إستخدام تصحيح أخطاء ASA IKEv2 لشبكة VPN من موقع إلى موقع مع PSKs

المحتويات

المقدمة

يصف هذا المستند معلومات حول تصحيح أخطاء مفتاح الإنترنت الإصدار 2 (IKEv2) على جهاز الأمان القابل للتكيف (ASA) من Cisco.

المتطلبات الأساسية

المتطلبات

لا توجد متطلبات خاصة لهذا المستند.

المكونات المستخدمة

لا يقتصر هذا المستند على إصدارات برامج ومكونات مادية معينة.

تم إنشاء المعلومات الواردة في هذا المستند من الأجهزة الموجودة في بيئة معملية خاصة. بدأت جميع الأجهزة المُستخدمة في هذا المستند بتكوين ممسوح (افتراضي). إذا كانت شبكتك قيد التشغيل، فتأكد من فهمك للتأثير المحتمل لأي أمر.

مسألة أساسية

تختلف عملية تبادل الحزم التي يتم إستخدامها في IKEv2 إختلافا جذريا عن تلك الموضحة في IKEv1. مع IKEv1، هناك عملية إستبدال مرحلة 1 محددة بشكل واضح المستخدمة في IKEv1. تتألف من ست حزم متبوعة بتبادل مرحلة 2 الذي يتكون من ثلاث حزم. تبادل IKEv2 متغير.

> **تلميح**: للحصول على معلومات أكثر تفصيلا حول الفروق وشرح لعملية تبادل الحزم، إرجع إلى تصحيح أخطاء مستوى البروتوكول وتبادل حزم IKEv2.

تصحيح الأخطاء المستخدمة

يتم إستخدام هذين التصحيح ل IKEv2:

```
debug crypto ikev2 protocol 127
debug crypto ikev2 platform 127
```

تكوينات ASA

يوزي هذا قسم مثال تشكيل ل ASA1 (البادئ) و ASA2 (المستجيب).

ASA1

```
interface GigabitEthernet0/0
nameif outside
security-level 0
ip address 10.0.0.1 255.255.255.0

interface GigabitEthernet0/2
nameif inside
security-level 100
ip address 192.168.1.2 255.255.255.0

crypto ipsec ikev2 ipsec-proposal AES256
protocol esp encryption aes-256
protocol esp integrity sha-1 md5

access-list l2l_list extended permit ip host 192.168.1.1
  host  192.168.2.99
access-list l2l_list extended permit ip host 192.168.1.12
  host 192.168.2.99

crypto map outside_map 1 match address l2l_list
crypto map outside_map 1 set peer 10.0.0.2
crypto map outside_map 1 set ikev2 ipsec-proposal AES256
crypto map outside_map interface outside

crypto ikev2 policy 1
encryption aes-256
integrity sha
group 2
prf sha
lifetime seconds 86400
```

```
crypto ikev2 enable outside

tunnel-group 10.0.0.2 type ipsec-l2l
tunnel-group 10.0.0.2 ipsec-attributes
ikev2 remote-authentication pre-shared-key *****
ikev2 local-authentication pre-shared-key *****
```

ASA2

```
interface GigabitEthernet0/1
nameif outside
security-level 0
ip address 10.0.0.2 255.255.255.0

interface GigabitEthernet0/2
nameif inside
security-level 100
ip address 192.168.2.1 255.255.255.0

crypto ipsec ikev2 ipsec-proposal AES256
protocol esp encryption aes-256
protocol esp integrity sha-1 md5

access-list l2l_list extended permit ip host 192.168.2.99
  host 192.168.1.1
access-list l2l_list extended permit ip host 192.168.2.99
  host 192.168.1.12

crypto map outside_map 1 match address l2l_list
crypto map outside_map 1 set peer 10.0.0.1
crypto map outside_map 1 set ikev2 ipsec-proposal AES256
crypto map outside_map interface outside

crypto ikev2 policy 1
encryption aes-256
integrity sha
group 2
prf sha
lifetime seconds 86400

crypto ikev2 enable outside
tunnel-group 10.0.0.1 type ipsec-l2l
tunnel-group 10.0.0.1 ipsec-attributes
ikev2 remote-authentication pre-shared-key *****
ikev2 local-authentication pre-shared-key *****
```

تصحيح الأخطاء

يصف هذا القسم تصحيح أخطاء اقتران الأمان (SA) واتصالات ASA1 (البادئ) ومفاوضات نفق ASA2 (المستجيب) وتوصيفات الرسائل.

تفاوض النفق

يستلم ASA1 أن يطابق ال crypto Access Control List (ACL) للنظير ASA **10.0.0.2** ويبدأ إنشاء ال SA:

```
IKEv2-PLAT-3: attempting to find tunnel
   group for IP: 10.0.0.2
```

```
IKEv2-PLAT-3: mapped to tunnel group 10.0.0.2
   using peer IP
IKEv2-PLAT-3: my_auth_method = 2
IKEv2-PLAT-3: supported_peers_auth_method = 2
IKEv2-PLAT-3: P1 ID = 0
IKEv2-PLAT-3: Translating IKE_ID_AUTO to = 255
IKEv2-PLAT-3: (16) tp_name set to:
IKEv2-PLAT-3: (16) tg_name set to: 10.0.0.2
IKEv2-PLAT-3: (16) tunn grp type set to: L2L
IKEv2-PLAT-5: New ikev2 sa request admitted
IKEv2-PLAT-5: Incrementing outgoing negotiating
  sa count by one
```

الزوج الأولي من الرسائل التي يتم إرسالها وهو لتبادل IKE_SA_INIT. تتفاوض هذه الرسائل لتبادل Diffie-Hellman (DH)، وإجراء تبادل عدم الاتصال، وتبادل خوارزميات التشفير على.

وفيما يلي التكوين ذي الصلة ل ASA1:

```
crypto ikev2
   policy 1
encryption
aes-256
integrity sha
group 2
prf sha
lifetime seconds
  86400
crypto ikev2
  enable
  outside

Tunnel Group
matching the
identity name
s present:

tunnel-group
   10.0.0.2
   type ipsec-l2l
tunnel-group
   10.0.0.2
   ipsec-attributes
ikev2
   remote-
   authentication
   pre-shared-key
   *****
ikev2
   local-
   authentication
   pre-shared-key
  *****
```

فيما يلي إخراج تصحيح الأخطاء لهذا التبادل:

```
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: IDLE Event: EV_INIT_SA
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_GET_IKE_POLICY
```

```
IKEv2-PROTO-3: (16): Getting configured policies
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000
   (I) MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_SET_POLICY
IKEv2-PROTO-3: (16): Setting configured policies
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_CHK_AUTH4PKI
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_GEN_DH_KEY
IKEv2-PROTO-3: (16): Computing DH public key
IKEv2-PROTO-3: (16):
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_NO_EVENT
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_OK_RECD_DH_PUBKEY_RESP
IKEv2-PROTO-5: (16): Action: Action_Null
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=0000000000000000 (I)
   MsgID = 00000000 CurState: I_BLD_INIT
   Event: EV_GET_CONFIG_MODE
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
```

ثم يقوم ASA1 بإنشاء حزمة IKE_INIT_SA، والتي تحتوي على:

- **رأس ISAKMP** (SPI/الإصدار/العلامات)
- **SAi1** (خوارزمية التشفير التي يدعمها بادئ IKE)
- **KEi** (قيمة مفتاح DH العام للبادئ)
- **N** (البادئ مرة واحدة)

```
R_SPI=0000000000000000 (I) MsgID = 00000000
   CurState: I_BLD_INIT Event: EV_BLD_MSG
IKEv2-PROTO-2: (16): Sending initial message
IKEv2-PROTO-3: Tx [L 10.0.0.1:500/R 10.0.0.2:500/VRF i0:f0]
   m_id: 0x0
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 -
   r: 0000000000000000]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 0000000000000000
IKEv2-PROTO-4: Next payload: SA, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_SA_INIT,
   flags: INITIATOR
IKEv2-PROTO-4: Message id: 0x0, length: 338
SA  Next payload: KE, reserved: 0x0,
   length: 48
IKEv2-PROTO-4: last proposal: 0x0, reserved: 0x0,
   length: 44  Proposal: 1, Protocol id: IKE,
   SPI size: 0, #trans: 4
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
```

```
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 2, reserved: 0x0, id: SHA1
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 4, reserved: 0x0,
   id: DH_GROUP_1024_MODP/Group 2
KE  Next payload: N, reserved: 0x0,
   length: 136
    DH group: 2, Reserved: 0x0
      19 65 43 45 d2 72 a7 11 b8 a4 93 3f 44 95 6c b8
     6d 5a f0 f8 1f f3 d4 b9 ff 41 7b 0d 13 90 82 cf
     34 2e 74 e3 03 6e 9e 00 88 80 5d 86 2c 4c 79 35
     ee e6 98 91 89 f3 48 83 75 09 02 f1 3c b1 7f f5
     be 05 f1 fa 7e 8a 4c 43 eb a9 2c 3a 47 c0 68 40
     f5 dd 02 9d a5 b5 a2 a6 90 64 95 fc 57 b5 69 e8
     b2 4f 8e f2 a5 05 e3 c7 17 f9 c0 e0 c8 3e 91 ed
     c1 09 23 3e e5 09 4f be 1a 6a d4 d9 fb 65 44 1d
N  Next payload: VID, reserved: 0x0,
   length: 24
     84 8b 80 c2 52 6c 4f c7 f8 08 b8 ed! 52 af a2 f4
     d5 dd d4 f4
VID  Next payload: VID, reserved: 0x0,
   length: 23

     43 49 53 43 4f 2d 44 45 4c 45 54 45 2d 52 45 41
     53 4f 4e
VID  Next payload: VID, reserved: 0x0, length: 59

     43 49 53 43 4f 28 43 4f 50 59 52 49 47 48 54 29
     26 43 6f 70 79 72 69 67 68 74 20 28 63 29 20 32
     30 30 39 20 43 69 73 63 6f 20 53 79 73 74 65 6d
     73 2c 20 49 6e 63 2e
VID  Next payload: NONE, reserved: 0x0, length: 20
    40 48 b7 6e bc e8 85 25 e7 de 7f 00 d6 c2 d3
```

