Sharing IPsec with Tunnel Protection

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The Sharing IPsec with Tunnel Protection feature allows an IP Security (IPsec) Security Association Database (SADB) to be shared between two or more generic routing encapsulation (GRE) tunnel interfaces, when tunnel protection is used. When these tunnel interfaces are shared, they have a single underlying cryptographic SADB, cryptographic map, and IPsec profile in the Dynamic Multipoint Virtual Private Network (DMVPN) configuration.

The Sharing IPsec with Tunnel Protection feature is required by some DMVPN configurations. If IPsec security association (SA) sessions are not shared within the same IPsec SADB, then an IPsec SA may get associated with the wrong IPsec SADB and therefore the wrong tunnel interface, causing duplication of IPsec SAs and tunnel interfaces to flap. If the tunnel interfaces flap (change rapidly and repeatedly between online and offline states), then network connectivity problems occur.

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.

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Restrictions for Sharing IPsec with Tunnel Protection

Consider the following restrictions when sharing IPsec with tunnel protection:

- The **tunnel source** command on all tunnel interfaces using the same tunnel source *must* be configured using the interface type and number, not its IP address.
- All tunnels with the same **tunnel source** interface must use the same IPsec profile and the **shared** keyword with the **tunnel protection** command on all such tunnels. The only exception is a scenario when there are only peer-to-peer (P2P) GRE tunnel interfaces configured with the same tunnel source in the system, all with unique tunnel destination IP addresses.
- Different IPsec profile names must be used for shared and unshared tunnels.

For example, if “tunnel 1” is configured with the **tunnel source loopback0** command, and “tunnel 2” and “tunnel 3” are shared using the **tunnel source loopback1** command, then use **ipsec_profile_1** for tunnel 1 and **ipsec_profile_2** for tunnels 2 and 3.

- A different IPsec profile must be used for each set of shared tunnels.

For example, if tunnels 1 through 5 use **loopback0** as their tunnel source and tunnels 6 through 10 use loopback1, then define **ipsec_profile_1** for tunnels 1 through 5 and **ipsec_profile_2** for tunnels 6 to 10.

- Sometimes it may be desirable to not share an IPsec session between two or more tunnel interfaces using the same tunnel source.

For example, in a service provider environment, each DMVPN cloud can represent a different customer. It is desirable to lock the connections from a customer to a tunnel interface and not share or allow IPsec sessions from other customers. For such scenarios, Internet Security Association and Key Management Protocol (ISAKMP) profiles can be used to identify and bind customer connections to an ISAKMP profile and through that to an IPsec profile. This ISAKMP profile limits the IPsec profile to accept only those connections that matched the corresponding ISAKMP profile. Separate ISAKMP and IPsec profiles can be obtained for each DMVPN cloud (tunnel interface) without sharing the same IPsec SADB.

- Sharing IPsec is not desired and not supported for a virtual tunnel interface (VTI). A VTI provides a routable interface type for terminating IPsec tunnels and a way to define protection between sites to form an overlay network.

Information About Sharing IPsec with Tunnel Protection

The following section describes how the Sharing IPsec with Tunnel Protection feature allows an IPsec SADB to be shared between two or more GRE tunnel interfaces:

- Single IPsec SAs and GRE Tunnel Sessions, page 2

Single IPsec SAs and GRE Tunnel Sessions

In a dual-hub dual-DMVPN topology, it is possible to have two or more GRE tunnel sessions (same tunnel source and destination, but different tunnel keys) between the same two endpoints. In this case, it is desirable to use a single IPsec SA to secure both GRE tunnel sessions. Also, it is not possible to decide under which tunnel interface an IPsec Quick Mode (QM) request must be processed and bound when two tunnel interfaces use the same tunnel source.

The tunnel protection ipsec profile shared command is used to create a single IPsec SADB for all the tunnel interfaces that use the same profile and tunnel source interface. This allows a single IPsec SA to be used for all GRE tunnels (same tunnel source and destination, but different tunnel keys) between the same two endpoints. It also makes IPsec QM processing unambiguous because there is one SADB under which to process the incoming IPsec QM request for all shared tunnel interfaces as opposed to multiple SADBs, one for each tunnel interface when not shared.

