# *IPSec tunnel for ER75i routers application guide*



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# Contents



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Issue in CZ, 08/04/08



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# 1. Generally

IPsec (Internet Protocol Security) is a suite of protocols for securing Internet Protocol (IP) communications by authenticating and/or encrypting each IP packet in a data stream.

- Authenticating – receiving packet process can authenticate sent packet to match existing sender. (1st phase, IKE phase, Main mode) In PSK it finished by changing the keys.
- Encrypting – the both sides prearrange the packet encrypting. Follow step to encrypting the packet except the IP header, eventually encrypting complete packet and new IP header adding. (2nd Phase, IPSec phase, Quick mode) End by tunnel establishment.

IPsec also includes protocols for cryptographic key establishment. IPsec protocols operate at the network OSI model layer 3.

NAT-T (eventually NAT-Traversal) is shortcut for Network Address Translation Traversal. NAT is technology which serves to sharing of the one public IP address from non public network segment. It enables connection from the non public networks using IPSec tunnel.

# 2. IPSec limitation

- Only CISCO routers with IPSec support, from IOS 7.1
- Only ER75i routers with IPSec support, from firmware V1.1.1



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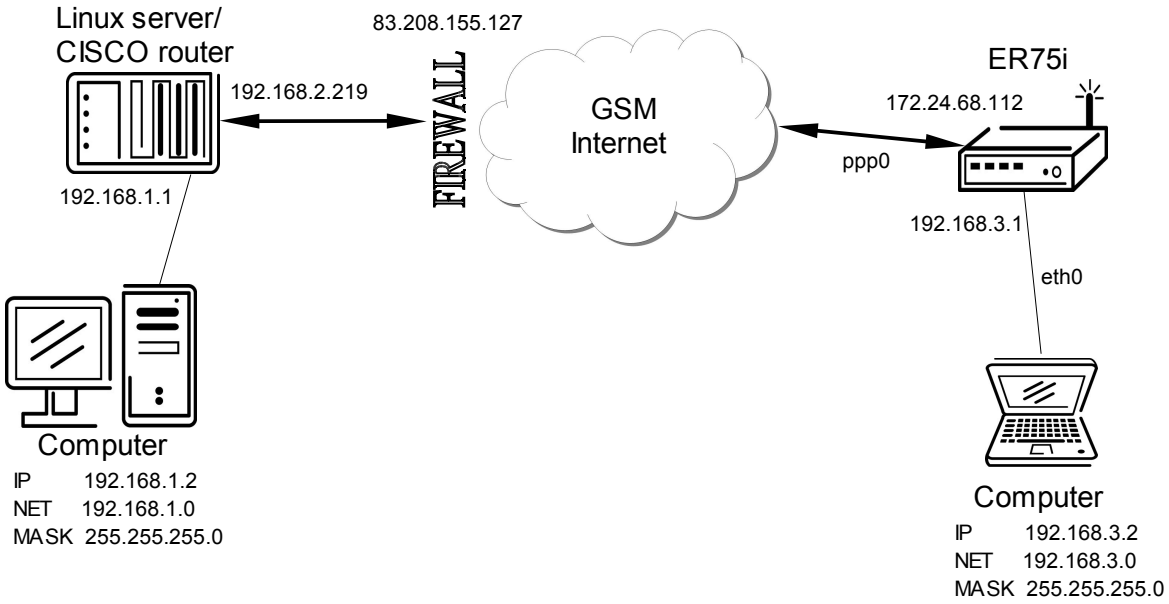
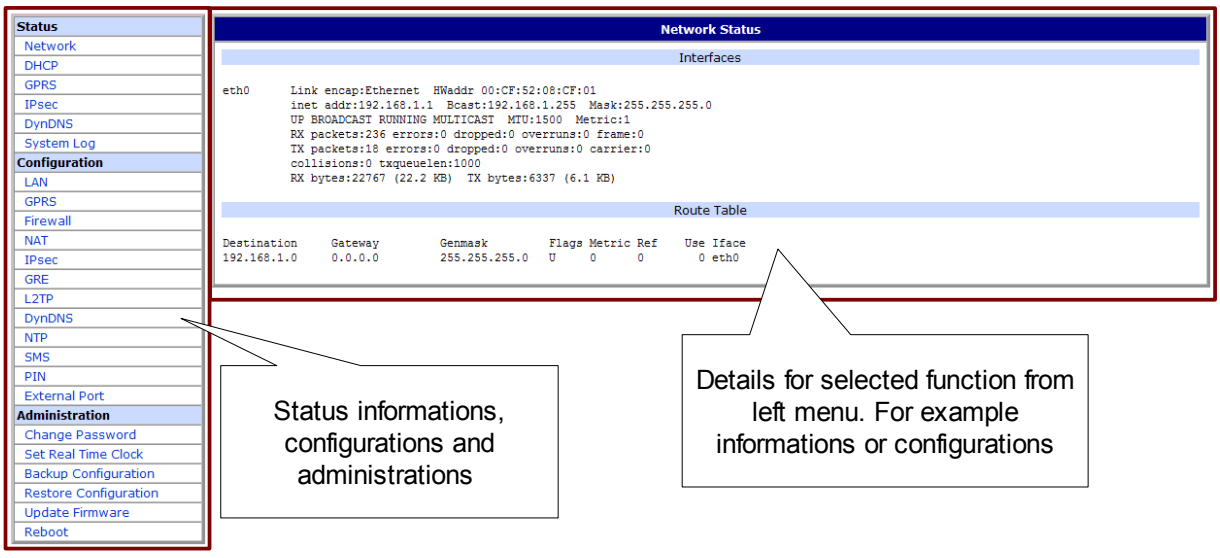
# 3. Example of use IPSec tunnel – Client side at ER75i

## 3.1. IPSec tunnel – client side at ER75i




### 3.1.1. Web configuration in ER75i

#### 3.1.1.1. Web interface in ER75i



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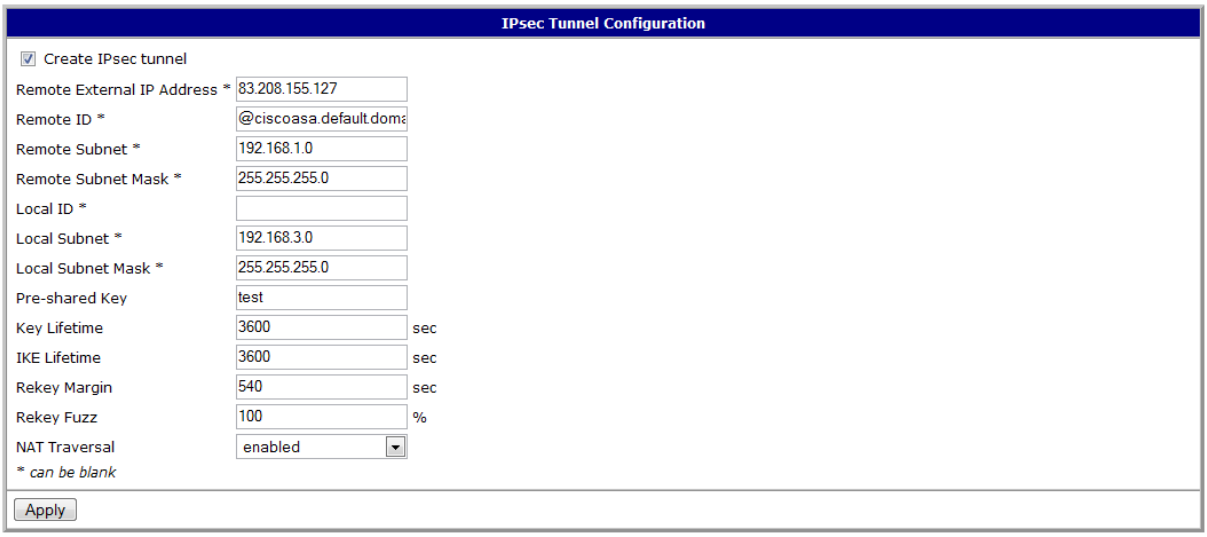
### 3.1.1.2. IPSec tunnel web configuration in ER75i




Remote ID ***@ciscoasa.default.domain*** is from two parts:

hostname: ciscoasa
domain-name: default.domain

When your network used address translation, then must be enabled NAT Traversal.