يتم بعد ذلك إرسال حزمة IKE_INIT_SA بواسطة ASA1:

```
IKEv2-PLAT-4: SENT PKT [IKE_SA_INIT]
   [10.0.0.1]:500->[10.0.0.2]:500
```

ASA2 يستلم ال ikev_init_sa ربط:

```
IKEv2-PLAT-4: RECV PKT [IKE_SA_INIT]
   [10.0.0.1]:500->[10.0.0.2]:500
   InitSPI=0xdfa3b583a4369958 RespSPI=0x0000000000000000
   MID=00000000
```

يقوم ASA2 بدء إنشاء SA لذلك النظير:

```
IKEv2-PROTO-3: Rx [L 10.0.0.2:500/R
   10.0.0.1:500/VRF i0:f0] m_id: 0x0
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 -
   r: 0000000000000000]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 0000000000000000
IKEv2-PROTO-4: Next payload: SA, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_SA_INIT,
   flags: INITIATOR
IKEv2-PROTO-4: Message id: 0x0, length: 338
IKEv2-PLAT-5: New ikev2 sa request admitted
```

```
IKEv2-PLAT-5: Incrementing incoming negotiating
   sa count by one
SA  Next payload: KE, reserved: 0x0, length: 48
IKEv2-PROTO-4:   last proposal: 0x0, reserved: 0x0,
   length: 44 Proposal: 1, Protocol id: IKE, SPI size: 0,
   #trans: 4
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 2, reserved: 0x0, id: SHA1
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 4, reserved: 0x0,
   id: DH_GROUP_1024_MODP/Group 2
KE  Next payload: N, reserved: 0x0, length: 136
    DH group: 2, Reserved: 0x0
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: IDLE
   Event: EV_RECV_INIT
IKEv2-PROTO-5: (16): SM Trace->
  SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
```

يتحقق ASA2 من رسالة IKE_INIT ويعالجها:

1. فهي تختار مجموعة التشفير من تلك التي تقدمها ASA1.

2. إنه يقوم بحساب مفاتيح السري للدردشة.

3. كما يقوم بحساب قيمة SKEYID يمكن اشتقاق كافة المفاتيح منها لـ ike_sa. يتم تشفير جميع الرسائل التالية باستثناء هذه الرسائل والمصادقة عليها. المفاتيح المستخدمة للتشفير وحماية التكامل مشتقة من SKEYID وتعرف بـ:

   يتم إستخدام SK_E للتشفير.

   يتم إستخدام SK_A للمصادقة.

   يتم اشتقاق SK_D واستخدامه لاشتقاق المزيد من مواد الطلاء لـ CHILD_SAs. ويتم حساب sk_e و sk_a منفصلان لكل إتجاه.

فيما يلي التكوين ذي الصلة لـ ASA2:

```
crypto ikev2
   policy 1
encryption
   aes-256
integrity sha
group 2
prf sha
lifetime seconds
   86400
crypto ikev2
   enable
   outside

Tunnel Group
matching the
identity name
```

```
is present:

tunnel-group
   10.0.0.1
   type ipsec-l2l
tunnel-group
   10.0.0.1
   ipsec-
   attributes
ikev2 remote-
   authentication
   pre-shared-key
   *****
ikev2 local-
   authentication
   pre-shared-key
  *****
```

فيما يلي إخراج تصحيح الأخطاء:

```
MsgID = 00000000 CurState: R_INIT Event: EV_VERIFY_MSG
IKEv2-PROTO-3: (16): Verify SA init message
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_INIT Event: EV_INSERT_SA
IKEv2-PROTO-3: (16): Insert SA
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_INIT
   Event: EV_GET_IKE_POLICY
IKEv2-PROTO-3: (16): Getting configured policies
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_INIT Event:EV_PROC_MSG
IKEv2-PROTO-2: (16): Processing initial message
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_INIT
   Event: EV_DETECT_NAT
IKEv2-PROTO-3: (16): Process NAT discovery notify
IKEv2-PROTO-5: (16): No NAT found
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_INIT
   Event: EV_CHK_CONFIG_MODE
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_SET_POLICY
IKEv2-PROTO-3: (16): Setting configured policies
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_CHK_AUTH4PKI
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_PKI_SESH_OPEN
IKEv2-PROTO-3: (16): Opening a PKI session
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_GEN_DH_KEY
```

```
IKEv2-PROTO-3: (16): Computing DH public key
IKEv2-PROTO-3: (16):
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_NO_EVENT
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_OK_RECD_DH_PUBKEY_RESP
IKEv2-PROTO-5: (16): Action: Action_Null
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_GEN_DH_SECRET
IKEv2-PROTO-3: (16): Computing DH secret key
IKEv2-PROTO-3: (16):
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_NO_EVENT
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_OK_RECD_DH_SECRET_RESP
IKEv2-PROTO-5: (16): Action: Action_Null
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_GEN_SKEYID
IKEv2-PROTO-3: (16): Generate skeyid
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000 CurState: R_BLD_INIT
   Event: EV_GET_CONFIG_MODE
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R) MsgID = 00000000
  CurState: R_BLD_INIT Event: EV_BLD_MSG
```

وبعد ذلك، يقوم ASA2 بإنشاء رسالة المستجيب لتبادل IKE_SA_INIT، والتي يتم استقبالها بواسطة ASA1. تحتوي هذه الحزمة على:

- رأس ISAKMP (SPI/ الإصدار/العلامات)
- SAr1 (خوارزمية التشفير التي اختارها المستجيب ل IKE)
- KEr (قيمة مفتاح DH العام للمستجيب)
- Responder Nonce

فيما يلي إخراج تصحيح الأخطاء:

```
IKEv2-PROTO-2: (16): Sending initial message
IKEv2-PROTO-3:   IKE Proposal: 1, SPI size: 0
   (initial negotiation),
Num. transforms: 4
AES-CBC SHA1 SHA96 DH_GROUP_1024_MODP/Group 2

IKEv2-PROTO-5: Construct Vendor Specific Payload:
   FRAGMENTATIONIKEv2-PROTO-3:
   Tx [L 10.0.0.2:500/R 10.0.0.1:500/VRF i0:f0] m_id: 0x0
```

```
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 - r: 27C943C13FD94665]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 27C943C13FD94665
IKEv2-PROTO-4: Next payload: SA, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_SA_INIT,
   flags: RESPONDER MSG-RESPONSE
IKEv2-PROTO-4: Message id: 0x0, length: 338
SA  Next payload: KE, reserved: 0x0, length: 48
IKEv2-PROTO-4:   last proposal: 0x0, reserved: 0x0,
   length: 44 Proposal: 1, Protocol id: IKE, SPI size: 0,
   #trans: 4
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 2, reserved: 0x0, id: SHA1
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 4, reserved: 0x0,
   id: DH_GROUP_1024_MODP/Group 2

KE  Next payload: N, reserved: 0x0, length: 136

DH group: 2, Reserved: 0x0
```

ASA2 يرسل رسالة المستجيب إلى ASA1:

```
IKEv2-PLAT-4: SENT PKT [IKE_SA_INIT]
   [10.0.0.2]:500->[10.0.0.1]:500 InitSPI=0xdfa3b583a4369958
  RespSPI=0x27c943c13fd94665 MID=00000000
```

ASA1 يستلم ال ike_SA_INIT إستجابة ربط من ASA2:

```
IKEv2-PLAT-4: RECV PKT
   [IKE_SA_INIT]
   [10.0.0.2]:500->
   [10.0.0.1]:500
   InitSPI=0xdfa3b583a4369958
   RespSPI=0x27c943c13fd94665
  MID=00000000
```

يقوم ASA2 بتشغيل المؤقت لعملية التخويل:

```
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000
   CurState: INIT_DONE
   Event: EV_DONE
IKEv2-PROTO-3: (16):
   Fragmentation is
   enabled
IKEv2-PROTO-3: (16): Cisco
   DeleteReason Notify
   is enabled
IKEv2-PROTO-3: (16): Complete
   SA init exchange
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
```

```
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000
   CurState: INIT_DONE
   Event: EV_CHK4_ROLE
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000

CurState: INIT_DONE Event:
   EV_START_TMR
IKEv2-PROTO-3: (16): Starting
   timer to wait for auth
   message (30 sec)
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000000
   CurState: R_WAIT_AUTH
  Event: EV_NO_EVENT
```

يتحقق ASA1 من الاستجابة ويعالجها:

1. يتم حساب مفتاح DH السري للبادئ.

2. تم إنشاء SKEYID للبادئ.

فيما يلي إخراج تصحيح الأخطاء:

```
IKEv2-PROTO-3: Rx [L 10.0.0.1:500/R 10.0.0.2:500/VRF i0:f0]
   m_id: 0x0
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 - r: 27C943C13FD94665]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 27C943C13FD94665
IKEv2-PROTO-4: Next payload: SA, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_SA_INIT,
   flags: RESPONDER MSG-RESPONSE
IKEv2-PROTO-4: Message id: 0x0, length: 338

SA  Next payload: KE, reserved: 0x0, length: 48
IKEv2-PROTO-4:   last proposal: 0x0, reserved: 0x0,
   length: 44 Proposal: 1, Protocol id: IKE, SPI size: 0,
   #trans: 4
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 2, reserved: 0x0, id: SHA1
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 4, reserved: 0x0,
   id: DH_GROUP_1024_MODP/Group 2
KE  Next payload: N, reserved: 0x0, length: 136
    DH group: 2, Reserved: 0x0

IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_WAIT_INIT
   Event: EV_RECV_INIT
IKEv2-PROTO-5: (16): Processing initial message
```

```
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_PROC_INIT
   Event: EV_CHK4_NOTIFY
IKEv2-PROTO-2: (16): Processing initial message
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_PROC_INIT
   Event: EV_VERIFY_MSG
IKEv2-PROTO-3: (16): Verify SA init message
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_PROC_INIT
   Event: EV_PROC_MSG
IKEv2-PROTO-2: (16): Processing initial message
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_PROC_INIT
   Event: EV_DETECT_NAT
IKEv2-PROTO-3: (16): Process NAT discovery notify
IKEv2-PROTO-3: (16): NAT-T is disabled
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_PROC_INIT
   Event: EV_CHK_NAT_T
IKEv2-PROTO-3: (16): Check NAT discovery
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_PROC_INIT
   Event: EV_CHK_CONFIG_MODE
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000000
   CurState: INIT_DONE Event: EV_GEN_DH_SECRET
IKEv2-PROTO-3: (16): Computing DH secret key
IKEv2-PROTO-3: (16):
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000000
   CurState: INIT_DONE Event: EV_NO_EVENT
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000000
   CurState: INIT_DONE Event: EV_OK_RECD_DH_SECRET_RESP
IKEv2-PROTO-5: (16): Action: Action_Null
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000000
   CurState: INIT_DONE Event: EV_GEN_SKEYID
IKEv2-PROTO-3: (16): Generate skeyid
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: INIT_DONE Event: EV_DONE
IKEv2-PROTO-3: (16): Fragmentation is enabled
IKEv2-PROTO-3: (16): Cisco DeleteReason Notify is enabled
```

