CHAPTER 3

Configuring RADIUS

This chapter describes how to configure Remote Access Dial-In User Service (RADIUS) protocol on NX-OS devices.

This chapter includes the following sections:

Information About RADIUS

The RADIUS distributed client/server system allows you to secure networks against unauthorized access. In the Cisco implementation, RADIUS clients run on Cisco NX-OS devices and send authentication and accounting requests to a central RADIUS server that contains all user authentication and network service access information.

This section includes the following topics:

RADIUS Network Environments

RADIUS can be implemented in a variety of network environments that require high levels of security while maintaining network access for remote users.

You can use RADIUS in the following network environments that require access security:

- Networks with multiple-vendor network devices, each supporting RADIUS. For example, network devices from several vendors can use a single RADIUS server-based security database.
- Networks already using RADIUS. You can add a Cisco NX-OS device with RADIUS to the network. This action might be the first step when you make a transition to a AAA server.
- Networks that require resource accounting. You can use RADIUS accounting independent of RADIUS authentication or authorization. The RADIUS accounting functions allow data to be sent at the start and end of services, indicating the amount of resources (such as time, packets, bytes, and so on) used during the session. An Internet service provider (ISP) might use a freeware-based version of the RADIUS access control and accounting software to meet special security and billing needs.
- Networks that support authentication profiles. Using the RADIUS server in your network, you can configure AAA authentication and set up per-user profiles. Per-user profiles enable the NX-OS device to better manage ports using their existing RADIUS solutions and to efficiently manage shared resources to offer different service-level agreements.

RADIUS Operation

When a user attempts to log in and authenticate to an NX-OS device using RADIUS, the following process occurs:

1. The user is prompted for and enters a username and password.
2. The username and encrypted password are sent over the network to the RADIUS server.
3. The user receives one of the following responses from the RADIUS server:
   - ACCEPT—The user is authenticated.
   - REJECT—The user is not authenticated and is prompted to reenter the username and password, or access is denied.
   - CHALLENGE—A challenge is issued by the RADIUS server. The challenge collects additional data from the user.
   - CHANGE PASSWORD—A request is issued by the RADIUS server, asking the user to select a new password.

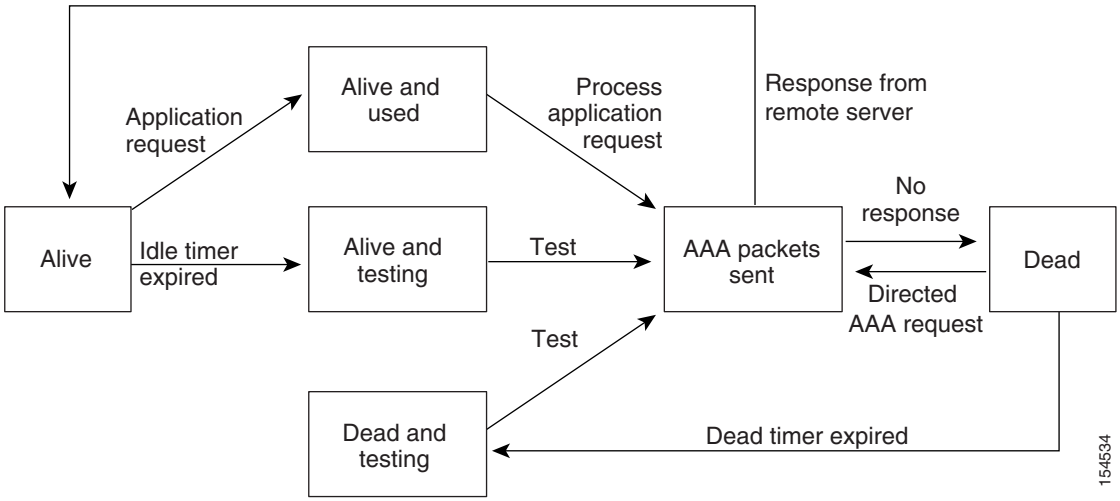
The ACCEPT or REJECT response is bundled with additional data that is used for EXEC or network authorization. You must first complete RADIUS authentication before using RADIUS authorization. The additional data included with the ACCEPT or REJECT packets consists of the following:

- Services that the user can access, including Telnet, rlogin, or local-area transport (LAT) connections, and Point-to-Point Protocol (PPP), Serial Line Internet Protocol (SLIP), or EXEC services.
- Connection parameters, including the host or client IPv4 or IPv6 address, access list, and user timeouts.