The IPSec setting is possible see on the next table.

| Configuration | ER75i |
|---|---|
| Remote External IP Address | 83.208.155.127 |
| Remote ID | @ciscoasa.default.domain |
| Remote Subnet | 192.168.1.0 |
| Remote Subnet Mask | 255.255.255.0 |
| Local Subnet | 192.168.3.0 |
| Local Subnet Mask | 255.255.255.0 |
| Pre-shared Key | test |
| NAT Traversal | Enabled |

The other settings is possible leave in default state. If „Remote External IP Address“ is blank in one side configuration then this side will wait connection and don't try establish connection itself.

Items, which can be blank, are used to exact tunnel identification.



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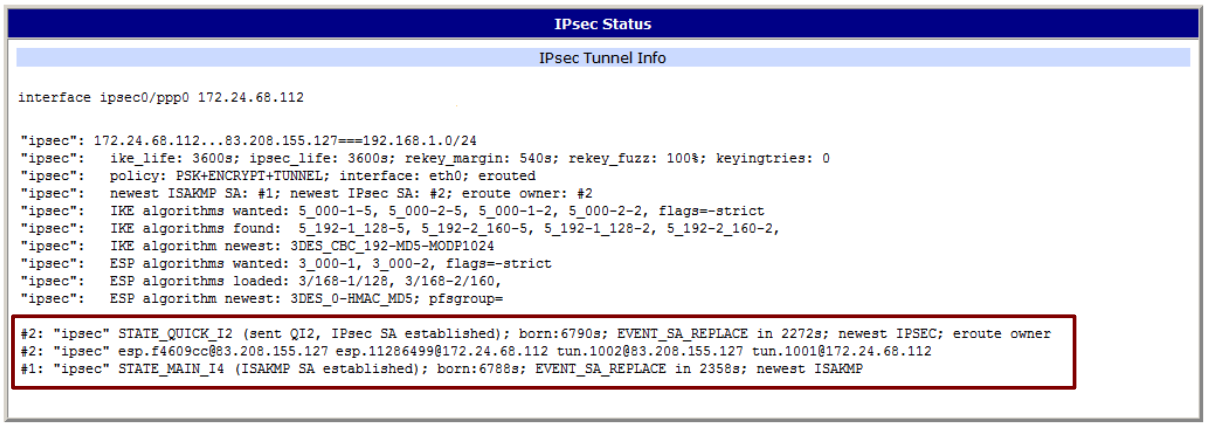
### 3.1.1.3. IPsec status in ER75i

Example of successful IPSec tunnel establishment.



**IPsec Status**

IPsec Tunnel Info

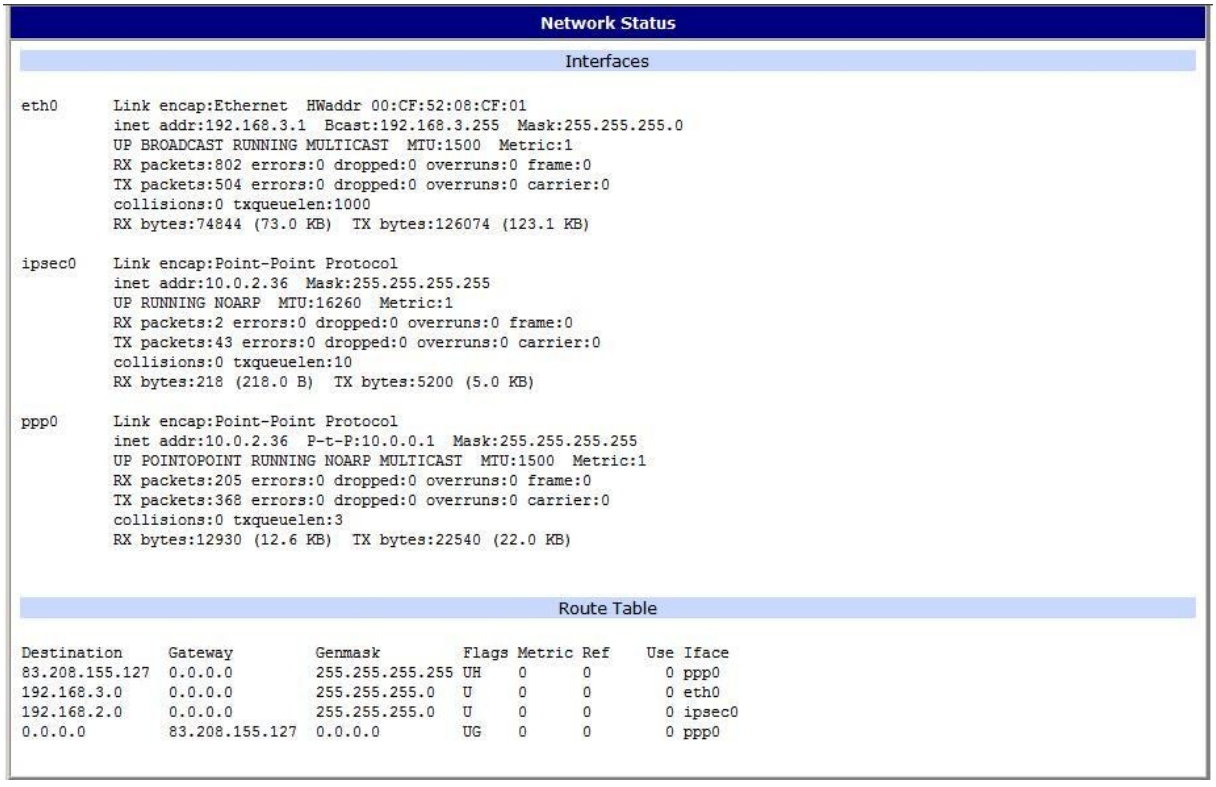
```
interface ipsec0/ppp0 172.24.68.112

"ipsec": 172.24.68.112...83.208.155.127===192.168.1.0/24
"ipsec":   ike_life: 3600s; ipsec_life: 3600s; rekey_margin: 540s; rekey_fuzz: 100%; keyingtries: 0
"ipsec":   policy: PSK+ENCRYPT+TUNNEL; interface: eth0; erouted
"ipsec":   newest ISAKMP SA: #1; newest IPsec SA: #2; eroute owner: #2
"ipsec":   IKE algorithms wanted: 5_000-1-5, 5_000-2-5, 5_000-1-2, 5_000-2-2, flags=-strict
"ipsec":   IKE algorithms found:  5_192-1_128-5, 5_192-2_160-5, 5_192-1_128-2, 5_192-2_160-2,
"ipsec":   IKE algorithm newest: 3DES_CBC_192-MD5-MODP1024
"ipsec":   ESP algorithms wanted: 3_000-1, 3_000-2, flags=-strict
"ipsec":   ESP algorithms loaded: 3/168-1/128, 3/168-2/160,
"ipsec":   ESP algorithm newest: 3DES_0-HMAC_MD5; pfsgroup=

#2: "ipsec" STATE_QUICK_I2 (sent QI2, IPsec SA established); born:6790s; EVENT_SA_REPLACE in 2272s; newest IPSEC; eroute owner
#2: "ipsec" esp.f4609cc@83.208.155.127 esp.11286499@172.24.68.112 tun.1002@83.208.155.127 tun.1001@172.24.68.112
#1: "ipsec" STATE_MAIN_I4 (ISAKMP SA established); born:6788s; EVENT_SA_REPLACE in 2358s; newest ISAKMP
```

You can see choose encryption by tunnel establishment phases:

| | | |
|---|---|---|
| **ER75i** | IKE: 3DES_CBC_192-MD5-MODP1024 | IPSec: 3DES_0-HMAC_MD5, pfsgroup = none |

In red cover is information about successful tunnel establishment.