اكتملت الآن عملية تبادل IKE_INIT_SA بين ASAs:

```
IKEv2-PROTO-3: (16): Complete SA init exchange
```

يبدأ ASA1 تبادل IKE_AUTH ويبدأ في إنشاء حمولة المصادقة. تحتوي حزمة IKE_AUTH على:

- **رأس ISAKMP** (SPI/ الإصدار/العلامات)
- **IDi** (هوية البادئ)
- **حمولة المصادقة**
- **SAi2** (بدء الـ SA - مماثل لـ المرحلة 2 تحويل مجموعة التبادل في IKEv1)
- **TSi و TSr** (أداوت تحديد حركة مرور المستجيب والبادئ)

  ملاحظة: يحتوي كل من TSi و TSr على عنوان المصدر والوجهة للبادئ والمستجيب على حركة المرور المشفرة. يحدد نطاق العناوين أن لكل حركة التوالي إلى إعادة توجيه/إستقبال حركة المرور إلى ذلك النطاق ومن ثم إنشاء قنوات لها. إذا كان العرض مقبول للمستجيب، فإنه يرجع حمولات TS متطابقة.

أيضا، يتم إنشاء أول CHILD_SA لوزج PROXY_ID الذي يطابق حزمة المشغل.

وفيما يلي التكوين ذي الصلة لـ ASA1:

```
crypto ipsec
   ikev2
   ipsec-proposal
   AES256
protocol esp
   encryption
   aes-256
protocol esp
   integrity
   sha-1 md5

access-list
   l2l_list
   extended
   permit ip
   host 10.0.0.2
  host 10.0.0.1
```

فيما يلي إخراج تصحيح الأخطاء:

```
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_BLD_AUTH Event: EV_GEN_AUTH
IKEv2-PROTO-3: (16): Generate my authentication data
IKEv2-PROTO-3: (16): Use preshared key for id 10.0.0.1,
   key len 5
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_BLD_AUTH
   Event: EV_CHK_AUTH_TYPE
IKEv2-PROTO-3: (16): Get my authentication method
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_BLD_AUTH
   Event: EV_OK_AUTH_GEN
IKEv2-PROTO-3: (16): Check for EAP exchange
IKEv2-PROTO-5: (16): SM Trace->
```

```
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (I)
   MsgID = 00000000 CurState: I_BLD_AUTH
   Event: EV_SEND_AUTH
IKEv2-PROTO-2: (16): Sending auth message
IKEv2-PROTO-5: Construct Vendor Specific Payload:
   CISCO-GRANITE
IKEv2-PROTO-3:   ESP Proposal: 1, SPI size: 4
   (IPSec negotiation),
Num. transforms: 4
   AES-CBC   SHA96   MD596
IKEv2-PROTO-5: Construct Notify Payload: INITIAL_CONTACT
IKEv2-PROTO-5: Construct Notify Payload: ESP_TFC_NO_SUPPORT
IKEv2-PROTO-5: Construct Notify Payload: NON_FIRST_FRAGS
IKEv2-PROTO-3: (16): Building packet for encryption;
   contents are:
VID  Next payload: IDi, reserved: 0x0, length: 20

     dd a3 b4 83 b7 01 6a 1f 3d b7 84 1a 75 e6 83 a6
IDi  Next payload: AUTH, reserved: 0x0, length: 12
    Id type: IPv4 address, Reserved: 0x0 0x0

     47 01 01 01
AUTH  Next payload: SA, reserved: 0x0, length: 28
    Auth method PSK, reserved: 0x0, reserved 0x0
Auth data&colon; 20 bytes
SA  Next payload: TSi, reserved: 0x0, length: 52
IKEv2-PROTO-4:   last proposal: 0x0, reserved: 0x0,
   length: 48 Proposal: 1, Protocol id: ESP, SPI size: 4,
   #trans: 4
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: MD596
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 5, reserved: 0x0, id:

  TSi  Next payload: TSr, reserved: 0x0, length: 24
    Num of TSs: 1, reserved 0x0, reserved 0x0
    TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
    start port: 0, end port: 65535
    start addr: 192.168.1.1, end addr: 192.168.1.1
TSr  Next payload: NOTIFY, reserved: 0x0, length: 24
    Num of TSs: 1, reserved 0x0, reserved 0x0
    TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
    start port: 0, end port: 65535
    start addr: 192.168.2.99, end addr: 192.168.2.99
IKEv2-PROTO-3: Tx [L 10.0.0.1:500/R 10.0.0.2:500/VRF i0:f0]
   m_id: 0x1
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 - r: 27C943C13FD94665]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 27C943C13FD94665

IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_AUTH, flags: INITIATOR
IKEv2-PROTO-4: Message id: 0x1, length: 284
ENCR  Next payload: VID, reserved: 0x0, length: 256
Encrypted data&colon; 252 bytes
```

ASA1 يرسل حزمة IKE_AUTH إلى ASA2:

```
IKEv2-PLAT-4: SENT PKT [IKE_AUTH]
```

```
   [10.0.0.1]:500->[10.0.0.2]:500
   InitSPI=0xdfa3b583a4369958 RespSPI=0x27c943c13fd94665
  MID=00000001
```

ASA2 يستلم هذه رطب من ASA1:

```
IKEv2-PLAT-4: RECV PKT [IKE_AUTH]
   [10.0.0.1]:500->[10.0.0.2]:500
   InitSPI=0xdfa3b583a4369958 RespSPI=0x27c943c13fd94665
  MID=00000001
```

يقوم ASA2 بإيقاف مؤقت التفويض والتحقق من بيانات المصادقة المستلمة من ASA1. وبعد ذلك، يقوم بإنشاء بيانات المصادقة الخاصة به، تمامًا مثل ASA1.

فيما يلي التكوين ذي الصلة لـ ASA2:

```
crypto ipsec
   ikev2
   ipsec-
   proposal
   AES256
protocol esp
   encryption
   aes-256
protocol esp
   integrity
  sha-1 md5
```

فيما يلي إخراج تصحيح الأخطاء:

```
IKEv2-PROTO-3: Rx [L 10.0.0.2:500/R 10.0.0.1:500/VRF i0:f0]
   m_id: 0x1
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 - r: 27C943C13FD94665]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 27C943C13FD94665
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_AUTH, flags: INITIATOR
IKEv2-PROTO-4: Message id: 0x1, length: 284
IKEv2-PROTO-5: (16): Request has mess_id 1;
   expected 1 through 1 REAL Decrypted packet:
   Data&colon; 216 bytes
IKEv2-PROTO-5: Parse Vendor Specific Payload: (CUSTOM) VID
   Next payload: IDi, reserved: 0x0, length: 20

     dd a3 b4 83 b7 01 6a 1f 3d b7 84 1a 75 e6 83 a6
IDi  Next payload: AUTH, reserved: 0x0, length: 12
    Id type: IPv4 address, Reserved: 0x0 0x0

     47 01 01 01
AUTH  Next payload: SA, reserved: 0x0, length: 28
    Auth method PSK, reserved: 0x0, reserved 0x0
Auth data&colon; 20 bytes
SA  Next payload: TSi, reserved: 0x0, length: 52
IKEv2-PROTO-4:   last proposal: 0x0, reserved: 0x0,
   length: 48 Proposal: 1, Protocol id: ESP, SPI size: 4,
   #trans: 4
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
```

```
   length: 8 type: 3, reserved: 0x0, id: MD596
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 5, reserved: 0x0, id:
TSi  Next payload: TSr, reserved: 0x0, length: 24
     Num of TSs: 1, reserved 0x0, reserved 0x0
     TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
     start port: 0, end port: 65535
     start addr: 192.168.1.1, end addr: 192.168.1.1
TSr  Next payload: NOTIFY, reserved: 0x0, length: 24
     Num of TSs: 1, reserved 0x0, reserved 0x0
     TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
     start port: 0, end port: 65535
     start addr: 192.168.2.99, end addr: 192.168.2.99
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R) MsgID = 00000001
   CurState: R_WAIT_AUTH Event: EV_RECV_AUTH
IKEv2-PROTO-3: (16): Stopping timer to wait for auth
   message
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R) MsgID = 00000001
   CurState: R_WAIT_AUTH Event: EV_CHK_NAT_T
IKEv2-PROTO-3: (16): Check NAT discovery
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R) MsgID = 00000001
   CurState: R_WAIT_AUTH Event: EV_PROC_ID
IKEv2-PROTO-2: (16): Recieved valid parameteres in
   process id
IKEv2-PLAT-3: (16) peer auth method set to: 2
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R) MsgID = 00000001
   CurState: R_WAIT_AUTH
   Event: EV_CHK_IF_PEER_CERT_NEEDS_TO_BE_FETCHED_FOR_
   PROF_SEL
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R) MsgID = 00000001
   CurState: R_WAIT_AUTH Event: EV_GET_POLICY_BY_PEERID
IKEv2-PROTO-3: (16): Getting configured policies
IKEv2-PLAT-3: attempting to find tunnel group for
   ID: 10.0.0.1
IKEv2-PLAT-3: mapped to tunnel group 10.0.0.1 using
   phase 1 ID
IKEv2-PLAT-3: (16) tg_name set to: 10.0.0.1
IKEv2-PLAT-3: (16) tunn grp type set to: L2L
IKEv2-PLAT-3: my_auth_method = 2
IKEv2-PLAT-3: supported_peers_auth_method = 2
IKEv2-PLAT-3: P1 ID = 0
IKEv2-PLAT-3: Translating IKE_ID_AUTO to = 255

IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_WAIT_AUTH
   Event: EV_SET_POLICY
IKEv2-PROTO-3: (16): Setting configured policies
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_WAIT_AUTH
   Event: EV_VERIFY_POLICY_BY_PEERID
IKEv2-PROTO-3: (16): Verify peer's policy
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001
   CurState: R_WAIT_AUTH Event: EV_CHK_CONFIG_MODE
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
```

```
   MsgID = 00000001 CurState: R_WAIT_AUTH
   Event: EV_CHK_AUTH4EAP
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_WAIT_AUTH
   Event: EV_CHK_POLREQEAP
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_CHK_AUTH_TYPE
IKEv2-PROTO-3: (16): Get peer authentication method
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_GET_PRESHR_KEY
IKEv2-PROTO-3: (16): Get peer's preshared key for 10.0.0.1
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_VERIFY_AUTH

IKEv2-PROTO-3: (16): Verify authentication data
IKEv2-PROTO-3: (16): Use preshared key for id 10.0.0.1,
   key len 5
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_GET_CONFIG_MODE
IKEv2-PLAT-2: Build config mode reply: no request stored
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_CHK4_IC
IKEv2-PROTO-3: (16): Processing initial contact
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_CHK_REDIRECT
IKEv2-PROTO-5: (16): Redirect check is not needed,
   skipping it
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_PROC_SA_TS
IKEv2-PROTO-2: (16): Processing auth message
IKEv2-PLAT-3: Selector received from peer is accepted
IKEv2-PLAT-3: PROXY MATCH on crypto map
   outside_map seq 1
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_NO_EVENT
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_VERIFY_AUTH
   Event: EV_OK_RECD_IPSEC_RESP
IKEv2-PROTO-2: (16): Processing auth message
```