RADIUS Server Monitoring

An unresponsive RADIUS server can cause a delay in processing AAA requests. You can configure the NX-OS device to periodically monitor a RADIUS server to check whether it is responding (or alive) to save time in processing AAA requests. The NX-OS device marks unresponsive RADIUS servers as dead and does not send AAA requests to any dead RADIUS servers. The NX-OS device periodically monitors the dead RADIUS servers and brings them to the alive state once they respond. This monitoring process verifies that a RADIUS server is in a working state before real AAA requests are sent its way. Whenever a RADIUS server changes to the dead or alive state, a Simple Network Management Protocol (SNMP) trap is generated and the NX-OS device displays an error message that a failure is taking place. See Figure 3-1.

Figure 3-1 RADIUS Server States



Note The monitoring interval for alive servers and dead servers are different and can be configured by the user. The RADIUS server monitoring is performed by sending a test authentication request to the RADIUS server.

Vendor-Specific Attributes

The Internet Engineering Task Force (IETF) draft standard specifies a method for communicating VSAs between the network access server and the RADIUS server. The IETF uses attribute 26. VSAs allow vendors to support their own extended attributes that are not suitable for general use. The Cisco RADIUS implementation supports one vendor-specific option using the format recommended in the specification. The Cisco vendor ID is 9, and the supported option is vendor type 1, which is named cisco-av-pair. The value is a string with the following format:

```
protocol : attribute separator value *
```

The protocol is a Cisco attribute for a particular type of authorization, separator is = (equal sign) for mandatory attributes, and * (asterisk) indicates optional attributes.

When you use RADIUS servers for authentication on a Cisco NX-OS device, the RADIUS protocol directs the RADIUS server to return user attributes, such as authorization information, along with authentication results. This authorization information is specified through VSAs.

The following VSA protocol options are supported by the Cisco NX-OS software:

- Shell—Protocol used in access-accept packets to provide user profile information.
- Accounting—Protocol used in accounting-request packets. If a value contains any white spaces, you should enclose the value within double quotation marks.

The Cisco NX-OS software supports the following attributes:

- roles—Lists all the roles to which the user belongs. The value field is a string that lists the role names delimited by white space. For example, if the user belongs to roles network-operator and vdc-admin, the value field would be "network-operator vdc-admin." This subattribute, which the RADIUS server sends in the VSA portion of the Access-Accept frames, can only be used with the shell protocol value. The following examples show the roles attribute as supported by Cisco ACS:

  ```
  shell:roles="network-operator vdc-admin"

  shell:roles*"network-operator vdc-admin"
  ```

  The following examples show the roles attribute as supported by FreeRADIUS:

  ```
  Cisco-AVPair = "shell:roles=\"network-operator vdc-admin\""

  Cisco-AVPair = "shell:roles*\"network-operator vdc-admin\""
  ```

  Note When you specify a VSA as shell:roles*"network-operator vdc-admin" or "shell:roles*\"network-operator vdc-admin\"", this VSA is flagged as an optional attribute and other Cisco devices ignore this attribute.

- accountinginfo—Stores accounting information in addition to the attributes covered by a standard RADIUS accounting protocol. This attribute is sent only in the VSA portion of the Account-Request frames from the RADIUS client on the switch. It can be used only with the accounting protocol data units (PDUs).

Virtualization Support

RADIUS configuration and operation are local to the virtual device context (VDC). For more information on VDCs, see the *Cisco Nexus 7000 Series NX-OS Virtual Device Context Configuration Guide, Release 4.0*.

