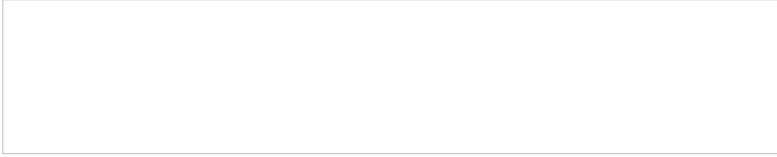


SR66与锐捷设备IPSEC over GRE互通IKE一阶段协商不成功经验案例

一、组网：



某局点锐捷3G路由器通过联通的设备（LAC）与SR6608（LNS）建立L2TP隧道，通过AAA服务器进行认证，认证通过后给3G路由器分配固定的IP地址。

为了加强数据的安全性，用户在锐捷3G路由器和SR6608之间部署了Ipsec_over_gre技术，保护关键的数据。

二、问题描述：

配置完成后，3G拨号及GRE通道正常，两端Tunnel口地址可以正常ping通，路由学习也都正常。但是IPSEC建立不成功，通过命令行查看，IKE 第一阶段协商都不成功。

三、过程分析：

1、IPSEC相关配置如下：

SR66侧配置：

```
acl number 3001
rule 0 permit ip destination 10.39.134.0 0.0.0.255
rule 5 permit ip destination 10.39.175.0 0.0.0.255
#
ike proposal 1
encryption-algorithm 3des-cbc
dh group2
authentication-algorithm md5
sa duration 6400
#
ike peer test-50
pre-shared-key cipher 3AavyEcNMKo=
remote-address 148.x.x.29
local-address 148.x.x.30
#
ipsec proposal 1
esp encryption-algorithm 3des
#
ipsec policy test 1 isakmp
security acl 3001
ike-peer test-50
proposal 1
#
interface Tunnel50
description to XXXX
ip address 148.x.x.30 255.255.255.252
source 10.74.42.218
destination 148.y.y.8
ipsec policy test
锐捷3G路由器配置：
ip access-list extended 101
10 permit ip 10.39.134.0 0.0.0.255 any
!
crypto isakmp policy 1
encryption 3des
authentication pre-share
hash md5
group 2
lifetime 6400
!
crypto isakmp key 7 summer address 148.x.x.30
```

```
crypto ipsec transform-set myset esp-3des esp-md5-hmac
crypto map mymap 1 ipsec-isakmp
set peer 148.x.x.30
set transform-set myset
match address 101
!
```

```
interface Tunnel 1
ip address 148.x.x.29 255.255.255.252
crypto map mymap
tunnel source Async 1
tunnel destination 10.74.42.218
```

因为之前已经排查Tunnel接口UP, 触发IPSEC保护的流的路由学习也是正常的, 所以现在需比较IPSEC相关配置, 查看IPSEC加密认证算法等相关配置是否对应, 从配置上看两边配置都是主模式, 而且加密及认证算法等都对应。

2、在SR66侧打开debug ike sa, debug ipsec sa开关, 在锐捷3G路由器上带保护流源地址ping包, 触发IPSEC建立, 查看SR66打印出的debug信息如下:

//SR66收到的主模式的第一次交换消息1, 用于IKE提议和转换方式的协商

```
*Jun 11 21:03:43:468 2012 liantong-VPDN IKE/7/DEBUG: received message:
*Jun 11 21:03:43:468 2012 liantong-VPDN IKE/7/DEBUG: ICookie: 0x1992b94d05fac7c4
*Jun 11 21:03:43:468 2012 liantong-VPDN IKE/7/DEBUG: RCookie: 0x0000000000000000
*Jun 11 21:03:43:468 2012 liantong-VPDN IKE/7/DEBUG: NEXT_PAYLOAD: SA
*Jun 11 21:03:43:468 2012 liantong-VPDN IKE/7/DEBUG: VERSION: 16
*Jun 11 21:03:43:468 2012 liantong-VPDN IKE/7/DEBUG: EXCH_TYPE: ID_PROT
*Jun 11 21:03:43:469 2012 liantong-VPDN IKE/7/DEBUG: FLAGS: [ ]
*Jun 11 21:03:43:469 2012 liantong-VPDN IKE/7/DEBUG: MESSAGE_ID: 0x00000000
*Jun 11 21:03:43:469 2012 liantong-VPDN IKE/7/DEBUG: LENGTH: 216
*Jun 11 21:03:43:469 2012 liantong-VPDN IKE/7/DEBUG: exchange lookup all list from COOKIE: iC
COOKIE 1992b94d05fac7c4
*Jun 11 21:03:43:469 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload SA
*Jun 11 21:03:43:469 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload VENDOR
*Jun 11 21:03:43:470 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload VENDOR
*Jun 11 21:03:43:470 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload VENDOR
*Jun 11 21:03:43:470 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload VENDOR
*Jun 11 21:03:44:270 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload VENDOR
*Jun 11 21:03:44:270 2012 liantong-VPDN IKE/7/DEBUG: validate payload SA
*Jun 11 21:03:44:271 2012 liantong-VPDN IKE/7/DEBUG: DOI: 1
*Jun 11 21:03:44:271 2012 liantong-VPDN IKE/7/DEBUG:
IKE_DPD: receive : afcad713 68a1f1c9 6b8696fc 77570100 (DPD)
*Jun 11 21:03:44:271 2012 liantong-VPDN IKE/7/DEBUG: exchange setup(R): 8fd4aa0
*Jun 11 21:03:44:271 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload PROPOSAL
*Jun 11 21:03:44:271 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload TRANSFORM
*Jun 11 21:03:44:271 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload TRANSFORM
*Jun 11 21:03:44:272 2012 liantong-VPDN IKE/7/DEBUG: validate payload PROPOSAL
*Jun 11 21:03:44:272 2012 liantong-VPDN IKE/7/DEBUG: NO: 1
*Jun 11 21:03:44:272 2012 liantong-VPDN IKE/7/DEBUG: PROTO: ISAKMP
*Jun 11 21:03:44:272 2012 liantong-VPDN IKE/7/DEBUG: SPI_SZ: 0
*Jun 11 21:03:44:272 2012 liantong-VPDN IKE/7/DEBUG: NTRANSFORMS: 2
*Jun 11 21:03:44:272 2012 liantong-VPDN IKE/7/DEBUG: validate payload TRANSFORM
*Jun 11 21:03:44:273 2012 liantong-VPDN IKE/7/DEBUG: NO: 1
*Jun 11 21:03:45:773 2012 liantong-VPDN IKE/7/DEBUG: ID: 1
*Jun 11 21:03:45:773 2012 liantong-VPDN IKE/7/DEBUG: Transform 1's attributes
*Jun 11 21:03:45:773 2012 liantong-VPDN IKE/7/DEBUG: Attribute ENCRYPTION_ALGORITHM :
3DES_CBC
*Jun 11 21:03:45:774 2012 liantong-VPDN IKE/7/DEBUG: Attribute HASH_ALGORITHM : MD5
*Jun 11 21:03:45:774 2012 liantong-VPDN IKE/7/DEBUG: Attribute AUTHENTICATION_METHOD :
PRE_SHARED
*Jun 11 21:03:45:774 2012 liantong-VPDN IKE/7/DEBUG: Attribute GROUP_DESCRIPTION : MOD
P_1024
*Jun 11 21:03:45:774 2012 liantong-VPDN IKE/7/DEBUG: Attribute LIFE_TYPE : SECONDS
*Jun 11 21:03:45:774 2012 liantong-VPDN IKE/7/DEBUG: Attribute LIFE_DURATION : 6400
*Jun 11 21:03:45:774 2012 liantong-VPDN IKE/7/DEBUG: validate payload TRANSFORM
*Jun 11 21:03:45:775 2012 liantong-VPDN IKE/7/DEBUG: NO: 2
*Jun 11 21:03:45:775 2012 liantong-VPDN IKE/7/DEBUG: ID: 1
*Jun 11 21:03:45:775 2012 liantong-VPDN IKE/7/DEBUG: Transform 2's attributes
```