يرسل ASA2 حزمة IKE_AUTH، والتي تحتوي على:

- رأس ISAKMP (SPI/ الإصدار/العلامات)
- IDr (هوية المستجيب)

- **حمولة المصادقة**

- **SAr2** (يدأ ال SA - مماثل ل المرحلة 2 تحويل مجموعة التبادل في IKEv1)

- **TSi و TSr** (أدوات تحديد حركة مرور المستجيب والبادئ)

ملاحظة: يحتوي كل من TSi و TSr على عنوان المصدر والوجهة للبادئ والمستجيب على التوالي إلعادة توجيه/إستقبال حركة المرور المشفرة. يحدد نطاق العناوين أن كل حركة المرور إلى ذلك النطاق ومن ثم إنشاء قنوات لها. هذه المعلمات متطابقة مع تلك التي تم استقبالها من ASA1.

فيما يلي إخراج تصحيح الأخطاء:

```
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_BLD_AUTH
   Event: EV_MY_AUTH_METHOD
IKEv2-PROTO-3: (16): Get my authentication method
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_BLD_AUTH
   Event: EV_GET_PRESHR_KEY
IKEv2-PROTO-3: (16): Get peer's preshared key for 10.0.0.1
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_BLD_AUTH
   Event: EV_GEN_AUTH
IKEv2-PROTO-3: (16): Generate my authentication data
IKEv2-PROTO-3: (16): Use preshared key for id 10.0.0.2,
   key len 5
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_BLD_AUTH
   Event: EV_CHK4_SIGN
IKEv2-PROTO-3: (16): Get my authentication method
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_BLD_AUTH
   Event: EV_OK_AUTH_GEN
IKEv2-PROTO-5: (16): SM Trace->
   SA: I_SPI=DFA3B583A4369958 R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001 CurState: R_BLD_AUTH
   Event: EV_SEND_AUTH
IKEv2-PROTO-2: (16): Sending auth message
IKEv2-PROTO-5: Construct Vendor Specific Payload:
   CISCO-GRANITE
IKEv2-PROTO-3:   ESP Proposal: 1, SPI size: 4 (IPSec
   negotiation),
Num. transforms: 3
   AES-CBC   SHA96
IKEv2-PROTO-5: Construct Notify Payload:
   ESP_TFC_NO_SUPPORTIKEv2-PROTO-5:
   Construct Notify Payload: NON_FIRST_FRAGSIKEv2-PROTO-3:
     (16):
Building packet for encryption; contents are:
VID  Next payload: IDr, reserved: 0x0, length: 20
     25 c9 42 c1 2c ee b5 22 3d b7 84 1a 75 e6 83 a6
IDr  Next payload: AUTH, reserved: 0x0,
```

```
   length: 12 Id type: IPv4 address, Reserved: 0x0 0x0
     51 01 01 01
AUTH  Next payload: SA, reserved: 0x0,
   length: 28 Auth method PSK, reserved: 0x0, reserved 0x0
Auth data&colon; 20 bytes
SA  Next payload: TSi, reserved: 0x0,
   length: 44 IKEv2-PROTO-4:   last proposal: 0x0,
   reserved: 0x0, length: 40
  Proposal: 1, Protocol id: ESP, SPI size: 4, #trans: 3
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
   length: 8 type: 5, reserved: 0x0, id:

TSi  Next payload: TSr, reserved: 0x0,
   length: 24 Num of TSs: 1, reserved 0x0, reserved 0x0
    TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
    start port: 0, end port: 65535
    start addr: 192.168.1.1, end addr: 192.168.1.1
TSr  Next payload: NOTIFY, reserved: 0x0,
   length: 24 Num of TSs: 1, reserved 0x0, reserved 0x0
    TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
    start port: 0, end port: 65535
    start addr: 192.168.2.99, end addr: 192.168.2.99
NOTIFY(ESP_TFC_NO_SUPPORT)  Next payload: NOTIFY,
   reserved: 0x0, length: 8 Security protocol id: IKE,
   spi size: 0, type: ESP_TFC_NO_SUPPORT
NOTIFY(NON_FIRST_FRAGS)  Next payload: NONE, reserved: 0x0,
   length: 8 Security protocol id: IKE, spi size: 0,
   type: NON_FIRST_FRAGS
IKEv2-PROTO-3: Tx [L 10.0.0.2:500/R 10.0.0.1:500/VRF i0:f0]
   m_id: 0x1
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 - r: 27C943C13FD94665]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 27C943C13FD94665
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_AUTH, flags:
   RESPONDER MSG-RESPONSE
IKEv2-PROTO-4: Message id: 0x1, length: 236
ENCR  Next payload: VID, reserved: 0x0, length: 208
Encrypted data&colon; 204 bytes
```

يرسل ASA2 الاستجابة لحزمة IKE_AUTH:

```
IKEv2-PLAT-4: SENT PKT [IKE_AUTH]
   [10.0.0.2]:500->[10.0.0.1]:500
   InitSPI=0xdfa3b583a4369958 RespSPI=0x27c943c13fd94665
  MID=00000001
```

ASA1 يستلم الرد من ASA2:

```
IKEv2-PLAT-4:
   RECV PKT [IKE_AUTH]
   [10.0.0.2]:500->
   [10.0.0.1]:500
   InitSPI=0xdfa3b583a4369958
   RespSPI=0x27c943c13fd94665
  MID=00000001
```

يدخل ASA2 إدخالات في قاعدة بيانات SA (SAD):

```
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001
   CurState: AUTH_DONE
   Event: EV_OK
IKEv2-PROTO-5: (16): Action:
   Action_Null
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001
   CurState: AUTH_DONE
   Event: EV_PKI_SESH_CLOSE
IKEv2-PROTO-3: (16): Closing
   the PKI session
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001
   CurState: AUTH_DONE
   Event: EV_INSERT_IKE
IKEv2-PROTO-2: (16):
   SA created;
   inserting SA into database
```

يقوم ASA1 بالتحقق من بيانات المصادقة ومعالجتها في هذه الحزمة، ثم يدرج SA هذه في مجموعة SAD الخاصة بها:

```
IKEv2-PROTO-3: Rx [L 10.0.0.1:500/R 10.0.0.2:500/VRF i0:f0]
   m_id: 0x1
IKEv2-PROTO-3: HDR[i:DFA3B583A4369958 - r: 27C943C13FD94665]
IKEv2-PROTO-4: IKEV2 HDR ispi: DFA3B583A4369958 -
   rspi: 27C943C13FD94665
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: IKE_AUTH,
   flags: RESPONDER MSG-RESPONSE
IKEv2-PROTO-4: Message id: 0x1, length: 236
REAL Decrypted packet:Data&colon; 168 bytes
IKEv2-PROTO-5: Parse Vendor Specific Payload: (CUSTOM) VID
   Next payload: IDr, reserved: 0x0, length: 20

     25 c9 42 c1 2c ee b5 22 3d b7 84 1a 75 e6 83 a6
IDr  Next payload: AUTH, reserved: 0x0, length: 12
    Id type: IPv4 address, Reserved: 0x0 0x0

     51 01 01 01
AUTH  Next payload: SA, reserved: 0x0, length: 28
    Auth method PSK, reserved: 0x0, reserved 0x0
Auth data&colon; 20 bytes
SA  Next payload: TSi, reserved: 0x0, length: 44
IKEv2-PROTO-4:   last proposal: 0x0, reserved: 0x0,
   length: 40 Proposal: 1, Protocol id: ESP, SPI size: 4,
   #trans: 3
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4:     last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4:     last transform: 0x0, reserved: 0x0:
```

```
   length: 8 type: 5, reserved: 0x0, id:

   TSi  Next payload: TSr, reserved: 0x0,
   length: 24 Num of TSs: 1, reserved 0x0, reserved 0x0
    TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
    start port: 0, end port: 65535
    start addr: 192.168.1.1, end addr: 192.168.1.1
TSr  Next payload: NOTIFY, reserved: 0x0,
   length: 24 Num of TSs: 1, reserved 0x0, reserved 0x0
    TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
    start port: 0, end port: 65535
    start addr: 192.168.2.99, end addr: 192.168.2.99
IKEv2-PROTO-5: Parse Notify Payload:
   ESP_TFC_NO_SUPPORT NOTIFY(ESP_TFC_NO_SUPPORT)
   Next payload: NOTIFY, reserved: 0x0, length: 8
    Security protocol id: IKE, spi size: 0,
   type: ESP_TFC_NO_SUPPORT
IKEv2-PROTO-5: Parse Notify Payload:
   NON_FIRST_FRAGS NOTIFY(NON_FIRST_FRAGS)  Next payload:
   NONE, reserved: 0x0, length: 8
    Security protocol id: IKE, spi size: 0,
   type: NON_FIRST_FRAGS
Decrypted packet:Data&colon; 236 bytes
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_WAIT_AUTH Event: EV_RECV_AUTH
IKEv2-PROTO-5: (16): Action: Action_Null
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_CHK4_NOTIFY
IKEv2-PROTO-2: (16): Process auth response notify
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_PROC_MSG
IKEv2-PLAT-3: (16) peer auth method set to: 2
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH
   Event: EV_CHK_IF_PEER_CERT_NEEDS_TO_BE_FETCHED_
   FOR_PROF_SEL
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_GET_POLICY_BY_PEERID
IKEv2-PROTO-3: (16): Getting configured policies
IKEv2-PLAT-3: connection initiated with tunnel
   group 10.0.0.2
IKEv2-PLAT-3: (16) tg_name set to: 10.0.0.2
IKEv2-PLAT-3: (16) tunn grp type set to: L2L
IKEv2-PLAT-3: my_auth_method = 2
IKEv2-PLAT-3: supported_peers_auth_method = 2
IKEv2-PLAT-3: P1 ID = 0
IKEv2-PLAT-3: Translating IKE_ID_AUTO to = 255
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_VERIFY_POLICY_BY_PEERID
IKEv2-PROTO-3: (16): Verify peer's policy
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_CHK_AUTH_TYPE
IKEv2-PROTO-3: (16): Get peer authentication method
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_GET_PRESHR_KEY
IKEv2-PROTO-3: (16): Get peer's preshared key for 10.0.0.2
```

```
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_VERIFY_AUTH
IKEv2-PROTO-3: (16): Verify authentication data
IKEv2-PROTO-3: (16): Use preshared key for id 10.0.0.2,
   key len 5
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_CHK_EAP
IKEv2-PROTO-3: (16): Check for EAP exchange
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_CHK_CONFIG_MODE
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_CHK_IKE_ONLY
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: I_PROC_AUTH Event: EV_PROC_SA_TS
IKEv2-PROTO-2: (16): Processing auth message
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: AUTH_DONE Event: EV_OK
IKEv2-PROTO-5: (16): Action: Action_Null
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: AUTH_DONE Event: EV_PKI_SESH_CLOSE
IKEv2-PROTO-3: (16): Closing the PKI session
IKEv2-PROTO-5: (16): SM Trace-> SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I) MsgID = 00000001
   CurState: AUTH_DONE Event: EV_INSERT_IKE
IKEv2-PROTO-2: (16): SA created; inserting SA into
   database
```

