TheGreenBow IPSec VPN Client

User Guide

Using Certificates

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1 Introduction

1.1 Goal of the document

This document explains how to use certificates with TheGreenBow IPSec VPN Client. Theses certificates can be stored on a smart card or imported from a PKCS#12 file.

This document explains also how to use a third party Certification Authority in order to be able to generate X509 Certificates and to open a VPN tunnel securely. There are many options to generate Certificates like using Microsoft Certificates server (i.e. Microsoft Certificate Service) available under Windows 2000/2003 Server, OpenSSL or some VPN Router themselves.

1.2 Features

Two kinds of certificates can be imported to TheGreenBow VPN Client:

- PKCS#12
- PEM certificates.

Certificates can be stored in a smart card whose access is protected by a PIN code. TheGreenBow VPN Client uses them dynamically while establishing a tunnel.

A certificate has three parts:

- certificate authority public key
- user certificate public key
- user certificate private key

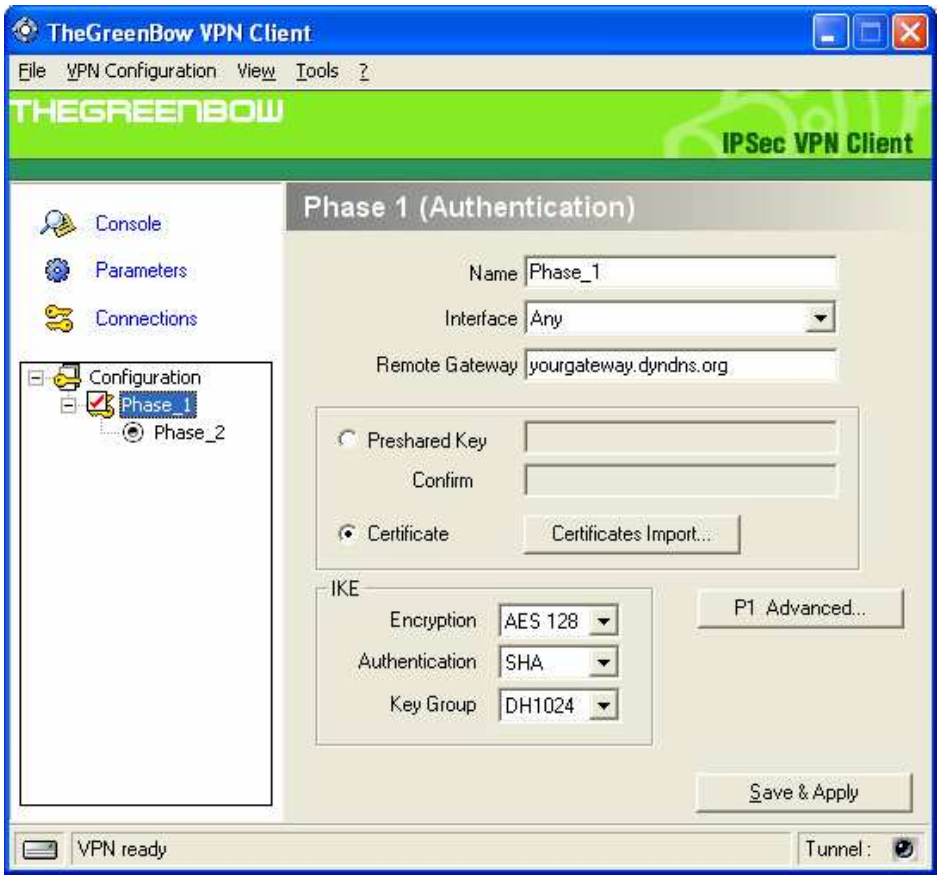
Once imported, these keys are stored in the configuration file. One certificate is bound to one tunnel. All configuration elements can be easily exported to another computer.

In the case of smart card, the configuration file contains no one of the three keys.

2 Managing certificates

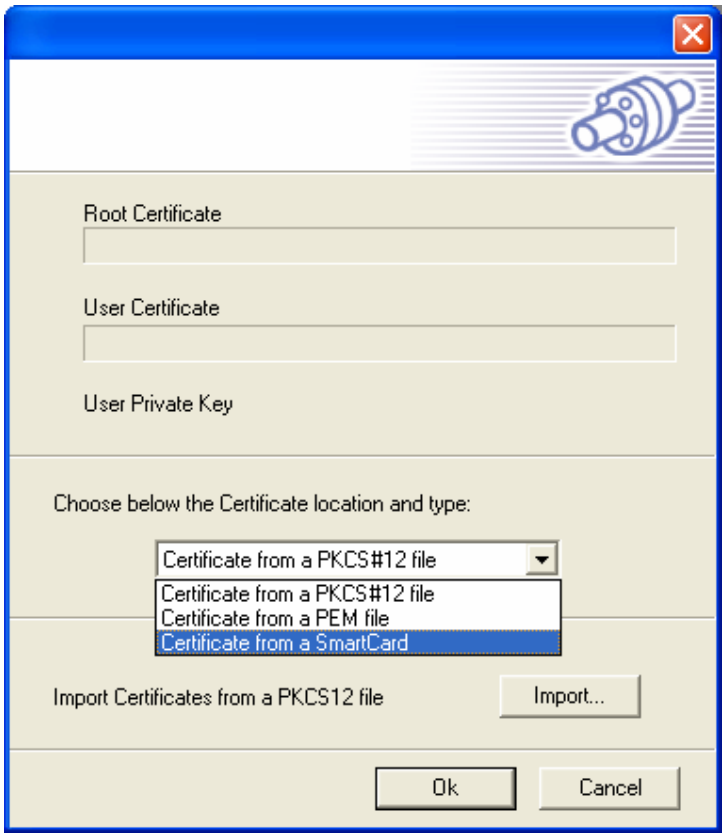
2.1 Using certificates

X509 certificates and smart cards are managed in phase 1 settings. A phase 1 must be created.



Click on “Certificate” and then on “Certificates Import…”

In the Certificates import window, the user can import certificates files in the VPN configuration or read them from a smart card.



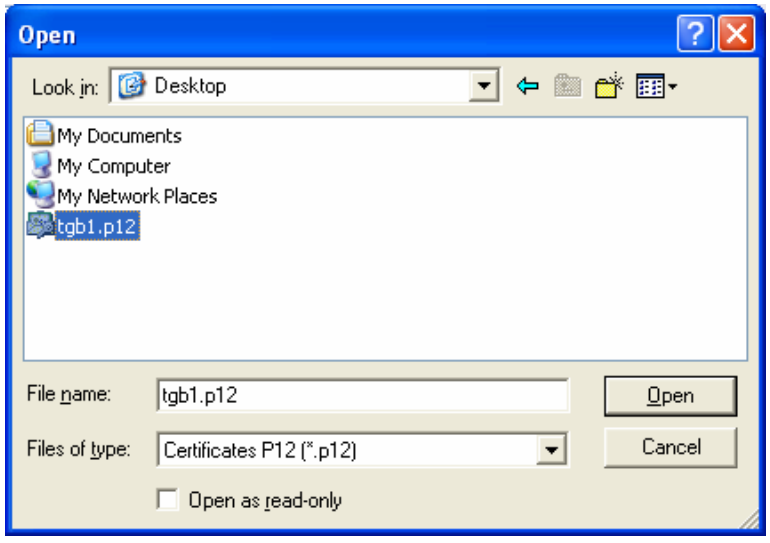
TheGreenBow VPN client supports the following certificates format file:

- PKCS#12 files
- PEM files
- CRT files

2.2 Importing PKCS#12 certificate

From the drop-down list, select “Certificate from a PKCS#12 file”.