### 3.1.1.4. IPSec status in ER75i



**Network Status**

Interfaces

```
eth0      Link encap:Ethernet  HWaddr 00:CF:52:08:CF:01
          inet addr:192.168.3.1  Bcast:192.168.3.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:802 errors:0 dropped:0 overruns:0 frame:0
          TX packets:504 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:74844 (73.0 KB)  TX bytes:126074 (123.1 KB)

ipsec0    Link encap:Point-Point Protocol
          inet addr:10.0.2.36  Mask:255.255.255.255
          UP RUNNING NOARP  MTU:16260  Metric:1
          RX packets:2 errors:0 dropped:0 overruns:0 frame:0
          TX packets:43 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:218 (218.0 B)  TX bytes:5200 (5.0 KB)

ppp0      Link encap:Point-Point Protocol
          inet addr:10.0.2.36  P-t-P:10.0.0.1  Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:205 errors:0 dropped:0 overruns:0 frame:0
          TX packets:368 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:12930 (12.6 KB)  TX bytes:22540 (22.0 KB)
```

Route Table

```
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
83.208.155.127  0.0.0.0         255.255.255.255 UH    0      0        0 ppp0
192.168.3.0     0.0.0.0         255.255.255.0   U     0      0        0 eth0
192.168.2.0     0.0.0.0         255.255.255.0   U     0      0        0 ipsec0
0.0.0.0         83.208.155.127  0.0.0.0         UG    0      0        0 ppp0
```

In Network Status you can see IPSec interface status and ER75i route table after IPSec tunnel establishment.



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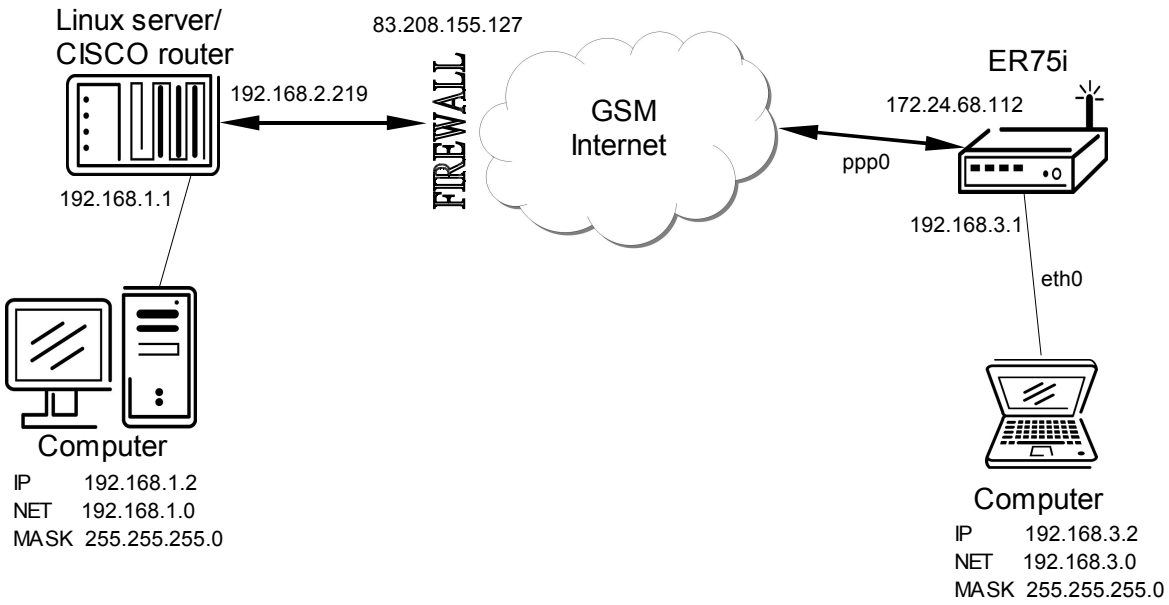
## 3.2. IPSec tunnel – server side at ER75i




### 3.2.1. Web configuration in ER75i

#### 3.2.1.1. Web interface in ER75i

See chapter 3.1.1.1.



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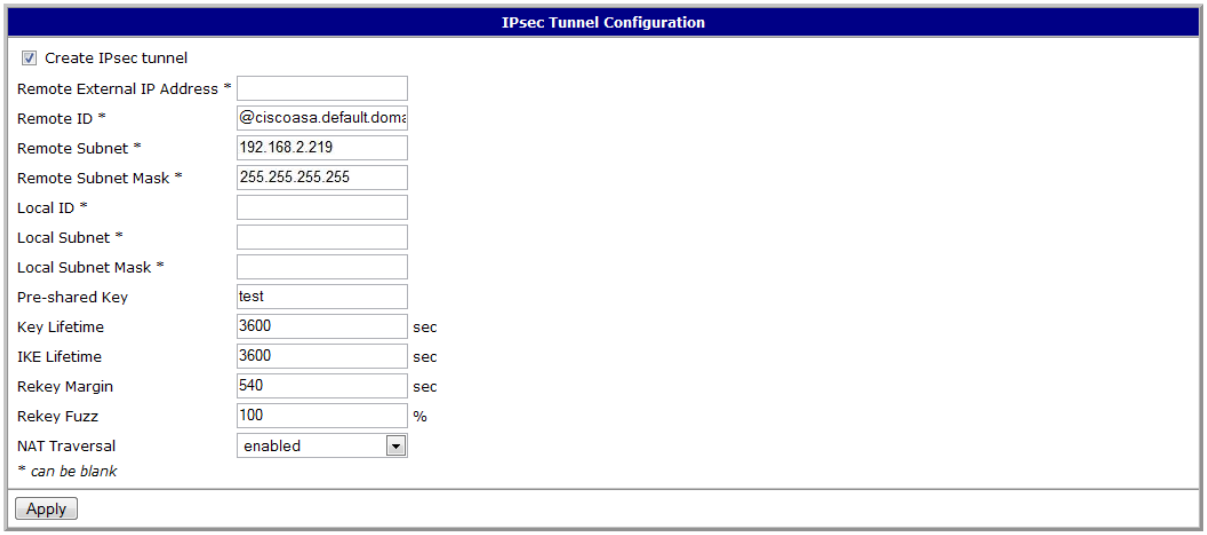
### 3.2.1.2. IPSec tunnel web configuration in ER75i

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| Remote Subnet Mask | 255.255.255.0 |
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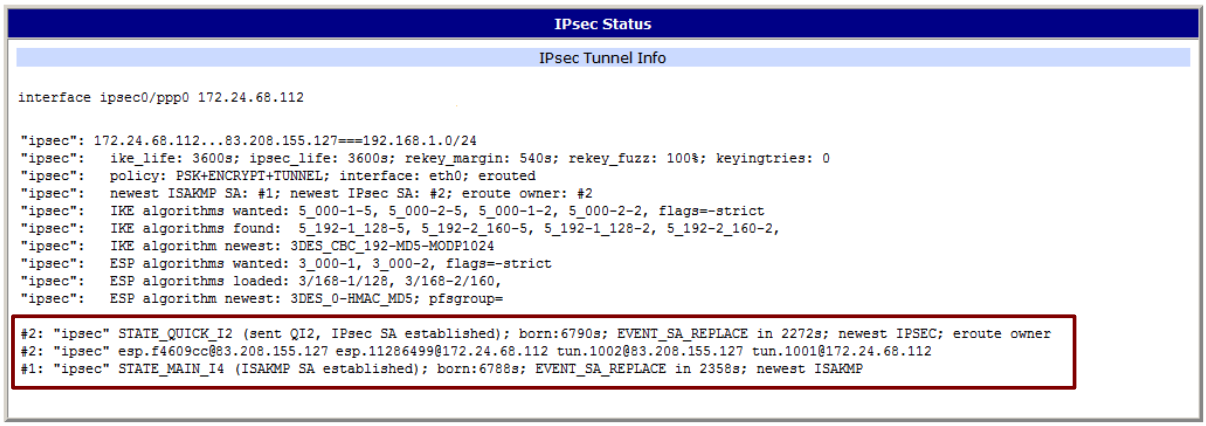
### 3.2.1.3. IPsec status in ER75i

Example of successful IPSec tunnel establishment.