النفق الآن نشط ل ASA1:

```
CONNECTION
    STATUS: UP...
   peer: 10.0.0.2:500,
   phase1_id: 10.0.0.2
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I)
   MsgID = 00000001
   CurState: AUTH_DONE
  Event: EV_REGISTER_SESSION
```

النفق الآن نشط ل ASA2:

```
CONNECTION
   STATUS: UP...
   peer: 10.0.0.1:500,
   phase1_id: 10.0.0.1
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001
   CurState: AUTH_DONE
  Event: EV_REGISTER_SESSION
```

ملاحظة: يصبح نفق المستجيب عادة نشطا قبل نفق البادئ.

تحدث عملية تسجيل IKEv2 على ASA1:

```
IKEv2-PLAT-3: (16)
   connection
   auth hdl set to 15
IKEv2-PLAT-3: AAA conn
   attribute retrieval
   successfully queued
   for register session
   request.
IKEv2-PROTO-3: (16):
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (I)
   MsgID = 00000001
   CurState: AUTH_DONE
   Event: EV_NO_EVENT
IKEv2-PLAT-3: (16) idle
   timeout set to: 30
IKEv2-PLAT-3: (16) session
   timeout set to: 0
IKEv2-PLAT-3: (16) group
   policy set to
   DfltGrpPolicy
IKEv2-PLAT-3: (16) class
   attr set
IKEv2-PLAT-3: (16) tunnel
   protocol set to: 0x5c
IKEv2-PLAT-3: IPv4 filter
   ID not configured
   for connection
IKEv2-PLAT-3: (16) group
   lock set to: none
IKEv2-PLAT-3: IPv6 filter ID
   not configured
   for connection
IKEv2-PLAT-3: (16)
   connection attribues
   set valid to TRUE
IKEv2-PLAT-3: Successfully
   retrieved conn attrs
IKEv2-PLAT-3: Session
   registration after conn
   attr retrieval
   PASSED, No error
IKEv2-PLAT-3:
CONNECTION STATUS:
   REGISTERED...
   peer: 10.0.0.2:500,
  phase1_id: 10.0.0.2
```

تحدث عملية تسجيل IKEv2 على ASA2:

```
IKEv2-PLAT-3: (16)
   connection
   auth hdl set to 15
IKEv2-PLAT-3: AAA conn
```

```
   attribute retrieval
   successfully queued for
   register session request.
IKEv2-PROTO-3: (16):
IKEv2-PROTO-5: (16):
   SM Trace->
   SA: I_SPI=DFA3B583A4369958
   R_SPI=27C943C13FD94665 (R)
   MsgID = 00000001
   CurState: AUTH_DONE
   Event: EV_NO_EVENT
IKEv2-PLAT-3: (16) idle
   timeout
   set to: 30
IKEv2-PLAT-3: (16) session
   timeout
   set to: 0
IKEv2-PLAT-3: (16) group
   policy set to
   DfltGrpPolicy
IKEv2-PLAT-3: (16) class
   attr set
IKEv2-PLAT-3: (16) tunnel
   protocol set to: 0x5c
IKEv2-PLAT-3: IPv4 filter ID
   not configured
   for connection
IKEv2-PLAT-3: (16) group
   lock set to: none
IKEv2-PLAT-3: IPv6 filter ID
   not configured
   for connection
   attribues set
   valid to TRUE
IKEv2-PLAT-3: Successfully
   retrieved conn attrs
IKEv2-PLAT-3: Session
   registration after conn
   attr retrieval PASSED,
   No error
IKEv2-PLAT-3:
CONNECTION STATUS:
   REGISTERED...
   peer: 10.0.0.1:500,
  phase1_id: 10.0.0.1
```

تصحيح أخطاء Child SA

ملاحظة: يتألف هذا التبادل من وجوه للطلب والاستجابة، ويشار إليه باسم تبادل IKE_SA بعد الرحلة 2 في IKEv1. ويمكن البدء في هذه العملية من خلال أي من طرفي IKE_SA لتبادل الأولية.

يقوم ASA2 ببدء تبادل CHILD_SA. هذا هو طلب CREATE_CHILD_SA. تحتوي حزمة CHILD_SA على:

- **SA HDR** - يحتوي هذا على نوع الإصدار.flags و exchange.
- **nonce ni** (إختياري) - إذا تم إنشاء CHILD_SA جديد من التبادل الأولي، فيجب أن يتم إرسال حمولة ثانية لتبديل المفاتيح (KE) مرة واحدة.

- حمولة SA

- **KEi** (مفتاح إختياري) - يمكن أن يحتوي طلب CREATE_CHILD_SA إختياري على حمولة KE لتبادل DH إضافي لتمكين ضمانات أقوى لإعادة توجيه سرية CHILD_SA. إذا كان عرض SA يتضمن مجموعات DH مختلفة، فيجب أن يكون KEi عنصرا من المجموعة التي يتوقع البادئ أن يقبلها المستجيب. إذا كانت تخمينات غير صحيحة، فسيفشل تبادل CREATE_CHILD_SA، ويجب إعادة المحاولة باستخدام KEi مختلف.

- **n** (إعلام الحمولة، إختياري) - يتم إستخدام حمولة الإعلام، من أجل إرسال البيانات المعلوماتية، مثل حالات الخطأ وانتقالات الحالة، إلى نظير IKE. يمكن أن تظهر حمولة الإعلام في رسالة إستجابة (تحدد عادة سبب رفض الطلب)، أو في تبادل معلومات (للإبلاغ عن خطأ ليس في طلب IKE)، أو في أي رسالة أخرى للإشارة إلى إمكانيات الطلب. إذا كان تبادل CREATE_CHILD_SA هذا يستبدل SA المرسل أو تعديل معنى الطلب، فيجب أن تحدد حمولة العميل الموقوع من النوع REKEY_SA التي تشير إلى SA الحالي. إذا لم يقم تبادل CREATE_CHILD_SA هذا بإعادة تكوين SA الحالي، فيجب حذف حمولة N.

- **TSi و TSr** (إختياري): هذا يعرض محددات حركة مرور البيانات التي تم إنشاء SA لها. في هذه الحالة، تكون بين الأجهزة المضيفة 192.168.1.12 و 192.168.2.99.

