目录

简介

本文提供信息了解在Cisco IOS软件的调试，当使用主模式和预先共享密钥(PSK)时。

本文在配置里也提供信息关于怎样翻译某些调试线路。

这些主题没有讨论：

- 通过流量，在通道设立了后
- IPSec或Internet Key Exchange (IKE)基本概念

核心问题

IKE和IPSec调试倾向于获得隐秘。Cisco技术支持中心(TAC)经常使用这些Bug了解与IPSec VPN隧道建立的一问题哪里查找。

方案

主模式典型地使用在LAN-to-LAN隧道之间，或者在远程访问(EzVPN)的情况下，当证书使用验证时。

那些调试是从运行15.2(1)T软件版本的Cisco IOS设备。

两个主要方案在本文描述：

- IOS发起者侧
- IOS响应方侧

在本文中，在两个站点之间的一个基于VTI的通道根据IPv6设立。

> **注意**：
>
> 请使用命令查找工具(仅限注册用户)为了得到关于用于本文的命令的更多信息。
>
> 使用 **debug** 命令之前，请参阅有关 Debug 命令的重要信息。

使用的调试

- debug crypto isakmp
- debug crypto ipsec
- debug crypto kmi

IOS 路由器配置

加密配置

其他旁拉

调试

IOS响应方旁拉

主模式消息1 (MM1)

最初的提议对于IKE包括：

- 加密
- 切细
- Diffie-Hellman (DH)组
- 寿命

相关的配置：

主模式消息2 (MM2) -发送我们的回复

主模式消息3 (MM3)

包括：

- 网络地址转换(NAT)发现
- DH交换第一部分

主模式消息4 (MM4)

包括：

- NAT检测有效负载
- DH交换的继续

主模式消息5 (MM5) -发起者发送其标识

包括：

- 本地身份信息
- 密钥

主模式消息6 (MM6) -响应方发送其标识。阶段1完成。

包括：

- 从对等体发送的远程标识
- 关于隧道组的最终决策选择

相关的配置：

快速模式消息1 (QM1)

```
*Sep 21 08:33:43.433: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
```

```
*Sep 21 08:33:43.433: ISAKMP: set new node 1371333358 to QM_IDLE
*Sep 21 08:33:43.433: ISAKMP: (1011): processing HASH payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing SA payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):Checking IPSec proposal 1
*Sep 21 08:33:43.433: ISAKMP: transform 1, ESP_AES
*Sep 21 08:33:43.433: ISAKMP:   attributes in transform:
*Sep 21 08:33:43.433: ISAKMP:      encaps is 1 (Tunnel)
*Sep 21 08:33:43.433: ISAKMP:      SA life type in seconds
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (basic) of 3600
*Sep 21 08:33:43.433: ISAKMP:      SA life type in kilobytes
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
*Sep 21 08:33:43.433: ISAKMP:      authenticator is HMAC-SHA
*Sep 21 08:33:43.433: ISAKMP:      key length is 128
*Sep 21 08:33:43.433: ISAKMP: (1011):atts are acceptable.
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1,
 (key eng. msg.) INBOUND local= 2001: DB8::3:0, remote= 2001: DB8::2:0,
    local_proxy= ::/0/256/0,
    remote_proxy= ::/0/256/0,
   protocol= ESP, transform= NONE  (Tunnel),
   lifedur= 0s and 0kb,
   spi= 0x0(0), conn_id= 0, keysize= 128, flags= 0x0
*Sep 21 08:33:43.433: ISAKMP: (1011): processing NONCE payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):QM Responder gets spi
*Sep 21 08:33:43.433: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.433: ISAKMP: (1011): Old State = IKE_QM_READY  New State =
IKE_QM_SPI_STARVE
```

