IPsec VPN Accounting

Last Updated: October 17, 2011

The IPsec VPN Accounting feature allows a session to be accounted by indicating when the session starts and stops. A VPN session is defined as an Internet Key Exchange (IKE) security association (SA) and the one or more SA pairs that are created by the IKE SA. The session starts when the first IP Security (IPsec) pair is created and stops when all IPsec SAs are deleted. Session identifying information and session usage information is passed to the Remote Authentication Dial-In User Service (RADIUS) server through standard RADIUS attributes and vendor-specific attributes (VSAs).

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- Information About IPsec VPN Accounting, page 2
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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for IPsec VPN Accounting

- You should understand how to configure RADIUS and authentication, authorization, and accounting (AAA) accounting.
- You should know how to configure IPsec accounting.
Information About IPsec VPN Accounting

- RADIUS Accounting, page 2
- IKE and IPsec Subsystem Interaction, page 4

RADIUS Accounting

For many large networks, it is required that user activity be recorded for auditing purposes. The method that is used most is RADIUS accounting.

RADIUS accounting allows for a session to be accounted for by indicating when the session starts and when it stops. Additionally, session identifying information and session usage information is passed to the RADIUS server through RADIUS attributes and VSAs.

- RADIUS Start Accounting, page 2
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- RADIUS Update Accounting, page 4

RADIUS Start Accounting

The RADIUS Start packet contains many attributes that generally identify who is requesting the service and of what the property of that service consists. The table below represents the attributes required for the start.

<table>
<thead>
<tr>
<th>RADIUS Attributes Value</th>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>user-name</td>
<td>Username used in extended authentication (XAUTH). The username may be NULL when XAUTH is not used.</td>
</tr>
<tr>
<td>4</td>
<td>nas-ip-address</td>
<td>Identifying IP address of the network access server (NAS) that serves the user. It should be unique to the NAS within the scope of the RADIUS server.</td>
</tr>
<tr>
<td>5</td>
<td>nas-port</td>
<td>Physical port number of the NAS that serves the user.</td>
</tr>
<tr>
<td>8</td>
<td>framed-ip-address</td>
<td>Private address allocated for the IP Security (IPsec) session.</td>
</tr>
</tbody>
</table>
### RADIUS Attributes

<table>
<thead>
<tr>
<th>Value</th>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>acct-status-type</td>
<td>Status type. This attribute indicates whether this accounting request marks the beginning (start), the end (stop), or an update of the session.</td>
</tr>
<tr>
<td>41</td>
<td>acct-delay-time</td>
<td>Number of seconds the client has been trying to send a particular record.</td>
</tr>
<tr>
<td>44</td>
<td>acct-session-id</td>
<td>Unique accounting identifier that makes it easy to match start and stop records in a log file.</td>
</tr>
<tr>
<td>26</td>
<td>vrf-id</td>
<td>String that represents the name of the Virtual Route Forwarder (VRF).</td>
</tr>
<tr>
<td>26</td>
<td>isakmp-initiator-ip</td>
<td>Endpoint IP address of the remote Internet Key Exchange (IKE) initiator (V4).</td>
</tr>
<tr>
<td>26</td>
<td>isakmp-group-id</td>
<td>Name of the VPN group profile used for accounting.</td>
</tr>
<tr>
<td>26</td>
<td>isakmp-phase1-id</td>
<td>Phase 1 identification (ID) used by IKE (for example, domain name [DN], fully qualified domain name [FQDN], IP address) to help identify the session initiator.</td>
</tr>
</tbody>
</table>

### RADIUS Stop Accounting

RADIUS Stop Accounting

The RADIUS Stop packet contains many attributes that identify the usage of the session. Table 2 represents the additional attributes required for the RADIUS stop packet. It is possible that only the stop packet is sent without the start if configured to do so. If only the stop packet is sent, this allows an easy way to reduce the number of records going to the AAA server.