The SA of a QM proposal to a tunnel interface is processed by using the shared SADB and crypto map parameters. On the cryptodata plane, the decrypted and GRE decapsulated packets are demultiplexed to the appropriate tunnel interface by the GRE module using a local address, remote address, and optional tunnel key information.

Note The tunnel source, tunnel destination, and tunnel key (triplet) must be unique for all tunnel interfaces on a router. For a multipoint GRE interface where the tunnel destination is not configured, the pair (tunnel source and tunnel key) must be unique. Incoming GRE packets are also matched to P2P GRE tunnels first; if there is not a match, then they are matched to mGRE tunnels.

How to Share an IPsec Session Between Multiple Tunnels

- Sharing an IPsec SADB Between Multiple Tunnel Interfaces in a DMVPN, page 3
- What to Do Next, page 4

Sharing an IPsec SADB Between Multiple Tunnel Interfaces in a DMVPN

Use the following commands to configure a Cisco IOS router to share an IPsec SADB between multiple tunnel interfaces in a DMVPN.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface tunnel** *number*
4. *tunnel source {ip-address | interface-type interface-number}*
5. **tunnel protection ipsec profile** *name* [**shared]**
6. **exit**
7. **exit**

DETAILED STEPS

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

	Command or Action	Purpose
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**interface tunnel** *number* **Example:** `Router(config)# interface tunnel 5`	Configures a tunnel interface and enters interface configuration mode. • The *number* argument specifies the number of the tunnel interface that you want to create or configure. There is no limit on the number of tunnel interfaces you can create.

Step 4	*tunnel source {ip-address | interface-type interface-number}*
	Example:
	`Router(config-if)# tunnel source GigabitEthernet 0`
		Sets the source IP address or source interface type number for a tunnel interface.
		• When you are using the **tunnel protection ipsec profile**command, you must specify an interface, not an IP address for the tunnel source.

Step 5	**tunnel protection ipsec profile** *name* [**shared]** **Example:** `Router(config-if)# tunnel protection ipsec profile vpnprof shared`	Associates a tunnel interface with an IPsec profile. • The *name* argument specifies the name of the IPsec profile; this value must match the *name* specified in the **crypto ipsec profile***name* command. • The **shared** keyword allows IPsec sessions to be shared between multiple tunnel interfaces configured with the same tunnel source IP.
Step 6	**exit** **Example:** `Router(config-if)# exit`	Exits the tunnel interface.
Step 7	**exit** **Example:** `Router(config)# exit`	Exits global configuration mode.

What to Do Next

If your configuration requires more spoke routers in a dual-hub, dual DMVPN topology, repeat the steps in GUID-13F2F7BA-6999-4B7D-90A2-285ABF75EFE3 to configure additional spokes.

