

IPsec VPN Accounting

The IPsec VPN Accounting feature allows for a session to be accounted for by indicating when the session starts and when it 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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Prerequisites for IPsec VPN Accounting

- Understand how to configure RADIUS and authentication, authorization, and accounting (AAA) accounting.
- Understand how to configure IPsec accounting.

Information About IPsec VPN Accounting

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

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 1: RADIUS Accounting Start Packet Attributes

RADIUS Attributes Value	Attribute	Description
1	user-name	Username used in extended authentication (XAUTH).The username may be NULL when XAUTH is not used.
4	nas-ip-address	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.
5	nas-port	Physical port number of the NAS that serves the user.
8	framed-ip-address	Private address allocated for the IP Security (IPsec) session.
40	acct-status-type	Status type. This attribute indicates whether this accounting request marks the beginning (start), the end (stop), or an update of the session.
41	acct-delay-time	Number of seconds the client has been trying to send a particular record.
44	acct-session-id	Unique accounting identifier that makes it easy to match start and stop records in a log file.
26	vrf-id	String that represents the name of the Virtual Route Forwarder (VRF).
26	isakmp-initiator-ip	Endpoint IP address of the remote Internet Key Exchange (IKE) initiator (V4).
26	isakmp-group-id	Name of the VPN group profile used for accounting.
26	isakmp-phase1-id	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.

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 2: RADIUS Accounting Stop Packet Attributes

RADIUS Attributes Value	Attribute	Description
42	acct-input-octets	Number of octets that have been received from the Unity client over the course of the service that is being provided.
43	acct-output-octets	Number of octets that have been sent to the Unity client in the course of delivering this service.
46	acct-session-time	Length of time (in seconds) that the Unity client has received service.
47	acct-input-packets	Quantity of packets that have been received from the Unity client in the course of delivering this service.
48	acct-output-packets	Quantity of packets that have been sent to the Unity client in the course of delivering this service.
49	acct-terminate-cause	For future use.
52	acct-input-gigawords	How many times the Acct-Input-Octets counter has wrapped around the 232 (2 to the 32nd power) over the course of this service.
52	acct-output-gigawords	How many times the Acct-Input-Octets counter has wrapped around the 232 (2 to the 32nd power) over the course of this service.

RADIUS Update Accounting

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

IKE and IPsec Subsystem Interaction

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
*Aug 23 04:06:20.135: RADIUS:  Acct-Session-Id     [44]  10  "00000001"
*Aug 23 04:06:20.135: RADIUS:  Vendor, Cisco       [26]  31
*Aug 23 04:06:20.135: RADIUS:   Cisco AVpair       [1]   25  "isakmp-group-id=cclient"
```