相关配置：

```
*Sep 21 08:33:43.433: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.433: ISAKMP: set new node 1371333358 to QM_IDLE
*Sep 21 08:33:43.433: ISAKMP: (1011): processing HASH payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing SA payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):Checking IPSec proposal 1
*Sep 21 08:33:43.433: ISAKMP: transform 1, ESP_AES
*Sep 21 08:33:43.433: ISAKMP:   attributes in transform:
*Sep 21 08:33:43.433: ISAKMP:      encaps is 1 (Tunnel)
*Sep 21 08:33:43.433: ISAKMP:      SA life type in seconds
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (basic) of 3600
*Sep 21 08:33:43.433: ISAKMP:      SA life type in kilobytes
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
*Sep 21 08:33:43.433: ISAKMP:      authenticator is HMAC-SHA
*Sep 21 08:33:43.433: ISAKMP:      key length is 128
*Sep 21 08:33:43.433: ISAKMP: (1011):atts are acceptable.
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1,
 (key eng. msg.) INBOUND local= 2001: DB8::3:0, remote= 2001: DB8::2:0,
    local_proxy= ::/0/256/0,
    remote_proxy= ::/0/256/0,
   protocol= ESP, transform= NONE  (Tunnel),
   lifedur= 0s and 0kb,
   spi= 0x0(0), conn_id= 0, keysize= 128, flags= 0x0
```

```
*Sep 21 08:33:43.433: ISAKMP: (1011): processing NONCE payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):QM Responder gets spi
*Sep 21 08:33:43.433: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.433: ISAKMP: (1011): Old State = IKE_QM_READY  New State =
IKE_QM_SPI_STARVE
```

快速模式消息2 (QM2)

包括：

- 远程终端发送参数
- 短两个报价的第2阶段寿命选择

```
*Sep 21 08:33:43.433: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.433: ISAKMP: set new node 1371333358 to QM_IDLE
*Sep 21 08:33:43.433: ISAKMP: (1011): processing HASH payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing SA payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):Checking IPSec proposal 1
*Sep 21 08:33:43.433: ISAKMP: transform 1, ESP_AES
*Sep 21 08:33:43.433: ISAKMP:   attributes in transform:
*Sep 21 08:33:43.433: ISAKMP:      encaps is 1 (Tunnel)
*Sep 21 08:33:43.433: ISAKMP:      SA life type in seconds
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (basic) of 3600
*Sep 21 08:33:43.433: ISAKMP:      SA life type in kilobytes
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
*Sep 21 08:33:43.433: ISAKMP:      authenticator is HMAC-SHA
*Sep 21 08:33:43.433: ISAKMP:      key length is 128
*Sep 21 08:33:43.433: ISAKMP: (1011):atts are acceptable.
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1,
 (key eng. msg.) INBOUND local= 2001: DB8::3:0, remote= 2001: DB8::2:0,
    local_proxy= ::/0/256/0,
    remote_proxy= ::/0/256/0,
   protocol= ESP, transform= NONE  (Tunnel),
   lifedur= 0s and 0kb,
   spi= 0x0(0), conn_id= 0, keysize= 128, flags= 0x0
*Sep 21 08:33:43.433: ISAKMP: (1011): processing NONCE payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):QM Responder gets spi
*Sep 21 08:33:43.433: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.433: ISAKMP: (1011): Old State = IKE_QM_READY  New State =
IKE_QM_SPI_STARVE
```