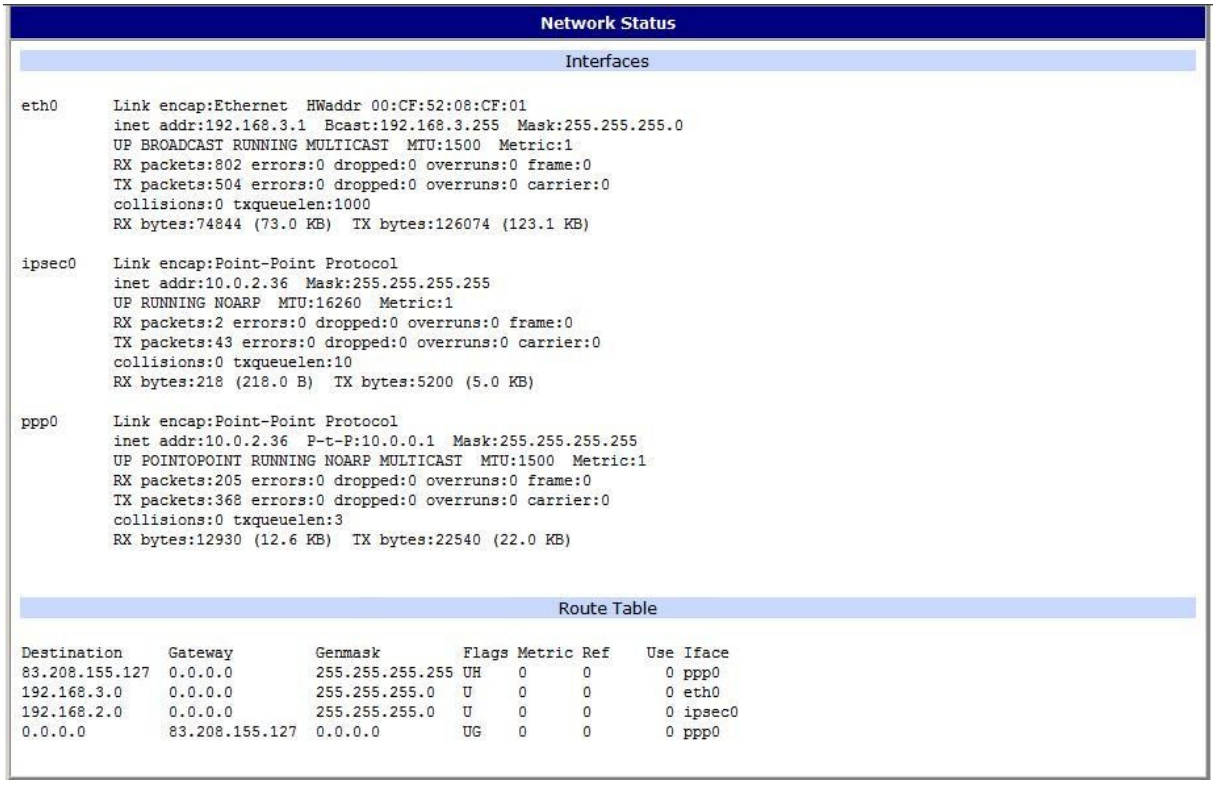



You can see choose encryption by tunnel establishment phases:

| | | |
|---|---|---|
| **ER75i** | IKE: 3DES_CBC_192-MD5-MODP1024 | IPSec: 3DES_0-HMAC_MD5, pfsgroup = none |

In red cover is information about successful tunnel establishment.

### 3.2.1.4. IPSec status in ER75i




In Network Status you can see IPSec interface status and ER75i route table after IPSec tunnel establishment.



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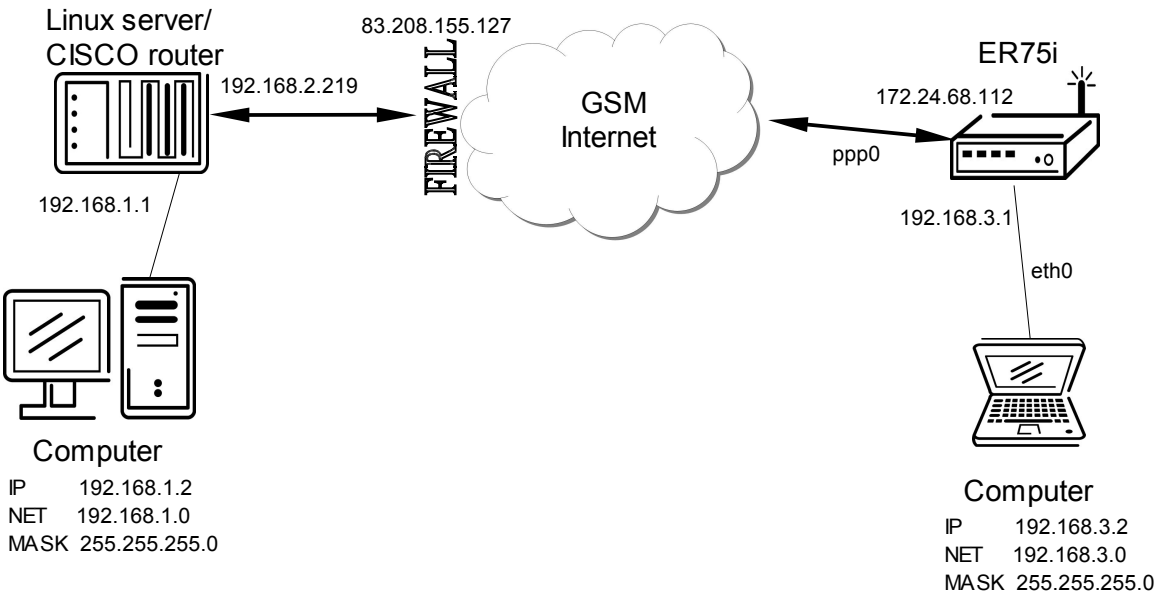
## 3.3. Linux server configuration




It is need configurate file ***ipsec.conf***.

```
conn conelur
        authby=secret
        type=tunnel
        left=83.208.155.127
        leftsubnet=192.168.1.0/24
        right=172.24.68.112
        rightsubnet=192.168.3.0/24
        ikelifetime=3600s
        keylife=3600s
        pfs=no
        auto=add
```

It is need set of the configuration file ***ipsec.secrets***.

```
83.208.155.127 172.24.68.112 :PSK "test"
```



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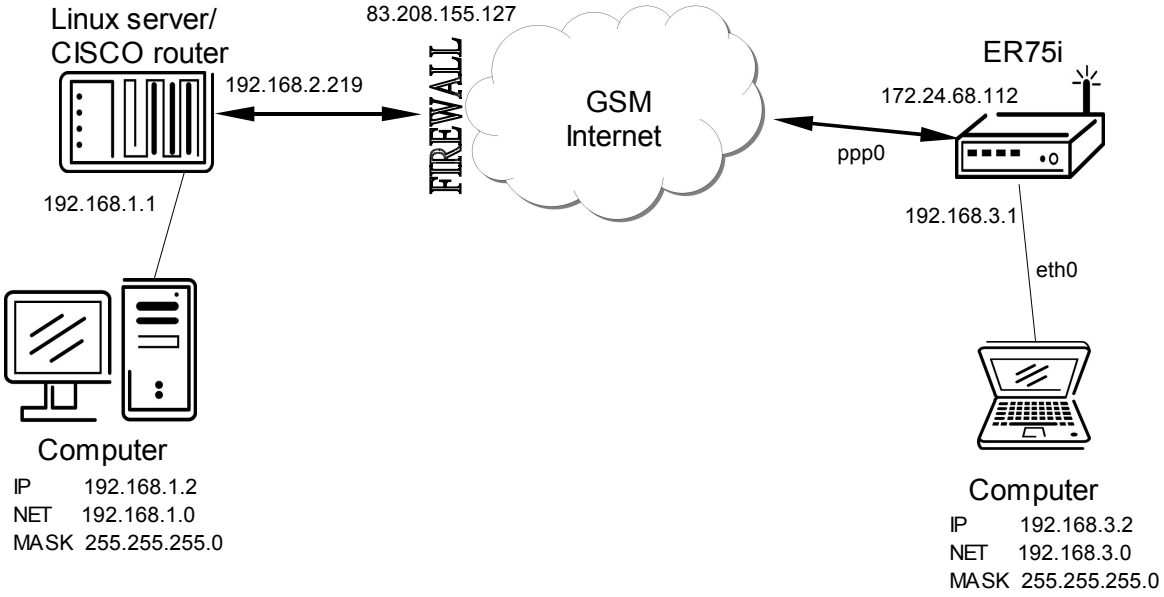
## 3.4. CISCO configuration statement




### 3.4.1. CISCO configuration – client at ER75i side

```
ASA Version 7.2(3)
!
hostname ciscoasa
domain-name default.domain
enable password 8Ry2YjIyt7RRXU24 encrypted
names
!
interface Vlan1
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
!
interface Vlan2
 nameif outside
 security-level 100
 ip address 192.168.2.219 255.255.255.0
!
interface Ethernet0/0
 switchport access vlan 2
!
interface Ethernet0/1
!
interface Ethernet0/2
!
interface Ethernet0/3
!
interface Ethernet0/4
```



