CHAPTER 36

RADIUS Servers for AAA

This chapter describes how to configure RADIUS servers for AAA and includes the following sections:

Information About RADIUS Servers

The ASA supports the following RFC-compliant RADIUS servers for AAA:

- Cisco Secure ACS 3.2, 4.0, 4.1, 4.2, and 5.x
- Cisco Identity Services Engine (ISE)
- RSA RADIUS in RSA Authentication Manager 5.2, 6.1, and 7.x
- Microsoft

This section includes the following topics:

Supported Authentication Methods

The ASA supports the following authentication methods with RADIUS servers:

- PAP—For all connection types.

- CHAP and MS-CHAPv1—For L2TP-over-IPsec connections.
- MS-CHAPv2—For L2TP-over-IPsec connections, and for regular IPsec remote access connections when the password management feature is enabled. You can also use MS-CHAPv2 with clientless connections.
- Authentication Proxy modes—For RADIUS-to Active-Directory, RADIUS-to-RSA/SDI, RADIUS-to-Token server, and RSA/SDI-to-RADIUS connections,

Note To enable MS-CHAPv2 as the protocol used between the ASA and the RADIUS server for a VPN connection, password management must be enabled in the tunnel group general attributes. Enabling password management generates an MS-CHAPv2 authentication request from the ASA to the RADIUS server. See the description of the **password-management** command for details.

If you use double authentication and enable password management in the tunnel group, then the primary and secondary authentication requests include MS-CHAPv2 request attributes. If a RADIUS server does not support MS-CHAPv2, then you can configure that server to send a non-MS-CHAPv2 authentication request by using the **no mschapv2-capable** command.

User Authorization of VPN Connections

The ASA can use RADIUS servers for user authorization of VPN remote access and firewall cut-through-proxy sessions using dynamic ACLs or ACL names per user. To implement dynamic ACLs, you must configure the RADIUS server to support them. When the user authenticates, the RADIUS server sends a downloadable ACL or ACL name to the ASA. Access to a given service is either permitted or denied by the ACL. The ASA deletes the ACL when the authentication session expires.

In addition to ACLs, the ASA supports many other attributes for authorization and setting of permissions for VPN remote access and firewall cut-through proxy sessions.

Supported Sets of RADIUS Attributes

The ASA supports the following sets of RADIUS attributes:

- Authentication attributes defined in RFC 2138.
- Accounting attributes defined in RFC 2139.
- RADIUS attributes for tunneled protocol support, defined in RFC 2868.
- Cisco IOS Vendor-Specific Attributes (VSAs), identified by RADIUS vendor ID 9.
- Cisco VPN-related VSAs, identified by RADIUS vendor ID 3076.
- Microsoft VSAs, defined in RFC 2548.
- Cisco VSA (Cisco-Priv-Level), which provides a standard 0-15 numeric ranking of privileges, with 1 being the lowest level and 15 being the highest level. A zero level indicates no privileges. The first level (login) allows privileged EXEC access for the commands available at this level. The second level (enable) allows CLI configuration privileges.

Supported RADIUS Authorization Attributes

Authorization refers to the process of enforcing permissions or attributes. A RADIUS server defined as an authentication server enforces permissions or attributes if they are configured. These attributes have vendor ID 3076.

Table 36-1 lists the supported RADIUS attributes that can be used for user authorization.

Note RADIUS attribute names do not contain the cVPN3000 prefix. Cisco Secure ACS 4.x supports this new nomenclature, but attribute names in pre-4.0 ACS releases still include the cVPN3000 prefix. The ASAs enforce the RADIUS attributes based on attribute numeric ID, not attribute name.

All attributes listed in Table 36-1 are downstream attributes that are sent from the RADIUS server to the ASA except for the following attribute numbers: 146, 150, 151, and 152. These attribute numbers are upstream attributes that are sent from the ASA to the RADIUS server. RADIUS attributes 146 and 150 are sent from the ASA to the RADIUS server for authentication and authorization requests. All four previously listed attributes are sent from the ASA to the RADIUS server for accounting start, interim-update, and stop requests. Upstream RADIUS attributes 146, 150, 151, and 152 were introduced in Version 8.4(3).

Cisco ACS 5.x and Cisco ISE do not support IPv6 framed IP addresses for IP address assignment using RADIUS authentication in Version 9.0(1).

Table 36-1 Supported RADIUS Authorization Attributes

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
Access-Hours	Y	1	String	Single	Name of the time range, for example, Business-hours
Access-List-Inbound	Y	86	String	Single	ACL ID
Access-List-Outbound	Y	87	String	Single	ACL ID
Address-Pools	Y	217	String	Single	Name of IP local pool
Allow-Network-Extension-Mode	Y	64	Boolean	Single	0 = Disabled 1 = Enabled
Authenticated-User-Idle-Timeout	Y	50	Integer	Single	1-35791394 minutes
Authorization-DN-Field	Y	67	String	Single	Possible values: UID, OU, O, CN, L, SP, C, EA, T, N, GN, SN, I, GENQ, DNQ, SER, use-entire-name
Authorization-Required		66	Integer	Single	0 = No 1 = Yes
Authorization-Type	Y	65	Integer	Single	0 = None 1 = RADIUS 2 = LDAP