相关配置：

```
*Sep 21 08:33:43.433: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.433: ISAKMP: set new node 1371333358 to QM_IDLE
```

```
*Sep 21 08:33:43.433: ISAKMP: (1011): processing HASH payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing SA payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):Checking IPSec proposal 1
*Sep 21 08:33:43.433: ISAKMP: transform 1, ESP_AES
*Sep 21 08:33:43.433: ISAKMP:   attributes in transform:
*Sep 21 08:33:43.433: ISAKMP:      encaps is 1 (Tunnel)
*Sep 21 08:33:43.433: ISAKMP:      SA life type in seconds
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (basic) of 3600
*Sep 21 08:33:43.433: ISAKMP:      SA life type in kilobytes
*Sep 21 08:33:43.433: ISAKMP:      SA life duration (VPI) of  0x0 0x46 0x50 0x0
*Sep 21 08:33:43.433: ISAKMP:      authenticator is HMAC-SHA
*Sep 21 08:33:43.433: ISAKMP:      key length is 128
*Sep 21 08:33:43.433: ISAKMP: (1011):atts are acceptable.
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1
*Sep 21 08:33:43.433: IPSEC(validate_proposal_request): proposal part #1,
 (key eng. msg.) INBOUND local= 2001: DB8::3:0, remote= 2001: DB8::2:0,
    local_proxy= ::/0/256/0,
    remote_proxy= ::/0/256/0,
   protocol= ESP, transform= NONE  (Tunnel),
   lifedur= 0s and 0kb,
   spi= 0x0(0), conn_id= 0, keysize= 128, flags= 0x0
*Sep 21 08:33:43.433: ISAKMP: (1011): processing NONCE payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011): processing ID payload. message ID =
1371333358
*Sep 21 08:33:43.433: ISAKMP: (1011):QM Responder gets spi
*Sep 21 08:33:43.433: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.433: ISAKMP: (1011): Old State = IKE_QM_READY  New State =
IKE_QM_SPI_STARVE
```

快速模式消息3 (QM3) -相位两应该完成和隧道接口上升

```
*Sep 21 08:33:43.437: %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel23,
changed state to up
*Sep 21 08:33:43.437: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.437: ISAKMP: (1011): deleting node 1371333358 error FALSE
reason "QM done (await)"
*Sep 21 08:33:43.437: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.437: ISAKMP: (1011): Old State = IKE_QM_R_QM2  New State =
IKE_QM_PHASE2_COMPLETE
*Sep 21 08:33:43.437: IPSEC(key_engine): got a queue event with 1 KMI message(s
*Sep 21 08:33:43.437: IPSEC(key_engine_enable_outbound): rec'd enable notify
from ISAKMP
```

IOS路由器-发起者

主模式消息1 (MM1) -初始联系

包括：

- 供应商ID (VID)

- 产能
- 阶段1建议
- IKE安全关联(SA)
- IPSec已经创建SAS的一个模板

```
*Sep 21 08:33:43.437: %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel23,
changed state to up
*Sep 21 08:33:43.437: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.437: ISAKMP: (1011): deleting node 1371333358 error FALSE
reason "QM done (await)"
*Sep 21 08:33:43.437: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.437: ISAKMP: (1011): Old State = IKE_QM_R_QM2  New State =
IKE_QM_PHASE2_COMPLETE
*Sep 21 08:33:43.437: IPSEC(key_engine): got a queue event with 1 KMI message(s
*Sep 21 08:33:43.437: IPSEC(key_engine_enable_outbound): rec'd enable notify
from ISAKMP
```

相关配置：


```
*Sep 21 08:33:43.437: %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel23,
changed state to up
*Sep 21 08:33:43.437: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.437: ISAKMP: (1011): deleting node 1371333358 error FALSE
reason "QM done (await)"
*Sep 21 08:33:43.437: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.437: ISAKMP: (1011): Old State = IKE_QM_R_QM2  New State =
IKE_QM_PHASE2_COMPLETE
*Sep 21 08:33:43.437: IPSEC(key_engine): got a queue event with 1 KMI message(s
*Sep 21 08:33:43.437: IPSEC(key_engine_enable_outbound): rec'd enable notify
from ISAKMP
```


