使用IPv6在思科路由器上实施IKEv2基于路由的站点到站点VPN

目录

简介

本文档介绍一种配置，用于在使用互联网密钥交换版本2(IKEv2)协议的两台Cisco路由器之间设置IPv6、基于路由的站点到站点隧道。

先决条件

要求

Cisco 建议您了解以下主题：

- Cisco IOS®/Cisco IOS® XE CLI配置的基础知识
- Internet安全关联、密钥管理协议(ISAKMP)和IPsec协议的基础知识
- 了解IPv6编址和路由

使用的组件

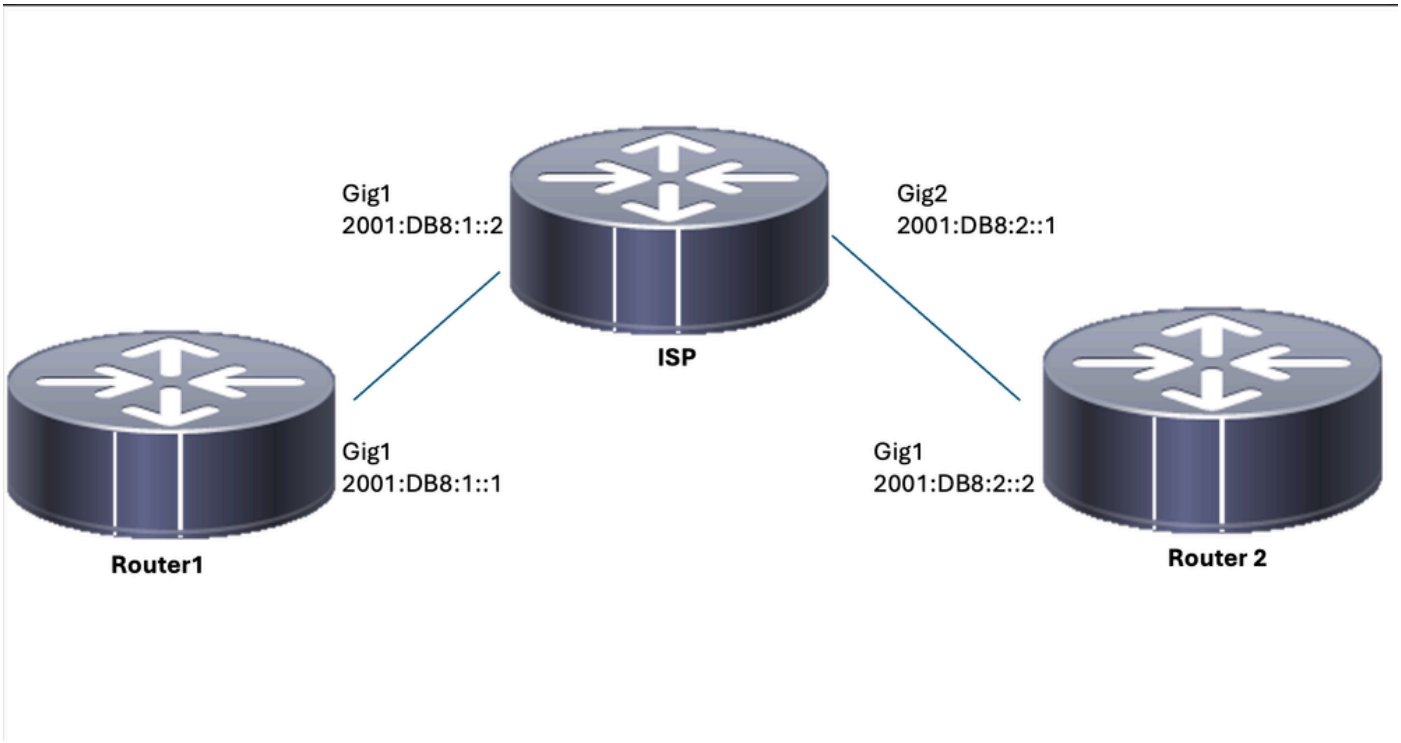
本文档中的信息基于以下软件版本：

- 运行17.03.04a的Cisco IOS XE作为本地路由器
- 运行17.03.04a作为远程路由器的Cisco IOS

本文档中的信息都是基于特定实验室环境中的设备编写的。本文档中使用的所有设备最初均采用原始（默认）配置。如果您的网络处于活动状态，请确保您了解所有命令的潜在影响。

配置

网络图



本地路由器配置

步骤1.启用IPv6单播路由。

```
ipv6 unicast-routing
```

步骤2.配置路由器接口。

```
interface GigabitEthernet1
ipv6 address 2001:DB8:1::1/64
no shutdown

interface GigabitEthernet2
ipv6 address FC00::1/64
no shutdown
```

步骤3.设置IPv6默认路由。

```
ipv6 route ::/0 GigabitEthernet1
```

步骤4.配置Ikev2建议。

```
crypto ikev2 proposal IKEv2-PROP
encryption aes-cbc-128
integrity sha1
group 14
```