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi- Valued	Description or Value
Banner1	Y	15	String	Single	Banner string to display for Cisco VPN remote access sessions: IPsec IKEv1, AnyConnect SSL-TLS/DTLS/IKEv2, and Clientless SSL
Banner2	Y	36	String	Single	Banner string to display for Cisco VPN remote access sessions: IPsec IKEv1, AnyConnect SSL-TLS/DTLS/IKEv2, and Clientless SSL. The Banner2 string is concatenated to the Banner1 string , if configured.
Cisco-IP-Phone-Bypass	Y	51	Integer	Single	0 = Disabled 1 = Enabled
Cisco-LEAP-Bypass	Y	75	Integer	Single	0 = Disabled 1 = Enabled
Client Type	Y	150	Integer	Single	1 = Cisco VPN Client (IKEv1) 2 = AnyConnect Client SSL VPN 3 = Clientless SSL VPN 4 = Cut-Through-Proxy 5 = L2TP/IPsec SSL VPN 6 = AnyConnect Client IPsec VPN (IKEv2)
Client-Type-Version-Limiting	Y	77	String	Single	IPsec VPN version number string
DHCP-Network-Scope	Y	61	String	Single	IP Address
Extended-Authentication-On-Rekey	Y	122	Integer	Single	0 = Disabled 1 = Enabled
Group-Policy	Y	25	String	Single	Sets the group policy for the remote access VPN session. For Versions 8.2.x and later, use this attribute instead of IETF-Radius-Class. You can use one of the following formats: • *group policy name* • OU=*group policy name* • OU=*group policy name*;
IE-Proxy-Bypass-Local		83	Integer	Single	0 = None 1 = Local
IE-Proxy-Exception-List		82	String	Single	New line (\n) separated list of DNS domains
IE-Proxy-PAC-URL	Y	133	String	Single	PAC address string
IE-Proxy-Server		80	String	Single	IP address

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
IE-Proxy-Server-Policy		81	Integer	Single	1 = No Modify 2 = No Proxy 3 = Auto detect 4 = Use Concentrator Setting
IKE-KeepAlive-Confidence-Interval	Y	68	Integer	Single	10-300 seconds
IKE-Keepalive-Retry-Interval	Y	84	Integer	Single	2-10 seconds
IKE-Keep-Alives	Y	41	Boolean	Single	0 = Disabled 1 = Enabled
Intercept-DHCP-Configure-Msg	Y	62	Boolean	Single	0 = Disabled 1 = Enabled
IPsec-Allow-Passwd-Store	Y	16	Boolean	Single	0 = Disabled 1 = Enabled
IPsec-Authentication		13	Integer	Single	0 = None 1 = RADIUS 2 = LDAP (authorization only) 3 = NT Domain 4 = SDI 5 = Internal 6 = RADIUS with Expiry 7 = Kerberos/Active Directory
IPsec-Auth-On-Rekey	Y	42	Boolean	Single	0 = Disabled 1 = Enabled
IPsec-Backup-Server-List	Y	60	String	Single	Server Addresses (space delimited)
IPsec-Backup-Servers	Y	59	String	Single	1 = Use Client-Configured list 2 = Disable and clear client list 3 = Use Backup Server list
IPsec-Client-Firewall-Filter-Name		57	String	Single	Specifies the name of the filter to be pushed to the client as firewall policy
IPsec-Client-Firewall-Filter-Optional	Y	58	Integer	Single	0 = Required 1 = Optional
IPsec-Default-Domain	Y	28	String	Single	Specifies the single default domain name to send to the client (1-255 characters).
IPsec-IKE-Peer-ID-Check	Y	40	Integer	Single	1 = Required 2 = If supported by peer certificate 3 = Do not check
IPsec-IP-Compression	Y	39	Integer	Single	0 = Disabled 1 = Enabled
IPsec-Mode-Config	Y	31	Boolean	Single	0 = Disabled 1 = Enabled

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
IPsec-Over-UDP	Y	34	Boolean	Single	0 = Disabled 1 = Enabled
IPsec-Over-UDP-Port	Y	35	Integer	Single	4001- 49151. The default is 10000.
IPsec-Required-Client-Firewall-Capability	Y	56	Integer	Single	0 = None 1 = Policy defined by remote FW Are-You-There (AYT) 2 = Policy pushed CPP 4 = Policy from server
IPsec-Sec-Association		12	String	Single	Name of the security association
IPsec-Split-DNS-Names	Y	29	String	Single	Specifies the list of secondary domain names to send to the client (1-255 characters).
IPsec-Split-Tunneling-Policy	Y	55	Integer	Single	0 = No split tunneling 1 = Split tunneling 2 = Local LAN permitted
IPsec-Split-Tunnel-List	Y	27	String	Single	Specifies the name of the network or ACL that describes the split tunnel inclusion list.
IPsec-Tunnel-Type	Y	30	Integer	Single	1 = LAN-to-LAN 2 = Remote access
IPsec-User-Group-Lock		33	Boolean	Single	0 = Disabled 1 = Enabled
IPv6-Address-Pools	Y	218	String	Single	Name of IP local pool-IPv6
IPv6-VPN-Filter	Y	219	String	Single	ACL value
L2TP-Encryption		21	Integer	Single	Bitmap: 1 = Encryption required 2 = 40 bits 4 = 128 bits 8 = Stateless-Req 15= 40/128-Encr/Stateless-Req
L2TP-MPPC-Compression		38	Integer	Single	0 = Disabled 1 = Enabled
Member-Of	Y	145	String	Single	Comma-delimited string, for example: `Engineering, Sales` An administrative attribute that can be used in dynamic access policies. It does not set a group policy.
MS-Client-Subnet-Mask	Y	63	Boolean	Single	An IP address
NAC-Default-ACL		92	String		ACL
NAC-Enable		89	Integer	Single	0 = No 1 = Yes