主模式消息2 (MM2) -对初始联系的回复

包括：

- 对等体选择互联网安全协会和密钥管理协议(ISAKMP)策略使用
- SA IKE


```
*Sep 21 08:33:43.437: %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel23,
changed state to up
*Sep 21 08:33:43.437: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.437: ISAKMP: (1011): deleting node 1371333358 error FALSE
reason "QM done (await)"
*Sep 21 08:33:43.437: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.437: ISAKMP: (1011): Old State = IKE_QM_R_QM2  New State =
IKE_QM_PHASE2_COMPLETE
*Sep 21 08:33:43.437: IPSEC(key_engine): got a queue event with 1 KMI message(s
*Sep 21 08:33:43.437: IPSEC(key_engine_enable_outbound): rec'd enable notify
from ISAKMP
```


主模式消息3 (MM3) - NAT发现号和Diffie-Hellman交换

包括：

- NAT发现有效负载和哈希
- DH交换开始
- 对端死机检测(DPD)支持

```
*Sep 21 08:33:43.437: %LINEPROTO-5-UPDOWN: Line protocol on Interface Tunnel23,
changed state to up
*Sep 21 08:33:43.437: ISAKMP (1011): received packet from 2001: DB8::2 dport
500 sport 500 Global (R) QM_IDLE
*Sep 21 08:33:43.437: ISAKMP: (1011): deleting node 1371333358 error FALSE
reason "QM done (await)"
*Sep 21 08:33:43.437: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.437: ISAKMP: (1011): Old State = IKE_QM_R_QM2  New State =
IKE_QM_PHASE2_COMPLETE
*Sep 21 08:33:43.437: IPSEC(key_engine): got a queue event with 1 KMI message(s
*Sep 21 08:33:43.437: IPSEC(key_engine_enable_outbound): rec'd enable notify
from ISAKMP
```

主模式消息4 (MM4) - NAT发现号和Diffie-Hellman交换

包括：

- NAT发现有效负载
- DH交换开始
- 另外的VIDs (DPD， Unity支持)
- 知识谈与另一个IOS设备

```
*Sep 21 08:33:43.273: ISAKMP (0): received packet from 2001: DB8::3 dport 500
sport 500 Global (I) MM_SA_SETUP
*Sep 21 08:33:43.273: ISAKMP: (0):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.273: ISAKMP: (0): Old State = IKE_I_MM3  New State = IKE_I_MM4

*Sep 21 08:33:43.273: ISAKMP: (0): processing KE payload. message ID = 0
*Sep 21 08:33:43.281: ISAKMP: (0): processing NONCE payload. message ID = 0
*Sep 21 08:33:43.281: ISAKMP: (0):found peer pre-shared key matching 2001:
DB8::3
*Sep 21 08:33:43.281: ISAKMP: (1011): processing vendor id payload
*Sep 21 08:33:43.281: ISAKMP: (1011): vendor ID is Unity
*Sep 21 08:33:43.281: ISAKMP: (1011): processing vendor id payload
*Sep 21 08:33:43.281: ISAKMP: (1011): vendor ID is DPD
*Sep 21 08:33:43.281: ISAKMP: (1011): processing vendor id payload
*Sep 21 08:33:43.281: ISAKMP: (1011): speaking to another IOS box!
*Sep 21 08:33:43.281: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.281: ISAKMP: (1011): Old State = IKE_I_MM4  New State =
IKE_I_MM4
```

主模式消息5 (MM5) -发送标识

包括：

- 远端对等体标识(ID)

```
*Sep 21 08:33:43.293: ISAKMP: (1011): Send initial contact
*Sep 21 08:33:43.293: ISAKMP: (1011): SA is doing pre-shared key authentication
using id type ID_IPV6_ADDR
*Sep 21 08:33:43.293: ISAKMP (1011): ID payload
       next-payload : 8
```

```
       type         : 5
        address      : 2001: DB8::2
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.293: ISAKMP: (1011):Total payload length: 24
*Sep 21 08:33:43.293: ISAKMP: (1011): sending packet to 2001: DB8::3 my_port
500 peer_port 500 (I) MM_KEY_EXCH
*Sep 21 08:33:43.293: ISAKMP: (1011): Sending an IKE IPv6 Packet.
*Sep 21 08:33:43.293: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.293: ISAKMP: (1011): Old State = IKE_I_MM4  New State =
IKE_I_MM5
```