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```
!
interface Ethernet0/5
!
interface Ethernet0/6
!
interface Ethernet0/7
!
passwd 2KFQnbNIdI.2KYOU encrypted
ftp mode passive
dns server-group DefaultDNS
 domain-name default.domain
same-security-traffic permit inter-interface
access-list outside_access_in extended permit ip any any
access-list outside_access_out extended permit ip any any
access-list inside_access_in extended permit ip any any
access-list inside_access_out extended permit ip any any
access-list outside_2_cryptomap extended permit ip 192.168.1.0 255.255.255.0 192.168.3.0
255.255.255.0
pager lines 24
logging enable
logging asdm informational
logging class auth asdm emergencies
logging class ip asdm critical
mtu inside 1500
mtu outside 1500
icmp unreachable rate-limit 1 burst-size 1
asdm image disk0:/asdm-523.bin
no asdm history enable
arp timeout 14400
global (outside) 1 interface
access-group inside_access_in in interface inside
access-group inside_access_out out interface inside
access-group outside_access_in in interface outside
access-group outside_access_out out interface outside
route outside 0.0.0.0 0.0.0.0 192.168.2.27 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 icmp 0:00:02
timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00
timeout sip 0:30:00 sip_media 0:02:00 sip-invite 0:03:00 sip-disconnect 0:02:00
timeout uauth 0:05:00 absolute
http server enable
http 192.168.1.0 255.255.255.0 inside
no snmp-server location
no snmp-server contact
snmp-server enable traps snmp authentication linkup linkdown coldstart
crypto ipsec transform-set ESP-DES-MD5 esp-des esp-md5-hmac
crypto ipsec transform-set ESP-DES-SHA esp-des esp-sha-hmac
crypto ipsec transform-set ESP-3DES-SHA esp-3des esp-sha-hmac
crypto ipsec transform-set ESP-AES-128-SHA esp-aes esp-sha-hmac
crypto ipsec transform-set ESP-AES-256-MD5 esp-aes-256 esp-md5-hmac
```



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```
crypto ipsec transform-set ESP-AES-256-SHA esp-aes-256 esp-sha-hmac
crypto ipsec transform-set ESP-AES-128-MD5 esp-aes esp-md5-hmac
crypto ipsec transform-set ESP-AES-192-MD5 esp-aes-192 esp-md5-hmac
crypto ipsec transform-set ESP-AES-192-SHA esp-aes-192 esp-sha-hmac
crypto ipsec transform-set UR1 esp-3des esp-none
crypto ipsec transform-set UR2 esp-des esp-none
crypto ipsec transform-set ESP-3DES-MD5 esp-3des esp-md5-hmac
crypto map outside_map 1 match address outside_2_cryptomap
crypto map outside_map 1 set connection-type answer-only
crypto map outside_map 1 set peer 172.24.68.112
crypto map outside_map 1 set transform-set ESP-3DES-MD5
crypto map outside_map interface outside
crypto isakmp identity hostname
crypto isakmp enable outside
crypto isakmp policy 10
 authentication pre-share
 encryption 3des
 hash md5
 group 2
 lifetime 3600
crypto isakmp nat-traversal  20
vpn-sessiondb max-session-limit 1
telnet timeout 5
ssh timeout 5
console timeout 0
l2tp tunnel hello 300
dhcpd auto_config outside
!
dhcpd address 192.168.1.2-192.168.1.33 inside
dhcpd enable inside
!
!
class-map inspection_default
 match default-inspection-traffic
!
!
policy-map type inspect dns preset_dns_map
 parameters
  message-length maximum 512
policy-map global_policy
 class inspection_default
  inspect dns preset_dns_map
  inspect ftp
  inspect h323 h225
  inspect h323 ras
  inspect rsh
  inspect rtsp
  inspect esmtp
  inspect sqlnet
  inspect skinny
```



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```
  inspect sunrpc
  inspect xdmcp
  inspect sip
  inspect netbios
  inspect tftp
  inspect icmp
  inspect icmp error
  inspect ipsec-pass-thru
!
service-policy global_policy global
ssl encryption 3des-sha1 aes128-sha1 aes256-sha1 des-sha1 rc4-md5
group-policy DfltGrpPolicy attributes
 banner none
 wins-server none
 dns-server none
 dhcp-network-scope none
 vpn-access-hours none
 vpn-simultaneous-logins 3
 vpn-idle-timeout none
 vpn-session-timeout none
 vpn-filter none
 vpn-tunnel-protocol IPSec l2tp-ipsec webvpn
 password-storage disable
 ip-comp disable
 re-xauth disable
 group-lock none
 pfs disable
 ipsec-udp enable
 ipsec-udp-port 10000
 split-tunnel-policy tunnelall
 split-tunnel-network-list none
 default-domain none
split-dns none
 intercept-dhcp 255.255.255.255 disable
 secure-unit-authentication disable
 user-authentication disable
 user-authentication-idle-timeout none
 ip-phone-bypass disable
 leap-bypass disable
 nem disable
 backup-servers keep-client-config
 msie-proxy server none
 msie-proxy method no-modify
 msie-proxy except-list none
 msie-proxy local-bypass disable
 nac disable
 nac-sq-period 300
 nac-reval-period 36000
 nac-default-acl none
 address-pools none
```



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```
 smartcard-removal-disconnect enable
 client-firewall none
 client-access-rule none
 webvpn
  functions none
html-content-filter none
  homepage none
  keep-alive-ignore 4
  http-comp gzip
  filter none
  url-list none
  customization value DfltCustomization
  port-forward none
  port-forward-name value Application Access
  sso-server none
  deny-message value Login was successful, but because certain criteria have not
 been met or due to some specific group policy, you do not have permission to use
 any of the VPN features. Contact your IT administrator for more information
  svc none
  svc keep-installer installed
  svc keepalive none
  svc rekey time none
  svc rekey method none
  svc dpd-interval client none
  svc dpd-interval gateway none
  svc compression deflate
tunnel-group DefaultL2LGroup ipsec-attributes
 pre-shared-key *
isakmp keepalive threshold 20 retry 10
tunnel-group 172.24.68.112 type ipsec-l2l
tunnel-group 172.24.68.112 ipsec-attributes
 pre-shared-key *
tunnel-group-map enable rules
tunnel-group-map default-group DefaultL2LGroup
prompt hostname context
no compression svc http-comp
zonelabs-integrity fail-timeout 20
Cryptochecksum:57784235ddef16872374b10e67a1415d
: end
```



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### *3.4.2. CISCO configuration – server at ER75i side*

```
ASA Version 7.2(3)
!
hostname ciscoasa
domain-name default.domain
enable password 8Ry2YjIyt7RRXU24 encrypted
names
!
interface Vlan1
 nameif inside
 security-level 100
 ip address 192.168.1.1 255.255.255.0
!
interface Vlan2
 nameif outside
 security-level 100
 ip address 192.168.2.219 255.255.255.0
!
interface Ethernet0/0
 switchport access vlan 2
!
interface Ethernet0/1
!
interface Ethernet0/2
!
interface Ethernet0/3
!
interface Ethernet0/4
!
interface Ethernet0/5
!
interface Ethernet0/6
!
interface Ethernet0/7
!
passwd 2KFQnbNIdI.2KYOU encrypted
ftp mode passive
dns server-group DefaultDNS
 domain-name default.domain
same-security-traffic permit inter-interface
access-list outside_access_in extended permit ip any any
access-list outside_access_out extended permit ip any any
access-list inside_access_in extended permit ip any any
access-list inside_access_out extended permit ip any any
```