فيما يلي إخراج تصحيح الأخطاء CREATE_CHILD_SA:

```
IKEv2-PLAT-5: INVALID PSH HANDLE
IKEv2-PLAT-3: attempting to find tunnel group
   for IP: 10.0.0.1
IKEv2-PLAT-3: mapped to tunnel group 10.0.0.1
   using peer IP
IKEv2-PLAT-3: my_auth_method = 2
IKEv2-PLAT-3: supported_peers_auth_method = 2
IKEv2-PLAT-3: P1 ID = 0
IKEv2-PLAT-3: Translating IKE_ID_AUTO to = 255
IKEv2-PLAT-3: (226) tp_name set to:
IKEv2-PLAT-3: (226) tg_name set to: 10.0.0.1
IKEv2-PLAT-3: (226) tunn grp type set to: L2L
IKEv2-PLAT-3: PSH cleanup
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7
   (I) MsgID = 00000001 CurState: READY
   Event: EV_INIT_CREATE_CHILD
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7
   (I) MsgID = 00000001 CurState: CHILD_I_INIT
   Event: EV_INIT_CREATE_CHILD
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7
   (I) MsgID = 00000001 CurState: CHILD_I_IPSEC
   Event: EV_INIT_CREATE_CHILD
IKEv2-PROTO-3: (225): Check for IPSEC rekey
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7
   (I) MsgID = 00000001 CurState: CHILD_I_IPSEC
   Event: EV_SET_IPSEC_DH_GRP
IKEv2-PROTO-3: (225): Set IPSEC DH group
```

```
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7
   (I) MsgID = 00000001
   CurState: CHILD_I_IPSEC Event: EV_CHK4_PFS
IKEv2-PROTO-3: (225): Checking for PFS configuration
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7
   (I) MsgID = 00000001 CurState: CHILD_I_IPSEC
   Event: EV_BLD_MSG
IKEv2-PROTO-2: (225): Sending child SA exchange
IKEv2-PROTO-3: ESP Proposal: 1, SPI size: 4
   (IPSec negotiation), num. transforms: 4
   AES-CBC SHA96 MD596
IKEv2-PROTO-3: (225): Building packet for encryption;
   contents are:
   SA Next payload: N, reserved: 0x0, length: 52
IKEv2-PROTO-4: last proposal: 0x0, reserved: 0x0,
   length: 48 Proposal: 1, Protocol id: ESP,
   SPI size: 4, #trans: 4
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
  length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: MD596
IKEv2-PROTO-4: last transform: 0x0, reserved: 0x0:
   length: 8 type: 5, reserved: 0x0, id:

N Next payload: TSi, reserved: 0x0, length: 24

2d 3e ec 11 e0 c7 5d 67 d5 23 25 76 1d 50 0d 05
fa b7 f0 48
TSi Next payload: TSr, reserved: 0x0, length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
start port: 0, end port: 65535
start addr: 192.168.2.99, end addr: 192.168.2.99
TSr Next payload: NONE, reserved: 0x0, length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
start port: 0, end port: 65535
start addr: 192.168.1.12, end addr: 192.168.1.12

IKEv2-PROTO-3: (225): Checking if request will fit in
   peer window
IKEv2-PROTO-3: Tx [L 10.0.0.2:500/R 10.0.0.1:500/VRF i0:f0]
   m_id: 0x6
IKEv2-PROTO-3: HDR[i:FD366326E1FED6FE -
   r: A75B9B2582AAECB7]
IKEv2-PROTO-4: IKEV2 HDR ispi: FD366326E1FED6FE -
   rspi: A75B9B2582AAECB7
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: CREATE_CHILD_SA,
   flags: INITIATOR
IKEv2-PROTO-4: Message id: 0x6, length: 180
ENCR Next payload: SA, reserved: 0x0, length: 152
Encrypted data&colon; 148 bytes
```

يرسل ASA2 هذه الحزمة وينتظر الاستجابة:

```
IKEv2-PLAT-4: SENT PKT
   [CREATE_CHILD_SA]
   [10.0.0.2]:500->
```

```
   [10.0.0.1]:500
   InitSPI=0xfd366326e1fed6fe
   RespSPI=0xa75b9b2582aaecb7
   MID=00000006

IKEv2-PROTO-5: (225):
   SM Trace->
   SA: I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006
   CurState: CHILD_I_WAIT
  Event: EV_NO_EVENT
```

ASA1 يستلم الربط:

```
IKEv2-PLAT-4:
   RECV PKT [CREATE_CHILD_SA]
   [10.0.0.2]:500->
   [10.0.0.1]:500
   InitSPI=0xfd366326e1fed6fe
   RespSPI=0xa75b9b2582aaecb7
   MID=00000006

IKEv2-PROTO-3: Rx
   [L 10.0.0.1:500/R
   10.0.0.2:500/VRF i0:f0]
  m_id: 0x6
```

ثم تتلقى ASA1 هذه الحزمة الدقيقة من ASA2 وتتحقق منها:

```
IKEv2-PROTO-3: HDR[i:FD366326E1FED6FE -
   r: A75B9B2582AAECB7]
IKEv2-PROTO-4: IKEV2 HDR ispi: FD366326E1FED6FE -
   rspi: A75B9B2582AAECB7
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: CREATE_CHILD_SA,
   flags: INITIATOR
IKEv2-PROTO-4: Message id: 0x6, length: 180
IKEv2-PROTO-5: (225): Request has mess_id 6;
   expected 6 through 6
   REAL Decrypted packet:Data&colon; 124 bytes
   SA Next payload: N, reserved: 0x0, length: 52
IKEv2-PROTO-4: last proposal: 0x0, reserved: 0x0,
   length: 48 Proposal: 1, Protocol id: ESP,
   SPI size: 4, #trans: 4
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 12 ype: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: MD596
IKEv2-PROTO-4: last transform: 0x0, reserved: 0x0:
   length: 8 type: 5, reserved: 0x0, id:

N Next payload: TSi, reserved: 0x0, length: 24

2d 3e ec 11 e0 c7 5d 67 d5 23 25 76 1d 50 0d 05
fa b7 f0 48
TSi Next payload: TSr, reserved: 0x0, length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
start port: 0, end port: 65535
```

```
start addr: 192.168.2.99, end addr: 192.168.2.99
TSr Next payload: NONE, reserved: 0x0, length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0, length: 16
start port: 0, end port: 65535
start addr: 192.168.1.12, end addr: 192.168.1.12
Decrypted packet:Data&colon; 180 bytes
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 CurState: READY
   Event: EV_RECV_CREATE_CHILD
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 CurState: CHILD_R_INIT
   Event: EV_RECV_CREATE_CHILD
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 CurState: CHILD_R_INIT
   Event: EV_VERIFY_MSG
IKEv2-PROTO-3: (225): Validating create child message
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 urState: CHILD_R_INIT
  Event: EV_CHK_CC_TYPE
```

يقوم ASA1 الآن بإنشاء الرد الخاص بتبادل CHILD_SA. هذه هي إستجابة CREATE_CHILD_SA. تحتوي حزمة CHILD_SA عادة على:

- SA HDR - يحتوي هذا على نوع الإصدار.flags و exchange.
- nonce ni (إختياري) - إذا تم إنشاء CHILD_SA كجزء من التبادل الأولي، فيجب عدم إرسال حمولة KE ثانية وواحدة.
- حمولة SA
- KEi (مفتاح، إختياري) - يمكن أن يحتوي طلب CREATE_CHILD_SA إختياري على حمولة KE لتبادل DH إضافي لتمكين ضمانات أقوى لإعادة توجيه سرية CHILD_SA. إذا كان عرض SA يتضمن مجموعات DH مختلفة، فيجب أن يكون KEi عنصرا من المجموعة التي يتوقع البادئ أن يقبلها المستجيب. أخطأ، فسيفشل تبادل CREATE_CHILD_SA، ويجب إعادة المحاولة مع KEi مختلف.
- n (العالم الحمولة، إختياري) - يتم إستخدام حمولة الإعلام لإرسال البيانات المعلوماتية، مثل حالات الخطأ والتقاطات الحالة، إلى نظير IKE. يمكن أن تظهر حمولة الإعلام في أخطاء المعلومات (بسبب رفض الطلب)، أو في تبادل رسالة إستجابة (تحدد عادة سبب الرفض للإبلاغ عن خطأ) أو لتعديل غير موجود في طلب IKE)، أو في أي رسالة أخرى للإشارة إلى إمكانيات المرسل أو معنى الطلب. إذا كان تبادل CREATE_CHILD_SA هذا يستبدل SA حالي بخلاف IKE_SA، فيجب أن تحدد حمولة الإعلام نوع REKEY_SA الذي يتم إعادة تكوينه. إذا لم يقم تبادل CREATE_CHILD_SA هذا بإعادة تكوين SA حالي، فيجب حذف حمولة N.
- TSi و TSr (إختياري) - يعرض هذا محددات حركة مرور البيانات التي تم إنشاء SA لها. في هذه الحالة، تكون بين الأجهزة المضيفة 192.168.2.99 و 192.168.1.12.

فيما يلي إخراج تصحيح الأخطاء:

```
IKEv2-PROTO-3: (225): Check for create child
   response message type
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 CurState: CHILD_R_IPSEC
   Event: EV_PROC_MSG
IKEv2-PROTO-2: (225): Processing child
   SA exchange
IKEv2-PLAT-3: Selector received from peer
   is accepted
IKEv2-PLAT-3: PROXY MATCH on crypto map
   outside_map seq 1
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_IPSEC Event: EV_NO_EVENT
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000005
   CurState: EXIT Event: EV_FREE_NEG
IKEv2-PROTO-5: (225): Deleting negotiation context
   for peer message ID: 0x5
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_IPSEC
   Event: EV_OK_RECD_IPSEC_RESP
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_IPSEC Event: EV_PROC_MSG
IKEv2-PROTO-2: (225): Processing child SA exchange
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 CurState:
   CHILD_R_IPSEC Event: EV_SET_IPSEC_DH_GRP
IKEv2-PROTO-3: (225): Set IPSEC DH group
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_IPSEC Event: EV_OK
IKEv2-PROTO-3: (225): Requesting SPI from IPSec
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_WAIT_SPI Event: EV_OK_GOT_SPI
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_BLD_MSG Event: EV_CHK4_PFS
IKEv2-PROTO-3: (225): Checking for PFS configuration
IKEv2-PROTO-5: (225): SM Trace->
   SA:I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R) MsgID = 00000006
   CurState: CHILD_R_BLD_MSG Event: EV_BLD_MSG
IKEv2-PROTO-2: (225): Sending child SA exchange
IKEv2-PROTO-3: ESP Proposal: 1, SPI size: 4
  (IPSec negotiation),
Num. transforms: 3
AES-CBC SHA96
```

```
IKEv2-PROTO-3: (225): Building packet for encryption;
   contents are:
SA Next payload: N, reserved: 0x0, length: 44
IKEv2-PROTO-4: last proposal: 0x0, reserved: 0x0,
   length: 40
Proposal: 1, Protocol id: ESP, SPI size: 4,
   #trans: 3
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 12
type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 8
type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4: last transform: 0x0,
   reserved: 0x0: length: 8
type: 5, reserved: 0x0, id:

N Next payload: TSi, reserved: 0x0,
   length: 24

b7 6a c6 75 53 55 99 5a df ee 05
   18 1a 27 a6 cb
01 56 22 ad
TSi Next payload: TSr, reserved: 0x0,
   length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0,
   length: 16
start port: 0, end port: 65535
start addr: 192.168.2.99,
   end addr: 192.168.2.99
TSr Next payload: NONE, reserved: 0x0,
   length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0,
   length: 16
start port: 0, end port: 65535
start addr: 192.168.1.12, end addr: 192.168.1.12

IKEv2-PROTO-3: Tx
   [L 10.0.0.1:500/R 10.0.0.2:500/VRF i0:f0]
   m_id: 0x6
IKEv2-PROTO-3: HDR[i:FD366326E1FED6FE -
   r: A75B9B2582AAECB7]
IKEv2-PROTO-4: IKEV2 HDR ispi: FD366326E1FED6FE -
   rspi: A75B9B2582AAECB7
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: CREATE_CHILD_SA,
   flags: RESPONDER MSG-RESPONSE
IKEv2-PROTO-4: Message id: 0x6, length: 172
ENCR Next payload: SA, reserved: 0x0,
   length: 144
Encrypted data&colon; 140 bytes
```

