TheGreenBow IPSec VPN Client

Configuration Guide

Vyatta Router
with Certificate

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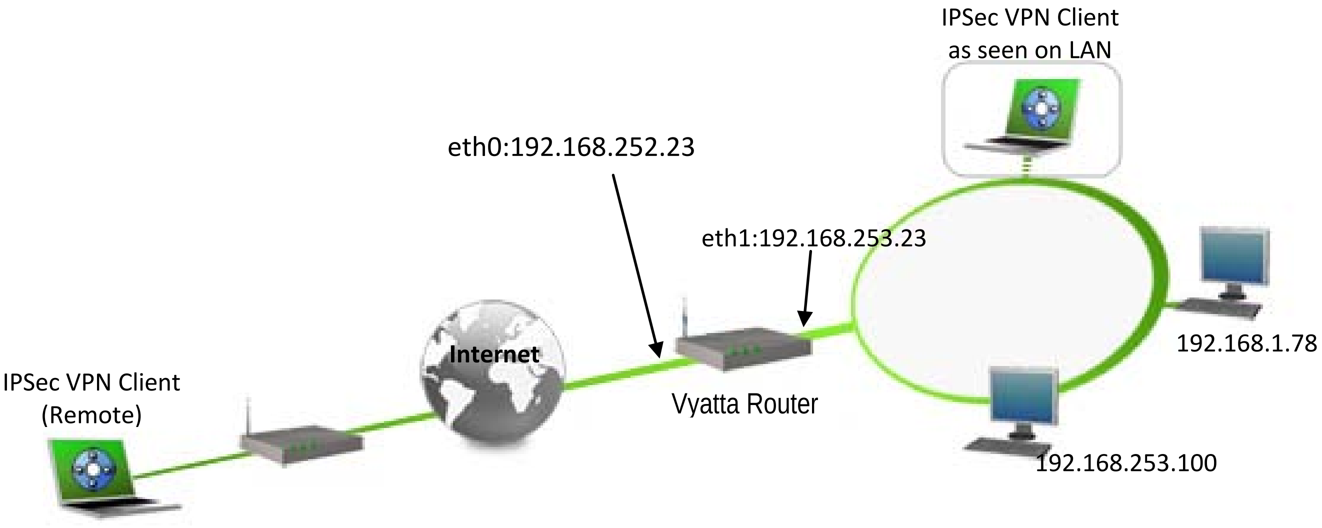
1 Introduction

1.1 Goal of this document

This configuration guide describes how to configure TheGreenBow IPSec VPN Client software with a Vyatta VPN Router to establish VPN connections for remote access to corporate network

1.2 VPN Network topology

In our VPN network example (diagram hereafter), we will connect TheGreenBow IPSec VPN Client software to the LAN behind the Vyatta VPN Router. The VPN client is connected to the Internet with a DSL connection or through a LAN. All the addresses in this document are given for example purpose.



1.3 Vyatta Router Restrictions

Depending on the firmware version, Vyatta Router may not support NAT-T and as a consequence the IPSec VPN Client software could not connect if standing on a LAN behind (e.g. router at home, ..).

1.4 Vyatta VPN Gateway

Our tests and VPN configuration have been conducted with Vyatta Router firmware release VC6.4.

1.5 Vyatta VPN Router product info

It is critical that users find all necessary information about Vyatta VPN Router Gateway. All product info, User Guide and knowledge base for the Vyatta VPN Router can be found on the Vyatta Router website: www.vyatta.org.

Vyatta Router Product page	http://www.vyatta.org/downloads
Vyatta Router User Guide	http://www.vyatta.org/documentation
Vyatta Router FAQ/Knowledge Base	http://www.vyatta.org/forum

2 Vyatta VPN Router configuration using CLI

This section describes how to build an IPSec VPN configuration with your Vyatta VPN Router.

Once connected to your Vyatta VPN gateway, you must select “Security” and “VPN” tabs.

This DOCUMENT does not include how to install the Vyatta system. For more this information, please visit Vyatta website.