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```
access-list outside_2_cryptomap extended permit ip 192.168.1.0 255.255.255.0 192
.168.3.0 255.255.255.0
pager lines 24
logging enable
logging asdm informational
logging class auth asdm emergencies
logging class ip asdm critical
mtu inside 1500
mtu outside 1500
icmp unreachable rate-limit 1 burst-size 1
asdm image disk0:/asdm-523.bin
no asdm history enable
arp timeout 14400
global (outside) 1 interface
access-group inside_access_in in interface inside
access-group inside_access_out out interface inside
access-group outside_access_in in interface outside
access-group outside_access_out out interface outside
route outside 0.0.0.0 0.0.0.0 192.168.2.27 1
timeout xlate 3:00:00
timeout conn 1:00:00 half-closed 0:10:00 udp 0:02:00 icmp 0:00:02
timeout sunrpc 0:10:00 h323 0:05:00 h225 1:00:00 mgcp 0:05:00 mgcp-pat 0:05:00
timeout sip 0:30:00 sip_media 0:02:00 sip-invite 0:03:00 sip-disconnect 0:02:00
timeout uauth 0:05:00 absolute
http server enable
http 192.168.1.0 255.255.255.0 inside
no snmp-server location
no snmp-server contact
snmp-server enable traps snmp authentication linkup linkdown coldstart
crypto ipsec transform-set ESP-DES-MD5 esp-des esp-md5-hmac
crypto ipsec transform-set ESP-DES-SHA esp-des esp-sha-hmac
crypto ipsec transform-set ESP-3DES-SHA esp-3des esp-sha-hmac
crypto ipsec transform-set ESP-AES-128-SHA esp-aes esp-sha-hmac
crypto ipsec transform-set ESP-AES-256-MD5 esp-aes-256 esp-md5-hmac
crypto ipsec transform-set ESP-AES-256-SHA esp-aes-256 esp-sha-hmac
crypto ipsec transform-set ESP-AES-128-MD5 esp-aes esp-md5-hmac
crypto ipsec transform-set ESP-AES-192-MD5 esp-aes-192 esp-md5-hmac
crypto ipsec transform-set ESP-AES-192-SHA esp-aes-192 esp-sha-hmac
crypto ipsec transform-set UR1 esp-3des esp-none
crypto ipsec transform-set UR2 esp-des esp-none
crypto ipsec transform-set ESP-3DES-MD5 esp-3des esp-md5-hmac
crypto map outside_map 1 match address outside_2_cryptomap
crypto map outside_map 1 set connection-type originate-only
crypto map outside_map 1 set peer 172.24.68.112
crypto map outside_map 1 set transform-set ESP-3DES-MD5
crypto map outside_map interface outside
```



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```
crypto isakmp identity hostname
crypto isakmp enable outside
crypto isakmp policy 10
 authentication pre-share
 encryption 3des
 hash md5
 group 2
 lifetime 3600
crypto isakmp nat-traversal  20
vpn-sessiondb max-session-limit 1
telnet timeout 5
ssh timeout 5
console timeout 0
l2tp tunnel hello 300
dhcpd auto_config outside
!
dhcpd address 192.168.1.2-192.168.1.33 inside
dhcpd enable inside
!

!
class-map inspection_default
 match default-inspection-traffic
!
!
policy-map type inspect dns preset_dns_map
 parameters
  message-length maximum 512
policy-map global_policy
 class inspection_default
  inspect dns preset_dns_map
  inspect ftp
  inspect h323 h225
  inspect h323 ras
  inspect rsh
  inspect rtsp
  inspect esmtp
  inspect sqlnet
  inspect skinny
  inspect sunrpc
  inspect xdmcp
  inspect sip
  inspect netbios
  inspect tftp
  inspect icmp
  inspect icmp error
```



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```
  inspect ipsec-pass-thru
!
service-policy global_policy global
ssl encryption 3des-sha1 aes128-sha1 aes256-sha1 des-sha1 rc4-md5
group-policy DfltGrpPolicy attributes
 banner none
 wins-server none
 dns-server none
 dhcp-network-scope none
 vpn-access-hours none
 vpn-simultaneous-logins 3
 vpn-idle-timeout none
 vpn-session-timeout none
 vpn-filter none
 vpn-tunnel-protocol IPSec l2tp-ipsec webvpn
 password-storage disable
 ip-comp disable
 re-xauth disable
 group-lock none
 pfs disable
 ipsec-udp enable
 ipsec-udp-port 10000
 split-tunnel-policy tunnelall
 split-tunnel-network-list none
 default-domain none
split-dns none
 intercept-dhcp 255.255.255.255 disable
 secure-unit-authentication disable
 user-authentication disable
 user-authentication-idle-timeout none
 ip-phone-bypass disable
 leap-bypass disable
 nem disable
 backup-servers keep-client-config
 msie-proxy server none
 msie-proxy method no-modify
 msie-proxy except-list none
 msie-proxy local-bypass disable
 nac disable
 nac-sq-period 300
 nac-reval-period 36000
 nac-default-acl none
 address-pools none
 smartcard-removal-disconnect enable
 client-firewall none
 client-access-rule none
```



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```
 webvpn
  functions none
 html-content-filter none
  homepage none
  keep-alive-ignore 4
  http-comp gzip
  filter none
  url-list none
  customization value DfltCustomization
  port-forward none
  port-forward-name value Application Access
  sso-server none
  deny-message value Login was successful, but because certain criteria have not
  been met or due to some specific group policy, you do not have permission to us
e any of the VPN features. Contact your IT administrator for more information
  svc none
  svc keep-installer installed
  svc keepalive none
  svc rekey time none
  svc rekey method none
  svc dpd-interval client none
  svc dpd-interval gateway none
  svc compression deflate
tunnel-group DefaultL2LGroup ipsec-attributes
 pre-shared-key *
 isakmp keepalive threshold 20 retry 10
tunnel-group 172.24.68.112 type ipsec-l2l
tunnel-group 172.24.68.112 ipsec-attributes
 pre-shared-key *
tunnel-group-map enable rules
tunnel-group-map default-group DefaultL2LGroup
prompt hostname context
no compression svc http-comp
zonelabs-integrity fail-timeout 20
Cryptochecksum:3745a840258fc10269e066655f5b252e
: end
```



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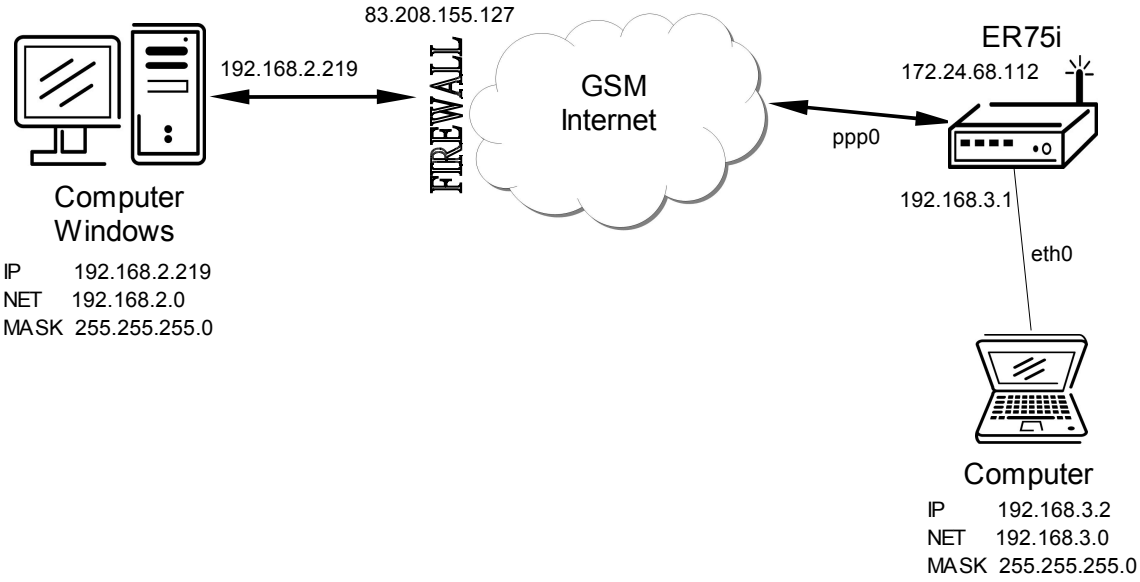
## 3.5. IPSec configuration in Windows