يرسل ASA1 الاستجابة:

```
IKEv2-PLAT-4: SENT PKT
   [CREATE_CHILD_SA]
   [10.0.0.1]:500->
   [10.0.0.2]:500
   InitSPI=0xfd366326e1fed6fe
   RespSPI=0xa75b9b2582aaecb7
  MID=00000006
```

ASA2 يستلم الربط:

```
IKEv2-PLAT-4:
   RECV PKT [CREATE_CHILD_SA]
   [10.0.0.1]:500->
   [10.0.0.2]:500
   InitSPI=0xfd366326e1fed6fe
   RespSPI=0xa75b9b2582aaecb7
   MID=00000006

IKEv2-PROTO-3: Rx
   [L 10.0.0.2:500/R
   10.0.0.1:500/VRF i0:f0]
  m_id: 0x6
```

يتحقق ASA2 الآن من الحزمة:

```
IKEv2-PROTO-3: HDR[i:FD366326E1FED6FE -
   r: A75B9B2582AAECB7]
IKEv2-PROTO-4: IKEV2 HDR ispi: FD366326E1FED6FE -
   rspi: A75B9B2582AAECB7
IKEv2-PROTO-4: Next payload: ENCR, version: 2.0
IKEv2-PROTO-4: Exchange type: CREATE_CHILD_SA,
   flags: RESPONDER MSG-RESPONSE
IKEv2-PROTO-4: Message id: 0x6, length: 172

REAL Decrypted packet:Data&colon; 116 bytes
SA Next payload: N, reserved: 0x0, length: 44
IKEv2-PROTO-4: last proposal: 0x0, reserved: 0x0,
   length: 40 Proposal: 1, Protocol id: ESP, SPI size: 4,
   #trans: 3
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 12 type: 1, reserved: 0x0, id: AES-CBC
IKEv2-PROTO-4: last transform: 0x3, reserved: 0x0:
   length: 8 type: 3, reserved: 0x0, id: SHA96
IKEv2-PROTO-4: last transform: 0x0,
   reserved: 0x0: length: 8 type: 5, reserved: 0x0, id:

N Next payload: TSi, reserved: 0x0,
   length: 24

b7 6a c6 75 53 55 99 5a df ee 05 18
   1a 27 a6 cb
01 56 22 ad
TSi Next payload: TSr, reserved: 0x0,
   length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0,
   length: 16
start port: 0, end port: 65535
start addr: 192.168.2.99,
   end addr: 192.168.2.99
TSr Next payload: NONE, reserved: 0x0,
   length: 24
Num of TSs: 1, reserved 0x0, reserved 0x0
TS type: TS_IPV4_ADDR_RANGE, proto id: 0,
   length: 16
start port: 0, end port: 65535
start addr: 192.168.1.12,
   end addr: 192.168.1.12
```

```
Decrypted packet:Data&colon; 172 bytes
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006 CurState:
   CHILD_I_WAIT Event: EV_RECV_CREATE_CHILD
IKEv2-PROTO-5: (225): Action: Action_Null
IKEv2-PROTO-5: (225): SM Trace-> SA: I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (I) MsgID = 00000006
   CurState: CHILD_I_PROC Event: EV_CHK4_NOTIFY
IKEv2-PROTO-2: (225): Processing any notify-messages
   in child SA exchange
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006 CurState: CHILD_I_PROC
   Event: EV_VERIFY_MSG
IKEv2-PROTO-3: (225): Validating create child message
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006 CurState: CHILD_I_PROC
   Event: EV_PROC_MSG
IKEv2-PROTO-2: (225): Processing child SA exchange
IKEv2-PROTO-5: (225): SM Trace->
   SA: I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (
   I) MsgID = 00000006 CurState: CHILD_I_PROC
   Event: EV_CHK4_PFS
IKEv2-PROTO-3: (225): Checking for PFS configuration
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006 CurState: CHILD_I_PROC
   Event: EV_CHK_IKE_REKEY
IKEv2-PROTO-3: (225): Checking if IKE SA rekey
IKEv2-PROTO-5: (225): SM Trace-> SA:
   I_SPI=FD366326E1FED6FE R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006 CurState: CHILD_I_PROC
   Event: EV_GEN_LOAD_IPSEC
IKEv2-PROTO-3: (225): Load IPSEC key material
IKEv2-PLAT-3: PROXY MATCH on crypto map outside_map seq 1
IKEv2-PLAT-3: (225) DPD Max Time will be: 10
IKEv2-PLAT-3: (225) DPD Max Time will be: 10
```

ASA1 يدخل اذه فرع SA مدخل داخل الا SAD:

```
IKEv2-PROTO-5: (225):
   SM Trace->
   SA: I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006
   CurState: CHILD_R_DONE
   Event: EV_OK

IKEv2-PROTO-2: (225):
   SA created; inserting
   SA into database

IKEv2-PROTO-5: (225):
   SM Trace->
   SA: I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (R)
   MsgID = 00000006 CurState:
   CHILD_R_DONE
  Event: EV_START_DEL_NEG_TMR
```

ASA2 يدخل اذه فرع SA مدخل داخل الا SAD:

```
IKEv2-PROTO-5: (225):
   SM Trace->
   SA: I_SPI=FD366326E1FED6FE
   R_SPI=A75B9B2582AAECB7 (I)
   MsgID = 00000006
   CurState: CHILD_I_DONE
   Event: EV_OK

IKEv2-PROTO-2: (225):
   SA created;
  inserting SA into database
```

التحقق من النفق

أستخدم المعلومات المقدمة في هذا القسم للتحقق من تكوينات نفق بروتوكول إدارة المفاتيح وارتباط أمان الإنترنت (ISAKMP) و IPSec.

ISAKMP

دخلت in order to دقق ال isakmp، هذا أمر:

```
show crypto isakmp sa det
```

ASA1

هنا الإنتاج ل ASA1:

```
ASA1(config)#show cry isa sa det
There are no IKEv1 SAs

IKEv2 SAs:Session-id:99220, Status:UP-ACTIVE, IKE count:1, CHILD count:2

Tunnel-id Local Remote Status Role
1889403559 10.0.0.1/500 10.0.0.2/500 READY RESPONDER

Encr: 3DES, Hash: MD596, DH Grp:2, Auth sign: PSK, Auth verify: PSK
Life/Active Time: 86400/195 sec
Session-id: 99220
Status Description: Negotiation done
Local spi: A75B9B2582AAECB7 Remote spi: FD366326E1FED6FE
Local id: 10.0.0.1
Remote id: 10.0.0.2
Local req mess id: 14 Remote req mess id: 16
Local next mess id: 14 Remote next mess id: 16
Local req queued: 14 Remote req queued: 16
Local window: 1 Remote window: 1
DPD configured for 10 seconds, retry 2
NAT-T is not detected
Child sa: local selector 192.168.1.12/0 - 192.168.1.12/65535
remote selector 192.168.2.99/0 - 192.168.2.99/65535
ESP spi in/out: 0x8564387d/0x8717a5a
AH spi in/out: 0x0/0x0
CPI in/out: 0x0/0x0
Encr: AES-CBC, keysize: 256, esp_hmac: SHA96
ah_hmac: None, comp: IPCOMP_NONE, mode tunnel
Child sa: local selector 192.168.1.1/0 - 192.168.1.1/65535
remote selector 192.168.2.99/0 - 192.168.2.99/65535
```

```
ESP spi in/out: 0x74756292/0xf0d97b2a
AH spi in/out: 0x0/0x0
CPI in/out: 0x0/0x0
Encr: AES-CBC, keysize: 256, esp_hmac: SHA96
ah_hmac: _NONE,, comp: IPCOMP_NONE, mode tunnel
```

ASA2

هنا الإنتاج ل ASA2:

```
ASA2(config)#show cry isa sa det

There are no IKEv1 SAs

IKEv2 SAs:

Session-id:99220, Status:UP-ACTIVE, IKE count:1, CHILD count:2

Tunnel-id                Local               Remote    Status        Role
472237395         10.0.0.2/500         10.0.0.1/500     READY   INITIATOR
     Encr: 3DES, Hash: MD596, DH Grp:2, Auth sign: PSK, Auth verify: PSK
     Life/Active Time: 86400/190 sec
     Session-id: 99220
     Status Description: Negotiation done
     Local spi: FD366326E1FED6FE       Remote spi: A75B9B2582AAECB7
     Local id: 10.0.0.2
     Remote id: 10.0.0.1
     Local req mess id: 16             Remote req mess id: 13
     Local next mess id: 16            Remote next mess id: 13
     Local req queued: 16              Remote req queued: 13
     Local window: 1                   Remote window: 1
     DPD configured for 10 seconds, retry 2
     NAT-T is not detected
Child sa: local selector  192.168.2.99/0 - 192.168.2.99/65535
         remote selector 192.168.1.12/0 - 192.168.1.12/65535
         ESP spi in/out: 0x8717a5a/0x8564387d
         AH spi in/out: 0x0/0x0
         CPI in/out: 0x0/0x0
         Encr: AES-CBC, keysize: 256, esp_hmac: SHA96
         ah_hmac: None, comp: IPCOMP_NONE, mode tunnel
Child sa: local selector  192.168.2.99/0 - 192.168.2.99/65535
         remote selector 192.168.1.1/0 - 192.168.1.1/65535
         ESP spi in/out: 0xf0d97b2a/0x74756292
         AH spi in/out: 0x0/0x0
         CPI in/out: 0x0/0x0
         Encr: AES-CBC, keysize: 256, esp_hmac: SHA96
         ah_hmac: None, comp: IPCOMP_NONE, mode tunnel
```

