring PAC Settings

This section describes how to configure Protected Access Credential (PAC) settings. The first time that an EAP-FAST client device attempts to authenticate to the local authenticator, the local authenticator generates a PAC for the client. You can also generate PACs manually and use the Aironet Client Utility to import the PAC file.

PAC Expiration Times

You can limit the number of days for which PACs are valid, and a grace period during which PACs are valid after they have expired. By default, PACs are valid for infinite days, with a grace period of infinite days. You apply the expiration time and the grace period settings to a group of users.

Use this command to configure the expiration time and grace period for PACs:

```
router(config-radsrv-group)# [no] eapfast pac expiry days [grace days]
```

Enter a number of days from 2 to 4095. Enter the **no** form of the command to reset the expiration time or grace period to infinite days.

In this example, PACs for the user group expire in 100 days with a grace period of two days:

```
router(config-radsrv-group)# eapfast pac expiry 100 grace 2
```

Generating PACs Manually

The local authenticator automatically generates PACs for EAP-FAST clients that request them. However, you might need to generate a PAC manually for some client devices. When you enter the command, the local authenticator generates a PAC file and writes it to the network location that you specify. The user imports the PAC file into the client profile.

Use this command to generate a PAC manually:

```
router# radius local-server pac-generate filename username [password password] [expiry days]
```

When you enter the PAC filename, enter the full path to which the local authenticator writes the PAC file (such as `tftp://172.1.1.1/test/user.pac`). The password is optional and, if not specified, a default password understood by the CCX client is used. Expiry is also optional and, if not specified, the default period is 1 day.

In this example, the local authenticator generates a PAC for the username *joe*, password-protects the file with the password *bingo*, sets the PAC to expire in 10 days, and writes the PAC file to the TFTP server at 10.0.0.5:

```
router# radius local-server pac-generate tftp://10.0.0.5 joe password bingo expiry 10
```

Configuring an Authority ID

All EAP-FAST authenticators are identified by an authority identity (AID). The local authenticator sends its AID to an authenticating client, and the client checks its database for a matching AID. If the client does not recognize the AID, it requests a new PAC.

Use these commands to assign an AID to the local authenticator:

```
router(config-radsevr)# [no] eapfast authority id identifier
router(config-radsevr)# [no] eapfast authority info identifier
```

The **eapfast authority id** command assigns an AID that the client device uses during authentication.

Configuring Server Keys

The local authenticator uses server keys to encrypt PACs that it generates and to decrypt PACs when authenticating clients. The server maintains two keys, a primary key and a secondary key, and uses the primary key to encrypt PACs. By default, the server uses a default value as the primary key but does not use a secondary key unless you configure one.

When the local authenticator receives a client PAC, it attempts to decrypt the PAC with the primary key. If decryption fails with the primary, the authenticator attempts to decrypt the PAC with the secondary key if one is configured. If decryption fails, the authenticator rejects the PAC as invalid.

Use these commands to configure server keys:

```
router(config-radsevr)# [no] eapfast server-key primary {[auto-generate] | [ [0 | 7] key]}
router(config-radsevr)# [no] eapfast server-key secondary [0 | 7] key
```

Keys can contain up to 32 hexadecimal digits. Enter **0** before the key to enter an unencrypted key. Enter **7** before the key to enter an encrypted key. Use the **no** form of the commands to reset the local authenticator to the default setting, which is to use a default value as a primary key.

Possible PAC Failures Caused by Access Point Clock

The local authenticator uses the access point clock to both generate PACs and to determine whether PACs are valid. However, relying on the access point clock can lead to PAC failures.

If your local authenticator access point receives its time setting from an NTP server, there is an interval between boot up and synchronization with the NTP server during which the access point uses its default time setting. If the local authenticator generates a PAC during that interval, the PAC might be expired when the access point receives a new time setting from the NTP server. If an EAP-FAST client attempts to authenticate during the interval between boot and NTP-synch, the local authenticator might reject the client's PAC as invalid.