### 3.5.1. IPSec configuration in the NCP Secure Entry Client program

#### 3.5.1.1. NCP Secure Entry Client program interface

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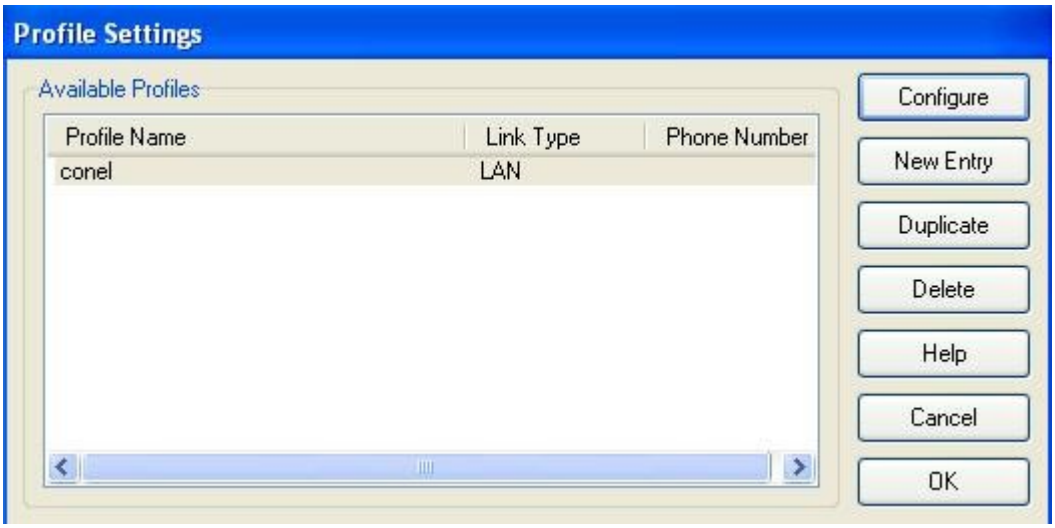
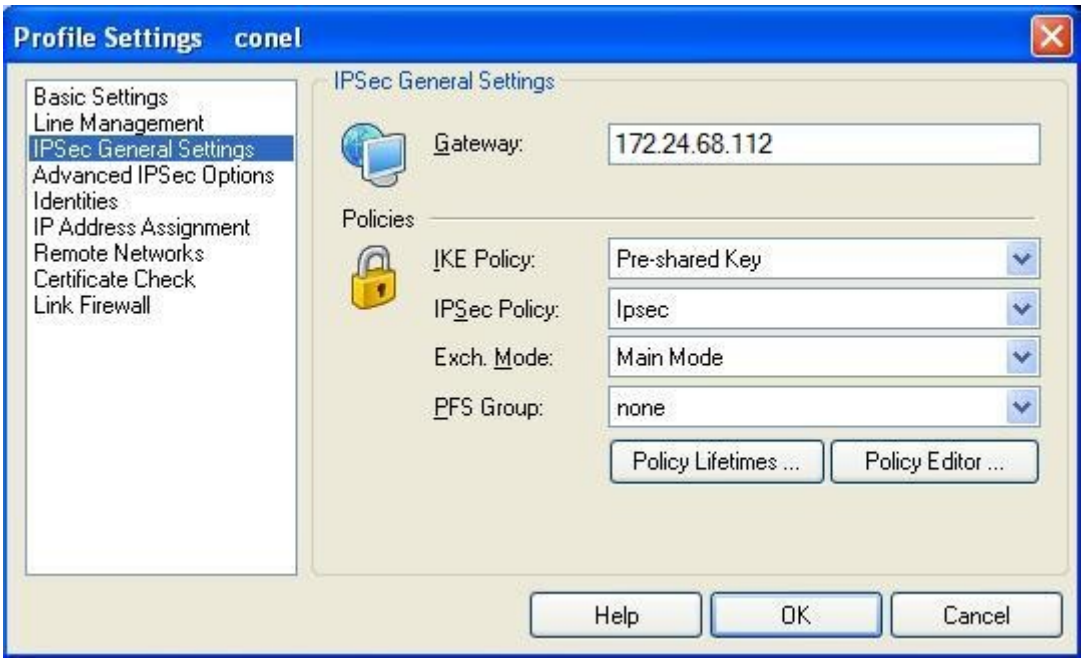
### 3.5.1.2. Profile settings for IPSec tunnel establishment




### 3.5.1.3. IPSec tunnel configuration – main settings



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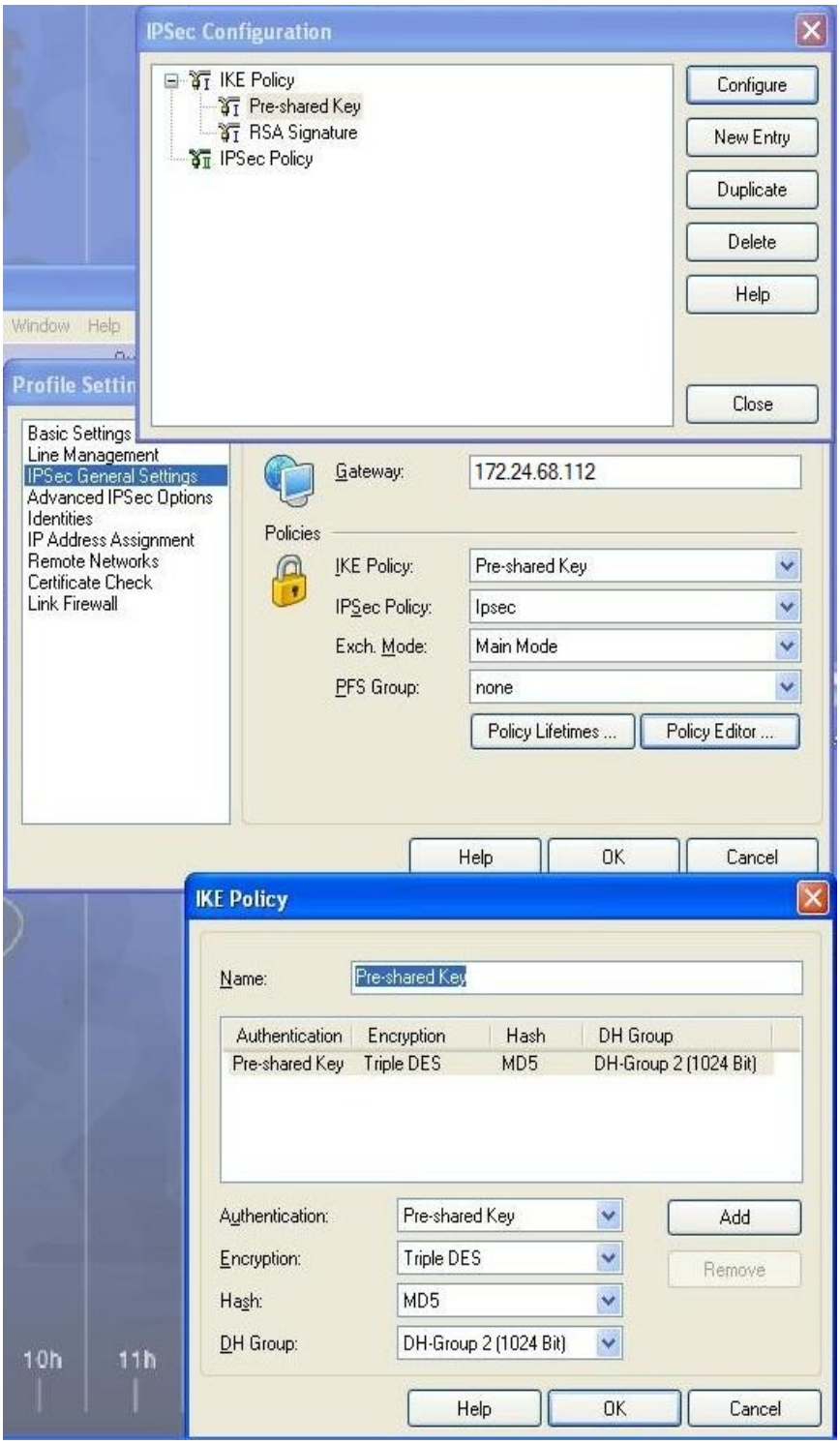
### 3.5.1.4. IKE policy configuration