The NX-OS device uses virtual routing and forwarding instances (VRFs) to access the RADIUS servers. For more information on VRFs, see the *Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide, Release 4.0*.

Licensing Requirements for RADIUS

The following table shows the licensing requirements for this feature:

Product	License Requirement
NX-OS	RADIUS requires no license. Any feature not included in a license package is bundled with the Cisco NX-OS system images and is provided at no extra charge to you. For a complete explanation of the NX-OS licensing scheme, see the *Cisco Nexus 7000 Series NX-OS Licensing Guide, Release 4.0*.

Prerequisites for RADIUS

RADIUS has the following prerequisites:

- Obtain IPv4 or IPv6 addresses or hostnames for the RADIUS servers.
- Obtain preshared keys from the RADIUS servers.
- Ensure that the NX-OS device is configured as a RADIUS client of the AAA servers.

Guidelines and Limitations

RADIUS has the following guidelines and limitations:

- You can configure a maximum of 64 RADIUS servers on the NX-OS device.
- If you have a user account configured on the local Cisco NX-OS device that has the same name as a remote user account on an AAA server, the Cisco NX-OS software applies the user roles for the local user account to the remote user, not the user roles configured on the AAA server.

Configuring RADIUS Servers

This section includes the following topics:

Note If you are familiar with the Cisco IOS CLI, be aware that the Cisco NX-OS commands for this feature might differ from the Cisco IOS commands that you would use.

RADIUS Server Configuration Process

Follow these steps to configure RADIUS servers:

Step 1 Establish the RADIUS server connections to the NX-OS device (see the "Configuring RADIUS Server Hosts" section on page 3-6).

Step 2 Configure the preshared secret keys for the RADIUS servers (see the "Configuring Global Preshared Keys" section on page 3-7).

Step 3 If needed, configure RADIUS server groups with subsets of the RADIUS servers for AAA authentication methods (see the "Allowing Users to Specify a RADIUS Server at Login" section on page 3-11 and the "Configuring AAA" section on page 2-7).

Step 4 If needed, configure any of the following optional parameters:

- Dead-time interval (see the "Configuring the Dead-Time Interval" section on page 3-17.
- Allow specification of a RADIUS server at login (see the "Allowing Users to Specify a RADIUS Server at Login" section on page 3-11).
- Transmission retry count and timeout interval (see the "Configuring the Global RADIUS Transmission Retry Count and Timeout Interval" section on page 3-12).
- Accounting and authentication attributes (see the "Configuring Accounting and Authentication Attributes for RADIUS Servers" section on page 3-14).

Step 5 If needed, configure periodic RADIUS server monitoring (see the "Configuring Periodic RADIUS Server Monitoring" section on page 3-16).

Configuring RADIUS Server Hosts

You must configure the IPv4 or IPv6 address or the hostname for each RADIUS server that you want to use for authentication. All RADIUS server hosts are added to the default RADIUS server group. You can configure up to 64 RADIUS servers.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*}
3. **exit**
4. **show radius-server**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **Example:** switch(config)# radius-server host 10.10.1.1	Specifies the IPv4 or IPv6 address or hostname for a RADIUS server.
Step 3	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.
Step 4	**show radius-server** **Example:** switch# show radius-server	(Optional) Displays the RADIUS server configuration.
Step 5	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Configuring Global Preshared Keys

You can configure preshared keys at the global level for all servers used by the NX-OS device. A preshared key is a shared secret text string between the NX-OS device and the RADIUS server hosts.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Obtain the preshared key values for the remote RADIUS servers.

SUMMARY STEPS

1. **config t**
2. **radius-server key** [**0** | **7**] *key-value*
3. **exit**
4. **show radius-server**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**radius-server key** [**0** | **7**] *key-value* **Example:** switch(config)# radius-server key 0 QsEfThUkO	Specifies a preshared key for all RADIUS servers. You can specify a clear text (**0**) or encrypted (**7**) preshared key. The default format is clear text. The maximum length is 63 characters. By default, no preshared key is configured.
Step 3	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.
Step 4	**show radius-server** **Example:** switch# show radius-server	(Optional) Displays the RADIUS server configuration. **Note** The preshared keys are saved in encrypted form in the running configuration. Use the **show running-config** command to display the encrypted preshared keys.
Step 5	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Configuring RADIUS Server Preshared Keys

You can configure preshared keys for a RADIUS server. A preshared key is a shared secret text string between the NX-OS device and the RADIUS server host.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

Obtain the preshared key values for the remote RADIUS servers.