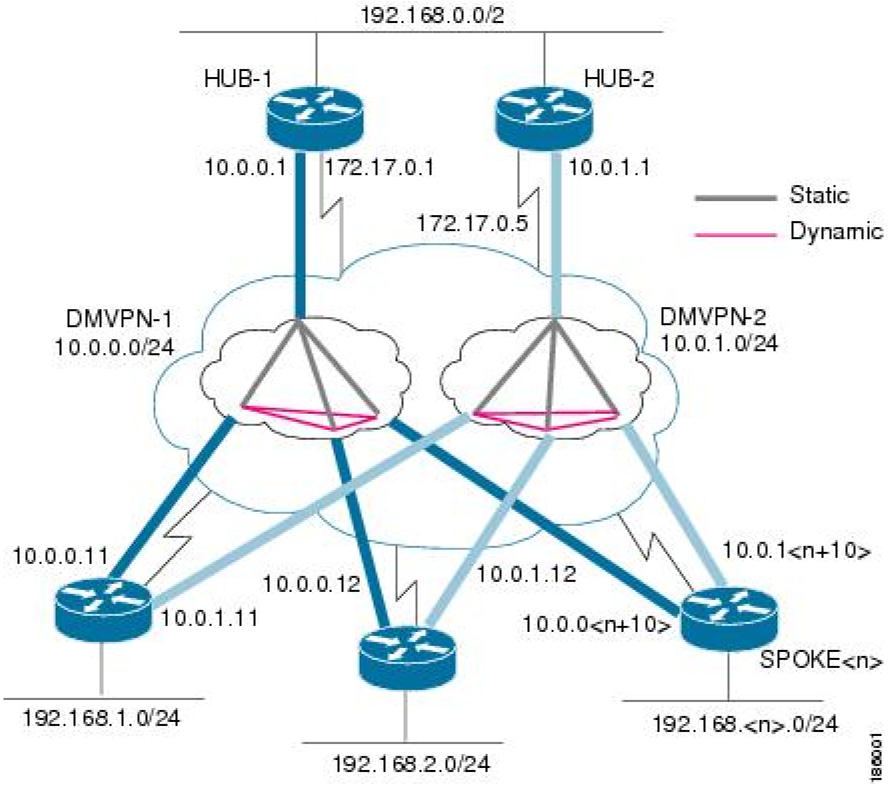
Configuration Examples for Sharing IPsec with Tunnel Protection

Dual-Hub Router Dual-DMVPN Topology

The dual-hub router, dual-DMVPN topology, shown in the figure below, has the following attributes:

- Each hub router is configured with a single mGRE tunnel interface.
- Each hub router is connected to one DMVPN subnet (blue cloud), and the spokes are connected to both DMVPN 1 and DMVPN 2.
- Each spoke router is configured with two mGRE tunnel interfaces.
- One mGRE tunnel interface belongs to DMVPN 1 and the other mGRE tunnel interface belongs to DMVPN 2.
- Each mGRE tunnel interface is configured with a same tunnel source IP address and uses shared tunnel protection between them.

Figure 1 Dual-Hub Router, Dual-DMVPN Topology.



Configuring an IPsec SADB Between Multiple Tunnel Interfaces in a DMVPN Example

The following configuration examples are given when configuring an IPsec SADB between multiple tunnel interfaces in a DMVPN:

- Hub 1 Configuration Example, page 6
- Hub 2 Configuration Example, page 7
- Spoke 1 Configuration Example, page 7
- Spoke 2 Configuration Example, page 8
- Results on Spoke 1 Example, page 9

Hub 1 Configuration Example

Hub 1 and Hub 2 configurations are similar, except that each hub belongs to a different DMVPN.

Hub 1 has the following DMVPN configuration:

- IP subnet: 10.0.0.0/24
- Next Hop Address Resolution Protocol (NHRP) network ID: 100000
- Tunnel key: 100000
- Dynamic routing protocol: Enhanced Interior Gateway Routing Protocol (EIGRP)

```
!
hostname Hub1
 !
 crypto isakmp policy 1
  authentication pre-share
 crypto isakmp key cisco47 address 0.0.0.0 0.0.0.0
 !
 crypto IPsec transform-set trans2 esp-des esp-md5-hmac
  mode transport
 !
 crypto IPsec profile vpnprof
  set transform-set trans2
 !
 interface Tunnel 5
  bandwidth 1000
  ip address 10.0.0.1 255.255.255.0
  ip mtu 1400
  no ip next-hop-self eigrp 1
  ip nhrp authentication test
  ip nhrp map multicast dynamic
  ip nhrp network-id 100000
  ip nhrp holdtime 600
no ip split-horizon eigrp 1
ip tcp adjust-mss 1360
  delay 1000
  tunnel source GigabitEthernet 0/0/0
  tunnel mode gre multipoint
  tunnel key 100000
  tunnel protection IPsec profile vpnprof
 !
 interface GigabitEthernet 0/0/0
  ip address 172.17.0.1 255.255.255.252
 !
 interface GigabitEthernet 0/0/1
  ip address 192.168.0.1 255.255.255.0
 !
 router eigrp 1
  network 10.0.0.0 0.0.0.255
  network 192.168.0.0 0.0.0.255
  no auto-summary
 !
```