<table>
<thead>
<tr>
<th>RADIUS Attributes Value</th>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>42</td>
<td>acct-input-octets</td>
<td>Number of octets that have been received from the Unity client over the course of the service that is being provided.</td>
</tr>
<tr>
<td>RADIUS Attributes Value</td>
<td>Attribute</td>
<td>Description</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>43</td>
<td>acct-output-octets</td>
<td>Number of octets that have been sent to the Unity client in the course of delivering this service.</td>
</tr>
<tr>
<td>46</td>
<td>acct-session-time</td>
<td>Length of time (in seconds) that the Unity client has received service.</td>
</tr>
<tr>
<td>47</td>
<td>acct-input-packets</td>
<td>Quantity of packets that have been received from the Unity client in the course of delivering this service.</td>
</tr>
<tr>
<td>48</td>
<td>acct-output-packets</td>
<td>Quantity of packets that have been sent to the Unity client in the course of delivering this service.</td>
</tr>
<tr>
<td>49</td>
<td>acct-terminate-cause</td>
<td>For future use.</td>
</tr>
<tr>
<td>52</td>
<td>acct-input-gigawords</td>
<td>How many times the Acct-Input-Octets counter has wrapped around the 2^{32} (2 to the 32nd power) over the course of this service.</td>
</tr>
<tr>
<td>52</td>
<td>acct-output-gigawords</td>
<td>How many times the Acct-Input-Octets counter has wrapped around the 2^{32} (2 to the 32nd power) over the course of this service.</td>
</tr>
</tbody>
</table>

**RADIUS Update Accounting**

RADIUS accounting updates are supported. Packet and octet counts are shown in the updates.

**IKE and IPsec Subsystem Interaction**

- Accounting Start, page 4
- Accounting Stop, page 5
- Accounting Updates, page 6

**Accounting Start**

If IPSec accounting is configured, after IKE phases are complete, an accounting start record is generated for the session. New accounting records are not generated during a rekeying.
The following is an account start record that was generated on a router and that is to be sent to the AAA server that is defined:

*Aug 23 04:06:20.131: RADIUS(00000002): sending
*Aug 23 04:06:20.131: RADIUS(00000002): Send Accounting-Request to 10.1.1.4:1646 id 4, len 220
*Aug 23 04:06:20.131: RADIUS: authenticator 38 F5 EB 46 4D BE 4A 6F - 45 EB EF 7D B7 19 FB 3F

Accounting Stop

An accounting stop packet is generated when there are no more flows (IPsec SA pairs) with the remote peer.

The accounting stop records contain the following information:

- Packets out
- Packets in
- Octets out
- Gigawords in
- Gigawords out

Below is an account start record that was generated on a router. The account start record is to be sent to the AAA server that is defined.

*Aug 23 04:20:16.519: RADIUS(00000003): Send Accounting-Request to 100.1.1.4:1646 id 19, len 238
*Aug 23 04:20:16.519: RADIUS: authenticator 82 65 5B 42 F0 3F 17 C3 - 23 F3 4C 35 A2 8A 3E 6
Accounting Updates

If accounting updates are enabled, accounting updates are sent while a session is “up.” The update interval can be configured. To enable the accounting updates, use the `aaa accounting` command.

The following is an accounting update record that is being sent from the router:

```
Router# *Aug 23 21:46:05.263: RADIUS(00000004): Using existing nas_port 0
*Aug 23 21:46:05.263: RADIUS(00000004): Config NAS IP: 100.1.1.147
*Aug 23 21:46:05.263: RADIUS(00000004): sending
*Aug 23 21:46:05.263: RADIUS(00000004): Send Accounting-Request to 100.1.1.4:1646 id 22, len 200
*Aug 23 21:46:05.263: RADIUS: authenticator 30 FA 48 86 8E 43 8E 4B - F9 09 71 04 4A F1 52 25
*Aug 23 21:46:05.267: RADIUS: Received from id 21645/19 100.1.1.4:1646, Accounting-response, len 20
*Aug 23 21:46:05.267: RADIUS: authenticator F1 CA C1 28 CE A0 26 C9 - 3E 22 C9 DA EA B8 22 A0
```

How to Configure IPsec VPN Accounting

- Configuring IPsec VPN Accounting, page 7
- Configuring Accounting Updates, page 11
- Troubleshooting for IPsec VPN Accounting, page 12
Configuring IPsec VPN Accounting

To enable IPsec VPN Accounting, you need to perform the following required task:
Before configuring IPsec VPN accounting, you must first configure IPsec.