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
NAC-Revalidation-Timer		91	Integer	Single	300-86400 seconds
NAC-Settings	Y	141	String	Single	Name of the NAC policy
NAC-Status-Query-Timer		90	Integer	Single	30-1800 seconds
Perfect-Forward-Secrecy-Enable	Y	88	Boolean	Single	0 = No 1 = Yes
PPTP-Encryption		20	Integer	Single	Bitmap: 1 = Encryption required 2 = 40 bits 4 = 128 bits 8 = Stateless-Required 15= 40/128-Encr/Stateless-Req
PPTP-MPPC-Compression		37	Integer	Single	0 = Disabled 1 = Enabled
Primary-DNS	Y	5	String	Single	An IP address
Primary-WINS	Y	7	String	Single	An IP address
Privilege-Level	Y	220	Integer	Single	An integer between 0 and 15.
Required-Client- Firewall-Vendor-Code	Y	45	Integer	Single	1 = Cisco Systems (with Cisco Integrated Client) 2 = Zone Labs 3 = NetworkICE 4 = Sygate 5 = Cisco Systems (with Cisco Intrusion Prevention Security Agent)
Required-Client-Firewall-Description	Y	47	String	Single	String
Required-Client-Firewall-Product-Code	Y	46	Integer	Single	Cisco Systems Products: 1 = Cisco Intrusion Prevention Security Agent or Cisco Integrated Client (CIC) Zone Labs Products: 1 = Zone Alarm 2 = Zone AlarmPro 3 = Zone Labs Integrity NetworkICE Product: 1 = BlackIce Defender/Agent Sygate Products: 1 = Personal Firewall 2 = Personal Firewall Pro 3 = Security Agent
Required-Individual-User-Auth	Y	49	Integer	Single	0 = Disabled 1 = Enabled

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
Require-HW-Client-Auth	Y	48	Boolean	Single	0 = Disabled 1 = Enabled
Secondary-DNS	Y	6	String	Single	An IP address
Secondary-WINS	Y	8	String	Single	An IP address
SEP-Card-Assignment		9	Integer	Single	Not used
Session Subtype	Y	152	Integer	Single	0 = None 1 = Clientless 2 = Client 3 = Client Only Session Subtype applies only when the Session Type (151) attribute has the following values: 1, 2, 3, and 4.
Session Type	Y	151	Integer	Single	0 = None 1 = AnyConnect Client SSL VPN 2 = AnyConnect Client IPSec VPN (IKEv2) 3 = Clientless SSL VPN 4 = Clientless Email Proxy 5 = Cisco VPN Client (IKEv1) 6 = IKEv1 LAN-LAN 7 = IKEv2 LAN-LAN 8 = VPN Load Balancing
Simultaneous-Logins	Y	2	Integer	Single	0-2147483647
Smart-Tunnel	Y	136	String	Single	Name of a Smart Tunnel
Smart-Tunnel-Auto	Y	138	Integer	Single	0 = Disabled 1 = Enabled 2 = AutoStart
Smart-Tunnel-Auto-Signon-Enable	Y	139	String	Single	Name of a Smart Tunnel Auto Signon list appended by the domain name
Strip-Realm	Y	135	Boolean	Single	0 = Disabled 1 = Enabled
SVC-Ask	Y	131	String	Single	0 = Disabled 1 = Enabled 3 = Enable default service 5 = Enable default clientless (2 and 4 not used)
SVC-Ask-Timeout	Y	132	Integer	Single	5-120 seconds
SVC-DPD-Interval-Client	Y	108	Integer	Single	0 = Off 5-3600 seconds
SVC-DPD-Interval-Gateway	Y	109	Integer	Single	0 = Off) 5-3600 seconds