相关配置：

```
*Sep 21 08:33:43.293: ISAKMP: (1011): Send initial contact
*Sep 21 08:33:43.293: ISAKMP: (1011): SA is doing pre-shared key authentication
using id type ID_IPV6_ADDR
*Sep 21 08:33:43.293: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
        address      : 2001: DB8::2
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.293: ISAKMP: (1011):Total payload length: 24
*Sep 21 08:33:43.293: ISAKMP: (1011): sending packet to 2001: DB8::3 my_port
500 peer_port 500 (I) MM_KEY_EXCH
*Sep 21 08:33:43.293: ISAKMP: (1011): Sending an IKE IPv6 Packet.
*Sep 21 08:33:43.293: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.293: ISAKMP: (1011): Old State = IKE_I_MM4  New State =
IKE_I_MM5
```

主模式消息6 (MM6) -远端对等体标识，阶段1设立

包括：

- 重新生成密钥开始的时期
- 远程标识(在这种情况下地址)
- 决策登陆在配置文件

```
*Sep 21 08:33:43.297: ISAKMP (1011): received packet from 2001: DB8::3 dport
500 sport 500 Global (I) MM_KEY_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): processing ID payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
       address      : 2001: DB8::3
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.297: ISAKMP: (0):: peer matches *none* of the profiles
*Sep 21 08:33:43.297: ISAKMP: (1011): processing HASH payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP: (1011): SA authentication status: authenticated
*Sep 21 08:33:43.297: ISAKMP: (1011): SA has been authenticated with 2001:
DB8::3
*Sep 21 08:33:43.297: ISAKMP: Trying to insert a peer 2001: DB8::2/2001:
DB8::3/500/,  and inserted successfully 9344BE8.
*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM5  New State =
```

```
IKE_I_MM6

*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_I_MM6

*Sep 21 08:33:43.301: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.301: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_P1_COMPLETE
```

相关配置：

```
*Sep 21 08:33:43.297: ISAKMP (1011): received packet from 2001: DB8::3 dport
500 sport 500 Global (I) MM_KEY_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): processing ID payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
       address      : 2001: DB8::3
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.297: ISAKMP: (0):: peer matches *none* of the profiles
*Sep 21 08:33:43.297: ISAKMP: (1011): processing HASH payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP: (1011): SA authentication status: authenticated
*Sep 21 08:33:43.297: ISAKMP: (1011): SA has been authenticated with 2001:
DB8::3
*Sep 21 08:33:43.297: ISAKMP: Trying to insert a peer 2001: DB8::2/2001:
DB8::3/500/,  and inserted successfully 9344BE8.
*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM5  New State =
IKE_I_MM6

*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_I_MM6

*Sep 21 08:33:43.301: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.301: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_P1_COMPLETE
```

快速模式消息1 (QM1) -对等体开始第2阶段

包括：

- 远程和本地代理ID
- 变换集

```
*Sep 21 08:33:43.297: ISAKMP (1011): received packet from 2001: DB8::3 dport
500 sport 500 Global (I) MM_KEY_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): processing ID payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
       address      : 2001: DB8::3
       protocol     : 17
       port         : 500
       length       : 24
```

```
*Sep 21 08:33:43.297: ISAKMP: (0):: peer matches *none* of the profiles
*Sep 21 08:33:43.297: ISAKMP: (1011): processing HASH payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP: (1011): SA authentication status: authenticated
*Sep 21 08:33:43.297: ISAKMP: (1011): SA has been authenticated with 2001:
DB8::3
*Sep 21 08:33:43.297: ISAKMP: Trying to insert a peer 2001: DB8::2/2001:
DB8::3/500/,  and inserted successfully 9344BE8.
*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM5  New State =
IKE_I_MM6

*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_I_MM6

*Sep 21 08:33:43.301: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.301: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_P1_COMPLETE
```