SUMMARY STEPS

1. **config t**
2. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **key** *key-value*
3. **exit**
4. **show radius-server**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **key** [**0** | **7**] *key-value* **Example:** switch(config)# radius-server host 10.10.1.1 key 0 PlIjUhYg	Specifies a preshared key for a specific RADIUS server. You can specify a clear text (**0**) or encrypted (**7**) preshared key. The default format is clear text. The maximum length is 63 characters. This preshared key is used instead of the global preshared key.
Step 3	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.
Step 4	**show radius-server** **Example:** switch# show radius-server	(Optional) Displays the RADIUS server configuration. **Note** The preshared keys are saved in encrypted form in the running configuration. Use the **show running-config** command to display the encrypted preshared keys.
Step 5	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Configuring RADIUS Server Groups

You can specify one or more remote AAA servers for authentication using server groups. All members of a group must belong to the RADIUS protocol. The servers are tried in the same order in which you configure them. You can configure up to 100 server groups in a VDC.

You can configure these server groups at any time but they only take effect when you apply them to an AAA service. For information on AAA services, see the "Remote AAA Services" section on page 2-3.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **aaa group server radius** *group-name*
3. **server** {*ipv4-address* | *ipv6-address* | *server-name*}
4. **deadtime** *minutes*

5. **use-vrf** *vrf-name*
6. **exit**
7. **show radius-server groups** [*group-name*]
8. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**aaa group server radius** *group-name* **Example:** switch(config)# **aaa group server radius RadServer** switch(config-radius)#	Creates a RADIUS server group and enters the RADIUS server group configuration submode for that group. The *group-name* argument is a case-sensitive alphanumeric string with a maximum length of 127 characters.
Step 3	**server** {*ipv4-address* | *ipv6-address* | *server-name*} **Example:** switch(config-radius)# server 10.10.1.1	Configures the RADIUS server as a member of the RADIUS server group. **Tip** If the specified RADIUS server is not found, configure it using the **radius-server host** command and retry this command.
Step 4	**deadtime** *minutes* **Example:** switch(config-radius)# deadtime 30	(Optional) Configures the monitoring dead time. The default is 0 minutes. The range is from 1 through 1440. **Note** If the dead-time interval for a RADIUS server group is greater than zero (0), that value takes precedence over the global dead-time value (see the "Configuring the Dead-Time Interval" section on page 3-17).
Step 5	**use-vrf** *vrf-name* **Example:** switch(config-radius)# use-vrf vrf1	(Optional) Specifies the VRF to use to contact the servers in the server group.
Step 6	**exit** **Example:** switch(config-radius)# exit switch(config)#	Exits configuration mode.
Step 7	**show radius-server groups** [*group-name*] **Example:** switch(config)# show radius-server group	(Optional) Displays the RADIUS server group configuration.
Step 8	**copy running-config startup-config** **Example:** switch(config)# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Allowing Users to Specify a RADIUS Server at Login

By default, the NX-OS device forwards an authentication request based on the default AAA authentication method. You can configure the NX-OS device to allow the user to specify a VRF and RADIUS server to send the authenticate request by enabling the directed-request option. If you enable this option, the user can log in as *username@vrfname:hostname,* where *vrfname* is the VRF to use and *hostname* is the name of a configured RADIUS server.

Note If you enable the directed-request option, the NX-OS device uses only the RADIUS method for authentication and not the default local method.

Note User-specified logins are supported only for Telnet sessions.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server directed-request**
3. **exit**
4. **show radius-server directed-request**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	switch(config)# **radius-server directed-request** **Example:** switch(config)# radius-server directed-request	Allows users to specify a RADIUS server to send the authentication request when logging in. The default is disabled.
Step 3	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.