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
SVC-DTLS	Y	123	Integer	Single	0 = False 1 = True
SVC-Keepalive	Y	107	Integer	Single	0 = Off 15-600 seconds
SVC-Modules	Y	127	String	Single	String (name of a module)
SVC-MTU	Y	125	Integer	Single	MTU value 256-1406 in bytes
SVC-Profiles	Y	128	String	Single	String (name of a profile)
SVC-Rekey-Time	Y	110	Integer	Single	0 = Disabled 1-10080 minutes
Tunnel Group Name	Y	146	String	Single	1-253 characters
Tunnel-Group-Lock	Y	85	String	Single	Name of the tunnel group or “none”
Tunneling-Protocols	Y	11	Integer	Single	1 = PPTP 2 = L2TP 4 = IPSec (IKEv1) 8 = L2TP/IPSec 16 = WebVPN 32 = SVC 64 = IPsec (IKEv2) 8 and 4 are mutually exclusive. 0 - 11, 16 - 27, 32 - 43, 48 - 59 are legal values.
Use-Client-Address		17	Boolean	Single	0 = Disabled 1 = Enabled
VLAN	Y	140	Integer	Single	0-4094
WebVPN-Access-List	Y	73	String	Single	Access-List name
WebVPN ACL	Y	73	String	Single	Name of a WebVPN ACL on the device
WebVPN-ActiveX-Relay	Y	137	Integer	Single	0 = Disabled Otherwise = Enabled
WebVPN-Apply-ACL	Y	102	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-Auto-HTTP-Signon	Y	124	String	Single	Reserved
WebVPN-Citrix-Metaframe-Enable	Y	101	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-Content-Filter-Parameters	Y	69	Integer	Single	1 = Java ActiveX 2 = Java Script 4 = Image 8 = Cookies in images
WebVPN-Customization	Y	113	String	Single	Name of the customization

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
WebVPN-Default-Homepage	Y	76	String	Single	A URL such as http://example-example.com
WebVPN-Deny-Message	Y	116	String	Single	Valid string (up to 500 characters)
WebVPN-Download_Max-Size	Y	157	Integer	Single	0x7fffffff
WebVPN-File-Access-Enable	Y	94	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-File-Server-Browsing-Enable	Y	96	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-File-Server-Entry-Enable	Y	95	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-Group-based-HTTP/HTTPS-Proxy -Exception-List	Y	78	String	Single	Comma-separated DNS/IP with an optional wildcard (*) (for example *.cisco.com, 192.168.1.*, wwwin.cisco.com)
WebVPN-Hidden-Shares	Y	126	Integer	Single	0 = None 1 = Visible
WebVPN-Home-Page-Use-Smart-Tunnel	Y	228	Boolean	Single	Enabled if clientless home page is to be rendered through Smart Tunnel.
WebVPN-HTML-Filter	Y	69	Bitmap	Single	1 = Java ActiveX 2 = Scripts 4 = Image 8 = Cookies
WebVPN-HTTP-Compression	Y	120	Integer	Single	0 = Off 1 = Deflate Compression
WebVPN-HTTP-Proxy-IP-Address	Y	74	String	Single	Comma-separated DNS/IP:port, with http= or https= prefix (for example http=10.10.10.10:80, https=11.11.11.11:443)
WebVPN-Idle-Timeout-Alert-Interval	Y	148	Integer	Single	0-30. 0 = Disabled.
WebVPN-Keepalive-Ignore	Y	121	Integer	Single	0-900
WebVPN-Macro-Substitution	Y	223	String	Single	Unbounded. For examples, see the *SSL VPN Deployment Guide* at the following URL: http://www.cisco.com/en/US/docs/security/asa/asa80/asdm60/ssl_vpn_deployment_guide/deploy.html
WebVPN-Macro-Substitution	Y	224	String	Single	Unbounded. For examples, see the *SSL VPN Deployment Guide* at the following URL: http://www.cisco.com/en/US/docs/security/asa/asa80/asdm60/ssl_vpn_deployment_guide/deploy.html
WebVPN-Port-Forwarding-Enable	Y	97	Integer	Single	0 = Disabled 1 = Enabled

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
WebVPN-Port-Forwarding-Exchange-Proxy-Enable	Y	98	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-Port-Forwarding-HTTP-Proxy	Y	99	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-Port-Forwarding-List	Y	72	String	Single	Port forwarding list name
WebVPN-Port-Forwarding-Name	Y	79	String	Single	String name (example, "Corporate-Apps"). This text replaces the default string, "Application Access," on the clientless portal home page.
WebVPN-Post-Max-Size	Y	159	Integer	Single	0x7fffffff
WebVPN-Session-Timeout-Alert-Interval	Y	149	Integer	Single	0-30. 0 = Disabled.
WebVPN Smart-Card-Removal-Disconnect	Y	225	Boolean	Single	0 = Disabled 1 = Enabled
WebVPN-Smart-Tunnel	Y	136	String	Single	Name of a Smart Tunnel
WebVPN-Smart-Tunnel-Auto-Sign-On	Y	139	String	Single	Name of a Smart Tunnel auto sign-on list appended by the domain name
WebVPN-Smart-Tunnel-Auto-Start	Y	138	Integer	Single	0 = Disabled 1 = Enabled 2 = Auto Start
WebVPN-Smart-Tunnel-Tunnel-Policy	Y	227	String	Single	One of "e networkname," "i networkname," or "a," where networkname is the name of a Smart Tunnel network list, e indicates the tunnel excluded, i indicates the tunnel specified, and a indicates all tunnels.
WebVPN-SSL-VPN-Client-Enable	Y	103	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-SSL-VPN-Client-Keep-Installation	Y	105	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-SSL-VPN-Client-Required	Y	104	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-SSO-Server-Name	Y	114	String	Single	Valid string
WebVPN-Storage-Key	Y	162	String	Single	
WebVPN-Storage-Objects	Y	161	String	Single	
WebVPN-SVC-Keepalive-Frequency	Y	107	Integer	Single	15-600 seconds, 0=Off
WebVPN-SVC-Client-DPD-Frequency	Y	108	Integer	Single	5-3600 seconds, 0=Off
WebVPN-SVC-DTLS-Enable	Y	123	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-SVC-DTLS-MTU	Y	125	Integer	Single	MTU value is from 256-1406 bytes.