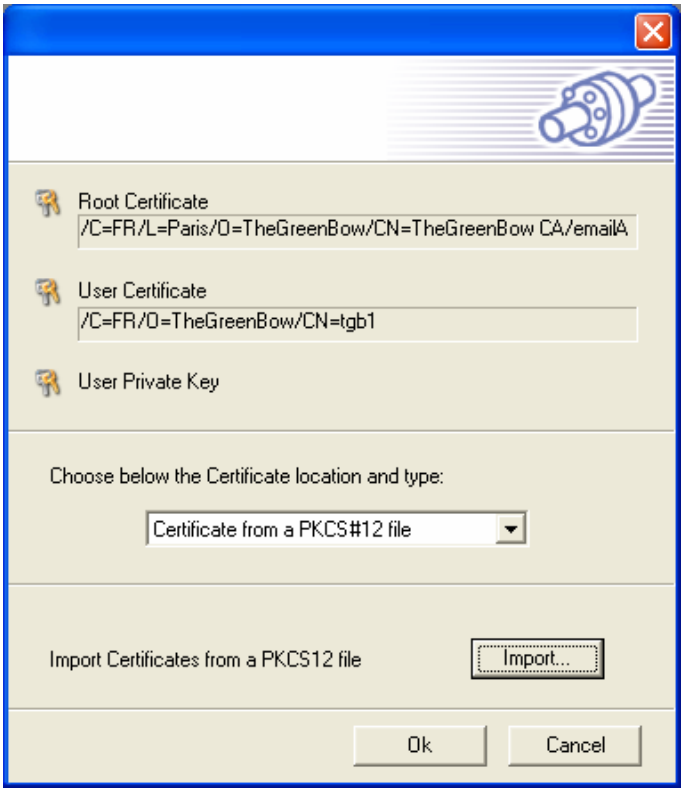
And click on “Import…”



Select the PKCS#12 file and click on “Open”.

The file can be protected by a password. If not, the edit box can be let empty.

Click on “OK” for importing the file.

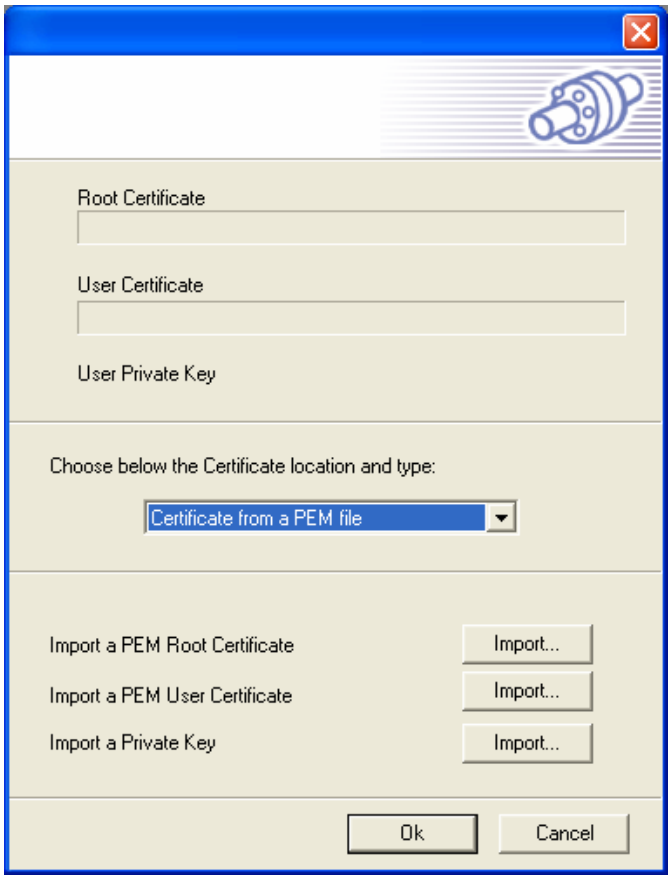


If the password is correct and the file not corrupted, the subject of the certificate and the subject of the issuer of the certificates are displayed.

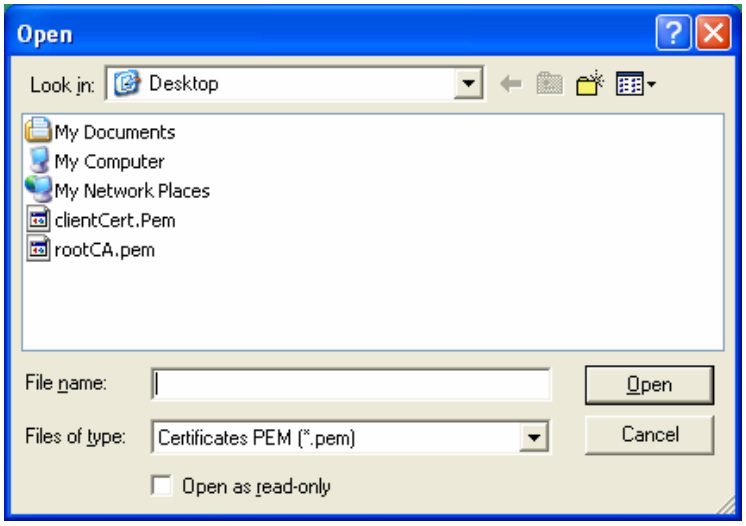
The key icons indicate that the data is now stored in TheGreenBow VPN Client configuration file.

2.3 Importing PEM files

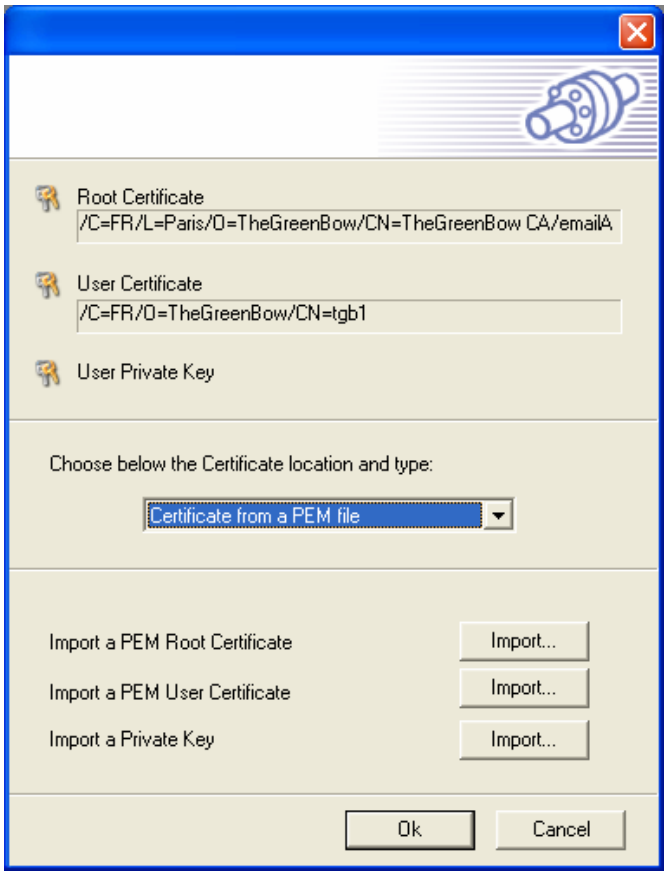
In the certificate management window, select “Certificate from a PEM file” in the drop-down list.