Hub 2 Configuration Example

Hub 2 has the following DMVPN configuration:

- IP subnet: 10.0.1.0/24
- NHRP network ID: 100001
- Tunnel key: 100001
- Dynamic routing protocol: EIGRP

```
!
hostname Hub2
 !
 crypto isakmp policy 1
  authentication pre-share
 crypto isakmp key cisco47 address 0.0.0.0 0.0.0.0
 !
 crypto ipsec transform-set trans2 esp-des esp-md5-hmac
  mode transport
 !
 crypto ipsec profile vpnprof
  set transform-set trans2
 !
 interface Tunnel 5
  bandwidth 1000
  ip address 10.0.1.1 255.255.255.0
  ip mtu 1400
  no ip next-hop-self eigrp 1
  ip nhrp authentication test
  ip nhrp map multicast dynamic
  ip nhrp network-id 100001
  ip nhrp holdtime 600
no ip split-horizon eigrp 1
ip tcp adjust-mss 1360
  delay 1000
  tunnel source GigabitEthernet 0/0/0
  tunnel mode gre multipoint
  tunnel key 100001
  tunnel protection ipsec profile vpnprof
 !
 interface GigabitEthernet 0/0/0
  ip address 172.17.0.5 255.255.255.252
 !
 interface GigabitEthernet 0/0/1
  ip address 192.168.0.2 255.255.255.0
 !
 router eigrp 1
  network 10.0.1.0 0.0.0.255
  network 192.168.0.0 0.0.0.255
  no auto-summary
 !
```

Spoke 1 Configuration Example

Spoke 1 has the following DMVPN configuration:

```
!
 hostname Spoke1
 !
 crypto isakmp policy 1
  authentication pre-share
 crypto isakmp key cisco47 address 0.0.0.0 0.0.0.0
 !
 crypto ipsec transform-set trans2 esp-des esp-md5-hmac
  mode transport
 !
 crypto ipsec profile vpnprof
  set transform-set trans2
 !
interface Tunnel 5
 bandwidth 1000
.
.
.
 ip nhrp authentication test
 ip nhrp map 10.0.0.1 172.17.0.1
 ip nhrp map multicast 172.17.0.1
 ip nhrp network-id 100000
 ip nhrp holdtime 300|
 ip nhrp nhs 10.0.0.1
 ip tcp adjust-mss 1360
 delay 1000
.
.
.
 tunnel protection ipsec profile vpnprof shared
!
interface Tunnel 5
 bandwidth 1000
.
.
.
 ip nhrp authentication test
 ip nhrp map 10.0.1.1 172.17.0.5
 ip nhrp map multicast 172.17.0.5
 ip nhrp network-id 100001
 ip nhrp holdtime 300
 ip nhrp nhs 10.0.1.1
 ip tcp adjust-mss 1360
 delay 1000
.
.
.
 tunnel protection ipsec profile vpnprof shared
!
 interface GigabitEthernet 0/0/0
  ip address dhcp hostname Spoke1
 !
 interface GigabitEthernet 0/0/1
  ip address 192.168.1.1 255.255.255.0
 !
 router eigrp 1
  network 10.0.0.0 0.0.0.255
  network 10.0.1.0 0.0.0.255
  network 192.168.1.0 0.0.0.255
  no auto-summary
 !
```