*Jun 11 21:03:45:775 2012 liantong-VPDN IKE/7/DEBUG: Attribute ENCRYPTION_ALGORITHM : DES_CBC

*Jun 11 21:03:45:775 2012 liantong-VPDN IKE/7/DEBUG: Attribute HASH_ALGORITHM : SHA

*Jun 11 21:03:47:276 2012 liantong-VPDN IKE/7/DEBUG: Attribute AUTHENTICATION_METHOD : RSA_SIG

*Jun 11 21:03:47:276 2012 liantong-VPDN IKE/7/DEBUG: Attribute GROUP_DESCRIPTION : MOD P_768

*Jun 11 21:03:47:276 2012 liantong-VPDN IKE/7/DEBUG: Attribute LIFE_TYPE : SECONDS

*Jun 11 21:03:47:276 2012 liantong-VPDN IKE/7/DEBUG: Attribute LIFE_DURATION : 86400

*Jun 11 21:03:47:276 2012 liantong-VPDN IKE/7/DEBUG: validate payload VENDOR

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: vendor ID seen

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: validate payload VENDOR

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: vendor ID seen

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: validate payload VENDOR

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: vendor ID seen

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: validate payload VENDOR

*Jun 11 21:03:47:277 2012 liantong-VPDN IKE/7/DEBUG: vendor ID seen

*Jun 11 21:03:47:278 2012 liantong-VPDN IKE/7/DEBUG: validate payload VENDOR

*Jun 11 21:03:47:278 2012 liantong-VPDN IKE/7/DEBUG: vendor ID seen

*Jun 11 21:03:47:278 2012 liantong-VPDN IKE/7/DEBUG: validate payload VENDOR

*Jun 11 21:03:47:278 2012 liantong-VPDN IKE/7/DEBUG: vendor ID seen

*Jun 11 21:03:47:278 2012 liantong-VPDN IKE/7/DEBUG: exchange check: checking for required SA

*Jun 11 21:03:48:779 2012 liantong-VPDN IKE/7/DEBUG: negotiate sa: transform 1 proto 1 proposal 1 compatible

*Jun 11 21:03:50:280 2012 liantong-VPDN IKE/7/DEBUG: negotiate sa: proposal 1 succeeded

*Jun 11 21:03:50:281 2012 liantong-VPDN IKE/7/DEBUG: vendor[0] :

*Jun 11 21:03:50:281 2012 liantong-VPDN IKE/7/DEBUG: 4a131c81 07035845 5c5728f2 0e95452f

*Jun 11 21:03:50:281 2012 liantong-VPDN IKE/7/DEBUG: vendor[1] :

*Jun 11 21:03:50:281 2012 liantong-VPDN IKE/7/DEBUG: 439b59f8 ba676c4c 7737ae22 eab8f582

*Jun 11 21:03:50:281 2012 liantong-VPDN IKE/7/DEBUG: vendor[2] :

*Jun 11 21:03:50:281 2012 liantong-VPDN IKE/7/DEBUG: 7d9419a6 5310ca6f 2c179d92 15529d56

*Jun 11 21:03:50:282 2012 liantong-VPDN IKE/7/DEBUG: vendor[3] :

*Jun 11 21:03:50:282 2012 liantong-VPDN IKE/7/DEBUG: 90cb8091 3ebb696e 086381b5 ec427b1f

*Jun 11 21:03:50:282 2012 liantong-VPDN IKE/7/DEBUG: vendor[4] :

*Jun 11 21:03:50:282 2012 liantong-VPDN IKE/7/DEBUG: afcad713 68a1f1c9 6b8696fc 77570100

*Jun 11 21:03:50:282 2012 liantong-VPDN IKE/7/DEBUG: IKE_DPD: receive : afcad713 68a1f1c9 6b8696fc 77570100 (DPD)

*Jun 11 21:03:50:282 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine: unexpected payload VENDOR

*Jun 11 21:03:51:783 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine: unexpected payload VENDOR

*Jun 11 21:03:51:783 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine: unexpected payload VENDOR

*Jun 11 21:03:51:783 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine: unexpected payload VENDOR

*Jun 11 21:03:51:783 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine(R): finished step 0, advancing...