2.1 Making CA certificate in Vyatta VPN Router

```
Login:vyatta
password:vyatta
vyatta@vyatta:~$ configure
vyatta@vyatta# set system gateway-address 192.168.252.XXX
vyatta@vyatta# set interfaces ethernet eth0 address 192.168.252.23/24
vyatta@vyatta# set interfaces ethernet eth1 address 192.168.253.23/24
vyatta@vyatta# commit
[edit]
vyatta@vyatta# exit
vyatta@vyatta:~$ cd /usr/lib/ssl/misc/
vyatta@vyatta:/usr/lib/ssl/misc$ sudo ./CA.sh -newca
......(Installation the Certificate Authority:
CA certificate filename (or enter to create)

Making CA certificate ...
Generating a 1024 bit RSA private key
............++++++
..++++++
writing new private key to './demoCA/private/./cakey.pem'
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:
-----
```

You are about to be asked to enter information that will be incorporated into your certificate request. What you are about to enter is what is called a Distinguished Name or a DN. There are quite a few fields but you can leave some blank. For some fields there will be a default value. If you enter '.', the field will be left blank.

```
-----
Country Name (2 letter code) [AU]:cn
State or Province Name (full name) [Some-State]:bj
Locality Name (eg, city) []:bj
Organization Name (eg, company) [Internet Widgits Pty Ltd]:tgb
Organizational Unit Name (eg, section) []:tgb
```

```
Common Name (eg, YOUR name) []:willyangye
Email Address []:will.yangye@thegreenbow.com
```

Please enter the following 'extra' attributes to be sent with your certificate request.

A challenge password []:123456

An optional company name []:tgb

Using configuration from /usr/lib/ssl/openssl.cnf

Enter pass phrase for ./demoCA/private/./cakey.pem:

......)

```
vyatta@vyatta:/usr/lib/ssl/misc$ sudo cp demoCA/cacert.pem /config/auth/
vyatta@vyatta:/usr/lib/ssl/misc$ sudo ./CA.sh -newreq
......(make a new cert request)
vyatta@vyatta:/usr/lib/ssl/misc$ sudo ./CA.sh -sign
......(signature the request)
vyatta@vyatta:/usr/lib/ssl/misc$ sudo mv newcert.pem host.pem
vyatta@vyatta:/usr/lib/ssl/misc$ sudo mv newkey.pem host.key
vyatta@vyatta:/usr/lib/ssl/misc$ sudo cp host.* /config/auth/
vyatta@vyatta:/usr/lib/ssl/misc$ sudo ./CA.sh -newreq
vyatta@vyatta:/usr/lib/ssl/misc$ sudo ./CA.sh -sign
vyatta@vyatta:/usr/lib/ssl/misc$ sudo mv newcert.pem win.pem
vyatta@vyatta:/usr/lib/ssl/misc$ sudo mv newkey.pem win.key
vyatta@vyatta:/usr/lib/ssl/misc$  sudo  openssl  pkcs12  -export  -in  win.pem  -inkey
win.key -certfile demoCA/cacert.pem -out win.p12
```

Copy the win.p12 file out of the router and import it into TheGreenBow IPSec VPN Client software.