IPsec

دخلت in order to دققت ال IPSec، هذه أمر:

```
show crypto ipsec sa
```

ASA1

هنا الإنتاج ل ASA1:

```
ASA1(config)#show cry ipsec sa
interface: outside
   Crypto map tag: outside_map, seq num: 1, local addr: 10.0.0.1

     access-list l2l_list extended permit ip host 192.168.1.1
       host 192.168.2.99
      local ident (addr/mask/prot/port):
         (192.168.1.1/255.255.255.255/0/0)
      remote ident (addr/mask/prot/port): (
         192.168.2.99/255.255.255.255/0/0)
      current_peer: 10.0.0.2

      #pkts encaps: 3, #pkts encrypt: 3, #pkts digest: 3
      #pkts decaps: 3, #pkts decrypt: 3, #pkts verify: 3
      #pkts compressed: 0, #pkts decompressed: 0
      #pkts not compressed: 3, #pkts comp failed: 0,
         #pkts decomp failed: 0
      #pre-frag successes: 0, #pre-frag failures: 0,
         #fragments created: 0
      #PMTUs sent: 0, #PMTUs rcvd: 0,
         #decapsulated frgs needing reassembly: 0
      #send errors: 0, #recv errors: 0

      local crypto endpt.: 10.0.0.1/500, remote crypto endpt.:
         10.0.0.2/500
      path mtu 1500, ipsec overhead 74, media mtu 1500
      current outbound spi: F0D97B2A
      current inbound spi : 74756292

    inbound esp sas:
      spi: 0x74756292 (1953850002)
         transform: esp-aes-256 esp-sha-hmac no compression
         in use settings ={L2L, Tunnel, }
         slot: 0, conn_id: 137990144, crypto-map: outside_map
         sa timing: remaining key lifetime (kB/sec): (4008959/28628)
         IV size: 16 bytes
         replay detection support: Y
         Anti replay bitmap:
          0x00000000 0x0000000F
   outbound esp sas:
     spi: 0xF0D97B2A (4040784682)
        transform: esp-aes-256 esp-sha-hmac no compression
        in use settings ={L2L, Tunnel, }
        slot: 0, conn_id: 137990144, crypto-map: outside_map
        sa timing: remaining key lifetime (kB/sec): (4147199/28628)
        IV size: 16 bytes
        replay detection support: Y
        Anti replay bitmap:
          0x00000000 0x00000001

   Crypto map tag: outside_map, seq num: 1, local addr: 10.0.0.1

     access-list l2l_list extended permit ip host 192.168.1.12
       host 192.168.2.99
     local ident (addr/mask/prot/port): (
       192.168.1.12/255.255.255.255/0/0)
     remote ident (addr/mask/prot/port):
       (192.168.2.99/255.255.255.255/0/0)
     current_peer: 10.0.0.2
     #pkts encaps: 3, #pkts encrypt: 3, #pkts digest: 3
     #pkts decaps: 3, #pkts decrypt: 3, #pkts verify: 3
     #pkts compressed: 0, #pkts decompressed: 0
     #pkts not compressed: 3, #pkts comp failed: 0,
       #pkts decomp failed: 0
```

```
     #pre-frag successes: 0, #pre-frag failures: 0,
       #fragments created: 0
     #PMTUs sent: 0, #PMTUs rcvd: 0, #decapsulated frgs needing
       reassembly: 0
     #send errors: 0, #recv errors: 0

     local crypto endpt.: 10.0.0.1/500, remote crypto
       endpt.: 10.0.0.2/500
     path mtu 1500, ipsec overhead 74, media mtu 1500
     current outbound spi: 08717A5A
     current inbound spi : 8564387D

   inbound esp sas:
     spi: 0x8564387D (2237937789)
        transform: esp-aes-256 esp-sha-hmac no compression
        in use settings ={L2L, Tunnel, }
        slot: 0, conn_id: 137990144, crypto-map: outside_map
        sa timing: remaining key lifetime (kB/sec): (4285439/28734)
        IV size: 16 bytes
        replay detection support: Y
        Anti replay bitmap:
         0x00000000 0x0000000F
   outbound esp sas:
     spi: 0x08717A5A (141654618)
        transform: esp-aes-256 esp-sha-hmac no compression
        in use settings ={L2L, Tunnel, }
        slot: 0, conn_id: 137990144, crypto-map: outside_map
        sa timing: remaining key lifetime (kB/sec): (4055039/28734)
        IV size: 16 bytes
        replay detection support: Y
Anti replay bitmap:
0x00000000 0x00000001
```

ASA2

هنا الإنتاج ل ASA2:

```
ASA2(config)#show cry ipsec sa
interface: outside
   Crypto map tag: outside_map, seq num: 1, local addr: 10.0.0.2

     access-list l2l_list extended permit ip host 192.168.2.99 host
       192.168.1.12
     local ident (addr/mask/prot/port):
       (192.168.2.99/255.255.255.255/0/0)
     remote ident (addr/mask/prot/port):
       (192.168.1.12/255.255.255.255/0/0)
     current_peer: 10.0.0.1

     #pkts encaps: 3, #pkts encrypt: 3, #pkts digest: 3
     #pkts decaps: 3, #pkts decrypt: 3, #pkts verify: 3
     #pkts compressed: 0, #pkts decompressed: 0
     #pkts not compressed: 3, #pkts comp failed: 0,
       #pkts decomp failed: 0
     #pre-frag successes: 0, #pre-frag failures: 0,
       #fragments created: 0
     #PMTUs sent: 0, #PMTUs rcvd: 0, #decapsulated frgs needing
       reassembly: 0
     #send errors: 0, #recv errors: 0

     local crypto endpt.: 10.0.0.2/500, remote crypto
       endpt.: 10.0.0.1/500
```

```
   path mtu 1500, ipsec overhead 74, media mtu 1500
   current outbound spi: 8564387D
   current inbound spi : 08717A5A

 inbound esp sas:
   spi: 0x08717A5A (141654618)
      transform: esp-aes-256 esp-sha-hmac no compression
      in use settings ={L2L, Tunnel, }
      slot: 0, conn_id: 137973760, crypto-map: outside_map
      sa timing: remaining key lifetime (kB/sec): (4193279/28770)
      IV size: 16 bytes         replay detection support: Y
      Anti replay bitmap:
       0x00000000 0x0000000F
 outbound esp sas:
   spi: 0x8564387D (2237937789)
      transform: esp-aes-256 esp-sha-hmac no compression
      in use settings ={L2L, Tunnel, }
      slot: 0, conn_id: 137973760, crypto-map: outside_map
      sa timing: remaining key lifetime (kB/sec): (4055039/28770)
      IV size: 16 bytes         replay detection support: Y
      Anti replay bitmap:
       0x00000000 0x00000001

Crypto map tag: outside_map, seq num: 1, local addr: 10.0.0.2

  access-list l2l_list extended permit ip host 192.168.2.99
    host 192.168.1.1
  local ident (addr/mask/prot/port): (
    192.168.2.99/255.255.255.255/0/0)
  remote ident (addr/mask/prot/port):
    (192.168.1.1/255.255.255.255/0/0)
  current_peer: 10.0.0.1
  #pkts encaps: 3, #pkts encrypt: 3, #pkts digest: 3
  #pkts decaps: 3, #pkts decrypt: 3, #pkts verify: 3
  #pkts compressed: 0, #pkts decompressed: 0
  #pkts not compressed: 3, #pkts comp failed: 0,
    #pkts decomp failed: 0
  #pre-frag successes: 0, #pre-frag failures: 0,
    #fragments created: 0
  #PMTUs sent: 0, #PMTUs rcvd: 0, #decapsulated frgs needing
    reassembly: 0
  #send errors: 0, #recv errors: 0

  local crypto endpt.: 10.0.0.2/500, remote crypto
    endpt.: 10.0.0.1/500
  path mtu 1500, ipsec overhead 74, media mtu 1500
  current outbound spi: 74756292
  current inbound spi : F0D97B2A

inbound esp sas:
  spi: 0xF0D97B2A (4040784682)
     transform: esp-aes-256 esp-sha-hmac no compression
     in use settings ={L2L, Tunnel, }
     slot: 0, conn_id: 137973760, crypto-map: outside_map
     sa timing: remaining key lifetime (kB/sec): (4285439/28663)
     IV size: 16 bytes
     replay detection support: Y
     Anti replay bitmap:
      0x00000000 0x0000000F
outbound esp sas:
  spi: 0x74756292 (1953850002)
     transform: esp-aes-256 esp-sha-hmac no compression
     in use settings ={L2L, Tunnel, }
     slot: 0, conn_id: 137973760, crypto-map: outside_map
```

```
       sa timing: remaining key lifetime (kB/sec): (4331519/28663)
       IV size: 16 bytes
       replay detection support: Y
       Anti replay bitmap:
        0x00000000 0x00000001
```

أنت يستطيع أيضا فحصت الإنتاج من **العرض crypto ikev2 sa** أمر، أي يوزي إنتاج أن يكون مماثل إلى الإنتاج من **العرض crypto isakmp sa** أمر:

```
IKEv2 SAs:

Session-id:99220, Status:UP-ACTIVE, IKE count:1, CHILD count:2

Tunnel-id               Local               Remote   Status        Role
1889403559         10.0.0.1/500         10.0.0.2/500    READY   RESPONDER
     Encr: 3DES, Hash: MD596, DH Grp:2, Auth sign: PSK, Auth verify: PSK
     Life/Active Time: 86400/179 sec
Child sa: local selector  192.168.1.12/0 - 192.168.1.12/65535
         remote selector 192.168.2.99/0 - 192.168.2.99/65535
         ESP spi in/out: 0x8564387d/0x8717a5a
Child sa: local selector  192.168.1.1/0 - 192.168.1.1/65535
         remote selector 192.168.2.99/0 - 192.168.2.99/65535
         ESP spi in/out: 0x74756292/0xf0d97b2a
```

معلومات ذات صلة

- [الدعم التقني والتنزيلات من Cisco]

حول هذه الترجمة
ترجمت Cisco هذا المستند باستخدام مجموعة من التقنيات الآلية والبشرية لتقديم محتوى دعم للمستخدمين في جميع أنحاء العالم بلغتهم الخاصة. يُرجى ملاحظة أن أفضل ترجمة آلية لن تكون دقيقة كما هو الحال مع الترجمة الاحترافية التي يقدمها مترجم محترف. تخلي Cisco Systems مسئوليتها عن دقة هذه الترجمات وتُوصي بالرجوع دائمًا إلى المستند الإنجليزي الأصلي (الرابط متوفر).