Click on each button “Import…” for importing the Certificate Authority (CA) public key, the user public key and the user private key.



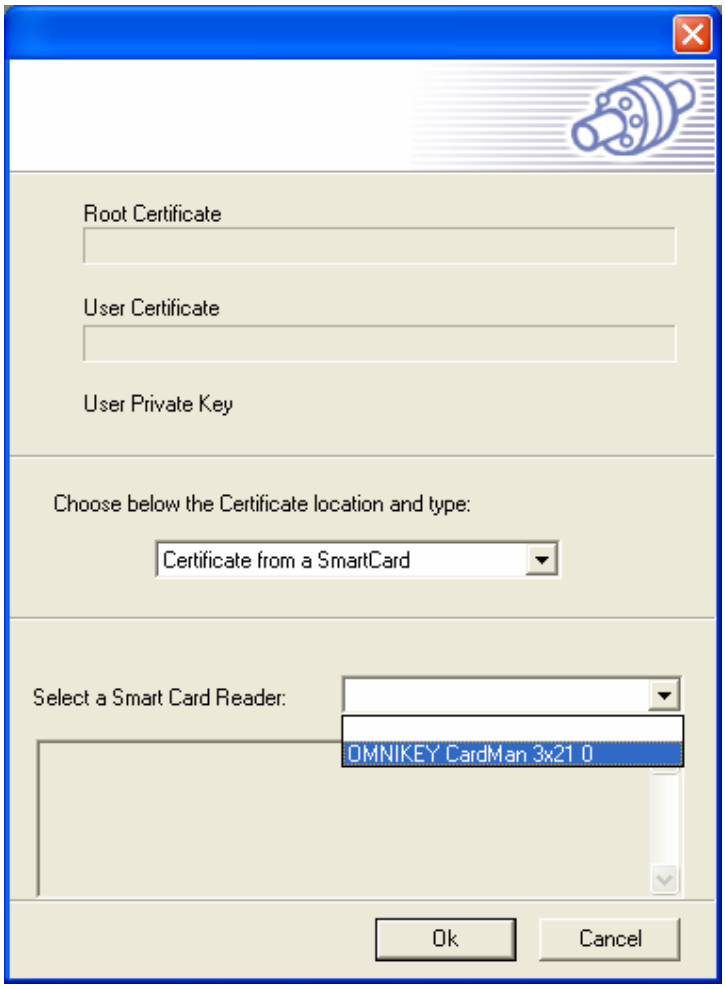
Select the file and click on “Open”



Once the files are imported, the subjects of the user certificate and its issuer are displayed.

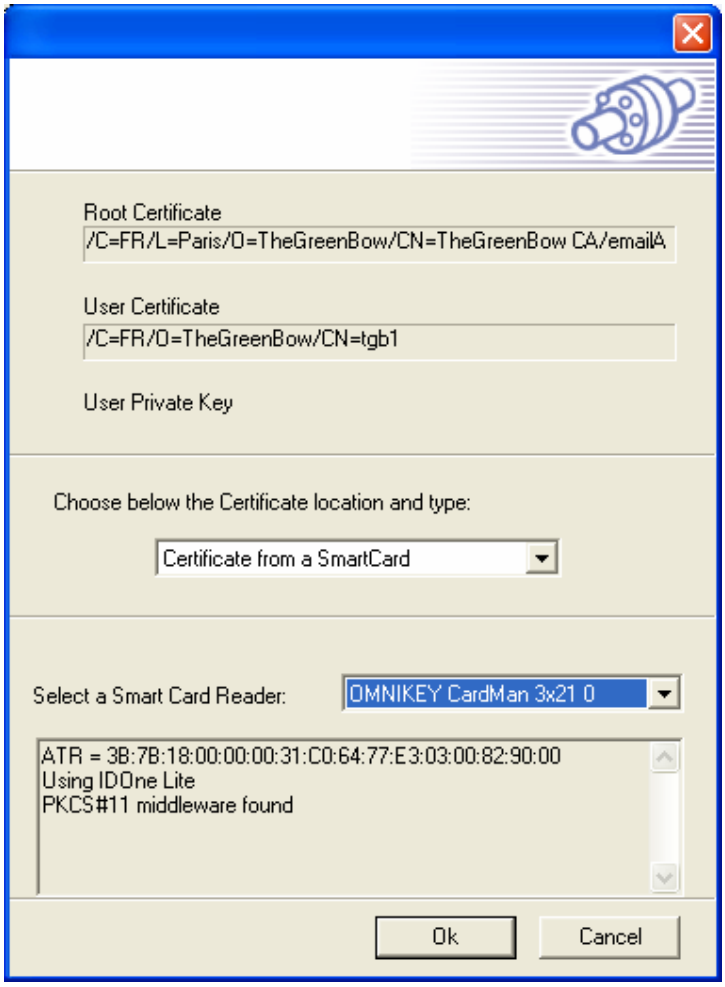
2.4 Reading smart cards

In the certificate management window, select “Certificate from a smart card”.



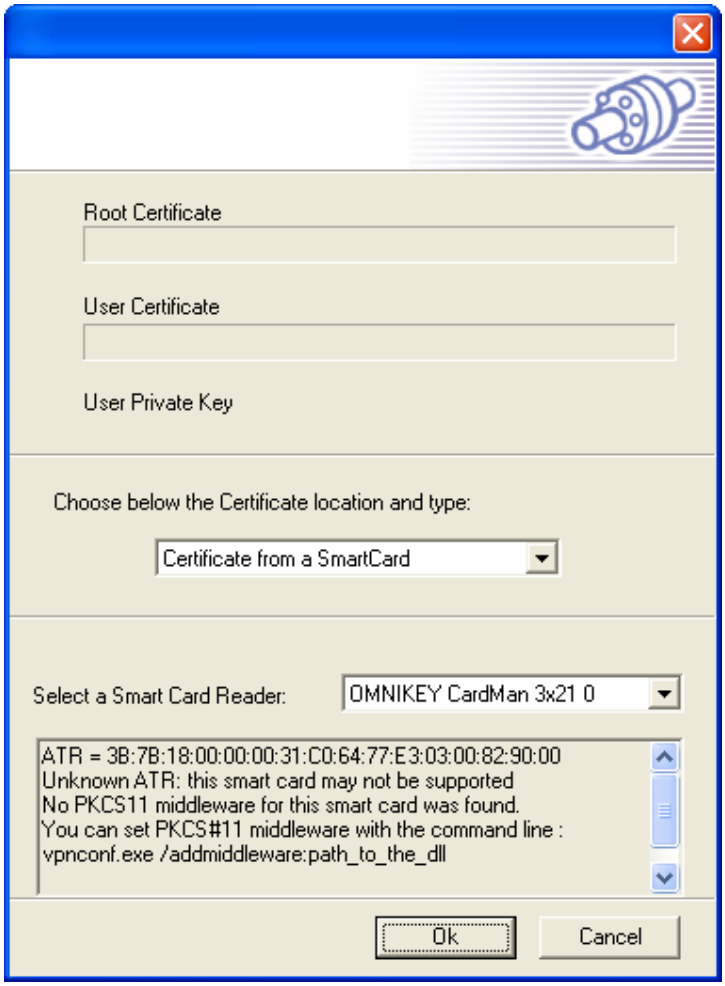
Select in the smart card list the smart card reader