步骤5.配置Ikev2策略。

```
crypto ikev2 policy IKEv2-POLI
proposal IKEv2-PROP
```

步骤6.使用预共享密钥配置密钥环。

```
crypto ikev2 keyring IPV6_KEY
peer Remote_IPV6
 address 2001:DB8:2::2/64
 pre-shared-key cisco123
```

步骤7.配置Ikev2配置文件。

```
crypto ikev2 profile IKEV2-PROF
 match identity remote address 2001:DB8:2::2/64
 authentication remote pre-share
 authentication local pre-share
 keyring local IPV6_KEY
```

步骤8.配置第2阶段策略。

```
crypto ipsec transform-set ESP-AES-SHA esp-aes esp-sha-hmac
mode tunnel
```

步骤9.配置IPsec配置文件。

```
crypto ipsec profile IPSEC-PROF
 set transform-set ESP-AES-SHA
 set ikev2-profile IKEV2-PROF
```

步骤10.配置隧道接口。

```
interface Tunnel1
 ipv6 address 2001:DB8:3::1/64
 tunnel source GigabitEthernet1
 tunnel mode ipsec ipv6
 tunnel destination 2001:DB8:2::2
 tunnel protection ipsec profile IPSEC-PROF
end
```

步骤11.配置相关流量的路由。

```
ipv6 route FC00::/64 2012::1
```

本地路由器最终配置

```
ipv6 unicast-routing
!
interface GigabitEthernet1
ipv6 address 2001:DB8:1::1/64
no shutdown

!

interface GigabitEthernet2
ipv6 address FC00::1/64
no shutdown

!

ipv6 route ::/0 GigabitEthernet1

!

crypto ikev2 proposal IKEv2-PROP
encryption aes-cbc-128
integrity sha1
group 14

!

crypto ikev2 policy IKEv2-POLI
```

```
proposal IKEv2-PROP

!

crypto ikev2 keyring IPV6_KEY
peer Remote_IPV6
 address 2001:DB8:2::2/64
 pre-shared-key cisco123

!

crypto ikev2 profile IKEV2-PROF
 match identity remote address 2001:DB8:2::2/64
 authentication remote pre-share
 authentication local pre-share
 keyring local IPV6_KEY

!

crypto ipsec transform-set ESP-AES-SHA esp-aes esp-sha-hmac
mode tunnel

!

crypto ipsec profile Prof1
 set transform-set ESP-AES-SHA

 !

 crypto ipsec profile IPSEC-PROF
 set transform-set ESP-AES-SHA
 set ikev2-profile IKEV2-PROF

!

interface Tunnel1
 ipv6 address 2001:DB8:3::1/64
 tunnel source GigabitEthernet1
 tunnel mode ipsec ipv6
 tunnel destination 2001:DB8:2::2
 tunnel protection ipsec profile IPSEC-PROF
end

!

ipv6 route FC00::/64 2012::1
```

ISP配置

```
ipv6 unicast-routing
!
!
interface GigabitEthernet1
 description Link to R1
 ipv6 address 2001:DB8:1::2/64
!
interface GigabitEthernet2
```

```
 description Link to R3
 ipv6 address 2001:DB8:2::1/64
!
!
!
ipv6 route 2001:DB8:1::/64 GigabitEthernet1
ipv6 route 2001:DB8:2::/64 GigabitEthernet2
!
```

远程路由器最终配置

```
ipv6 unicast-routing
!
interface GigabitEthernet1
ipv6 address 2001:DB8:2::2/64
no shutdown

!

interface GigabitEthernet2
ipv6 address FC00::2/64
no shutdown

!

ipv6 route ::/0 GigabitEthernet1

!

crypto ikev2 proposal IKEv2-PROP
encryption aes-cbc-128
integrity sha1
group 14

!

crypto ikev2 policy IKEv2-POLI
proposal IKEv2-PROP

!

crypto ikev2 keyring IPV6_KEY
peer Remote_IPV6
 address 2001:DB8:1::1/64
 pre-shared-key cisco123

!

crypto ikev2 profile IKEV2-PROF
 match identity remote address 2001:DB8:1::1/64
 authentication remote pre-share
 authentication local pre-share
 keyring local IPV6_KEY

!

crypto ipsec transform-set ESP-AES-SHA esp-aes esp-sha-hmac
```

```
mode tunnel

!

crypto ipsec profile Prof1
 set transform-set ESP-AES-SHA

 !

 crypto ipsec profile IPSEC-PROF
 set transform-set ESP-AES-SHA
 set ikev2-profile IKEV2-PROF

!

interface Tunnel1
 ipv6 address 2001:DB8:3::2/64
 tunnel source GigabitEthernet1
 tunnel mode ipsec ipv6
 tunnel destination 2001:DB8:1::1
 tunnel protection ipsec profile IPSEC-PROF
end

!

ipv6 route FC00::/64 2012::1
```