```
*Aug 23 04:06:20.135: RADIUS:  Framed-IP-Address   [8]   6   10.13.13.1
*Aug 23 04:06:20.135: RADIUS:  Vendor, Cisco       [26]  20
*Aug 23 04:06:20.135: RADIUS:   Cisco AVpair       [1]   14  "vrf-id=cisco"
*Aug 23 04:06:20.135: RADIUS:  Vendor, Cisco       [26]  35
*Aug 23 04:06:20.135: RADIUS:   Cisco AVpair       [1]   29  "isakmp-initator-ip=10.1.2.2"
*Aug 23 04:06:20.135: RADIUS:  Vendor, Cisco       [26]  36
*Aug 23 04:06:20.135: RADIUS:   Cisco AVpair       [1]   30  "connect-progress=No Progress"
*Aug 23 04:06:20.135: RADIUS:  User-Name           [1]   13  "username1"
*Aug 23 04:06:20.135: RADIUS:  Acct-Status-Type    [40]  6   Start                     [1]
*Aug 23 04:06:20.135: RADIUS:  Vendor, Cisco       [26]  25
*Aug 23 04:06:20.135: RADIUS:   cisco-nas-port     [2]   19  "FastEthernet0/0.1"
*Aug 23 04:06:20.135: RADIUS:  NAS-Port            [5]   6   0
*Aug 23 04:06:20.135: RADIUS:  NAS-IP-Address      [4]   6   10.1.1.147
*Aug 23 04:06:20.135: RADIUS:  Acct-Delay-Time     [41]  6   0
*Aug 23 04:06:20.139: RADIUS: Received from id 21645/4 10.1.1.4:1646, Accounting-response,
 len 20
*Aug 23 04:06:20.139: RADIUS:  authenticator B7 E3 D0 F5 61 9A 89 D8 - 99 A6 8A 8A 98 79
9D 5D
```

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): Using existing nas_port 0
*Aug 23 04:20:16.519: RADIUS(00000003): Config NAS IP: 100.1.1.147
*Aug 23 04:20:16.519: RADIUS(00000003): sending
*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 E6
*Aug 23 04:20:16.519: RADIUS:  Acct-Session-Id     [44]  10  "00000002"
*Aug 23 04:20:16.519: RADIUS:  Vendor, Cisco       [26]  20
*Aug 23 04:20:16.519: RADIUS:   Cisco AVpair       [1]   14  "vrf-id=cisco"
*Aug 23 04:20:16.519: RADIUS:  Vendor, Cisco       [26]  35
*Aug 23 04:20:16.519: RADIUS:   Cisco AVpair       [1]   29  "isakmp-initator-ip=10.1.1.2"
*Aug 23 04:20:16.519: RADIUS:  Vendor, Cisco       [26]  36
*Aug 23 04:20:16.519: RADIUS:   Cisco AVpair       [1]   30  "connect-progress=No Progress"
*Aug 23 04:20:16.519: RADIUS:  Acct-Session-Time   [46]  6   709
*Aug 23 04:20:16.519: RADIUS:  Acct-Input-Octets   [42]  6   152608
*Aug 23 04:20:16.519: RADIUS:  Acct-Output-Octets  [43]  6   152608
*Aug 23 04:20:16.519: RADIUS:  Acct-Input-Packets  [47]  6   1004
*Aug 23 04:20:16.519: RADIUS:  Acct-Output-Packets [48]  6   1004
*Apr 23 04:20:16.519: RADIUS:  Acct-Input-Giga-Word[52]  6   0
*Apr 23 04:20:16.519: RADIUS:  Acct-Output-Giga-Wor[53]  6   0

*Aug 23 04:20:16.519: RADIUS:  Acct-Terminate-Cause[49]  6   none                      [0]
*Aug 23 04:20:16.519: RADIUS:  Vendor, Cisco       [26]  32
```

```
*Aug 23 04:20:16.519: RADIUS:   Cisco AVpair       [1]   26  "disc-cause-ext=No Reason"
*Aug 23 04:20:16.519: RADIUS:  Acct-Status-Type    [40]  6   Stop                      [2]
*Aug 23 04:20:16.519: RADIUS:  Vendor, Cisco       [26]  25
*Aug 23 04:20:16.519: RADIUS:   cisco-nas-port     [2]   19  "FastEthernet0/0.1"
*Aug 23 04:20:16.519: RADIUS:  NAS-Port            [5]   6   0
*Aug 23 04:20:16.519: RADIUS:  NAS-IP-Address      [4]   6   100.1.1.147
*Aug 23 04:20:16.519: RADIUS:  Acct-Delay-Time     [41]  6   0
*Aug 23 04:20:16.523: RADIUS: Received from id 21645/19 100.1.1.4:1646, Accounting-response,
 len 20
*Aug 23 04:20:16.523: RADIUS:  authenticator F1 CA C1 28 CE A0 26 C9 - 3E 22 C9 DA EA B8
22 A0
```