	Command	Purpose
Step 4	**show radius-server directed-request** **Example:** switch# show radius-server directed-request	(Optional) Displays the directed request configuration.
Step 5	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Configuring the Global RADIUS Transmission Retry Count and Timeout Interval

You can configure a global retransmission retry count and timeout interval for all RADIUS servers. By default, a switch retries transmission to a RADIUS server only once before reverting to local authentication. You can increase this number up to a maximum of five retries per server. The timeout interval determines how long the NX-OS device waits for responses from RADIUS servers before declaring a timeout failure.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server retransmission** *count*
3. **radius-server timeout** *seconds*
4. **exit**
5. **show radius-server**
6. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	switch(config)# **radius-server retransmit** *count* **Example:** switch(config)# radius-server retransmit 3	Specifies the retransmission count for all RADIUS servers. The default retransmission count is 1 and the range is from 0 to 5.

	Command	Purpose

Step 3	`switch(config)# radius-server timeout seconds`
	
	Example:
	`switch(config)# radius-server timeout 10`
		Specifies the transmission timeout interval for RADIUS servers. The default timeout interval is 5 seconds and the range is from 1 to 60 seconds.

Step 4	`exit`
	
	Example:
	`switch(config)# exit`
	`switch#`
		Exits configuration mode.

Step 5	`show radius-server`
	
	Example:
	`switch# show radius-server`
		(Optional) Displays the RADIUS server configuration.

Step 6	`copy running-config startup-config`
	
	Example:
	`switch# copy running-config startup-config`
		(Optional) Copies the running configuration to the startup configuration.

Configuring the RADIUS Transmission Retry Count and Timeout Interval for a Server

By default, an NX-OS device retries a transmission to a RADIUS server only once before reverting to local authentication. You can increase this number up to a maximum of five retries per server. You can also set a timeout interval that the NX-OS device waits for responses from RADIUS servers before declaring a timeout failure.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **retransmit** *count*
3. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **timeout** *seconds*
4. **exit**
5. **show radius-server**
6. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	switch(config)# **radius-server host** {*ipv4-address* |*ipv6-address* | *host-name*} **retransmit** *count* **Example:** switch(config)# radius-server host server1 retransmit 3	Specifies the retransmission count for a specific server. The default is the global value. **Note** The retransmission count value specified for a RADIUS server overrides the count specified for all RADIUS servers in Step 2.
Step 3	switch(config)# **radius-server host** {*ipv4-address* |*ipv6-address* | *host-name*} **timeout** *seconds* **Example:** switch(config)# radius-server host server1 timeout 10	Specifies the transmission timeout interval for a specific server. The default is the global value. **Note** The timeout interval value specified for a RADIUS server overrides the interval value specified for all RADIUS servers in Step 3.
Step 4	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.
Step 5	**show radius-server** **Example:** switch# show radius-server	(Optional) Displays the RADIUS server configuration.
Step 6	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Configuring Accounting and Authentication Attributes for RADIUS Servers

You can specify that a RADIUS server is to be used only for accounting purposes or only for authentication purposes. By default, RADIUS servers are used for both accounting and authentication. You can also specify the destination UDP port numbers where RADIUS accounting and authentication messages should be sent if there is a conflict with the default port.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **acct-port** *udp-port*
3. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **accounting**

4. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **auth-port** *udp-port*
5. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **authentication**
6. **exit**
7. **show radius-server**
8. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **acct-port** *udp-port* **Example:** switch(config)# radius-server host 10.10.1.1 acct-port 2004	(Optional) Specifies a UDP port to use for RADIUS accounting messages. The default UDP port is 1813. The range is from 0 to 65535.
Step 3	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **accounting** **Example:** switch(config)# radius-server host 10.10.1.1 accounting	(Optional) Specifies that the specified RADIUS server to use only for accounting purposes. The default is both accounting and authentication.
Step 4	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **auth-port** *udp-port* **Example:** switch(config)# radius-server host 10.10.2.2 auth-port 2005	(Optional) Specifies a UDP port to use for RADIUS authentication messages. The default UDP port is 1812. The range is from 0 to 65535.
Step 5	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **authentication** **Example:** switch(config)# radius-server host 10.10.2.2 authentication	(Optional) Specifies that the specified RADIUS server is to be used only for authentication purposes. The default is both accounting and authentication.
Step 6	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.
Step 7	**show radius-server** **Example:** switch(config)# show radius-server	(Optional) Displays the RADIUS server configuration.
Step 8	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Configuring Periodic RADIUS Server Monitoring

You can monitor the availability of RADIUS servers. These parameters include the username and password to use for the server and an idle timer. The idle timer specifies the interval during which a RADIUS server receives no requests before the NX-OS device sends out a test packet. You can configure this option to test servers periodically.

Note For security reasons, we recommend that you do not configure a test username that is the same as an existing user in the RADIUS database.

The test idle timer specifies the interval during which a RADIUS server receives no requests before the NX-OS device sends out a test packet.

Note The default idle timer value is 0 minutes. When the idle time interval is 0 minutes, the NX-OS device does not perform periodic RADIUS server monitoring.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **test** {**idle-time** *minutes* | **password** *password* [**idle-time** *minutes*] | **username** *name* [**password** *password* [**idle-time** *minutes*]]}
3. **radius-server dead-time** *minutes*
4. **exit**
5. **show radius-server**
6. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	**radius-server host** {*ipv4-address* | *ipv6-address* | *host-name*} **test** {**idle-time** *minutes* | **password** *password* [**idle-time** *minutes*] | **username** *name* [**password** *password* [**idle-time** *minutes*]]} **Example:** switch(config)# radius-server host 10.10.1.1 test username user1 password Ur2Gd2BH idle-time 3	Specifies parameters for server monitoring. The default username is test and the default password is test. The default value for the idle timer is 0 minutes. The valid range is 0 to 1440 minutes. **Note** For periodic RADIUS server monitoring, you must set the idle timer to a value greater than 0.

	Command	Purpose
Step 3	**radius-server dead-time** *minutes* **Example:** `switch(config)# radius-server dead-time 5`	Specifies the number of minutes before the NX-OS device checks a RADIUS server that was previously unresponsive. The default value is 0 minutes. The valid range is 1 to 1440 minutes.

Step 4	**exit**
	
	Example:
	`switch(config)# exit`
	`switch#`
		Exits configuration mode.

Step 5	**show radius-server** **Example:** `switch# show radius-server`	(Optional) Displays the RADIUS server configuration.
Step 6	**copy running-config startup-config** **Example:** `switch# copy running-config startup-config`	(Optional) Copies the running configuration to the startup configuration.

Configuring the Dead-Time Interval

You can configure the dead-time interval for all RADIUS servers. The dead-time interval specifies the time that the NX-OS device waits after declaring a RADIUS server is dead, before sending out a test packet to determine if the server is now alive. The default value is 0 minutes.

Note When the dead-time interval is 0 minutes, RADIUS servers are not marked as dead even if they are not responding. You can configure the dead-time interval for a RADIUS server group (see the "Configuring RADIUS Server Groups" section on page 3-9).

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **config t**
2. **radius-server deadtime** *minutes*
3. **exit**
4. **show radius-server**
5. **copy running-config startup-config**

DETAILED STEPS

	Command	Purpose
Step 1	**config t** **Example:** switch# config t switch(config)#	Enters configuration mode.
Step 2	switch(config)# **radius-server deadtime** *minutes* **Example:** switch(config)# radius-server deadtime 5	Configures the dead-time interval. The default value is 0 minutes. The range is from 1 to 1440 minutes.
Step 3	**exit** **Example:** switch(config)# exit switch#	Exits configuration mode.
Step 4	**show radius-server** **Example:** switch# show radius-server	(Optional) Displays the RADIUS server configuration.
Step 5	**copy running-config startup-config** **Example:** switch# copy running-config startup-config	(Optional) Copies the running configuration to the startup configuration.