Table 36-1 Supported RADIUS Authorization Attributes (continued)

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
WebVPN-SVC-Gateway-DPD-Frequency	Y	109	Integer	Single	5-3600 seconds, 0=Off
WebVPN-SVC-Rekey-Time	Y	110	Integer	Single	4-10080 minutes, 0=Off
WebVPN-SVC-Rekey-Method	Y	111	Integer	Single	0 (Off), 1 (SSL), 2 (New Tunnel)
WebVPN-SVC-Compression	Y	112	Integer	Single	0 (Off), 1 (Deflate Compression)
WebVPN-UNIX-Group-ID (GID)	Y	222	Integer	Single	Valid UNIX group IDs
WebVPN-UNIX-User-ID (UIDs)	Y	221	Integer	Single	Valid UNIX user IDs
WebVPN-Upload-Max-Size	Y	158	Integer	Single	0x7fffffff
WebVPN-URL-Entry-Enable	Y	93	Integer	Single	0 = Disabled 1 = Enabled
WebVPN-URL-List	Y	71	String	Single	URL list name
WebVPN-User-Storage	Y	160	String	Single	
WebVPN-VDI	Y	163	String	Single	List of settings

Supported IETF RADIUS Authorization Attributes

Table 36-2 lists the supported IETF RADIUS attributes.

Table 36-2 Supported IETF RADIUS Attributes

Attribute Name	ASA	Attr. No.	Syntax/ Type	Single or Multi-Valued	Description or Value
IETF-Radius-Class	Y	25		Single	For Versions 8.2.x and later, we recommend that you use the Group-Policy attribute (VSA 3076, #25) as described in Table 36-1: • *group policy name* • OU=*group policy name* • OU=*group policy name*
IETF-Radius-Filter-Id	Y	11	String	Single	ACL name that is defined on the ASA, which applies only to full tunnel IPsec and SSL VPN clients.
IETF-Radius-Framed-IP-Address	Y	n/a	String	Single	An IP address
IETF-Radius-Framed-IP-Netmask	Y	n/a	String	Single	An IP address mask
IETF-Radius-Idle-Timeout	Y	28	Integer	Single	Seconds

Table 36-2 Supported IETF RADIUS Attributes (continued)

IETF-Radius-Service-Type	Y	6	Integer	Single	Seconds. Possible Service Type values: • .Administrative—User is allowed access to the configure prompt. • .NAS-Prompt—User is allowed access to the exec prompt. • .remote-access—User is allowed network access
IETF-Radius-Session-Timeout	Y	27	Integer	Single	Seconds

RADIUS Accounting Disconnect Reason Codes

These codes are returned if the ASA encounters a disconnect when sending packets:

Disconnect Reason Code
ACCT_DISC_USER_REQ = 1
ACCT_DISC_LOST_CARRIER = 2
ACCT_DISC_LOST_SERVICE = 3
ACCT_DISC_IDLE_TIMEOUT = 4
ACCT_DISC_SESS_TIMEOUT = 5
ACCT_DISC_ADMIN_RESET = 6
ACCT_DISC_ADMIN_REBOOT = 7
ACCT_DISC_PORT_ERROR = 8
ACCT_DISC_NAS_ERROR = 9
ACCT_DISC_NAS_REQUEST = 10
ACCT_DISC_NAS_REBOOT = 11
ACCT_DISC_PORT_UNNEEDED = 12
ACCT_DISC_PORT_PREEMPTED = 13
ACCT_DISC_PORT_SUSPENDED = 14
ACCT_DISC_SERV_UNAVAIL = 15
ACCT_DISC_CALLBACK = 16
ACCT_DISC_USER_ERROR = 17
ACCT_DISC_HOST_REQUEST = 18
ACCT_DISC_ADMIN_SHUTDOWN = 19
ACCT_DISC_SA_EXPIRED = 21
ACCT_DISC_MAX_REASONS = 22

Licensing Requirements for RADIUS Servers

Model	License Requirement
ASAv	Standard or Premium License.
All other models	Base License.

Guidelines and Limitations

This section includes the guidelines and limitations for this feature.

Context Mode Guidelines

Supported in single and multiple context mode.

Firewall Mode Guidelines

Supported in routed and transparent firewall mode.

IPv6 Guidelines

Supports IPv6.

Additional Guidelines

- You can have up to 100 server groups in single mode or 4 server groups per context in multiple mode.
- Each group can have up to 16 servers in single mode or 4 servers in multiple mode.
- If you need to configure fallback support using the local database, see Fallback Support, page 35-2 and the How Fallback Works with Multiple Servers in a Group, page 35-2.
- To prevent lockout from the ASA when using RADIUS authentication, see Recovering from a Lockout, page 43-36.