Accounting Updates

If accounting updates are enabled, accounting updates are sent while a session is “up.” The update interval is configurable. To enable the accounting updates, use the **aaa accounting update** 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 21:46:05.263: RADIUS:  Acct-Session-Id     [44]  10  "00000003"
*Aug 23 21:46:05.263: RADIUS:  Vendor, Cisco       [26]  20
*Aug 23 21:46:05.263: RADIUS:   Cisco AVpair       [1]   14  "vrf-id=cisco"
*Aug 23 21:46:05.263: RADIUS:  Vendor, Cisco       [26]  35
*Aug 23 21:46:05.263: RADIUS:   Cisco AVpair       [1]   29  "isakmp-initator-ip=10.1.1.2"
*Aug 23 21:46:05.263: RADIUS:  Vendor, Cisco       [26]  36
*Aug 23 21:46:05.263: RADIUS:   Cisco AVpair      [1]   30  "connect-progress=No Progress"
*Aug 23 21:46:05.263: RADIUS:  Acct-Session-Time   [46]  6   109
*Aug 23 21:46:05.263: RADIUS:  Acct-Input-Octets   [42]  6   608
*Aug 23 21:46:05.263: RADIUS:  Acct-Output-Octets  [43]  6   608
*Aug 23 21:46:05.263: RADIUS:  Acct-Input-Packets  [47]  6   4
*Aug 23 21:46:05.263: RADIUS:  Acct-Output-Packets [48]  6   4
*Aug 23 21:46:05.263: RADIUS:  Acct-Status-Type    [40]  6   Watchdog                  [3]
*Aug 23 21:46:05.263: RADIUS:  Vendor, Cisco       [26]  25
*Aug 23 21:46:05.263: RADIUS:   cisco-nas-port     [2]   19  "FastEthernet0/0.1"
*Aug 23 21:46:05.263: RADIUS:  NAS-Port            [5]   6   0
*Aug 23 21:46:05.263: RADIUS:  NAS-IP-Address      [4]   6   100.1.1.147
*Aug 23 21:46:05.263: RADIUS:  Acct-Delay-Time     [41]  6   0
*Aug 23 21:46:05.267: RADIUS: Received from id 21645/22 100.1.1.4:1646, Accounting-response,
 len 20
*Aug 23 21:46:05.267: RADIUS:  authenticator 51 6B BB 27 A4 F5 D7 61 - A7 03 73 D3 0A AC
1C
```

How to Configure IPsec VPN Accounting

Configuring IPsec VPN Accounting

Before you begin

IPsec must be configured first before configuring IPsec VPN accounting.

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

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**aaa new-model** **Example:**	Enables periodic interim accounting records to be sent to the accounting server.

	Command or Action	Purpose
	`Router (config)# aaa new-model`	
Step 4	**aaa authentication login** *list-name method* **Example:** `Router (config)# aaa authentication login cisco-client group radius`	Enforces authentication, authorization, and accounting (AAA) authentication for extended authorization (XAUTH) through RADIUS or local.
Step 5	**aaa authorization network** *list-name method* **Example:** `Router (config)# aaa authorization network cisco-client group radius`	Sets AAA authorization parameters on the remote client from RADIUS or local.
Step 6	**aaa accounting network list-name start-stop** [**broadcast**] **group** *group-name* **Example:** `Router (config)# aaa accounting network acc start-stop broadcast group radius`	Enables AAA accounting of requested services for billing or security purposes when RADIUS or TACACS+ is used.
Step 7	**aaa session-id common** **Example:** `Router (config)# 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.
Step 8	**crypto isakmp profile** *profile-name* **Example:** `Route (config)# crypto isakmp profile cisco`	Audits IP security (IPsec) user sessions and enters isakmp-profile submode.
Step 9	**vrf** *ivrf* **Example:** `Router (conf-isa-prof)# vrf cisco`	Associates the on-demand address pool with a Virtual Private Network (VPN) routing and forwarding (VRF) instance name.
Step 10	**match identity group** *group-name* **Example:** `Router(conf-isa-prof)# match identity group cisco`	Matches an identity from a peer in an ISAKMP profile.
Step 11	**client authentication list** *list-name* **Example:** `Router(conf-isa-prof)# client authentication list cisco`	Configures Internet Key Exchange (IKE) extended authentication (XAUTH) in an Internet Security Association and Key Management Protocol (ISAKMP) profile.

	Command or Action	Purpose
Step 12	**isakmp authorization list** *list-name* **Example:** `Router(conf-isa-prof)# isakmp authorization list cisco-client`	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).
Step 13	**client configuration address** [**initiate** | **respond**] **Example:** `Router(conf-isa-prof)# client configuration address respond`	Configures IKE mode configuration (MODECFG) in the ISAKMP profile.
Step 14	**accounting** *list-name* **Example:** `Router(conf-isa-prof)# accounting acc`	Enables AAA accounting services for all peers that connect through this ISAKMP profile.
Step 15	**exit** **Example:** `Router(conf-isa-prof)# exit`	Exits isakmp-profile submode.
Step 16	**crypto dynamic-map** *dynamic-map-name dynamic-seq-num* **Example:** `Router(config)# crypto dynamic-map mymap 10 ipsec-isakmp`	Creates a dynamic crypto map template and enters the crypto map configuration command mode.
Step 17	**set transform-set** *transform-set-name* **Example:** `Router(config-crypto-map)# set transform-set aswan`	Specifies which transform sets can be used with the crypto map template.
Step 18	**set isakmp-profile** *profile-name* **Example:** `Router(config-crypto-map)# set isakmp-profile cisco`	Sets the ISAKMP profile name.
Step 19	**reverse-route** [**remote-peer**] **Example:** `Router(config-crypto-map)# reverse-route`	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.
Step 20	**exit** **Example:**	Exits dynamic crypto map configuration mode.

	Command or Action	Purpose
	`Router(config-crypto-map)# exit`	
Step 21	**crypto map** *map-name* **ipsec-isakmp dynamic** *dynamic-template-name* **Example:** `Router(config)# crypto map mymap ipsec-isakmp dynamic dmap`	Enters crypto map configuration mode
Step 22	**radius-server host** *ip-address* [**auth-port** *port-number]* [**acct-port** *port-number*] **Example:** `Router(config)# radius-server host 172.16.1.4`	Specifies a RADIUS server host.
Step 23	**radius-server key** *string* **Example:** `Router(config)# radius-server key nsite`	Sets the authentication and encryption key for all RADIUS communications between the router and the RADIUS daemon.
Step 24	**radius-server vsa send accounting** **Example:** `Router(config)# radius-server vsa send accounting`	Configures the network access server to recognize and use vendor-specific attributes.
Step 25	**interface** *type slot / port* **Example:** `Router(config)# interface FastEthernet 1/0`	Configures an interface type and enters interface configuration mode.
Step 26	**crypto map** *map-name* **Example:** `Router(config-if)# crypto map mymap`	Applies a previously defined crypto map set to an interface.

Configuring Accounting Updates

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

Before you begin

IPsec VPN accounting must be configured before accounting updates are configured. See Configuring IPsec VPN Accounting, on page 5 for more information.

SUMMARY STEPS

1. **enable**

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

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**aaa accounting update periodic** *number* **Example:** `Router (config)# aaa accounting update periodic 1-2147483647`	(Optional) Enables periodic interim accounting records to be sent to the accounting server.

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

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**debug crypto isakmp aaa** **Example:**	Displays messages about Internet Key Exchange (IKE) events. • The **aaa** keyword specifies accounting events.

	Command or Action	Purpose
	`Router# debug crypto isakmp aaa`	

Configuration Examples for IPsec VPN Accounting

Accounting and ISAKMP-Profile Example

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