Enter the smart card PIN code



If the PIN is correct, the subject of the certificate is displayed in the window.

If the smart card is not supported, an error message is displayed:



Read next section for details about making your smart card supported.

2.5 Configuration options

Several smart card options are available for IT managers. It is possible to force use of a specific PKCS#11 middleware, for example. Administrative rights are required for using these options.

- **/addmiddleware:[path_to_middleware.dll]**

  Set manually the path to the PKCS#11 DLL that must be used by the client

- **/checkkeyusage:[yes|no]**

  By default, TheGreenBow VPN client does not check X509 key usage extensions.

  If "yes" is used, the VPN client will only look for certificates that have digital signature (DIGITAL_SIGNATURE) key usage.

  This parameter is only used for certificates read from smart cards.

3 Using Microsoft Certificates Server

In the section, we provide full steps to generate an user certificate, sign a Certificate Request and export Certificates using **Microsoft Certificate Server**.

3.1 Installing Microsoft Certificate Server

Microsoft Certificate server comes as a part of the Windows NT/2000/2003 server option packs. The Certificate server needs Microsoft Internet Information server (IIS) and Microsoft Internet explorer (IE) before it can be used.

The enrollment Web pages provided by Certificate Services allow you to connect to the service with a Web browser, and to do common tasks such as requesting the certification authority, processing a Certificate Request file, or processing a Smart Card enrollment file. The Web pages will be located on http://ServerName/CertSrv where ServerName is the name of the CA-issuing machine.

For information on configuring Microsoft Certificate Services on Windows 2000 server, see the following URLs:

- On Setting up a Certificate Authority:
  http://www.microsoft.com/windows2000/techinfo/planning/security/casetupsteps.asp
- On Microsoft Certificate Services Web Pages:
  http://www.microsoft.com/windows2000/techinfo/planning/security/cawebsteps.asp
- On Administering Microsoft Certificate Services:
  http://www.microsoft.com/windows2000/techinfo/planning/security/adminca.asp

Below we provide required steps to install Internet Information Server (IIS 6.0) and Microsoft Certificate Server (MCS) with a stand-alone root CA on Windows 2003 Server.

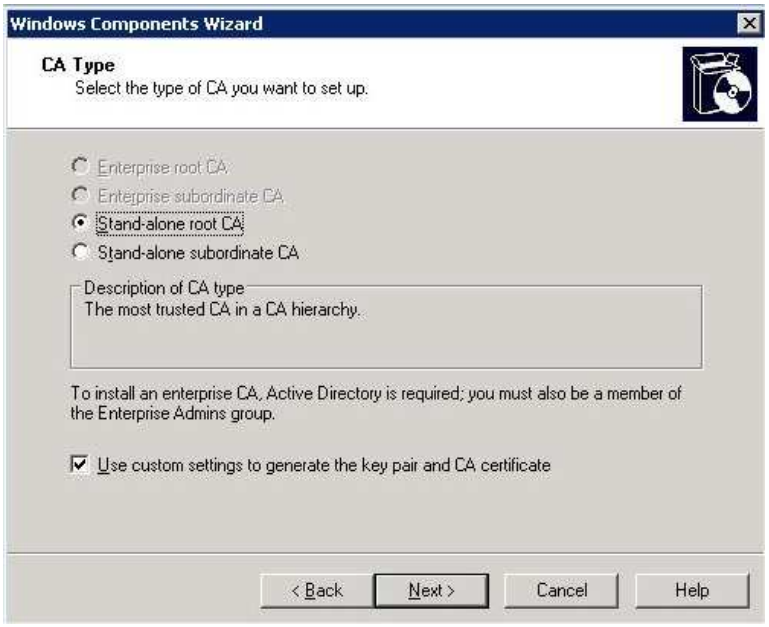
Microsoft Internet Information Server installation steps :

- Click **Start**, point to **Control Panel** and click **Add or Remove Programs** .
- Click the **Add/Remove Windows Components** button in the **Add or Remove Programs** window.
- On the **Windows Components** window, click on the **Application Server** entry and click the **Details** button.
- On the **Application Server** page, click on the **Internet Information Services (IIS)** entry and click the **Details** button.
- In the **Internet Information Service (IIS)** dialog box, put a checkmark in the **World Wide Web Service** checkbox and click **OK**.
- Click **OK** on the **Application Server** dialog box.
- Click **Next** on the **Windows Components** dialog box.
- Click **Finish** on the **Completing the Windows Components Wizard** page.

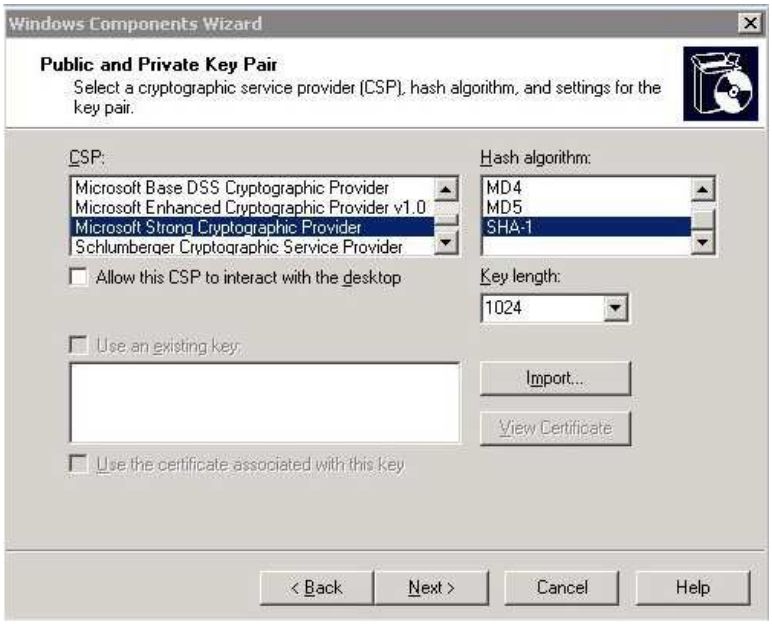
Microsoft Certificate Server with a stand-alone root CA installation steps :

- Click **Start**, point to **Control Panel** and click **Add/Remove Programs**.
- In the **Add or Remove Programs** window, click the **Add/Remove Windows Components** button.
- In the **Windows Components** dialog box, click on the **Certificate Services** entry and click the **Details** button.
- In the **Certificate Services** dialog box, put a checkmark in the **Certificate Services CA** checkbox.