Configuring RADIUS Servers

This section includes the following topics:

Task Flow for Configuring RADIUS Servers

Step 1 Load the ASA attributes into the RADIUS server. The method that you use to load the attributes depends on which type of RADIUS server that you are using:

- If you are using Cisco ACS: the server already has these attributes integrated. You can skip this step.

- For RADIUS servers from other vendors (for example, Microsoft Internet Authentication Service): you must manually define each ASA attribute. To define an attribute, use the attribute name or number, type, value, and vendor code (3076).

Step 2 Add a RADIUS server group. See Configuring RADIUS Server Groups, page 36-15.

Step 3 For a server group, add a server to the group. See Adding a RADIUS Server to a Group, page 36-19.

Configuring RADIUS Server Groups

If you want to use an external RADIUS server for authentication, authorization, or accounting, you must first create at least one RADIUS server group per AAA protocol and add one or more servers to each group. You identify AAA server groups by name.

To add a RADIUS server group, perform the following steps:

Detailed Steps

	Command	Purpose

Step 1	**aaa-server** *server_tag* **protocol radius**
	Example:
	`ciscoasa(config)# aaa-server servergroup1 protocol radius`
	`ciscoasa(config-aaa-server-group)#`
		Identifies the server group name and the protocol.
		When you enter the **aaa-server protocol** command, you enter aaa-server group configuration mode.

Step 2	**merge-dacl** {**before-avpair** | **after-avpair**}
	Example:
	`ciscoasa(config)# aaa-server servergroup1 protocol radius`
	`ciscoasa(config-aaa-server-group)# merge-dacl before-avpair`
		Merges a downloadable ACL with the ACL received in the Cisco AV pair from a RADIUS packet. The default setting is **no merge dacl**, which specifies that downloadable ACLs will not be merged with Cisco AV pair ACLs. If both an AV pair and a downloadable ACL are received, the AV pair has priority and is used.
		The **before-avpair** option specifies that the downloadable ACL entries should be placed before the Cisco AV pair entries.
		The **after-avpair** option specifies that the downloadable ACL entries should be placed after the Cisco AV pair entries. This option applies only to VPN connections. For VPN users, ACLs can be in the form of Cisco AV pair ACLs, downloadable ACLs, and an ACL that is configured on the ASA. This option determines whether or not the downloadable ACL and the AV pair ACL are merged, and does not apply to any ACLs configured on the ASA.

	Command	Purpose
Step 3	**max-failed-attempts** *number* **Example:** ciscoasa(config-aaa-server-group)# max-failed-attempts 2	Specifies the maximum number of requests sent to a RADIUS server in the group before trying the next server. The *number* argument can range from 1 and 5. The default is 3. If you configured a fallback method using the local database (for management access only), and all the servers in the group fail to respond, then the group is considered to be unresponsive, and the fallback method is tried. The server group remains marked as unresponsive for a period of 10 minutes (by default), so that additional AAA requests within that period do not attempt to contact the server group, and the fallback method is used immediately. To change the unresponsive period from the default, see the **reactivation-mode** command in the next step. If you do not have a fallback method, the ASA continues to retry the servers in the group.
Step 4	**reactivation-mode** {**depletion** [**deadtime** *minutes*] | **timed**} **Example:** ciscoasa(config-aaa-server-group)# reactivation-mode deadtime 20	Specifies the method (reactivation policy) by which failed servers in a group are reactivated. The **depletion** keyword reactivates failed servers only after all of the servers in the group are inactive. The **deadtime** *minutes* keyword-argument pair specifies the amount of time in minutes, between 0 and 1440, that elapses between the disabling of the last server in the group and the subsequent reenabling of all servers. The default is 10 minutes. The **timed** keyword reactivates failed servers after 30 seconds of down time.
Step 5	**accounting-mode simultaneous** **Example:** ciscoasa(config-aaa-server-group)# accounting-mode simultaneous	Sends accounting messages to all servers in the group. To restore the default of sending messages only to the active server, enter the **accounting-mode single** command.
Step 6	**aaa-server** *server_group* [*interface_name*] **host** *server_ip* **Example:** ciscoasa(config)# aaa-server servergroup1 outside host 10.10.1.1	Identifies the server and the AAA server group to which it belongs. When you enter the **aaa-server host** command, you enter aaa-server host configuration mode.

	Command	Purpose

Step 7	**dynamic-authorization** {port *port-number*}
	Example:
	`(config-aaa-server-group)# dynamic-authorization port 1700`
		Enables the RADIUS Dynamic Authorization (CoA) services for the AAA server group.
		Once defined, the corresponding RADIUS server group will be registered for CoA notification and the ASA will listen to the port for the CoA policy updates from ISE.
		The valid range of the CoA listening *port-number* is1 to 65535.
		If the port number or interface specified in the ‘no’ form of this command does not match a line in the current configuration, an error message will be displayed.