SUMMARY STEPS

1. enable
2. configure terminal
3. aaa new-model
4. aaa authentication login list-name method
5. aaa authorization network list-name method
6. aaa accounting network list-name start-stop [broadcast] group group-name
7. aaa session-id common
8. crypto isakmp profile profile-name
9. vrf ivrf
10. match identity group group-name
11. client authentication list list-name
12. isakmp authorization list list-name
13. client configuration address [ initiate | respond ]
14. accounting list-name
15. exit
16. crypto dynamic-map dynamic-map-name dynamic-seq-num
17. set transform-set transform-set-name
18. set isakmp-profile profile-name
19. reverse-route [ remote-peer ]
20. exit
21. crypto map map-name ipsec-isakmp dynamic dynamic-template-name
22. radius-server host ip-address [ auth-port port-number ] [ acct-port port-number ]
23. radius-server key string
24. radius-server vsa send accounting
25. interface type slot/port
26. crypto map map-name

DETAILED STEPS

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td>Router&gt; enable</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Enter your password if prompted.</td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td>Step 2 configure terminal</td>
<td>Enters global configuration mode.</td>
</tr>
</tbody>
</table>
| **Example:**

Router# configure terminal |

| Step 3 aaa new-model | Enables periodic interim accounting records to be sent to the accounting server. |
| **Example:**

Router (config)# aaa new-model |

| Step 4 aaa authentication login list-name method | Enforces authentication, authorization, and accounting (AAA) authentication for extended authorization (XAUTH) through RADIUS or local. |
| **Example:**

Router (config)# aaa authentication login cisco-client group radius |

| Step 5 aaa authorization network list-name method | Sets AAA authorization parameters on the remote client from RADIUS or local. |
| **Example:**

Router (config)# aaa authorization network cisco-client group radius |

| Step 6 aaa accounting network list-name start-stop [broadcast] group group-name | Enables AAA accounting of requested services for billing or security purposes when you use RADIUS or TACACS+. |
| **Example:**

Router (config)# aaa accounting network acc start-stop broadcast group radius |

| Step 7 aaa session-id common | Specifies whether the same session ID is used for each AAA accounting service type within a call or whether a different session ID is assigned to each accounting service type. |
| **Example:**

Router (config)# aaa session-id common |

| Step 8 crypto isakmp profile profile-name | Audits IP security (IPsec) user sessions and enters isakmp-profile submode. |
| **Example:**

Route (config)# crypto isakmp profile cisco |
<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 9</strong> <code>vrf ivrf</code></td>
<td>Associates the on-demand address pool with a Virtual Private Network (VPN) routing and forwarding (VRF) instance name.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router (conf-isa-prof)# vrf cisco</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 10</strong> <code>match identity group group-name</code></td>
<td>Matches an identity from a peer in an ISAKMP profile.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router(conf-isa-prof)# match identity group cisco</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 11</strong> <code>client authentication list list-name</code></td>
<td>Configures Internet Key Exchange (IKE) extended authentication (XAUTH) in an Internet Security Association and Key Management Protocol (ISAKMP) profile.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router(conf-isa-prof)# client authentication list cisco</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 12</strong> <code>isakmp authorization list list-name</code></td>
<td>Configures an IKE shared secret and other parameters using the AAA server in an ISAKMP profile. The shared secret and other parameters are generally pushed to the remote peer through mode configuration (MODECFG).</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router(conf-isa-prof)# isakmp authorization list cisco-client</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 13</strong> `client configuration address [ initiate</td>
<td>respond ]`</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router(conf-isa-prof)# client configuration address respond</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 14</strong> <code>accounting list-name</code></td>
<td>Enables AAA accounting services for all peers that connect through this ISAKMP profile.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router(conf-isa-prof)# accounting acc</code></td>
<td></td>
</tr>
<tr>
<td><strong>Step 15</strong> <code>exit</code></td>
<td>Exits isakmp-profile submode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td></td>
</tr>
<tr>
<td><code>Router(conf-isa-prof)# exit</code></td>
<td></td>
</tr>
<tr>
<td>Command or Action</td>
<td>Purpose</td>
</tr>
<tr>
<td>-------------------</td>
<td>---------</td>
</tr>
<tr>
<td><strong>Step 16</strong> crypto dynamic-map <em>dynamic-map-name</em> <em>dynamic-seq-num</em></td>
<td>Creates a dynamic crypto map template and enters the crypto map configuration command mode.</td>
</tr>
</tbody>
</table>
| **Example:**