*Jun 11 21:03:51:784 2012 liantong-VPDN IKE/7/DEBUG: add payload to message: SA

*Jun 11 21:03:51:784 2012 liantong-VPDN IKE/7/DEBUG: DOI: 1

*Jun 11 21:03:51:784 2012 liantong-VPDN IKE/7/DEBUG: add payload to message: PROPOSAL

*Jun 11 21:03:51:784 2012 liantong-VPDN IKE/7/DEBUG: NO: 1

*Jun 11 21:03:51:785 2012 liantong-VPDN IKE/7/DEBUG: PROTO: ISAKMP

*Jun 11 21:03:51:785 2012 liantong-VPDN IKE/7/DEBUG: SPI_SZ: 0

*Jun 11 21:03:53:285 2012 liantong-VPDN IKE/7/DEBUG: NTRANSFORMS: 1

*Jun 11 21:03:53:285 2012 liantong-VPDN IKE/7/DEBUG: add payload to message: TRANSFORM

*Jun 11 21:03:53:286 2012 liantong-VPDN IKE/7/DEBUG: NO: 1

*Jun 11 21:03:53:286 2012 liantong-VPDN IKE/7/DEBUG: ID: 1

*Jun 11 21:03:53:286 2012 liantong-VPDN IKE/7/DEBUG: Transform 1's attributes

*Jun 11 21:03:53:286 2012 liantong-VPDN IKE/7/DEBUG: Attribute ENCRYPTION_ALGORITHM : 3DES_CBC

*Jun 11 21:03:53:286 2012 liantong-VPDN IKE/7/DEBUG: Attribute HASH_ALGORITHM : MD5

*Jun 11 21:03:53:286 2012 liantong-VPDN IKE/7/DEBUG: Attribute AUTHENTICATION_METHOD : PRE_SHARED

*Jun 11 21:03:53:287 2012 liantong-VPDN IKE/7/DEBUG: Attribute GROUP_DESCRIPTION : MOD P_1024

*Jun 11 21:03:53:287 2012 liantong-VPDN IKE/7/DEBUG: Attribute LIFE_TYPE : SECONDS

*Jun 11 21:03:53:287 2012 liantong-VPDN IKE/7/DEBUG: Attribute LIFE_DURATION : 6400

*Jun 11 21:03:53:287 2012 liantong-VPDN IKE/7/DEBUG: P1 construct VID: responder not support n at traversal.

*Jun 11 21:03:53:287 2012 liantong-VPDN IKE/7/DEBUG: exchange check: checking for required SA //SR66发送主模式的第一次交换消息2, 用于IKE提议和转换方式的协商

*Jun 11 21:03:53:287 2012 liantong-VPDN IKE/7/DEBUG: send message:

*Jun 11 21:03:54:794 2012 liantong-VPDN IKE/7/DEBUG: ICOOKIE: 0x1992b94d05fac7c4

*Jun 11 21:03:54:795 2012 liantong-VPDN IKE/7/DEBUG: RCOOKIE: 0xe0e726d3f22a58cd

*Jun 11 21:03:54:795 2012 liantong-VPDN IKE/7/DEBUG: NEXT_PAYLOAD: SA

*Jun 11 21:03:54:795 2012 liantong-VPDN IKE/7/DEBUG: VERSION: 16

*Jun 11 21:03:54:796 2012 liantong-VPDN IKE/7/DEBUG: EXCH_TYPE: ID_PROT

*Jun 11 21:03:54:796 2012 liantong-VPDN IKE/7/DEBUG: FLAGS: []

*Jun 11 21:03:54:796 2012 liantong-VPDN IKE/7/DEBUG: MESSAGE_ID: 0x00000000

*Jun 11 21:03:54:796 2012 liantong-VPDN IKE/7/DEBUG: LENGTH: 80

*Jun 11 21:03:54:796 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine(R): finished step 1, advancing...