If your local authenticator does not receive its time setting from an NTP server and it reboots frequently, PACs generated by the local authenticator might not expire when they should. The access point clock is reset when the access point reboots, so the elapsed time on the clock would not reach the PAC expiration time.

Limiting the Local Authenticator to One Authentication Type

By default, a local authenticator access point performs LEAP, EAP-FAST, and MAC-based authentication for client devices. However, you can limit the local authenticator to perform only one or two authentication types. Use the **no** form of the authentication command to restrict the authenticator to an authentication type:

```
router(config-radsrv)# [no] authentication [eapfast] [leap] [mac]
```

Because all authentication types are enabled by default, you enter the **no** form of the command to disable authentication types. For example, if you want the authenticator to perform only LEAP authentication, you enter these commands:

```
router(config-radsrv)# no authentication eapfast
router(config-radsrv)# no authentication mac
```

Unblocking Locked Usernames

You can unblock usernames before the lockout time expires, or when the lockout time is set to infinite. In Privileged Exec mode on the local authenticator, enter this command to unblock a locked username:

```
router# clear radius local-server user username
```

Viewing Local Authenticator Statistics

In privileged exec mode, enter this command to view statistics collected by the local authenticator:

```
router# show radius local-server statistics
```

This example shows local authenticator statistics:

```
Successes           : 0           Unknown usernames      : 0
Client blocks       : 0           Invalid passwords      : 0
Unknown NAS         : 0           Invalid packet from NAS: 0

NAS : 10.91.6.158
Successes           : 0           Unknown usernames      : 0
Client blocks       : 0           Invalid passwords      : 0
Corrupted packet    : 0           Unknown RADIUS message : 0
No username attribute : 0         Missing auth attribute : 0
Shared key mismatch : 0           Invalid state attribute: 0
Unknown EAP message : 0           Unknown EAP auth type  : 0
Auto provision success : 0         Auto provision failure  : 0
PAC refresh         : 0           Invalid PAC received    : 0

Username            Successes  Failures  Blocks
nicky                0         0         0
jones                0         0         0
jsmith               0         0         0
Router#sh radius local-server statistics
Successes           : 1           Unknown usernames      : 0
Client blocks       : 0           Invalid passwords      : 0
Unknown NAS         : 0           Invalid packet from NAS: 0
```

The first section of statistics lists cumulative statistics from the local authenticator.

The second section lists stats for each access point (NAS) authorized to use the local authenticator. The EAP-FAST statistics in this section include these stats:

- Auto provision success—the number of PACs generated automatically
- Auto provision failure—the number of PACs not generated because of an invalid handshake packet or invalid username or password
- PAC refresh—the number of PACs renewed by clients
- Invalid PAC received—the number of PACs received that were expired, that the authenticator could not decrypt, or that were assigned to a client username not in the authenticator's database

The third section lists stats for individual users. If a user is blocked and the lockout time is set to infinite, *blocked* appears at the end of the stat line for that user. If the lockout time is not infinite, *Unblocked in x seconds* appears at the end of the stat line for that user.

Use this privileged exec mode command to reset local authenticator statistics to zero:

```
router# clear radius local-server statistics
```

Using Debug Messages

In privileged exec mode, enter this command to control the display of debug messages for the local authenticator:

```
router# debug radius local-server { client | eapfast | error | packets }
```

Use the command options to display this debug information:

- Use the **client** option to display error messages related to failed client authentications.
 - Use the **eapfast** option to display error messages related to EAP-FAST authentication. Use the sub-options to select specific debugging information:
 - **encryption**—displays information on the encryption and decryption of received and transmitted packets
 - **events**—displays information on all EAP-FAST events
 - **pac**—displays information on events related to PACs, such as PAC generation and verification
 - **pkts**—displays packets sent to and received from EAP-FAST clients
 - Use the **error** option to display error messages related to the local authenticator.
 - Use the **packets** option to turn on display of the content of RADIUS packets sent and received.
-