Router(config)# crypto dynamic-map mymap 10 ipsec-isakmp |  |
| **Step 17** set transform-set *transform-set-name* | Specifies which transform sets can be used with the crypto map template. |
| **Example:**

Router(config-crypto-map)# set transform-set aswan |  |
| **Step 18** set isakmp-profile *profile-name* | Sets the ISAKMP profile name. |
| **Example:**

Router(config-crypto-map)# set isakmp-profile cisco |  |
| **Step 19** reverse-route [ remote-peer ] | Allows routes (ip addresses) to be injected for destinations behind the VPN remote tunnel endpoint and may include a route to the tunnel endpoint itself (using the remote-peer keyword for the crypto map). |
| **Example:**

Router(config-crypto-map)# reverse-route |  |
| **Step 20** exit | Exits dynamic crypto map configuration mode. |
| **Example:**

Router(config-crypto-map)# exit |  |
| **Step 21** crypto map *map-name* ipsec-isakmp dynamic *dynamic-template-name* | Enters crypto map configuration mode |
| **Example:**

Router(config)# crypto map mymap ipsec-isakmp dynamic dmap |  |
| **Step 22** radius-server host *ip-address* [auth-port*port-number*] [acct-port*port-number*] | Specifies a RADIUS server host. |
| **Example:**

Router(config)# radius-server host 172.16.1.4 |  |
### Configuring Accounting Updates

To send accounting updates while a session is “up,” perform the following optional task:

Before you configure accounting updates, you must first configure IPsec VPN accounting. See the section “Configuring IPsec VPN Accounting. page 7.”

**SUMMARY STEPS**

1. enable
2. configure terminal
3. aaa accounting update periodic *number*

**DETAILED STEPS**

<table>
<thead>
<tr>
<th>Command or Action</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1</strong> enable</td>
<td>Enables privileged EXEC mode.</td>
</tr>
<tr>
<td><strong>Example:</strong></td>
<td>* Enter your password if prompted.</td>
</tr>
<tr>
<td>Router&gt; enable</td>
<td></td>
</tr>
</tbody>
</table>
### Command or Action | Purpose
---|---
**Step 2** configure terminal | Enters global configuration mode.
**Example:**
Router# configure terminal

**Step 3** aaa accounting update periodic *number* | (Optional) Enables periodic interim accounting records to be sent to the accounting server.
**Example:**
Router (config)# aaa accounting update periodic 1-2147483647

### Troubleshooting for IPsec VPN Accounting
To display messages about IPsec accounting events, perform the following optional task:

**SUMMARY STEPS**
1. enable
2. debug crypto isakmp aaa

**DETAILED STEPS**

| Command or Action | Purpose |
---|---|
**Step 1** enable | Enables privileged EXEC mode.
**Example:**
Router> enable  
- Enter your password if prompted.

**Step 2** debug crypto isakmp aaa | Displays messages about Internet Key Exchange (IKE) events.
**Example:**
Router# debug crypto isakmp aaa  
- The *aaa* keyword specifies accounting events.