Spoke 2 Configuration Example

Spoke 2 has the following DMVPN configuration:

```
!
 hostname Spoke2
 !
 crypto isakmp policy 1
  authentication pre-share
 crypto isakmp key cisco47 address 0.0.0.0 0.0.0.0
 !
 crypto ipsec transform-set trans2 esp-des esp-md5-hmac
  mode transport
 !
 crypto ipsec profile vpnprof
  set transform-set trans2
 !
interface Tunnel 5
 bandwidth 1000
.
.
.
 ip nhrp authentication test
 ip nhrp map 10.0.0.1 172.17.0.1
 ip nhrp map multicast 172.17.0.1
 ip nhrp network-id 100000
 ip nhrp holdtime 300|
 ip nhrp nhs 10.0.0.1
 ip tcp adjust-mss 1360
 delay 1000
.
.
.
 tunnel protection ipsec profile vpnprof shared
!
interface Tunnel 5
 bandwidth 1000
.
.
.
 ip nhrp authentication test
 ip nhrp map 10.0.1.1 172.17.0.5
 ip nhrp map multicast 172.17.0.5
 ip nhrp network-id 100001
 ip nhrp holdtime 300
 ip nhrp nhs 10.0.1.1
 ip tcp adjust-mss 1360
 delay 1000
.
.
.
 tunnel protection ipsec profile vpnprof shared
 !
 interface GigabitEthernet 0/0/0
  ip address dhcp hostname Spoke2
 !
 interface GigabitEthernet 0/0/1
  ip address 192.168.2.1 255.255.255.0
 !
 router eigrp 1
  network 10.0.0.0 0.0.0.255
  network 10.0.1.0 0.0.0.255
  network 192.168.2.0 0.0.0.255
  no auto-summary
 !
```

Results on Spoke 1 Example

Spoke 1 has the following results for its DMVPN configuration:

```
Spoke1# show ip nhrp
10.0.0.1/32 via 10.0.0.1, Tunnel 0 created 00:06:52, never expire
  Type: static, Flags: used
  NBMA address: 172.17.0.1
10.0.0.12/32 via 10.0.0.12, Tunnel 0 created 00:03:17, expire 00:01:52
  Type: dynamic, Flags: router
  NBMA address: 172.17.0.12
10.0.1.1/32 via 10.0.1.1, Tunnel 1 created 00:13:45, never expire
  Type: static, Flags: used
  NBMA address: 172.17.0.5
10.0.1.12/32 via 10.0.1.12, Tunnel 1 created 00:00:02, expire 00:04:57
  Type: dynamic, Flags: router
  NBMA address: 172.17.0.12
Spoke1# show crypto socket
```

Note There are only three crypto connections because the two NHRP sessions (10.0.0.12, Tunnel0) and (10.0.1.12, Tunnel1) are only one IPsec session, because they both have the same nonbroadcast multiaccess (NBMA) IPsec peer address.

```
Number of Crypto Socket connections 3
   Shd Peers (local/remote): 172.17.0.11
/172.17.0.12
       Local Ident  (addr/mask/port/prot): (172.17.0.11/255.255.255.255/0/47)
       Remote Ident (addr/mask/port/prot): (172.17.0.12/255.255.255.255/0/47)
       Flags: shared
       ipsec Profile: "vpnprof"