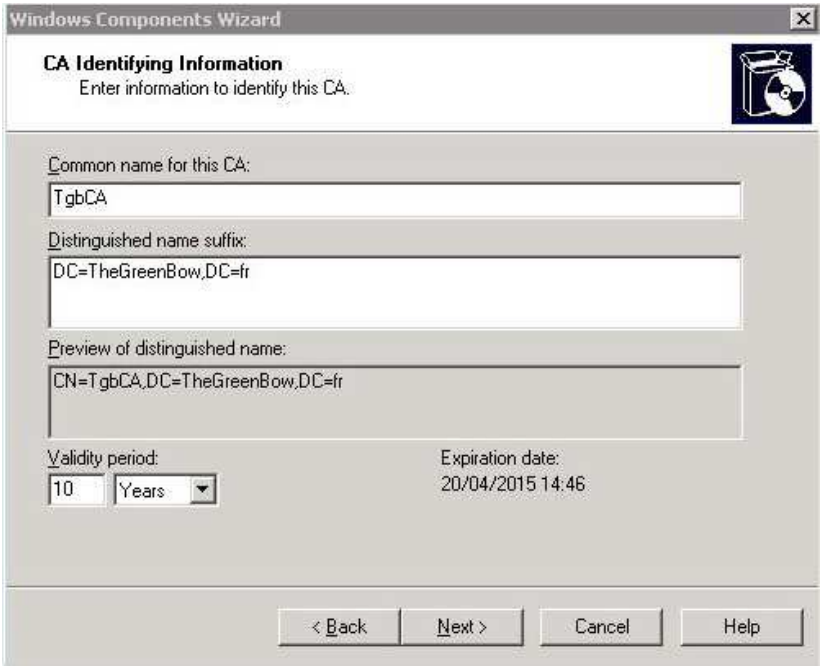
- Both the **Certificate Services CA** and **Certificate Services Web Enrollment Support** checkboxes are checked. Click **OK** in the **Certificate Services** dialog box.
- Click **Next** in the **Windows Components** dialog box.
- Update the **CA Type** page as shown below. Click **Next**.



- Update/customize the **Public and Private Key Pair** page as shown below. Click **Next.**



- Update/customize the **CA Identifying Information** page as shown below. Click **Next**.



- On the **Certificate Database Settings** page, use the default locations for the **Certificate Database** and **Certificate Database Log**. You do not need to specify a shared folder to store configuration information because this information will be stored in the Active Directory. Click **Next**.
- Click **Yes** on the **Microsoft Certificate Services** dialog box that informs you that Internet Information Services must be stopped temporarily.
- Click **Yes** on the **Microsoft Certificate Services** dialog box that informs you that Active Server Pages must be enabled on IIS if you wish to use the Certificate Services Web enrollment site.
- Click **Finish** on the **Completing the Windows Components Wizard** page.
- Close the **Add or Remove Programs** window.

3.2 Generating Certificates

In the section, we provide full steps to generate an user certificate and sign a Certificate Request.

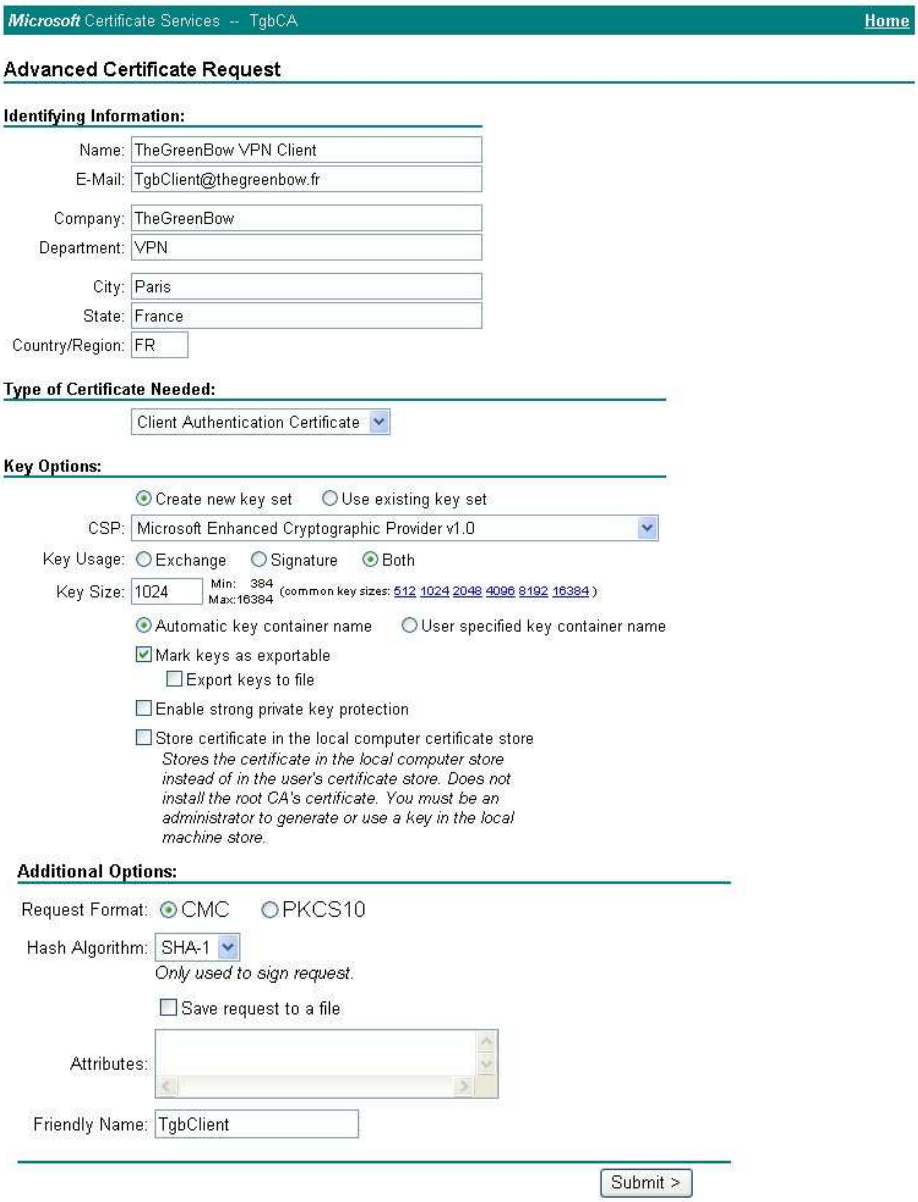
3.2.1 Generating an user certificate

This section describes the generation of User certificate for TheGreenBow VPN IPSec Client. This section applies to any other VPN IPSec end point, like a VPN router.