//通过上面的2个消息完成主模式第一次交换, 完成IKE提议和转换方式的协商

//SR66收到的主模式的第二次交换消息3, 用于IKE DH和伪随机值nonce的交换

*Jun 11 21:03:54:796 2012 liantong-VPDN IKE/7/DEBUG: received message:

*Jun 11 21:03:54:797 2012 liantong-VPDN IKE/7/DEBUG: ICOOKIE: 0x1992b94d05fac7c4

*Jun 11 21:03:56:297 2012 liantong-VPDN IKE/7/DEBUG: RCOOKIE: 0xe0e726d3f22a58cd

*Jun 11 21:03:56:297 2012 liantong-VPDN IKE/7/DEBUG: NEXT_PAYLOAD: KEY_EXCH

*Jun 11 21:03:56:297 2012 liantong-VPDN IKE/7/DEBUG: VERSION: 16

*Jun 11 21:03:56:298 2012 liantong-VPDN IKE/7/DEBUG: EXCH_TYPE: ID_PROT

*Jun 11 21:03:56:298 2012 liantong-VPDN IKE/7/DEBUG: FLAGS: []

*Jun 11 21:03:56:298 2012 liantong-VPDN IKE/7/DEBUG: MESSAGE_ID: 0x00000000

*Jun 11 21:03:56:298 2012 liantong-VPDN IKE/7/DEBUG: LENGTH: 184

*Jun 11 21:03:56:298 2012 liantong-VPDN IKE/7/DEBUG: check message duplicate

*Jun 11 21:03:56:298 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload KEY_EXCH

*Jun 11 21:03:56:299 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload NONCE

*Jun 11 21:03:56:299 2012 liantong-VPDN IKE/7/DEBUG: validate payload KEY_EXCH

*Jun 11 21:03:56:299 2012 liantong-VPDN IKE/7/DEBUG: validate payload NONCE

*Jun 11 21:03:57:700 2012 liantong-VPDN IKE/7/DEBUG: exchange check: checking for required KEY_EXCH

*Jun 11 21:03:57:700 2012 liantong-VPDN IKE/7/DEBUG: exchange check: checking for required NONCE

*Jun 11 21:03:57:700 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine(R): finished step 2, advancing...

*Jun 11 21:03:57:700 2012 liantong-VPDN IKE/7/DEBUG: add payload to message: KEY_EXCH

*Jun 11 21:03:57:700 2012 liantong-VPDN IKE/7/DEBUG: Group ID: 2

*Jun 11 21:03:57:701 2012 liantong-VPDN IKE/7/DEBUG: add payload to message: NONCE

*Jun 11 21:03:57:701 2012 liantong-VPDN IKE/7/DEBUG: add payload to message: VENDOR

*Jun 11 21:03:57:701 2012 liantong-VPDN IKE/7/DEBUG: IKE_DPD:: send VID : afcad713 68a1f1c9 6b8696fc 77570100 (DPD)

*Jun 11 21:03:57:701 2012 liantong-VPDN IKE/7/DEBUG: exchange check: checking for required KEY_EXCH

*Jun 11 21:03:57:701 2012 liantong-VPDN IKE/7/DEBUG: exchange check: checking for required NONCE

//SR66发送的主模式的第二次交换消息4, 用于IKE DH和伪随机值nonce的交换

*Jun 11 21:03:57:701 2012 liantong-VPDN IKE/7/DEBUG: send message:

*Jun 11 21:03:57:702 2012 liantong-VPDN IKE/7/DEBUG: ICOOKIE: 0x1992b94d05fac7c4

*Jun 11 21:03:59:202 2012 liantong-VPDN IKE/7/DEBUG: RCOOKIE: 0xe0e726d3f22a58cd

*Jun 11 21:03:59:202 2012 liantong-VPDN IKE/7/DEBUG: NEXT_PAYLOAD: KEY_EXCH

*Jun 11 21:03:59:202 2012 liantong-VPDN IKE/7/DEBUG: VERSION: 16

*Jun 11 21:03:59:203 2012 liantong-VPDN IKE/7/DEBUG: EXCH_TYPE: ID_PROT

*Jun 11 21:03:59:203 2012 liantong-VPDN IKE/7/DEBUG: FLAGS: []