2.2 Setup VPN in Vyatta VPN Router

```
vyatta@vyatta:/usr/lib/ssl/misc$ configure
[edit]
vyatta@vyatta# set vpn ipsec
[edit]
vyatta@vyatta# edit vpn ipsec
[edit vpn ipsec]
vyatta@vyatta# set esp-group esp-d
[edit vpn ipsec]
vyatta@vyatta# edit esp-group esp-d
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# set compression disable
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# set lifetime 3600
```

```
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# set mode tunnel
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# set pfs dh-group2
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# set proposal 1 encryption aes256
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# set proposal 1 hash sha1
[edit vpn ipsec esp-group esp-d]
vyatta@vyatta# top
[edit]
vyatta@vyatta# edit vpn ipsec
[edit vpn ipsec]
vyatta@vyatta# set ike-group ike-d
[edit vpn ipsec]
vyatta@vyatta# edit ike-group ike-d
[edit vpn ipsec ike-group ike-d]
vyatta@vyatta# set lifetime 3600
[edit vpn ipsec ike-group ike-d]
vyatta@vyatta# set proposal 1 dh-group 2
[edit vpn ipsec ike-group ike-d]
vyatta@vyatta# set proposal 1 encryption aes256
[edit vpn ipsec ike-group ike-d]
vyatta@vyatta# set proposal 1 hash sha1
[edit vpn ipsec ike-group ike-d]
vyatta@vyatta# top
[edit]
vyatta@vyatta# set vpn ipsec nat-traversal enable
[edit]
vyatta@vyatta# set vpn ipsec ipsec-interfaces interface eth0
[edit]
vyatta@vyatta# commit
[ vpn ]
VPN Warning: IPSec configured but no site-to-site peers or l2tp remote-users
configured
[edit]
vyatta@vyatta# set vpn ipsec site-to-site peer 0.0.0.0
[edit]
vyatta@vyatta# edit vpn ipsec site-to-site peer 0.0.0.0
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set authentication mode x509