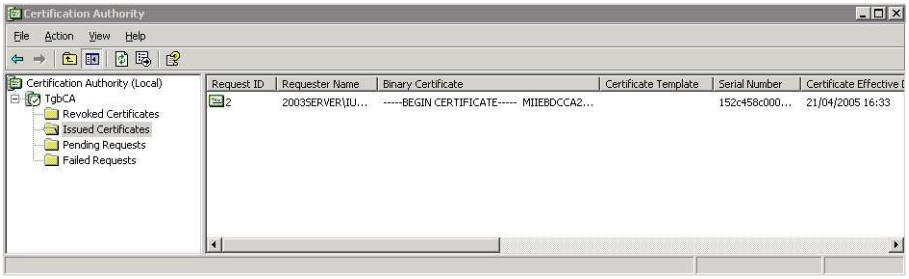
To generate generated an user certificate do:

- Connect to your Certificate Server (http://ServerName/CertSrv where ServerName is the name of the CA-issuing machine)
- Click **Request a Certificate** on the **Welcome** page.

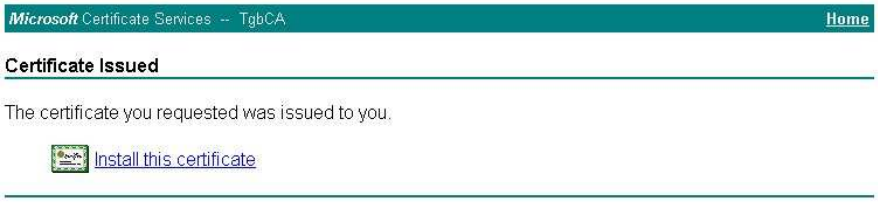
- Click **Advanced Certificate Request** on the **Request a Certificate** page.
- Click **Create and submit a request to this CA** on the **Advanced Certificate Request** page.
- Fill the **Advanced Certificate Request** page (a sample is shown below). You must check **Mark keys as exportable** as TheGreenBow VPN IPSec Client needs the Certificate private key to establish a tunnel. Click **Submit**.



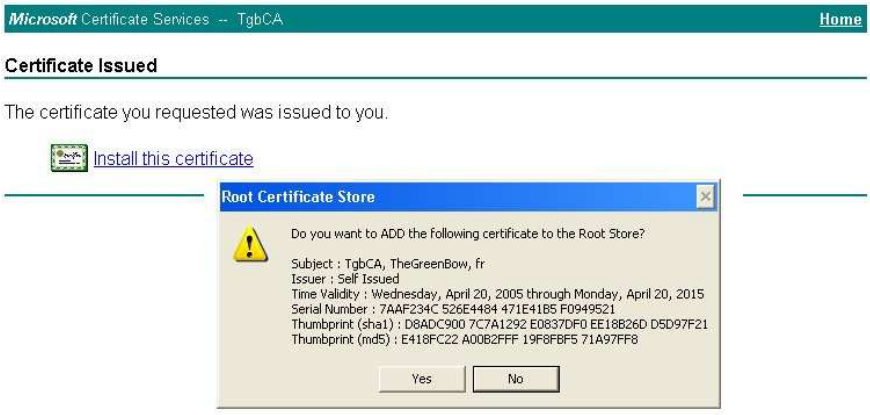
After processing, the **Certificate Pending** page appears. You have to wait until your request is accepted and validated by your Microsoft Certificate Server administrator.



- To retrieve your Certificate, return back to Microsoft Certificate Server's home page and click **View the status of a pending Certificate Request**.
- In the **View the Status of a Pending Certificate Request** page, select the request you want to view.
- The **Certificate Issued** page appears as shown below:



To add the current Certificate to your local Certificates Store click the **Install this Certificate**.



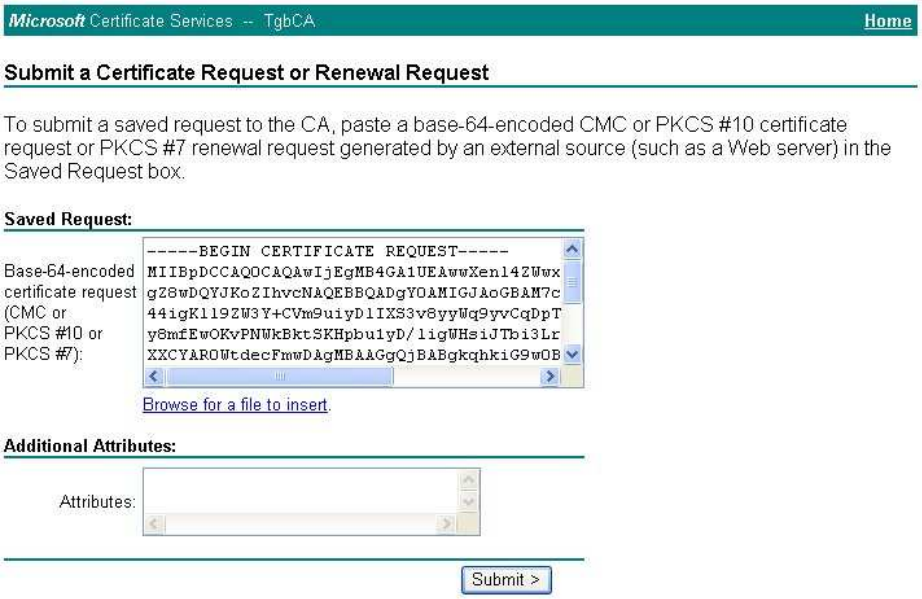
After processing the **Certificate Installed** page appears confirming the Certificate successful installation in Internet Explorer Certificate store.

To export a Certificate from **Internet Explorer** Certificate store, check 3.3 section.

3.2.2 Signing a Certificate Request

To sign the Certificate Request using Microsoft Certificate Server do:

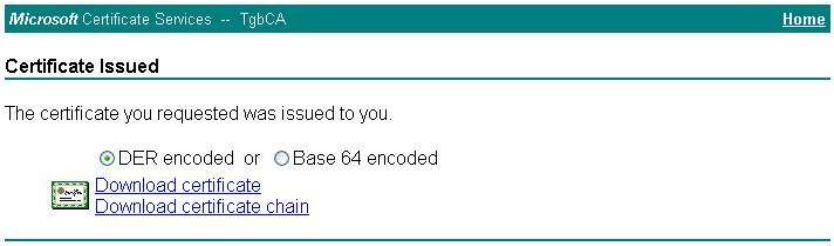
- Connect to your Certificate Server (http://ServerName/CertSrv where ServerName is the name of the CA-issuing machine)
- Click **Request a Certificate** on the **Welcome** page.
- Click **Advanced Certificate Request** on the **Request a Certificate** page.
- Click **Submit a Certificate Request by using a base-64-encoded CMC or PKCS #10 file, or submit a renewal request by using a base-64-encoded PKCS #7** file.
- Click **Browse for a file to insert** and browse to the certificate request file then **Read!** Button. The **Submit a Certificate Request or Renewal Request** page looks like:



Click **Submit**.