### Configuration Examples for IPsec VPN Accounting
- Accounting and ISAKMP-Profile Example, page 13
- Accounting Without ISAKMP Profiles Example, page 14
Accounting and ISAKMP-Profile Example

The following example shows a configuration for supporting remote access clients with accounting and ISAKMP profiles:

```
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname sheep
!
! aaa new-model
!
! aaa accounting network ipsec start-stop group radius
aaa accounting update periodic 1
aaa session-id common
ip subnet-zero
ip cef
!
no ip domain lookup
ip domain name cisco.com
ip name-server 172.29.2.133
ip name-server 172.29.11.48
!
! crypto isakmp policy 1
authentication pre-share
group 2
!
! crypto isakmp policy 10
hash md5
authentication pre-share
lifetime 200
! crypto isakmp key cisco address 172.31.100.2
crypto iakmp client configuration group cclient
key jegjegjhrg
pool addressA
crypto-isakmp profile groupA
vrf cisco
match identity group cclient
client authentication list cisco-client
isakmp authorization list cisco-client
client configuration address respond
accounting acc
!
crypto ipsec transform-set esp-des-md5 esp-des esp-md5-hmac
!
crypto dynamic-map remotes 1
set peer 172.31.100.2
set security-association lifetime seconds 120
set transform-set esp-des-md5
reverse-route
!
crypto map test 10 ipsec-isakmp dynamic remotes
!
voice call carrier capacity active
!
interface Loopback0
ip address 10.20.20.20 255.255.255.0
no ip route-cache
no ip mroute-cache
!
interface FastEthernet0/0
ip address 10.2.80.203 255.255.255.0
no ip mroute-cache
```
Accounting Without ISAKMP Profiles Example

The following example shows a full Cisco IOS configuration that supports accounting remote access peers when ISAKMP profiles are not used:

```
version 12.2
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
! hostname sheep
! aaa new-model
```

```
load-interval 30
duplex full
!
interface FastEthernet1/0
 ip address 192.168.219.2 255.255.255.0
 no ip mroute-cache
duplex auto
 speed auto
!
interface FastEthernet1/1
 ip address 172.28.100.1 255.255.255.0
 no ip mroute-cache
duplex auto
 speed auto
crypto map test
!
 no fair-queue
 ip default-gateway 10.2.80.1
 ip classless
 ip route 10.0.0.0 0.0.0.0 10.2.80.1
 ip route 10.20.0.0 255.0.0.0 10.2.80.56
 ip route 10.10.10.0 255.255.255.0 172.31.100.2
 ip route 10.0.0.2 255.255.255.255 10.2.80.73
 ip local pool addressA 192.168.1.1 192.168.1.253
 no ip http server
 ip pim bidir-enable
!
!
 ip access-list extended encrypt
 permit ip host 10.0.0.1 host 10.5.0.1
!
 Access-list 101 permit ip host 10.20.20.20 host 10.10.10.10
!
 radius-server host 172.27.162.206 auth-port 1645 acct-port 1646 key cisco123
 radius-server retransmit 3
 radius-server authorization permit missing Service-Type
 radius-server vsa send accounting
call rsvp-sync
!
 mgcp profile default
!
dial-peer cor custom
!
!
 gatekeeper
 shutdown
!
!
 line con 0
 exec-timeout 0 0
 exec prompt timestamp
 line aux 0
 line vty 5 15
 ntp server 172.31.150.52
 end
```
aaa accounting network ipsecaaa start-stop group radius
aaa accounting update periodic 1
aaa session-id common
ip subnet-zero
crypt
no ip domain lookup
ip domain name cisco.com
ip name-server 172.29.2.133
ip name-server 172.29.11.48
!
crypto isakmp policy 1
  authentication pre-share
group 2
!
crypto isakmp policy 10
  hash md5
  authentication pre-share
  lifetime 200
crypto isakmp key cisco address 172.31.100.2
!
crypto ipsec transform-set esp-des-md5 esp-des esp-md5-hmac
!
crypto map test client accounting list ipsecaaa
crypto map test 10 ipsec-isakmp
  set peer 172.31.100.2
  set security-association lifetime seconds 120
  set transform-set esp-des-md5
  match address 101
!
voice call carrier capacity active
!
interface Loopback0
  ip address 10.20.20.20 255.255.255.0
  no ip route-cache
  no ip mroute-cache
!
interface FastEthernet0/0
  ip address 10.2.80.203 255.255.255.0
  no ip route-cache
  load-interval 30
duplex full
!
interface FastEthernet1/0
  ip address 192.168.219.2 255.255.255.0
  no ip route-cache
duplex auto
speed auto
!
interface FastEthernet1/1
  ip address 172.28.100.1 255.255.255.0
  no ip route-cache
duplex auto
speed auto
crypto map test
!
no fair-queue
ip default-gateway 10.2.80.1
ip classless
ip route 10.0.0.0 0.0.0.0 10.2.80.1
ip route 10.30.0.0 255.0.0.0 10.2.80.56
ip route 10.10.10.0 255.255.255.0 172.31.100.2
ip route 10.0.0.2 255.255.255.255 10.2.80.73
no ip http server
ip pim bidir-enable
!
ip access-list extended encrypt
permit ip host 10.0.0.1 host 10.5.0.1