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set authentication x509 ca-cert-file /config/auth/cacert.pem
```

```
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set authentication x509 cert-file /config/auth/host.pem
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set authentication x509 key file /config/auth/host.key
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set authentication x509 key password 123456
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set default-esp-group esp-d
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set ike-group ike-d
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set local-ip 192.168.252.23
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set tunnel 1 local subnet 192.168.253.0/24
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# set tunnel 1 remote subnet 0.0.0.0/0
[edit vpn ipsec site-to-site peer 0.0.0.0]
vyatta@vyatta# top
[edit]
vyatta@vyatta# commit
vyatta@vyatta# save
```

2.3 Very important steps in Vyatta VPN router configuration

Vyatta Open-source Router uses StrongSwan as its IPSec solution, but, there is a bug in VC6.4. The bug impacts the VPN-config perl script, which did not include some necessary configuration using in StrongSwan.

The solution is below:

```
vyatta@vyatta# exit
exit
vyatta@vyatta:~$ sudo vi /etc/ipsec.conf
```

Then open and edit the conf file and add below configuration into the “conn peer-0.0.0.0-tunnel-1” section

```
leftsourceip=192.168.253.23
rightsubnetwithin=0.0.0.0/0
save & quit the conf file, then at the CLI restart vpn damon
vyatta@vyatta:~$ restart vpn
```

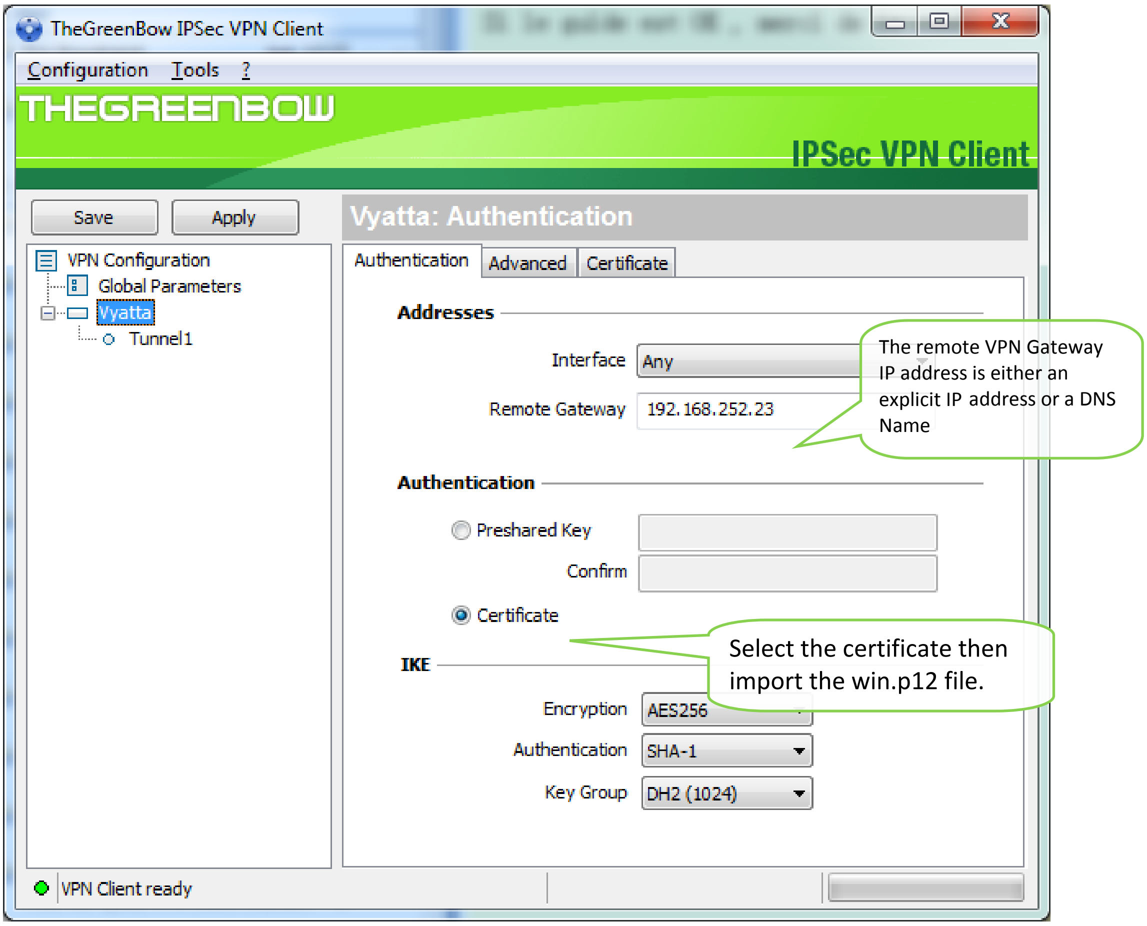
The Router Ready!