Step 8	**authorize-only** **Example:** `(config-aaa-server-group)# authorize-only`	Enables authorize-only mode for the RADIUS server group. This indicates that when this server group is used for authorization, the RADIUS Access Request message will be built as an “Authorize Only” request as opposed to the configured password methods that are available now. The Authorize-Only request includes a Service-Type attribute with value Authorize-Only (17) and message authenticator within the Access-Request. The support of the authorize-only mode eliminates the need of including the RADIUS common password in the Access-Request. Thus, it does not require the configuration of common password using the radius-common-pw CLI in the aaa-server-host mode. **Note** The authorize-only mode is configured for the server-group while the common password is host-specific. Thus, once authorize-only mode is configured, the common password configured for individual AAA server would be ignored.

Step 9	**without-csd** {**anyconnect**}
	Example:
	`(config-tunnel-webvpn)# without-csd anyconnect`
		Switches off hostscan processing for connections that are made to a specific tunnel-group. This setting currently applies to clientless and L3 connections. This command has been modified to allow this setting to be applied to AnyConnect connections only.

	Command	Purpose

Step 10	**interim-accounting-update** {periodic *interval*}
	Example:
	`(config-aaa-server-group)# interim-accounting-update periodic 12`
		Enables the generation of RADIUS interim-accounting-update messages. Currently these messages are only generated when a VPN tunnel connection is added to a clientless VPN session. When this happens the accounting update is generated in order to inform the RADIUS server of the newly assigned IP address. Keywords have been added to this command to enable it to be configured to allow the current capabilities or to allow the generation of periodic interim accounting updates for all sessions that are configured to send accounting messages to the indicated server group.
		periodic - This optional keyword enables the periodic generation and transmission of accounting records for every VPN session that is configured to send accounting records to the server group in question.
		interval - This is a numeric value that represents the length, in hours, of the interval between periodic accounting updates. The valid range is 1 to 120 and the default value is 24.

Examples

The following example shows how to add one RADIUS group with a single server:

```
ciscoasa(config)# aaa-server AuthOutbound protocol radius
ciscoasa(config-aaa-server-group)# exit
ciscoasa(config)# aaa-server AuthOutbound (inside) host 10.1.1.3
ciscoasa(config-aaa-server-host)# key RadUauthKey
ciscoasa(config-aaa-server-host)# exit
```

The following example shows how to configure an ISE server object for authorization-only, dynamic authorization (CoA) updates, and hourly periodic accounting:

```
ciscoasa(config)# aaa-server ise protocol radius
ciscoasa(config-aaa-server-group)# authorize-only
ciscoasa(config-aaa-server-group)# interim-accounting-update periodic 1
ciscoasa(config-aaa-server-group)# dynamic-authorization
ciscoasa(config-aaa-server-group)# exit
ciscoasa(config-aaa-server-group)# authorize-only
ciscoasa(config)# aaa-server ise (inside) host 10.1.1.3
ciscoasa(config-aaa-server-host)# key sharedsecret
ciscoasa(config-aaa-server-host)# exit
```

The following example shows how to configure a tunnel group for password authentication with ISE:

```
ciscoasa(config)# tunnel-group aaa-coa general-attributes
ciscoasa(config-tunnel-general)# address-pool vpn
ciscoasa(config-tunnel-general)# authentication-server-group ise
ciscoasa(config-tunnel-general)# accounting-server-group ise
ciscoasa(config-tunnel-general)# exit
```

The following example shows how to configure a tunnel group for local certificate validation and authorization with ISE:

```
ciscoasa(config)# tunnel-group aaa-coa general-attributes
ciscoasa(config-tunnel-general)# address-pool vpn
ciscoasa(config-tunnel-general)# authentication certificate
ciscoasa(config-tunnel-general)# authorization-server-group ise
ciscoasa(config-tunnel-general)# accounting-server-group ise
ciscoasa(config-tunnel-general)# exit
```

Adding a RADIUS Server to a Group

To add a RADIUS server to a group, perform the following steps:

Detailed Steps

	Command	Purpose
Step 1	**aaa-server** *server_group* [*interface_name*] **host** *server_ip* **Example:** ciscoasa(config-aaa-server-group)# aaa-server servergroup1 outside host 10.10.1.1	Identifies the RADIUS server and the AAA server group to which it belongs. When you enter the **aaa-server host** command, you enter aaa-server host configuration mode.
Step 2	**acl-netmask-convert** {**auto-detect** | **standard** | **wildcard**} **Example:** ciscoasa(config-aaa-server-host)# **acl-netmask-convert standard**	Specifies how the ASA treats netmasks received in a downloadable ACL from a RADIUS server that is accessed by using the **aaa-server host** command. The **auto-detect** keyword specifies that the ASA should attempt to determine the type of netmask expression used. If the ASA detects a wildcard netmask expression, it converts it to a standard netmask expression. The **standard** keyword specifies that the ASA assumes downloadable ACLs received from the RADIUS server contain only standard netmask expressions. No translation from wildcard netmask expressions is performed. The **wildcard** keyword specifies that the ASA assumes downloadable ACLs received from the RADIUS server contain only wildcard netmask expressions and converts them all to standard netmask expressions when the ACLs are downloaded.
Step 3	**radius-common-pw** *string* **Example:** ciscoasa(config-aaa-server-host)# radius-common-pw examplepassword123abc	Specifies a common password to be used for all users who are accessing a RADIUS authorization server through the ASA. The *string* argument is a case-sensitive, alphanumeric keyword of up to 127 characters to be used as a common password for all authorization transactions with the RADIUS server.
Step 4	**mschapv2-capable** **Example:** ciscoasa(config-aaa-server-host)# mschapv2-capable	Enables MS-CHAPv2 authentication requests to the RADIUS server.