       Socket State: Open
       Client: "TUNNEL SEC" (Client State: Active)
   Shd Peers (local/remote): 172.17.0.11
/172.17.0.5
       Local Ident  (addr/mask/port/prot): (172.17.0.11/255.255.255.255/0/47)
       Remote Ident (addr/mask/port/prot): (172.17.0.5/255.255.255.255/0/47)
       Flags: shared
       ipsec Profile: "vpnprof"
       Socket State: Open
       Client: "TUNNEL SEC" (Client State: Active)
   Shd Peers (local/remote): 172.17.0.11
/172.17.0.1
       Local Ident  (addr/mask/port/prot): (172.17.0.11/255.255.255.255/0/47)
       Remote Ident (addr/mask/port/prot): (172.17.0.1/255.255.255.255/0/47)
       Flags: shared
       ipsec Profile: "vpnprof"
       Socket State: Open
       Client: "TUNNEL SEC" (Client State: Active)
Crypto Sockets in Listen state:
Client: "TUNNEL SEC" Profile: "vpnprof" Map-name: "vpnprof-head-1"
Spoke1# show crypto map
Crypto Map: "vpnprof-head-1" idb: FastEthernet0/0/0 local address: 172.17.0.11
Crypto Map "vpnprof-head-1" 65536 ipsec-isakmp
        Profile name: vpnprof
        Security association lifetime: 4608000 kilobytes/3600 seconds
        PFS (Y/N): N
        Transform sets={
                trans2,
        }
Crypto Map "vpnprof-head-1" 65537 ipsec-isakmp
        Map is a PROFILE INSTANCE.
        Peer = 172.17.0.5
        Extended IP access list
            access-list  permit gre host 172.17.0.11 host 172.17.0.5
        Current peer: 172.17.0.5
        Security association lifetime: 4608000 kilobytes/3600 seconds
        PFS (Y/N): N
        Transform sets={
                trans2,
        }
Crypto Map "vpnprof-head-1" 65538 ipsec-isakmp
        Map is a PROFILE INSTANCE.
        Peer = 172.17.0.1
        Extended IP access list
            access-list  permit gre host 172.17.0.11 host 172.17.0.1
        Current peer: 172.17.0.1
        Security association lifetime: 4608000 kilobytes/3600 seconds
        PFS (Y/N): N
        Transform sets={
                trans2,
        }
Crypto Map "vpnprof-head-1" 65539 ipsec-isakmp
        Map is a PROFILE INSTANCE.
        Peer = 172.17.0.12
        Extended IP access list
            access-list  permit gre host 172.17.0.11 host 172.17.0.12
        Current peer: 172.17.0.12
```

```
Security association lifetime: 4608000 kilobytes/3600 seconds
PFS (Y/N): N
Transform sets={
        trans2,
}
Interfaces using crypto map vpnprof-head-1:
        Tunnel1
        Tunnel0
```