3 TheGreenBow IPSec VPN Client configuration

This section describes the required configuration to connect to a Vyatta VPN Router via VPN connections.

To download the latest release of TheGreenBow IPSec VPN Client software, please go to http://www.thegreenbow.com/vpn_down.html.

3.1 VPN Client Phase 1 (IKE) Configuration



Vyatta: Authentication

Addresses

Interface: Any

Remote Gateway: 192.168.252.23

Authentication

○ Preshared Key

Confirm

● Certificate

IKE

Encryption: AES256

Authentication: SHA-1

Key Group: DH2 (1024)

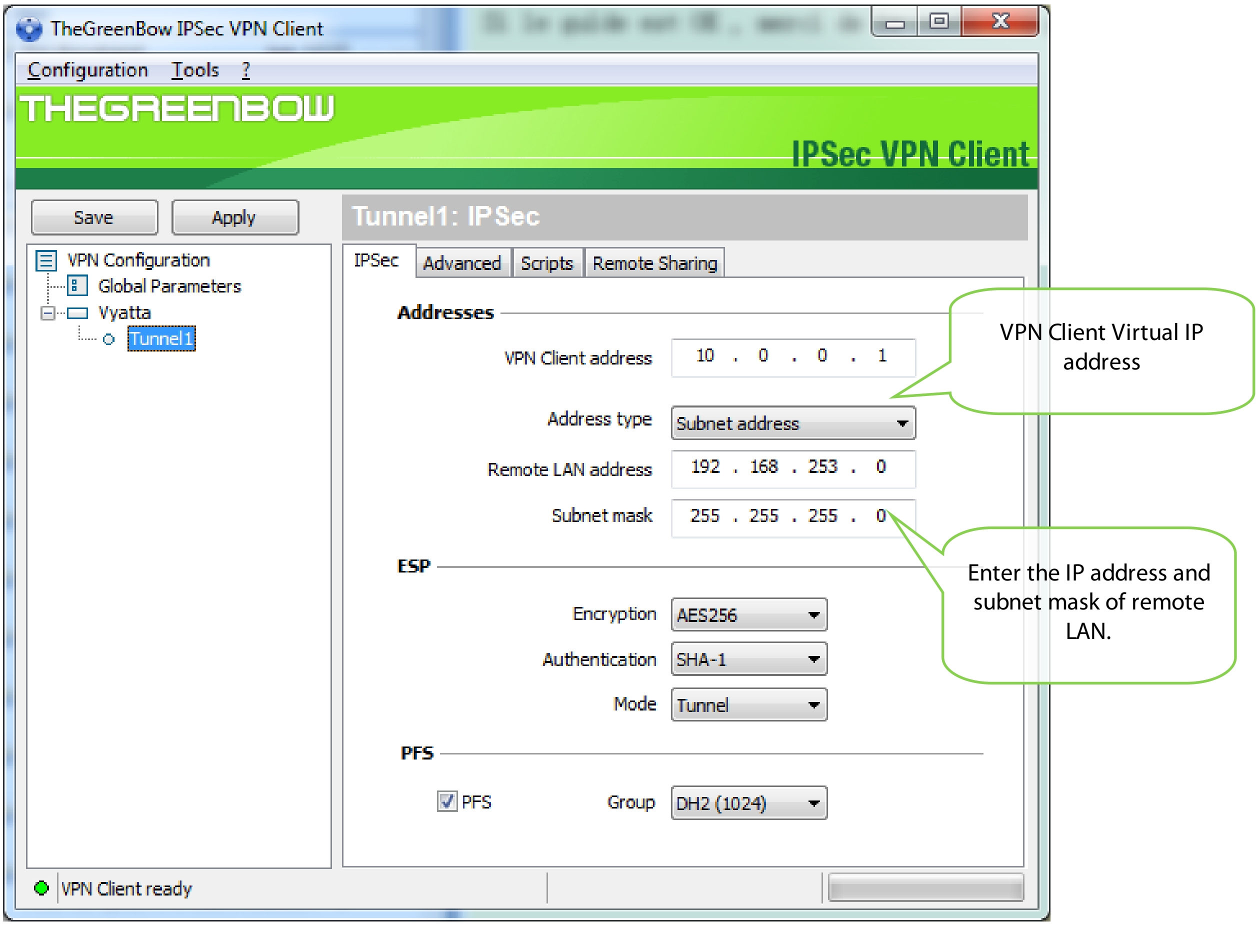
The remote VPN Gateway IP address is either an explicit IP address or a DNS Name

Select the certificate then import the win.p12 file.

Phase 1 configuration

You may use either Preshared key, Certificates, USB Tokens, OTP Token (One Time Password) or X-Auth combined with RADIUS Server for User Authentication with the Vyatta Router. This configuration is one example of what can be accomplished in term of User Authentication. You may want to refer to either the Vyatta Router user guide or TheGreenBow IPSec VPN Client software User Guide for more details on User Authentication options.

3.2 VPN Client Phase 2 (IPSec) Configuration



Addresses

VPN Client address: 10 . 0 . 0 . 1

Address type: Subnet address

Remote LAN address: 192 . 168 . 253 . 0

Subnet mask: 255 . 255 . 255 . 0

ESP

Encryption: AES256

Authentication: SHA-1

Mode: Tunnel

PFS

☑ PFS Group: DH2 (1024)

● VPN Client ready

VPN Client Virtual IP address

Enter the IP address and subnet mask of remote LAN.

Phase 2 Configuration

3.3 Open IPSec VPN tunnels

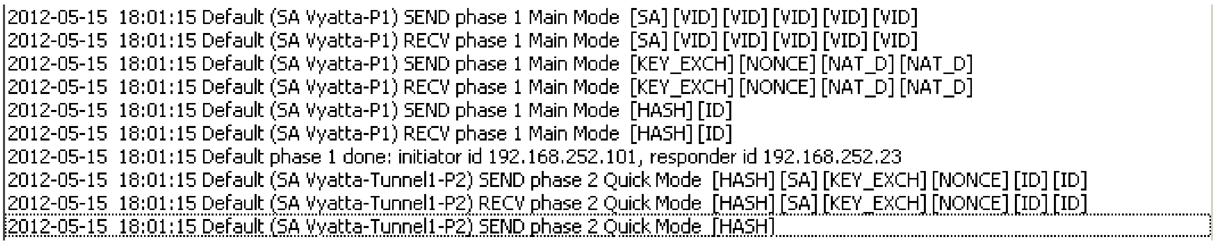
Once both Vyatta Router and TheGreenBow IPSec VPN Client software have been configured accordingly, you are ready to open VPN tunnels. First make sure you enable your firewall with IPSec traffic.