*Jun 11 21:03:59:203 2012 liantong-VPDN IKE/7/DEBUG: MESSAGE_ID: 0x00000000

*Jun 11 21:03:59:203 2012 liantong-VPDN IKE/7/DEBUG: LENGTH: 204

*Jun 11 21:03:59:203 2012 liantong-VPDN IKE/7/DEBUG: exchange state machine(R): finished step 3, advancing...

//通过上面的2个消息完成主模式第二次交换, 完成IKE DH和伪随机值nonce的交换

//SR66收到的主模式的第三次交换消息5, 用于通信双方的身份认证

*Jun 11 21:03:59:203 2012 liantong-VPDN IKE/7/DEBUG: received message:

*Jun 11 21:03:59:204 2012 liantong-VPDN IKE/7/DEBUG: ICOOKIE: 0x1992b94d05fac7c4

```
*Jun 11 21:03:59:204 2012 liantong-VPDN IKE/7/DEBUG: RCOOKIE: 0xe0e726d3f22a58cd
*Jun 11 21:03:59:204 2012 liantong-VPDN IKE/7/DEBUG: NEXT_PAYLOAD: ID
*Jun 11 21:03:59:204 2012 liantong-VPDN IKE/7/DEBUG: VERSION: 16
*Jun 11 21:03:59:204 2012 liantong-VPDN IKE/7/DEBUG: EXCH_TYPE: ID_PROT
*Jun 11 21:03:59:204 2012 liantong-VPDN IKE/7/DEBUG: FLAGS: [ ENC ]
*Jun 11 21:04:00:705 2012 liantong-VPDN IKE/7/DEBUG: MESSAGE_ID: 0x00000000
*Jun 11 21:04:00:705 2012 liantong-VPDN IKE/7/DEBUG: LENGTH: 68
*Jun 11 21:04:00:705 2012 liantong-VPDN IKE/7/DEBUG: check message duplicate
*Jun 11 21:04:00:705 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: payload ID
*Jun 11 21:04:00:705 2012 liantong-VPDN IKE/7/DEBUG: parse payloads: invalid next payload type
223 in payload of type 5
```

通过debug信息可以分析出IKE主模式6个消息交互的第5个消息就进行不下去了，因为parse payload s: invalid next payload type 223 in payload of type 5。

我们知道，消息5是用来进行双方身份认证的，对SR66来说，打印这个消息表示对端发过来的报文经解密之后认为是错的，一般情况下，两端密码配置不一致会导致这种情况。

四、解决方法：

根据上面的debug信息，可以定位问题因为两端设备pre-shared-key配置不一致。

通过办事处咨询友商，其反馈密码就是crypto isakmp key 7 summer address 148.10.2.30中配置的summer，因为SR66这边的配置为密文，不能判断是否密码配置正确，协调办事处修改为明文显示summer后，发现还是IKE第一阶段协商失败，debug信息与上面debug信息类似，消息5还是显示发过来的报文解密后是错的。这是为什么呢？

没有办法，我们这边密码修改后肯定是正确的，对端一定是像友商工程师说的吗？登录友商网站查询，发现其配置手册中有这样的命令说明：

```
crypto isakmp key 0|7 keystring { hostname peer-hostname | address peer-address }
```

指定与特定远程IKE 对等体一起使用的共享密钥。

数字0 为输入为明文

数字7 为输入为密文

友商原配置为crypto isakmp key 7 summer address 148.10.2.30，按照命令说明理解，这里输入的summer是密文，并不是真正的密码，而是密码在锐捷设备上加密后的显示。

协调将其配置修改为crypto isakmp key **0 summer** address 148.10.2.30，代表输入的summer是真正的密码，修改后SR66与其IPSEC协商成功，问题解决。