相关配置：

```
*Sep 21 08:33:43.297: ISAKMP (1011): received packet from 2001: DB8::3 dport
500 sport 500 Global (I) MM_KEY_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): processing ID payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
       address      : 2001: DB8::3
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.297: ISAKMP: (0):: peer matches *none* of the profiles
*Sep 21 08:33:43.297: ISAKMP: (1011): processing HASH payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP: (1011): SA authentication status: authenticated
*Sep 21 08:33:43.297: ISAKMP: (1011): SA has been authenticated with 2001:
DB8::3
*Sep 21 08:33:43.297: ISAKMP: Trying to insert a peer 2001: DB8::2/2001:
DB8::3/500/,  and inserted successfully 9344BE8.
*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM5  New State =
IKE_I_MM6

*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_I_MM6

*Sep 21 08:33:43.301: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.301: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_P1_COMPLETE
```

快速模式消息2 (QM2)

包括：

- 代理身分的确认
- 隧道类型
- 完善的转发秘密(PFS)设置

```
*Sep 21 08:33:43.297: ISAKMP (1011): received packet from 2001: DB8::3 dport
500 sport 500 Global (I) MM_KEY_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): processing ID payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
       address      : 2001: DB8::3
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.297: ISAKMP: (0):: peer matches *none* of the profiles
*Sep 21 08:33:43.297: ISAKMP: (1011): processing HASH payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP: (1011): SA authentication status: authenticated
*Sep 21 08:33:43.297: ISAKMP: (1011): SA has been authenticated with 2001:
DB8::3
*Sep 21 08:33:43.297: ISAKMP: Trying to insert a peer 2001: DB8::2/2001:
DB8::3/500/,  and inserted successfully 9344BE8.
*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM5  New State =
IKE_I_MM6

*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_I_MM6

*Sep 21 08:33:43.301: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.301: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_P1_COMPLETE
```

相关配置：


```
*Sep 21 08:33:43.297: ISAKMP (1011): received packet from 2001: DB8::3 dport
500 sport 500 Global (I) MM_KEY_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): processing ID payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP (1011): ID payload
       next-payload : 8
       type         : 5
       address      : 2001: DB8::3
       protocol     : 17
       port         : 500
       length       : 24
*Sep 21 08:33:43.297: ISAKMP: (0):: peer matches *none* of the profiles
*Sep 21 08:33:43.297: ISAKMP: (1011): processing HASH payload. message ID = 0
*Sep 21 08:33:43.297: ISAKMP: (1011): SA authentication status: authenticated
*Sep 21 08:33:43.297: ISAKMP: (1011): SA has been authenticated with 2001:
DB8::3
*Sep 21 08:33:43.297: ISAKMP: Trying to insert a peer 2001: DB8::2/2001:
DB8::3/500/,  and inserted successfully 9344BE8.
*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_FROM_PEER, IKE_MM_EXCH
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM5  New State =
IKE_I_MM6

*Sep 21 08:33:43.297: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_MAIN_MODE
*Sep 21 08:33:43.297: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_I_MM6

*Sep 21 08:33:43.301: ISAKMP: (1011):Input = IKE_MESG_INTERNAL,
IKE_PROCESS_COMPLETE
*Sep 21 08:33:43.301: ISAKMP: (1011): Old State = IKE_I_MM6  New State =
IKE_P1_COMPLETE
```