Note All three crypto sessions are shown under each tunnel interface (three entries, twice) in the **show crypto ipsec sa** output, because both interfaces are mapped to the same IPsec SADB, which has three entries. This duplication of output is expected in this case.

```
Spoke1# show crypto ipsec sa
interface: Tunnel 0
    Crypto map tag: vpnprof-head-1, local addr 172.17.0.11
   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.17.0.11/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (172.17.0.1/255.255.255.255/47/0)
   current_peer 172.17.0.1 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 134, #pkts encrypt: 134, #pkts digest: 134
    #pkts decaps: 118, #pkts decrypt: 118, #pkts verify: 118
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 22, #recv errors 0
     local crypto endpt.: 172.17.0.11, remote crypto endpt.: 172.17.0.1
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0/0
     current outbound spi: 0xA75421B1(2807308721)
     inbound esp sas:
      spi: 0x96185188(2518176136)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 3, flow_id: SW:3, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4569747/3242)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     inbound ah sas:
     inbound pcp sas:
     outbound esp sas:
      spi: 0xA75421B1(2807308721)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 4, flow_id: SW:4, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4569745/3242)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     outbound ah sas:
     outbound pcp sas:
   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.17.0.11/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (172.17.0.5/255.255.255.255/47/0)
   current_peer 172.17.0.5 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 244, #pkts encrypt: 244, #pkts digest: 244
    #pkts decaps: 253, #pkts decrypt: 253, #pkts verify: 253
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 1, #recv errors 0
     local crypto endpt.: 172.17.0.11, remote crypto endpt.: 172.17.0.5
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0/0
     current outbound spi: 0x3C50B3AB(1011921835)
     inbound esp sas:
      spi: 0x3EBE84EF(1052673263)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 1, flow_id: SW:1, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4549326/2779)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     inbound ah sas:
     inbound pcp sas:
     outbound esp sas:
      spi: 0x3C50B3AB(1011921835)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 2, flow_id: SW:2, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4549327/2779)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     outbound ah sas:
     outbound pcp sas:
   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.17.0.11/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (172.17.0.12/255.255.255.255/47/0)
   current_peer 172.17.0.12 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 0, #pkts encrypt: 0, #pkts digest: 0
    #pkts decaps: 2, #pkts decrypt: 2, #pkts verify: 2
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0
     local crypto endpt.: 172.17.0.11, remote crypto endpt.: 172.17.0.12
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0/0
     current outbound spi: 0x38C04B36(952126262)
     inbound esp sas:
      spi: 0xA2EC557(170837335)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 5, flow_id: SW:5, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4515510/3395)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     inbound ah sas:
     inbound pcp sas:
     outbound esp sas:
      spi: 0x38C04B36(952126262)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 6, flow_id: SW:6, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4515511/3395)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     outbound ah sas:
     outbound pcp sas:
interface: Tunnel 1
    Crypto map tag: vpnprof-head-1, local addr 172.17.0.11
   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.17.0.11/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (172.17.0.1/255.255.255.255/47/0)
   current_peer 172.17.0.1 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 134, #pkts encrypt: 134, #pkts digest: 134
    #pkts decaps: 118, #pkts decrypt: 118, #pkts verify: 118
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 22, #recv errors 0
     local crypto endpt.: 172.17.0.11, remote crypto endpt.: 172.17.0.1
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0/0
     current outbound spi: 0xA75421B1(2807308721)
     inbound esp sas:
      spi: 0x96185188(2518176136)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 3, flow_id: SW:3, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4569747/3242)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     inbound ah sas:
     inbound pcp sas:
     outbound esp sas:
      spi: 0xA75421B1(2807308721)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 4, flow_id: SW:4, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4569745/3242)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     outbound ah sas:
     outbound pcp sas:
   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.17.0.11/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (172.17.0.5/255.255.255.255/47/0)
   current_peer 172.17.0.5 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 244, #pkts encrypt: 244, #pkts digest: 244
    #pkts decaps: 253, #pkts decrypt: 253, #pkts verify: 253
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 1, #recv errors 0
     local crypto endpt.: 172.17.0.11, remote crypto endpt.: 172.17.0.5
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0/0
     current outbound spi: 0x3C50B3AB(1011921835)
     inbound esp sas:
      spi: 0x3EBE84EF(1052673263)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 1, flow_id: SW:1, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4549326/2779)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     inbound ah sas:
     inbound pcp sas:
     outbound esp sas:
      spi: 0x3C50B3AB(1011921835)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 2, flow_id: SW:2, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4549327/2779)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     outbound ah sas:
     outbound pcp sas:
   protected vrf: (none)
   local  ident (addr/mask/prot/port): (172.17.0.11/255.255.255.255/47/0)
   remote ident (addr/mask/prot/port): (172.17.0.12/255.255.255.255/47/0)
   current_peer 172.17.0.12 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 0, #pkts encrypt: 0, #pkts digest: 0
    #pkts decaps: 2, #pkts decrypt: 2, #pkts verify: 2
    #pkts compressed: 0, #pkts decompressed: 0
    #pkts not compressed: 0, #pkts compr. failed: 0
    #pkts not decompressed: 0, #pkts decompress failed: 0
    #send errors 0, #recv errors 0
     local crypto endpt.: 172.17.0.11, remote crypto endpt.: 172.17.0.12
     path mtu 1500, ip mtu 1500, ip mtu idb FastEthernet0/0/0
     current outbound spi: 0x38C04B36(952126262)
     inbound esp sas:
      spi: 0xA2EC557(170837335)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 5, flow_id: SW:5, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4515510/3395)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     inbound ah sas:
     inbound pcp sas:
     outbound esp sas:
      spi: 0x38C04B36(952126262)
        transform: esp-des esp-md5-hmac ,
        in use settings ={Transport, }
        conn id: 6, flow_id: SW:6, crypto map: vpnprof-head-1
        sa timing: remaining key lifetime (k/sec): (4515511/3395)
        IV size: 8 bytes
        replay detection support: Y
        Status: ACTIVE
     outbound ah sas:
     outbound pcp sas:
Spoke1#
```