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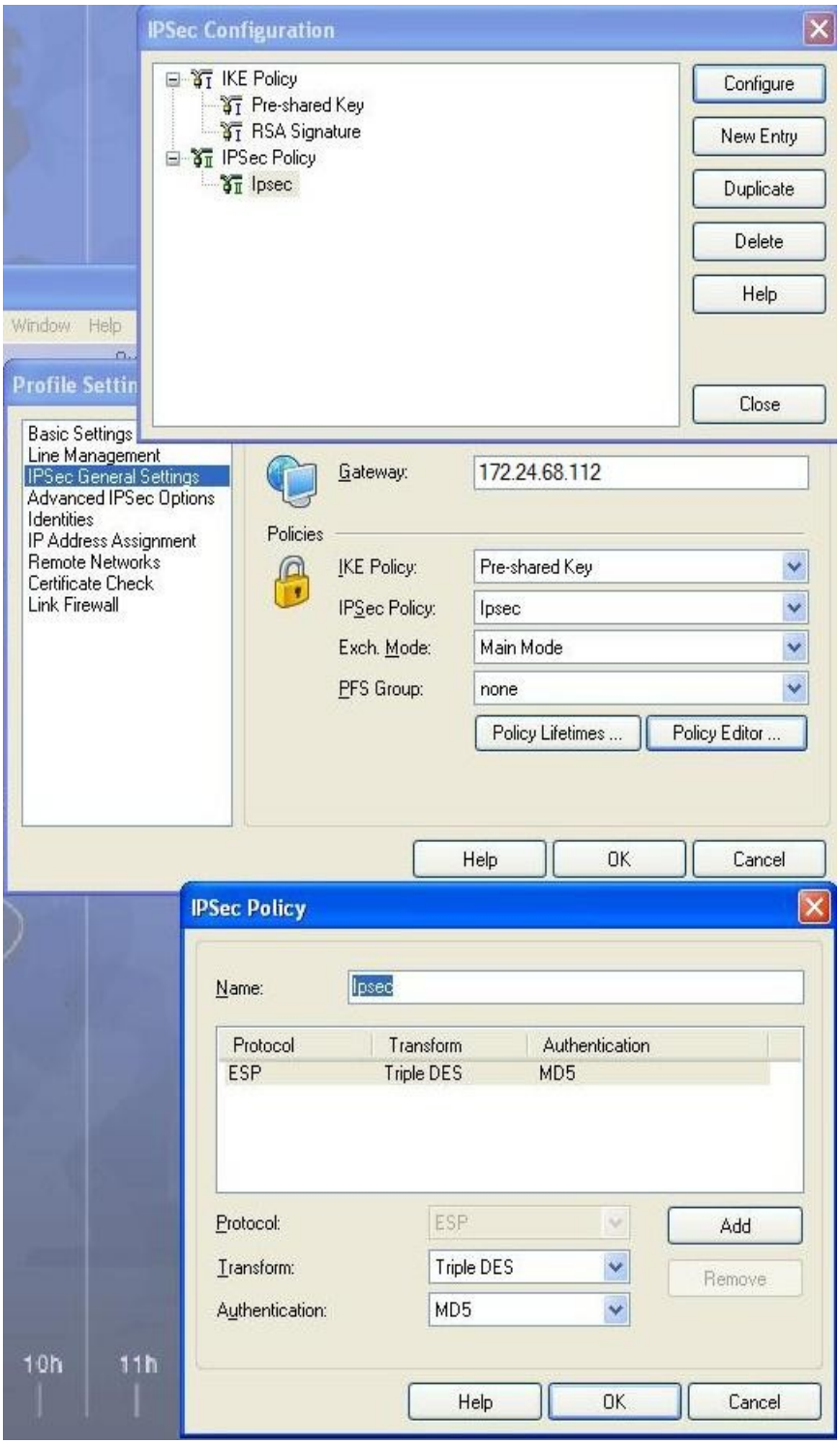
### 3.5.1.5. IPSec policy configuration



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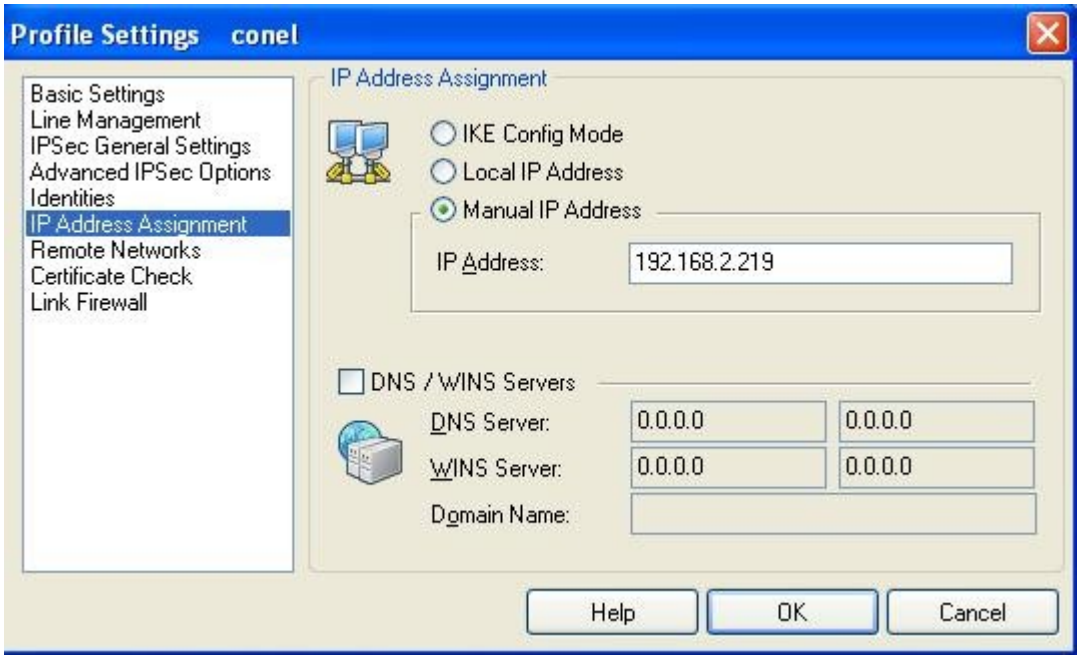
### 3.5.1.6. Identification configuration


### 3.5.1.7. IPSec address assignment configuration



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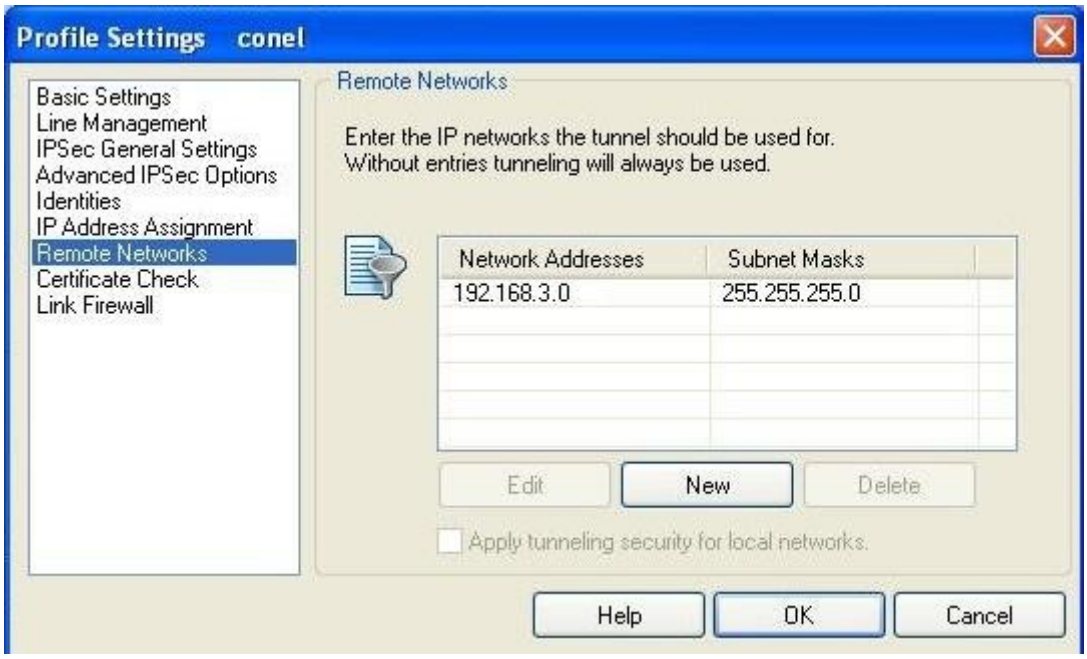
### 3.5.1.8. Remote network configuration




### 3.5.1.9. ER75i configuration

The ER75i router is set according to chapter 3.1.



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