快速模式消息3 (QM3) -第2阶段建立

包括：

- 设置通过流量的安全策略索引(斯皮)

```
*Sep 21 08:33:43.305: ISAKMP: (1011): Sending an IKE IPv6 Packet.
*Sep 21 08:33:43.305: ISAKMP: (1011): deleting node 1371333358 error FALSE
reason "No Error"
*Sep 21 08:33:43.305: ISAKMP: (1011):Node 1371333358, Input =
IKE_MESG_FROM_PEER, IKE_QM_EXCH
*Sep 21 08:33:43.305: ISAKMP: (1011): Old State = IKE_QM_I_QM1  New State =
IKE_QM_PHASE2_COMPLETE
*Sep 21 08:33:43.305: IPSEC(key_engine): got a queue event with 1 KMI message(s)
*Sep 21 08:33:43.305: IPSEC(crypto_ipsec_create_ipsec_sas): Map found
Tunnel23-head-0
*Sep 21 08:33:43.305: IPSEC(crypto_ipsec_sa_find_ident_head): reconnecting
with the same proxies and peer 2001: DB8::3
*Sep 21 08:33:43.305: IPSEC(create_sa): sa created,
 (sa) sa_dest= 2001: DB8::2, sa_proto= 50,
   sa_spi= 0x45F16A9A(1173449370),
   sa_trans= esp-aes esp-sha-hmac , sa_conn_id= 305
   sa_lifetime(k/sec)= (4608000/3439)
*Sep 21 08:33:43.305: IPSEC(create_sa): sa created,
 (sa) sa_dest= 2001: DB8::3, sa_proto= 50,
   sa_spi= 0x221A7153(572158291),
   sa_trans= esp-aes esp-sha-hmac , sa_conn_id= 306
   sa_lifetime(k/sec)= (4608000/3439)
R2(config-if)#
*Sep 21 08:33:43.309: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Tunnel23, changed state to up
```

通道验证

```
sh crypto ipsec sa

interface: Tunnel23
   Crypto map tag: Tunnel23-head-0, local addr 2001: DB8::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::3 port 500
    PERMIT, flags={origin_is_acl,}
    #pkts encaps: 4, #pkts encrypt: 4, #pkts digest: 4
    #pkts decaps: 4, #pkts decrypt: 4, #pkts verify: 4
   #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,
    remote crypto endpt.: 2001: DB8::3
    path mtu 1500, ipv6 mtu 1500, ipv6 mtu idb Ethernet0/0
    current outbound spi: 0x221A7153(572158291)
    PFS (Y/N): N, DH group: none

    inbound esp sas:
      spi: 0x45F16A9A(1173449370)
       transform: esp-aes esp-sha-hmac ,
```

```
       in use settings ={Tunnel, }
       conn id: 305, flow_id: SW:305, sibling_flags 80000041, crypto map:
Tunnel23-head-0
       sa timing: remaining key lifetime (k/sec): (4183789/3408)
       IV size: 16 bytes
       replay detection support: Y
       Status: ACTIVE

    inbound ah sas:

    inbound pcp sas:

    outbound esp sas:
      spi: 0x221A7153(572158291)
       transform: esp-aes esp-sha-hmac ,
       in use settings ={Tunnel, }
       conn id: 306, flow_id: SW:306, sibling_flags 80000041, crypto map:
Tunnel23-head-0
       sa timing: remaining key lifetime (k/sec): (4183790/3408)
       IV size: 16 bytes
       replay detection support: Y
       Status: ACTIVE

R2(config-if)#do ping fe80::23:3
Output Interface: tunnel23
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to FE80::23:3, timeout is 2 seconds:
Packet sent with a source address of FE80::23:2%Tunnel23
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/11/20 ms
R2(config-if)#do sh crypto ipsec sa | i caps|ident
  local  ident (addr/mask/prot/port): (::/0/0/0)
  remote ident (addr/mask/prot/port): (::/0/0/0)
    #pkts encaps: 9, #pkts encrypt: 9, #pkts digest: 9
    #pkts decaps: 9, #pkts decrypt: 9, #pkts verify: 9
```

通道启用和通过流量。

相关信息

- 在IPSec的维基百科条款;标准和参考包含很多有用的信息。
- 积极模式)排除故障技术说明的ASA IPsec和IKE调试(IKEv1
- 主模式)排除故障TechNote的ASA IPsec和IKE调试(IKEv1
- 技术支持和文档 - Cisco Systems