Additional References

The following sections provide references related to the Sharing IPSec with Tunnel Protection feature.

Related Documents

Related Topic	Document Title
Cisco IOS commands	Cisco IOS Master Commands List, All Releases
Security commands: complete command syntax, command mode, command history, defaults, usage guidelines, and examples	*Cisco IOS Security Command Reference*
Configuring a DMVPN	Dynamic Multipoint VPN (DMVPN)
Configuring basic IP Security (IPsec) Virtual Private Networks (VPNs)	Configuring Security for VPNs with IPsec

Standards

Standard	Title
None	--

MIBs

MIB	MIBs Link
No new or modified MIBs are supported by this feature, and support for existing MIBs has not been modified by this feature.	To locate and download MIBs for selected platforms, Cisco IOS XE software releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 2401	*Security Architecture for the Internet Protocol*
RFC 2547	*BGP/MPLS VPNs*
RFC 2784	*Generic Routing Encapsulation (GRE)*

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 Sharing IPsec with Tunnel Protection

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 1 Feature Information for Sharing IPsec with Tunnel Protection

Feature Name	Releases	Feature Information
Sharing IPSect with Tunnel Protection	Cisco IOS XE Release 2.5	The Sharing IPsec with Tunnel Protection feature allows an Internet Protocol Security (IPsec) session to be shared between two or more generic routing encapsulation (GRE) tunnel interfaces. In Cisco IOS XE Release 2.5, this feature was introduced on the Cisco ASR 1000 Series Aggregation Routers. The following command was introduced or modified by this feature: **tunnel protection ipsec profile shared.**

Glossary

GRE-- generic routing encapsulation. Tunnels that provide a specific pathway across the shared WAN and encapsulate traffic with new packet headers to ensure delivery to specific destinations. The network is private because traffic can enter a tunnel only at an endpoint. Tunnels do not provide true confidentiality (encryption does) but can carry encrypted traffic.

GRE tunneling can also be used to encapsulate non-IP traffic into IP and send it over the Internet or IP network. The Internet Package Exchange (IPX) and AppleTalk protocols are examples of non-IP traffic.

IKE-- Internet Key Exchange. A hybrid protocol that implements Oakley key exchange and Skeme key exchange inside the ISAKMP framework. Although IKE can be used with other protocols, its initial implementation is with IPsec. IKE provides authentication of the IPsec peers, negotiates IPsec keys, and negotiates IPsec security associations.

IPsec-- IP security. A framework of open standards developed by the Internet Engineering Task Force (IETF). IPsec provides security for transmission of sensitive information over unprotected networks such as the Internet. IPsec acts at the network layer, protecting and authenticating IP packets between participating IPsec peers, such as Cisco routers.

ISAKMP-- Internet Security Association Key Management Protocol. A protocol framework that defines payload formats, the mechanics of implementing a key exchange protocol, and the negotiation of a security association.

NHRP-- Next Hop Resolution Protocol. Protocol that routers, access servers, and hosts can use to discover the addresses of other routers and hosts connected to an NBMA network.

The Cisco implementation of NHRP supports the IETF draft version 11 of NBMA NHRP.

The Cisco implementation of NHRP supports IP Version 4, Internet Packet Exchange (IPX) network layers, and, at the link layer, ATM, Ethernet, SMDS, and multipoint tunnel networks. Although NHRP is available on Ethernet, NHRP need not be implemented over Ethernet media because Ethernet is capable of broadcasting. Ethernet support is unnecessary (and not provided) for IPX.

SA-- security association. Describes how two or more entities use security services to communicate securely. For example, an IPsec SA defines the encryption algorithm (if used), the authentication algorithm, and the shared session key to be used during the IPsec connection.

Both IPsec and IKE require and use SAs to identify the parameters of their connections. IKE can negotiate and establish its own SA. The IPsec SA is established either by IKE or by manual user configuration.

transform-- List of operations performed on a data flow to provide data authentication, data confidentiality, and data compression. For example, one transform is the ESP protocol with the HMAC-MD5 authentication algorithm; another transform is the AH protocol with the 56-bit DES encryption algorithm and the ESP protocol with the HMAC-SHA authentication algorithm.

tunnel-- A secure communication path between two peers, such as two routers. It does not refer to using IPsec in tunnel mode.

VPN-- Virtual Private Network. A framework that consists of multiple peers transmitting private data securely to one another over an otherwise public infrastructure. In this framework, inbound and outbound network traffic is protected using protocols that tunnel and encrypt all data. This framework permits networks to extend beyond their local topology, while remote users are provided with the appearance and functionality of a direct network connection.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.