1. Click on "**Save & Apply**" to take into account all modifications we've made on your VPN Client configuration

2. Click on "**Open Tunnel**", or generate traffic that will automatically open a secure IPSec VPN Tunnel (e.g. ping, IE browser)

3. Select "**Connections**" to see opened VPN Tunnels

4. Select "**Console**" if you want to access to the IPSec VPN logs and adjust filters to display less IPSec messaging. The following example shows a successful connection between TheGreenBow IPSec VPN Client and a Vyatta VPN Router.



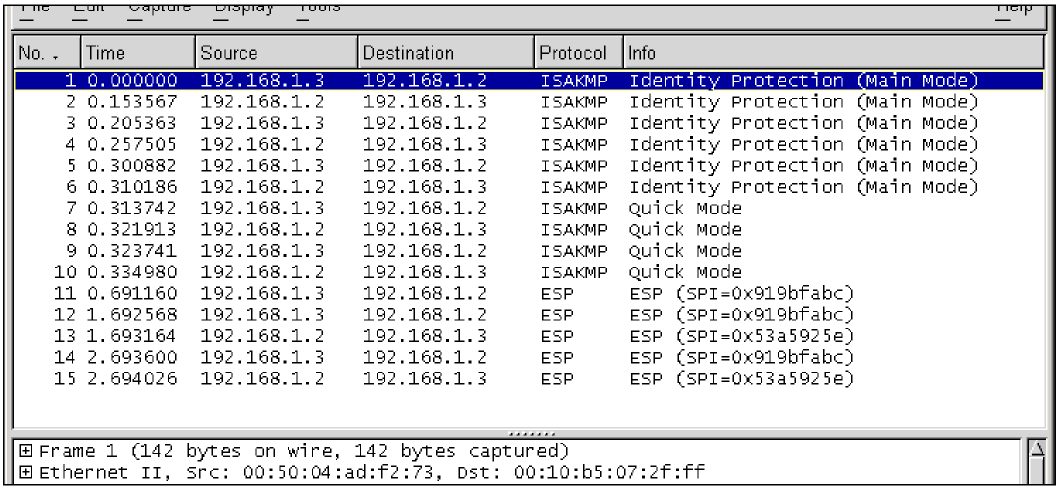
```
2012-05-15 18:01:15 Default (SA Vyatta-P1) SEND phase 1 Main Mode [SA] [VID] [VID] [VID] [VID] [VID]
2012-05-15 18:01:15 Default (SA Vyatta-P1) RECV phase 1 Main Mode [SA] [VID] [VID] [VID] [VID] [VID]
2012-05-15 18:01:15 Default (SA Vyatta-P1) SEND phase 1 Main Mode [KEY_EXCH] [NONCE] [NAT_D] [NAT_D]
2012-05-15 18:01:15 Default (SA Vyatta-P1) RECV phase 1 Main Mode [KEY_EXCH] [NONCE] [NAT_D] [NAT_D]
2012-05-15 18:01:15 Default (SA Vyatta-P1) SEND phase 1 Main Mode [HASH] [ID]
2012-05-15 18:01:15 Default (SA Vyatta-P1) RECV phase 1 Main Mode [HASH] [ID]
2012-05-15 18:01:15 Default phase 1 done: initiator id 192.168.252.101, responder id 192.168.252.23
2012-05-15 18:01:15 Default (SA Vyatta-Tunnel1-P2) SEND phase 2 Quick Mode [HASH] [SA] [KEY_EXCH] [NONCE] [ID] [ID]
2012-05-15 18:01:15 Default (SA Vyatta-Tunnel1-P2) RECV phase 2 Quick Mode [HASH] [SA] [KEY_EXCH] [NONCE] [ID] [ID]
2012-05-15 18:01:15 Default (SA Vyatta-Tunnel1-P2) SEND phase 2 Quick Mode [HASH]
```

4 Tools in case of trouble

Configuring an IPSec VPN tunnel can be a hard task. One missing parameter can prevent a VPN connection from being established. Some tools are available to find source of troubles during a VPN establishment.