After processing, the **Certificate Pending** page appears. You have to wait until your request is accepted and validated by your Microsoft Certificate Server administrator.

- To retrieve your Certificate, return back to Microsoft Certificate Server's home page and click **View the status of a pending Certificate Request**.
- In the **View the Status of a Pending Certificate Request** page, select the request you want to view.
- The **Certificate Issued** page appears as shown below:



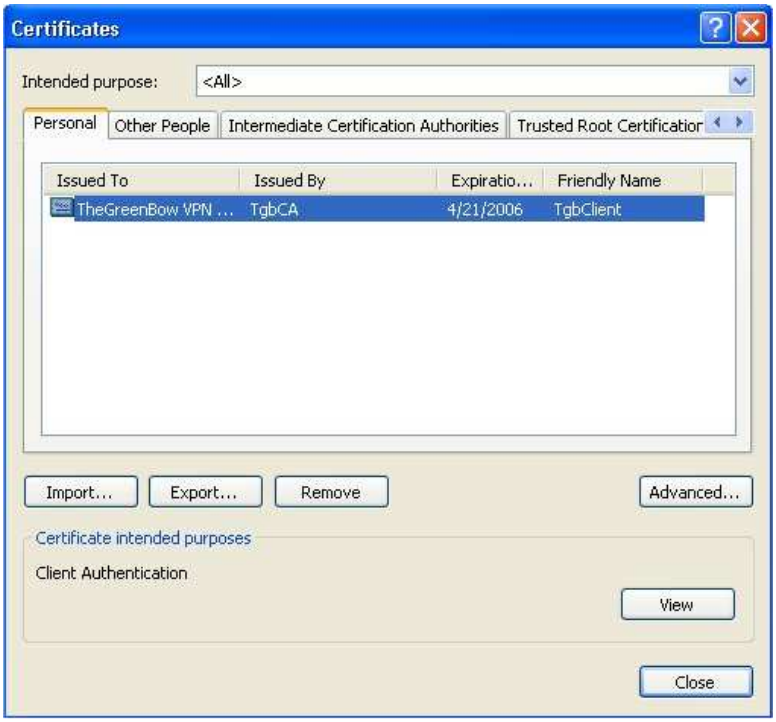
- Click **Download Certificate**. A file download would pop out, press **Save** button (The default file name is certnew.cer).

3.3 Certificate Export

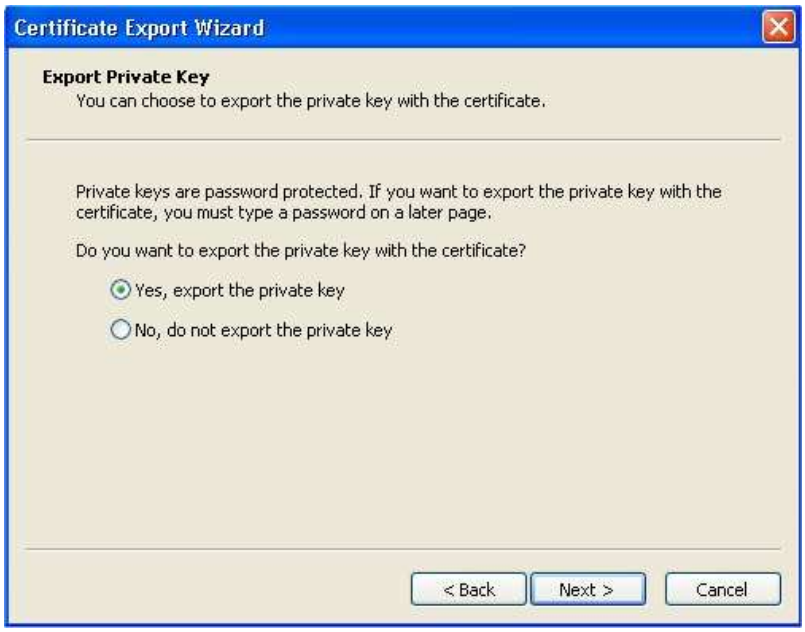
Installed Certificates in Internet Explorer Certificate store can be exported using the PKCS12 file format.

To export Certificates from Internet Explorer Certificate store do:

- Run Internet Explorer.
- Open **Internet Options…** in **Tools** menu.
- Select **Content** tab then click **Certificates** button.
- In the Certificates dialog box, open **Personal** tab. Select the Certificate to export as shown below:



- Click **Export**….
- In the **Certificate Export Wizard** click **Next**.
- In the **Export Private Key** select **Yes, export private key** as need by TheGreenBow VPN IPSec Client.



- In the **Export File Format** page select **Include all Certificates in the certification path if possible**. The Root CA is also exported as needed by TheGreenBow VPN IPSec Client.

- Click **Next**.
- In the **Password** page, type and confirm your password then click **Next**.
- In the **File to Export** page specify destination file path then click **Next**.
- In the **Completing the Certificate Export Wizard** Click **Finish**.

4 Using OpenSSL

OpenSSL is a free non-commercial toolkit that provides a wide range of cryptographic operations. It also includes utilities for Certificate management. More details about building and using OpenSSL can be found at http://www.openssl.org.

Since the openssl program is a command line tool we have written several batch scripts for Certificate generation and management. Unzip **TgbSmallPKI.zip** into **C:\TgbSmallPKI** for instance (in the following sections, we will assume that this path is our working folder). The working folder contains:

- **RootCA.bat**: It generates a self-signed root Certificate.
- **UserCA.bat**: It generates an user certificate signed by the root Certificate.
- **Pkcs12.bat**: It Converts a P12 file into PEM files.
- **CAinfo.bat**: It displays a PEM Certificate information.
- **CAsign.bat**: It signs a Certificate Request.
- The **\Bin** forlder contains:
  - **openssl.cnf**: A large part of what goes into a Certificate depends on the contents of this configuration file. It is divided into sections, which helps to make the configuration more modular. You can customize this file depending on your needs (see OpenSSL documentation for more details).
  - **openssl.exe**, **libeay32.dll** and **ssleay32.dll** are the toolkit core for Windows platforms.
- **ReadME.txt**: A documentation file.

4.1 Generating Certificates

In the following section we will show how to generate a self-signed root Certificate, an User Certificate and sign a Certificate Request using OpenSSL for Windows.

4.1.1 Generating a self-signed Certificate

A self-signed Certificate is a Certificate that is not signed by a recognized Certificate Authority. A self-signed Certificate can be used to act as a Certificate authority issuing, renewing and revoking Certificates.