Manually Monitoring RADIUS Servers or Groups

You can manually issue a test message to a RADIUS server or to a server group.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **test aaa server radius** {*ipv4-address* | *ipv6-address* | *host-name*} [**vrf** *vrf-name*] *username password*
2. **test aaa group** *group-name username password*

DETAILED STEPS

	Command	Purpose
Step 1	**test aaa server radius** {*ipv4-address* | *ipv6-address* | *server-name*} [**vrf** *vrf-name*] *username password* **Example:** `switch# test aaa server radius 10.10.1.1 user1 Ur2Gd2BH`	Sends a test message to a RADIUS server to confirm availability.
Step 1	**test aaa group** *group-name username password* **Example:** `switch# test aaa group RadGroup user2 As3He3CI`	Sends a test message to a RADIUS server group to confirm availability.

Verifying RADIUS Configuration

To display RADIUS configuration information, perform one of the following tasks:

Command	Purpose
show running-config radius [**all**]	Displays the RADIUS configuration in the running configuration.
show startup-config radius	Displays the RADIUS configuration in the startup configuration.
show radius-server [*server-name* | *ipv4-address* | *ipv6-address*] [**directed-request** | **groups** | **sorted** | **statistics**]	Displays all configured RADIUS server parameters.

For detailed information about the fields in the output from this command, see the *Cisco Nexus 7000 Series NX-OS Security Command Reference, Release 4.0*.

Displaying RADIUS Server Statistics

You can display the statistics that the NX-OS device maintains for RADIUS server activity.

BEFORE YOU BEGIN

Ensure that you are in the correct VDC (or use the **switchto vdc** command).

SUMMARY STEPS

1. **show radius-server statistics** {*hostname* \| *ipv4-address* \| *ipv6-address*}

DETAILED STEPS

	Command	Purpose

Step 1	`switch# show radius-server statistics {hostname | ipv4-address | ipv6-address}`
	
	Example:
	`switch# show radius-server statistics 10.10.1.1`
		Displays the RADIUS statistics.

For detailed information about the fields in the output from this command, see the *Cisco Nexus 7000 Series NX-OS Security Command Reference, Release 4.0*.

Example RADIUS Configuration

The following example shows how to configure RADIUS:

```
radius-server key 7 "ToIkLhPpG"
radius-server host 10.10.1.1 key 7 "ShMoMhTl" authentication accounting
aaa group server radius RadServer
    server 10.10.1.1
```

Where to Go Next

You can now configure AAA authentication methods to include the RADIUS server groups (see Chapter 2, “Configuring AAA”).

Default Settings

Table 3-1 lists the default settings for RADIUS parameters.

Table 3-1 Default RADIUS Parameters

Parameters	Default
Server roles	Authentication and accounting
Dead timer interval	0 minutes
Retransmission count	1
Retransmission timer interval	5 seconds
Authentication UDP port	1812
Accounting UDP port	1813
Idle timer interval	0 minutes
Periodic server monitoring username	test
Periodic server monitoring password	test

Additional References

For additional information related to implementing RADIUS, see the following sections:

- Related Documents, page 3-21
- Standards, page 3-21
- MIBs, page 3-21

Related Documents

Related Topic	Document Title
NX-OS Licensing	*Cisco Nexus 7000 Series NX-OS Licensing Guide, Release 4.0*
Command reference	*Cisco Nexus 7000 Series NX-OS Security Command Reference, Release 4.0*
VRF configuration	*Cisco Nexus 7000 Series NX-OS Unicast Routing Configuration Guide, Release 4.0*

Standards

Standards	Title
No new or modified standards are supported by this feature, and support for existing standards has not been modified by this feature.	—

MIBs

MIBs	MIBs Link
• CISCO-AAA-SERVER-MIB • CISCO-AAA-SERVER-EXT-MIB	To locate and download MIBs, go to the following URL: http://www.cisco.com/public/sw-center/netmgmt/cmtk/mibs.shtml