```
version 2.1
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname sheep
!
aaa new-model
!
!
aaa accounting network ipsecaaa 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
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
```

Accounting Without ISAKMP Profiles Example

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

```
version 2.1
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname sheep
!
aaa new-model
!
!
aaa accounting network ipsecaaa 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 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 mroute-cache
 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 10.30.0.0 255.0.0.0 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 10.10.10.10
!
!
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
!
```

```
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

Related Topic	Document Title
Configuring AAA accounting	" Configuring Accounting " module in the *Cisco IOS XE Security Configuration Guide: Securing User Services*
Configuring IPsec VPN accounting	" Configuring Security for VPNs with IPsec " module in the *Cisco IOS XE Security Configuration Guide: Secure Connectivity*
Configuring basic AAA RADIUS	" Configuring RADIUS " module in the *Cisco IOS XE Security Configuration Guide: Securing User Services*
Configuring ISAKMP profiles	" VRF-Aware IPsec " module in the *Cisco IOS XE Security Configuration Guide: Secure Connectivity*
Privilege levels with TACACS+ and RADIUS	• " Configuring TACACS+ " module in the *Cisco IOS XE Security Configuration Guide: Securing User Services* • " Configuring RADIUS " module in the *Cisco IOS XE Security Configuration Guide: Securing User Services*
IP security, RADIUS, and AAA commands	*Cisco IOS Security Command Reference*

Standards

Standard	Title
None.	--

MIBs

MIB	MIBs Link
None.	To locate and download MIBs for selected platforms, Cisco software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
None.	

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies. To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds. Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

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 IPsec VPN Accounting

Feature Name	Releases	Feature Information
IPsec VPN Accounting	Cisco IOS XE Release 2.1	The IPsec VPN Accounting feature allows for a session to be accounted for by indicating when the session starts and when it stops. A VPN session is defined as an IKE SA and the one or more SA pairs that are created by the IKE SA. The session starts when the first IPsec pair is created and stops when all IPsec SAs are deleted. Session identifying information and session usage information is passed to the RADIUS server through standard RADIUS attributes and VSAs. The following commands were introduced or modified: **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**.

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.

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).