access-list 101 permit ip host 10.20.20.20 host 10.10.10

radius-server host 172.27.162.206 auth-port 1645 acct-port 1646 key cisco123
radius-server retransmit 3
radius-server authorization permit missing Service-Type
radius-server vsa send accounting
call rsvp-sync

mgcp profile default

dial-peer cor custom

! gatekeeper
shutdown
!
line con 0
exec-timeout 0 0
eexec prompt timestamp
line aux 0
line vty 5 15

exception core-file ioscrypto/core/sheep-core
exception dump 172.25.1.129
ntp clock-period 17208229
ntp server 172.71.150.52

end

Additional References

Related Documents

<table>
<thead>
<tr>
<th>Related Topic</th>
<th>Document Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configuring AAA accounting</td>
<td>• Configuring Accounting</td>
</tr>
<tr>
<td>Configuring IPsec VPN accounting</td>
<td>• Configuring Security for VPNs with IPsec</td>
</tr>
<tr>
<td>Configuring basic AAA RADIUS</td>
<td>• The section “Configuring RADIUS” in the Cisco IOS Security Configuration Guide: User Services on Cisco.com</td>
</tr>
<tr>
<td>Configuring ISAKMP profiles</td>
<td>VRF Aware IPsec</td>
</tr>
<tr>
<td>Privilege levels with TACACS+ and RADIUS</td>
<td>• Configuring TACACS+</td>
</tr>
<tr>
<td></td>
<td>• “Configuring RADIUS” section of the Cisco IOS Security Configuration Guide: User Services on Cisco.com</td>
</tr>
<tr>
<td>IP security, RADIUS, and AAA commands</td>
<td>Cisco IOS Security Command Reference</td>
</tr>
</tbody>
</table>
MIBs

<table>
<thead>
<tr>
<th>MIBs</th>
<th>MIBs Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: <a href="http://www.cisco.com/go/mibs">http://www.cisco.com/go/mibs</a></td>
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Technical Assistance

<table>
<thead>
<tr>
<th>Description</th>
<th>Link</th>
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<tbody>
<tr>
<td>The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.</td>
<td><a href="http://www.cisco.com/cisco/web/support/index.html">http://www.cisco.com/cisco/web/support/index.html</a></td>
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</tbody>
</table>

Feature Information for IPsec VPN Accounting

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.
### Table 3  
#### Feature Information for <Phrase Based on Module Title>

<table>
<thead>
<tr>
<th>Feature Name</th>
<th>Releases</th>
<th>Feature Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>IPsec VPN Accounting</td>
<td>12.2(15)T</td>
<td>The IPsec VPN Accounting feature allows a session to be accounted by indicating when the session starts and stops. A VPN session is defined as an Internet Key Exchange (IKE) security association (SA) and the one or more SA pairs that are created by the IKE SA. The session starts when the first IP Security (IPsec) pair is created and stops when all IPsec SAs are deleted. Session identifying information and session usage information is passed to the Remote Authentication Dial-In User Service (RADIUS) server through standard RADIUS attributes and vendor-specific attributes (VSAs). This feature was introduced in Cisco IOS Release 12.2(15)T The following commands were introduced or modified: \texttt{client authentication list, client configuration address, crypto isakmp profile, crypto map (global IPsec), debug crypto isakmp, isakmp authorization list, match identity, set isakmp-profile, vrf}</td>
</tr>
</tbody>
</table>