To create a self-signed Certificate, run **RootCA**. Below a sample output:

```
*
! Creating Root CA folders
*
Root CA folder set to .\RootCA
Root CA key length is 1024 bits
Root CA validity is 3650 days
The system cannot find the file specified.

*
! Creating CA private key (1024 bits, 3650 days)
*
Loading 'screen' into random state - done
Generating RSA private key, 1024 bit long modulus
.........++++++
.++++++
```

```
e is 65537 (0x10001)

*
! CA autosigning (1024 bits, 3650 days)
*
Using configuration from .\Bin\openssl.cnf
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) [FR]:FR
State or Province Name (full name) [France]:France
Locality Name (eg, city) []:Paris
Organization Name (eg, company) [TheGreenBow]:TheGreenBow
Organizational Unit Name (eg, section) []:Authority Certificate
Common Name (eg, YOUR name) []:TheGreenBow CA
Email Address []:TgbCA@thegreenbow.fr

Please enter the following 'extra' attributes
to be sent with your Certificate Request
A challenge password []:capassword
An optional company name []:TheGreenBow
Loading 'screen' into random state - done
Signature ok
subject=/C=FR/ST=France/L=Paris/O=TheGreenBow/OU=Authority Certificate/CN=TheGreenBow CA/Email=TgbCA
@thegreenbow.fr
Getting Private key

"----------------------------"
"----------------------------"

Root Certificate at .\RootCA\RootCA.pem
Root Private Key at .\RootCA\CAKey.key
```

The root Certificate RootCA.pem and its private key CAKey.key are located in RootCA folder.

4.1.2 Generating an user certificate

When X.509 Certificate authentication is chosen within IKE, a User certificate is used to identify a VPN IPSec end point and to perform signatures/verification operations.

The **UserCA** script generates an user Certificate, its private key and a PKCS12 file. It requires an intermediate folder as a parameter. It can be used to generate Certificates for all VPN IPSec end points.

To generate all required files for TheGreenBow VPN IPSec Client, run **UserCA TgbClient**:

```
*
! Creating User CA folder
*

Creating User Certificate folder at .\TgbClient
User CA key length is 1024 bits
User CA validity is 3650 days
```

```
*
! Creating User CA private key (1024 bits)
*
Loading 'screen' into random state - done
Generating RSA private key, 1024 bit long modulus
.......++++++
.....................++++++
e is 65537 (0x10001)

*
! Signing User CA
*
Using configuration from .\Bin\openssl.cnf
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) [FR]:FR
State or Province Name (full name) [France]:France
Locality Name (eg, city) []:Paris
Organization Name (eg, company) [TheGreenBow]:TheGreenBow
Organizational Unit Name (eg, section) []:VPN
Common Name (eg, YOUR name) []:TheGreenBow VPN Client
Email Address []:TgbClient@thegreenbow.fr

Please enter the following 'extra' attributes
to be sent with your Certificate Request
A challenge password []:tgbcapwd
An optional company name []:TheGreenBow
Loading 'screen' into random state - done
Signature ok
subject=/C=FR/ST=France/L=Paris/O=TheGreenBow/OU=VPN/CN=TheGreenBow VPN
Client/Email=TgbClient@thegreenbow.fr
Getting CA Private Key

*
! User CA in P12 Format
*
Loading 'screen' into random state - done
Enter Export Password:
Verifying password - Enter Export Password:
TgbClient.p12 created in .\TgbClient.p12

"----------------------------"
"----------------------------"

User Certificate at .\TgbClient\TgbClient.pem
User Private Key at .\TgbClient\local.key
User Certificate Subject is:
subject= /C=FR/ST=France/L=Paris/O=TheGreenBow/OU=VPN/CN=TheGreenBow VPN
Client/Email=TgbClient@thegreenbow.fr
```

The most relevant files in the **TgbClient** folder are:

- TgbClient.pem: The User Certificate.
- Local.key: the User Certificate private key.
- Subject.txt: the User Certificate subject.
- TgbClient.p12: a PKCS12 file format containing user and root Certificates and the user certificare private key.

4.2 Additional TgbSmallPKI tools

In the following section we will show how to display Certificate information and how to extract Certificates and private keys from a PKCS12 format file.

- **Pkcs12.bat**: It Converts a P12 file into PEM files.
- **CAinfo.bat**: It displays a PEM Certificate information.

4.2.1 Displaying Certificate information

Displaying Certificate information can be useful to retrieve several fields such as the Issuer, the Validity date and the Subject.

The **CAinfo** script displays a User Certificate information. It requires Certificate file as a parameter.

To display more information about TgbClient.pem (TheGreenBow User Certificate generated in section **4.1.2**), run **CAinfo TgbClient\TgbClient.pem**:

```
*
! Certificate TgbClient\TgbClient.pem information
*

Certificate:
   Data:
      Version: 1 (0x0)
      Serial Number: 1 (0x1)
      Signature Algorithm: md5WithRSAEncryption
      Issuer: C=FR, ST=France, L=Paris, O=TheGreenBow, OU=Authority Certificate, CN=TheGreenBow CA
/Email=TgbCA@thegreenbow.fr
      Validity
         Not Before: Apr 19 12:44:03 2005 GMT
         Not After: Apr 17 12:44:03 2015 GMT
      Subject: C=FR, ST=France, L=Paris, O=TheGreenBow, OU=VPN, CN=TheGreenBow VPN Client/Email=Tg
bClient@thegreenbow.fr
      Subject Public Key Info:
         Public Key Algorithm: rsaEncryption
         RSA Public Key: (1024 bit)
            Modulus (1024 bit):
               00:ac:00:2c:1b:82:6d:32:2e:17:09:9f:13:8d:b9:
               9f:9b:db:d7:3f:f7:45:9b:f2:73:6d:8b:3d:9b:b1:
               14:99:25:22:fb:a8:56:30:9d:68:43:e9:14:84:6f:
               4c:24:fa:e2:36:84:56:2d:b2:5c:11:fd:be:b9:9e:
               ed:49:c8:c1:08:29:d0:17:ca:b8:12:41:41:55:4d:
               48:01:57:bc:22:9a:c9:48:ca:e2:c2:59:2c:78:8d:
               6d:cc:89:09:3a:97:f5:f4:b7:96:ea:da:82:0e:8c:
               87:49:a7:45:a4:74:45:31:8e:ac:be:9a:a2:8c:a1:
               16:be:f7:46:4a:94:78:31:73
            Exponent: 65537 (0x10001)
```

Signature Algorithm: md5WithRSAEncryption
b2:ba:7c:92:9c:eb:59:c2:7e:d9:95:af:71:8b:06:2f:b8:44:
b3:b5:2a:b7:98:0b:1e:08:97:85:c7:bc:21:1c:cf:df:15:97:
d9:4f:e5:ec:31:14:6f:9e:b1:8a:47:37:ad:6b:4b:c8:15:bf:
cd:8a:1b:ed:a5:f7:3e:ac:72:73:b9:bc:f6:22:b3:05:f5:26:
40:dd:f8:4c:83:3f:25:da:68:32:8b:bd:1b:68:24:e8:df:31:
83:5b:74:91:10:1f:6a:d0:b9:3c:f3:04:50:4c:6e:ce:c9:de:
3a:38:fe:2d:ad:6c:6b:e6:74:38:51:0c:5b:c5:bb:6b:05:25:
44:d9

5 Troubleshootings

You will be able to find all troubleshooting issues, listed in a TroubleShooting Document (pdf) on our website.

The document is available at: www.thegreenbow.com/vpn_doc.html

6 Contacts

Information and update are available at: http://www.thegreenbow.com

Technical support by email at: support@thegreenbow.com

Sales at +33 1 43 12 39 37 or by email at: sales@thegreenbow.com