确认

```
On Router 1

R1#show crypto ikev2 sa
 IPv4 Crypto IKEv2  SA

 IPv6 Crypto IKEv2  SA

Tunnel-id    fvrf/ivrf              Status
2          none/none             READY
Local  2001:DB8:1::1/500
Remote  2001:DB8:2::2/500
      Encr: AES-CBC, keysize: 256, PRF: SHA256, Hash: SHA256, DH Grp:14, Auth sign: PSK, Auth verify: P
      Life/Active Time: 86400/75989 sec

R1#show crypto ipsec sa

interface: Tunnel1
    Crypto map tag: Tunnel1-head-0, local addr 2001:DB8:1::1

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (::/0/0/0)
   remote ident (addr/mask/prot/port): (::/0/0/0)
   current_peer 2001:DB8:2::2 port 500
     PERMIT, flags={origin_is_acl,}
    #pkts encaps: 14, #pkts encrypt: 14, #pkts digest: 14
    #pkts decaps: 14, #pkts decrypt: 14, #pkts verify: 14
    #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.: 2001:DB8:1::1,
     remote crypto endpt.: 2001:DB8:2::2
     plaintext mtu 1422, path mtu 1500, ipv6 mtu 1500, ipv6 mtu idb GigabitEthernet1
     current outbound spi: 0x9DC2A6F6(2646779638)
     PFS (Y/N): N, DH group: none

     inbound esp sas:
      spi: 0x18569EF7(408329975)
        transform: esp-aes esp-sha-hmac ,
        in use settings ={Tunnel, }
        conn id: 2104, flow_id: CSR:104, sibling_flags FFFFFFFF80000049, crypto map: Tunnel1-head-0
         sa timing: remaining key lifetime (k/sec): (4608000/1193)
        IV size: 16 bytes
        replay detection support: Y
        Status: ACTIVE(ACTIVE)

     inbound ah sas:

     inbound pcp sas:

     outbound esp sas:
      spi: 0x9DC2A6F6(2646779638)
        transform: esp-aes esp-sha-hmac ,
        in use settings ={Tunnel, }
        conn id: 2103, flow_id: CSR:103, sibling_flags FFFFFFFF80000049, crypto map: Tunnel1-head-0
         sa timing: remaining key lifetime (k/sec): (4608000/1193)
        IV size: 16 bytes
        replay detection support: Y
        Status: ACTIVE(ACTIVE)

     outbound ah sas:

     outbound pcp sas:


On Router 2

R2#show crypto ikev2 sa
 IPv4 Crypto IKEv2  SA

 IPv6 Crypto IKEv2  SA

Tunnel-id    fvrf/ivrf              Status
1          none/none             READY
Local  2001:DB8:2::2/500
Remote  2001:DB8:1::1/500
      Encr: AES-CBC, keysize: 256, PRF: SHA256, Hash: SHA256, DH Grp:14, Auth sign: PSK, Auth verify: P
      Life/Active Time: 86400/19 sec

R2#show cryto ipsec sa

interface: Tunnel1
    Crypto map tag: Tunnel1-head-0, local addr 2001:DB8:2::2

   protected vrf: (none)
   local  ident (addr/mask/prot/port): (::/0/0/0)
   remote ident (addr/mask/prot/port): (::/0/0/0)
   current_peer 2001:DB8:1::1 port 500
     PERMIT, flags={origin_is_acl,}
```

```
#pkts encaps: 14, #pkts encrypt: 14, #pkts digest: 14
#pkts decaps: 14, #pkts decrypt: 14, #pkts verify: 14
#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.: 2001:DB8:2::2,
 remote crypto endpt.: 2001:DB8:1::1
 plaintext mtu 1422, path mtu 1500, ipv6 mtu 1500, ipv6 mtu idb GigabitEthernet1
 current outbound spi: 0xEF1D3BA2(4011670434)
 PFS (Y/N): N, DH group: none

 inbound esp sas:
  spi: 0x9829B86D(2552871021)
    transform: esp-aes esp-sha-hmac ,
    in use settings ={Tunnel, }
    conn id: 2006, flow_id: CSR:6, sibling_flags FFFFFFFF80000049, crypto map: Tunnel1-head-0
     sa timing: remaining key lifetime (k/sec): (4608000/3556)
    IV size: 16 bytes
    replay detection support: Y
    Status: ACTIVE(ACTIVE)

 inbound ah sas:

 inbound pcp sas:

 outbound esp sas:
  spi: 0xEF1D3BA2(4011670434)
    transform: esp-aes esp-sha-hmac ,
    in use settings ={Tunnel, }
    conn id: 2005, flow_id: CSR:5, sibling_flags FFFFFFFF80000049, crypto map: Tunnel1-head-0
     sa timing: remaining key lifetime (k/sec): (4607998/3556)
    IV size: 16 bytes
    replay detection support: Y
    Status: ACTIVE(ACTIVE)

 outbound ah sas:

 outbound pcp sas:
```

故障排除

要对隧道进行故障排除，请使用以下debug命令：

- debug crypto ikev2
- debug crypto ikev2 error
- debug crypto ipsec
- debug crypto ipsec error

关于此翻译
思科采用人工翻译与机器翻译相结合的方式将此文档翻译成不同语言，希望全球的用户都能通过各自的语言得到支持性的内容。

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