### Glossary

**IKE** --Internet Key Exchange. IKE establishes a shared security policy and authenticates keys for services (such as IP security [IPsec]) that require keys. Before any IPsec traffic can be passed, each router, firewall, and host must verify the identity of its peer. This can be done by manually entering preshared keys into both hosts or by a certification authority (CA) service.

**IPsec** --IP security. IPsec is A framework of open standards that provides data confidentiality, data integrity, and data authentication between participating peers. IPsec provides these security services at the IP layer. IPsec uses IKE to handle the negotiation of protocols and algorithms based on local policy and to generate the encryption and authentication keys to be used by IPsec. IPsec can protect one or more data flows between a pair of hosts, between a pair of security gateways, or between a security gateway and a host.
**ISAKMP** --Internet Security Association and Key Management Protocol. ISAKMP is an Internet IPsec protocol (RFC 2408) that negotiates, establishes, modifies, and deletes security associations. It also exchanges key generation and authentication data (independent of the details of any specific key generation technique), key establishment protocol, encryption algorithm, or authentication mechanism.

**L2TP session** --Layer 2 Transport Protocol. L2TP are communications transactions between the L2TP access concentrator (LAC) and the L2TP network server (LNS) that support tunneling of a single PPP connection. There is a one-to-one relationship among the PPP connection, L2TP session, and L2TP call.

**NAS** --network access server. A NAS is a Cisco platform (or collection of platforms, such as an AccessPath system) that interfaces between the packet world (for example, the Internet) and the circuit world (for example, the public switched telephone network [PSTN]).

**PFS** --perfect forward secrecy. PFS is a cryptographic characteristic associated with a derived shared secret value. With PFS, if one key is compromised, previous and subsequent keys are not compromised because subsequent keys are not derived from previous keys.

**QM** --Queue Manager. The Cisco IP Queue Manager (IP QM) is an intelligent, IP-based, call-treatment and routing solution that provides powerful call-treatment options as part of the Cisco IP Contact Center (IPCC) solution.

**RADIUS** --Remote Authentication Dial-In User Service. RADIUS is a database for authenticating modem and ISDN connections and for tracking connection time.

**RSA** --Rivest, Shamir, and Adelman. Rivest, Shamir, and Adelman are the inventors of the Public-key cryptographic system that can be used for encryption and authentication.

**SA** --security association. A SA is an instance of security policy and keying material that is applied to a data flow.

**TACACS+** --Terminal Access Controller Access Control System Plus. TACACS+ is a security application that provides centralized validation of users attempting to gain access to a router or network access server.

**TED** --Tunnel Endpoint Discovery. TED is a Cisco IOS software feature that allows routers to discover IPsec endpoints.

**VPN** --Virtual Private Network. A VPN enables IP traffic to travel securely over a public TCP/IP network by encrypting all traffic from one network to another. A VPN uses "tunneling" to encrypt all information at the IP level.

**VRF** --A VPN routing/forwarding instance. A VRF consists of an IP routing table, a derived forwarding table, a set of interfaces that use the forwarding table, and a set of rules and routing protocols that determine what goes into the forwarding table. In general, a VRF includes the routing information that defines a customer VPN site that is attached to a PE router.

**VSA** --vendor-specific attribute. A VSA is an attribute that has been implemented by a particular vendor. It uses the attribute Vendor-Specific to encapsulate the resulting AV pair: essentially, Vendor-Specific = protocol:attribute = value.

**XAUTH** --Extended authentication. XAUTH is an optional exchange between IKE Phase 1 and IKE Phase 2, in which the router demands additional authentication information in an attempt to authenticate the actual user (as opposed to authenticating the peer).

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