4.1 A good network analyser: Wireshark

Wireshark is a free software that can be used for packet and traffic analysis. It shows IP or TCP packets received on a network card. This tool is available on website http://www.wireshark.org. It can be used to follow protocol exchange between two devices. For installation and use details, read its specific documentation (http://www.wireshark.org/docs/).



```
No. .  Time      Source       Destination  Protocol Info
    1 0.000000  192.168.1.3  192.168.1.2  ISAKMP   Identity Protection (Main Mode)
    2 0.153567  192.168.1.2  192.168.1.3  ISAKMP   Identity Protection (Main Mode)
    3 0.205363  192.168.1.3  192.168.1.2  ISAKMP   Identity Protection (Main Mode)
    4 0.257505  192.168.1.2  192.168.1.3  ISAKMP   Identity Protection (Main Mode)
    5 0.300882  192.168.1.3  192.168.1.2  ISAKMP   Identity Protection (Main Mode)
    6 0.310186  192.168.1.2  192.168.1.3  ISAKMP   Identity Protection (Main Mode)
    7 0.313742  192.168.1.3  192.168.1.2  ISAKMP   Quick Mode
    8 0.321913  192.168.1.2  192.168.1.3  ISAKMP   Quick Mode
    9 0.323741  192.168.1.3  192.168.1.2  ISAKMP   Quick Mode
   10 0.334980  192.168.1.2  192.168.1.3  ISAKMP   Quick Mode
   11 0.691160  192.168.1.3  192.168.1.2  ESP      ESP (SPI=0x919bfabc)
   12 1.692568  192.168.1.3  192.168.1.2  ESP      ESP (SPI=0x919bfabc)
   13 1.693164  192.168.1.2  192.168.1.3  ESP      ESP (SPI=0x53a5925e)
   14 2.693600  192.168.1.3  192.168.1.2  ESP      ESP (SPI=0x919bfabc)
   15 2.694026  192.168.1.2  192.168.1.3  ESP      ESP (SPI=0x53a5925e)

⊞ Frame 1 (142 bytes on wire, 142 bytes captured)
⊞ Ethernet II, Src: 00:50:04:ad:f2:73, Dst: 00:10:b5:07:2f:ff
```

5 VPN IPSec Troubleshooting

5.1 « PAYLOAD MALFORMED » error (wrong Phase 1 [SA])

```
114920 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [SA][VID]
114920 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [NOTIFY]
114920 Default exchange_run: exchange_validate failed
114920 Default dropped message from 195.100.205.114 port 500 due to notification
type PAYLOAD_MALFORMED
114920 Default SEND Informational  [NOTIFY] with PAYLOAD_MALFORMED error
```

If you have an « PAYLOAD MALFORMED » error you might have a wrong Phase 1 [SA], check if the encryption algorithms are the same on each side of the VPN tunnel.

5.2 « INVALID COOKIE » error

```
115933 Default message_recv: invalid cookie(s) 5918ca0c2634288f 7364e3e486e49105
115933 Default dropped message from 195.100.205.114 port 500 due to notification
type INVALID_COOKIE
115933 Default SEND Informational  [NOTIFY] with INVALID_COOKIE error
```

If you have an « INVALID COOKIE » error, it means that one of the endpoint is using a SA that is no more in use. Reset the VPN connection on each side.

5.3 « no keystate » error

```
115315 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [SA][VID]
115317 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [SA][VID]
115317 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [KEY][NONCE]
115319 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [KEY][NONCE]
115319 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [ID][HASH][NOTIFY]
115319 Default ipsec_get_keystate: no keystate in ISAKMP SA 00B57C50
```

Check if the preshared key is correct or if the local ID is correct (see « Advanced » button). You should have more information in the remote endpoint logs.

5.4 « received remote ID other than expected » error

```
120348 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [SA][VID]
120349 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [SA][VID]
120349 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [KEY][NONCE]
120351 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [KEY][NONCE]
120351 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [ID][HASH][NOTIFY]
120351 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [ID][HASH][NOTIFY]
120351 Default ike_phase_1_recv_ID: received remote ID other than expected
support@thegreenbow.fr
```

The « Remote ID » value (see « Advanced » Button) does not match what the remote endpoint is expected.