	Command	Purpose

Step 5	`timeout hh:mm:ss`
	Example:
	`ciscoasa(config-aaa-server-host)# timeout 15`
		Specifies the length of time, in seconds, that the ASA waits for a response from the primary server before sending the request to the backup server.

Step 6	`retry-interval seconds`
	Example:
	`ciscoasa(config-aaa-server-host)# retry-interval 8`
		Configures the amount of time between retry attempts for a particular AAA server designated in a previous **aaa-server host** command.
		The *seconds* argument specifies the retry interval (1-10 seconds) for the request. This is the time that the ASA waits before retrying a connection request.
		Note The interval between subsequent retries will always be 50 or 100 milliseconds, regardless of the retry-interval settings you have entered. This is the intended behavior.

Step 7	`accounting-mode simultaneous`
	Example:
	`ciscoasa(config-aaa-server-group)# accounting-mode simultaneous`
		Sends accounting messages to all servers in the group.
		To restore the default of sending messages only to the active server, enter the **accounting-mode single** command.

Step 8	`authentication-port port`
	Example:
	`ciscoasa(config-aaa-server-host)# authentication-port 1645`
		Specifies the authentication port as port number1645, or the server port o be used for authentication of users.

Step 9	`accounting-port port`
	Example:
	`ciscoasa(config-aaa-server-host)# accounting-port 1646`
		Specifies the accounting port as port number 1646, or the server port to be used for accounting for this host.

Step 10	`key`
	Example:
	`ciscoasa(config-aaa-host)# key myexamplekey1`
		Specifies the server secret value used to authenticate the RADIUS server to the ASA. The server secret that you configure should match the one configured on the RADIUS server. If you do not know the server secret value, ask the RADIUS server administrator. The maximum length is 64 characters.

Examples

The following example shows how to add a RADIUS server to an existing RADIUS server group:

```
ciscoasa(config)# aaa-server svrgrp1 protocol radius
ciscoasa(config-aaa-server-group)# aaa-server svrgrp1 host 192.168.3.4
ciscoasa(config-aaa-server-host)# acl-netmask-convert wildcard
ciscoasa(config-aaa-server-host)# radius-common-pw myexaplepasswordabc123
ciscoasa(config-aaa-server-host)# mschapv2-capable
ciscoasa(config-aaa-server-host)# timeout 9
ciscoasa(config-aaa-server-host)# retry-interval 7
ciscoasa(config-aaa-server-host)# accounting-mode simultaneous
ciscoasa(config-aaa-server-host)# authentication-port 1650
ciscoasa(config-aaa-server-host)# authorization-port 1645
ciscoasa(config-aaa-server-host)# key mysecretkeyexampleiceage2
ciscoasa(config-aaa-server-host)# exit
ciscoasa(config)#
```

Monitoring RADIUS Servers

To monitor RADIUS servers,enter one of the following commands:

Command	Purpose
show aaa-server	Shows the configured RADIUS server statistics. To clear the RADIUS server configuration, enter the **clear aaa-server statistics** command.
show running-config aaa-server	Shows the RADIUS server running configuration. To clear RADIUS server statistics, enter the **clear configure aaa-server** command.

Additional References

For additional information related to implementing AAA through RADIUS servers, see RFCs, page 36-22.

RFCs

RFC	Title
2138	*Remote Authentication Dial In User Service (RADIUS)*
2139	*RADIUS Accounting*
2548	*Microsoft Vendor-specific RADIUS Attributes*
2868	*RADIUS Attributes for Tunnel Protocol Support*

Feature History for RADIUS Servers

Table 36-3 lists each feature change and the platform release in which it was implemented.

Table 36-3 Feature History for RADIUS Servers

Feature Name	Platform Releases	Feature Information
RADIUS Servers for AAA	7.0(1)	Describes how to configure RADIUS servers for AAA. We introduced the following commands: **aaa-server protocol**, **max-failed-attempts**, **reactivation-mode**, **accounting-mode simultaneous**, **aaa-server host**, **show aaa-server**, **show running-config aaa-server**, **clear aaa-server statistics**, **authentication-port**, **accounting-port**, **retry-interval**, **acl-netmask-convert**, **clear configure aaa-server**, **merge-dacl**, **radius-common-pw, key**.
Key vendor-specific attributes (VSAs) sent in RADIUS access request and accounting request packets from the ASA	8.4(3)	Four New VSAs—Tunnel Group Name (146) and Client Type (150) are sent in RADIUS access request packets from the ASA. Session Type (151) and Session Subtype (152) are sent in RADIUS accounting request packets from the ASA. All four attributes are sent for all accounting request packet types: Start, Interim-Update, and Stop. The RADIUS server (for example, ACS and ISE) can then enforce authorization and policy attributes or use them for accounting and billing purposes.