5.5 « NO PROPOSAL CHOSEN » error

```
115911 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [SA][VID]
115913 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [SA][VID]
115913 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [KEY][NONCE]
115915 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [KEY][NONCE]
115915 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [ID][HASH][NOTIFY]
115915 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [ID][HASH][NOTIFY]
115915 Default phase 1 done: initiator id c364cd70: 195.100.205.112, responder id
c364cd72: 195.100.205.114, src: 195.100.205.112 dst: 195.100.205.114
115915 Default (SA CNXVPN1-CNXVPN1-P2) SEND phase 2 Quick Mode
[SA][KEY][ID][HASH][NONCE]
115915 Default RECV Informational  [HASH][NOTIFY] with NO_PROPOSAL_CHOSEN error
115915 Default RECV Informational  [HASH][DEL]
115915 Default CNXVPN1-P1 deleted
```

If you have an « NO PROPOSAL CHOSEN » error, check that the « Phase 2 » encryption algorithms are the same on each side of the VPN Tunnel.

Check « Phase 1 » algorithms if you have this:

```
115911 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [SA][VID]
115911 Default RECV Informational  [NOTIFY] with NO_PROPOSAL_CHOSEN error
```

5.6 « INVALID ID INFORMATION » error

```
122623 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [SA][VID]
122625 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [SA][VID]
122625 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [KEY][NONCE]
122626 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [KEY][NONCE]
122626 Default (SA CNXVPN1-P1) SEND phase 1 Main Mode  [ID][HASH][NOTIFY]
122626 Default (SA CNXVPN1-P1) RECV phase 1 Main Mode  [ID][HASH][NOTIFY]
122626 Default phase 1 done: initiator id c364cd70: 195.100.205.112, responder id
c364cd72: 195.100.205.114, src: 195.100.205.112 dst: 195.100.205.114
122626 Default (SA CNXVPN1-CNXVPN1-P2) SEND phase 2 Quick Mode
[SA][KEY][ID][HASH][NONCE]
122626 Default RECV Informational  [HASH][NOTIFY] with INVALID_ID_INFORMATION error
122626 Default RECV Informational  [HASH][DEL]
122626 Default CNXVPN1-P1 deleted
```

If you have an « INVALID ID INFORMATION » error, check if « Phase 2 » ID (local address and network address) is correct and match what is expected by the remote endpoint.

Check also ID type (“Subnet address” and “Single address”). If network mask is not check, you are using a IPV4_ADDR type (and not a IPV4_SUBNET type).

5.7 I clicked on “Open tunnel”, but nothing happens.

Read logs of each VPN tunnel endpoint. IKE requests can be dropped by firewalls. An IPSec Client uses UDP port 500 and protocol ESP (protocol 50).

5.8 The VPN tunnel is up but I can’t ping !

If the VPN tunnel is up, but you still cannot ping the remote LAN, here are a few guidelines:

- Check Phase 2 settings: VPN Client address and Remote LAN address. Usually, VPN Client IP address should not belong to the remote LAN subnet
- Once VPN tunnel is up, packets are sent with ESP protocol. This protocol can be blocked by firewall. Check that every device between the client and the VPN server does accept ESP
- Check your VPN server logs. Packets can be dropped by one of its firewall rules.
- Check your ISP support ESP

- If you still cannot ping, follow ICMP traffic on VPN server LAN interface and on LAN computer interface (with Wireshark for example). You will have an indication that encryption works.
- Check the “default gateway” value in VPN Server LAN. A target on your remote LAN can receive pings but does not answer because there is a no “Default gateway” setting.
- You cannot access to the computers in the LAN by their name. You must specify their IP address inside the LAN.
- We recommend you to install Wireshark (http://www.wireshark.org) on one of your target computer. You can check that your pings arrive inside the LAN.

6 Contacts

News and updates on TheGreenBow web site: http://www.thegreenbow.com

Technical support by email at support@thegreenbow.com

Sales contacts by email at sales@thegreenbow.com

Secure, Strong, Simple.

TheGreenBow Security Software