TekCERT

Installation & Configuration Guide
Version 2.7

Document Revision 2.3

http://www.kaplansoft.com/

TekCERT is built by Yasin KAPLAN

Read "Readme.rtf" for last minute changes and updates which can be found under the application directory.

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Introduction

TekCERT is a X.509 Certificate / Certificate Signing Request (CSR) generator and signing tool runs under Windows *(7/8/10, 2008-2022 Server)*. Visit http://www.kaplansoft.com/TekCERT/ regularly for updates.

Major features

- Generates 1024, 2048, 3072- and 4096-bits certificates for up to 40 years of validity period.
- Sha-1withRSA, sha256withRSA, sha384withRSA, sha512withRSA, Sha-1withECDSA, sha256withECDSA, sha384withECDSA and sha512withECDSA key algorithms supported. The freeware version supports only sha-1withRSAEncryption.
- Supports Automatic Certificate Management Environment, ACME *(RFC 8555)*, protocol and can use Let's Encrypt services to sign certificates.
- OCSP *(RFC 6960)* Responder Service *(SP license is required)*.
- SCEP *(RFC 8894)* Server *(SP license is required)*.
- Timestamp request generation and signing based on RFC 3161 *(Commercial license is required)*.
- Generated certificates are automatically installed in Windows Certificate Store with private key.
- Generates Certificate Signing Request *(CSR)* and processes response from certificate authority.
- Signs Certificate Signing Requests with a user selected CA certificate *(Self Signed Certificate)*.
- All certificate parameters can be configured through TekCERT GUI and from the command line interface.
- You can browse, export and delete certificates through TekCERT GUI and from the command line interface.
- You can convert various certificate types to each other.

System Requirements

Microsoft .NET Framework 4.8 installed with the latest patches. A Pentium class CPU with 4 GB of RAM is ideal for most configurations.

Installation

Unzip "TekCERT.zip" and click "Setup.exe" that comes with the distribution. Follow the instructions of the setup wizard. Setup will install TekCERT and add a shortcut for TekCERT to the desktop and start menu.

Certificate Generation

You can create certificates through the Certificates tab. A certificate can be generated as self-signed certificate, a Certificate Authority, CA *(A self-signed certificate with additional attributes)* and a certificate signed with one of existing CA certificates. You can also create certificate signing requests through the same tab. Generated CSR files will be saved on to disk and pending signing requests can be processed through Pending Signing Requests tab.

The freeware version of TekCERT allows selecting only sha-1withRSAEncryption as certificate key and signing algorithm.

You can browse existing certificates in Windows Certificates Stores. Invalid certificates, expired or CRL verification failed, will be listed in red color.

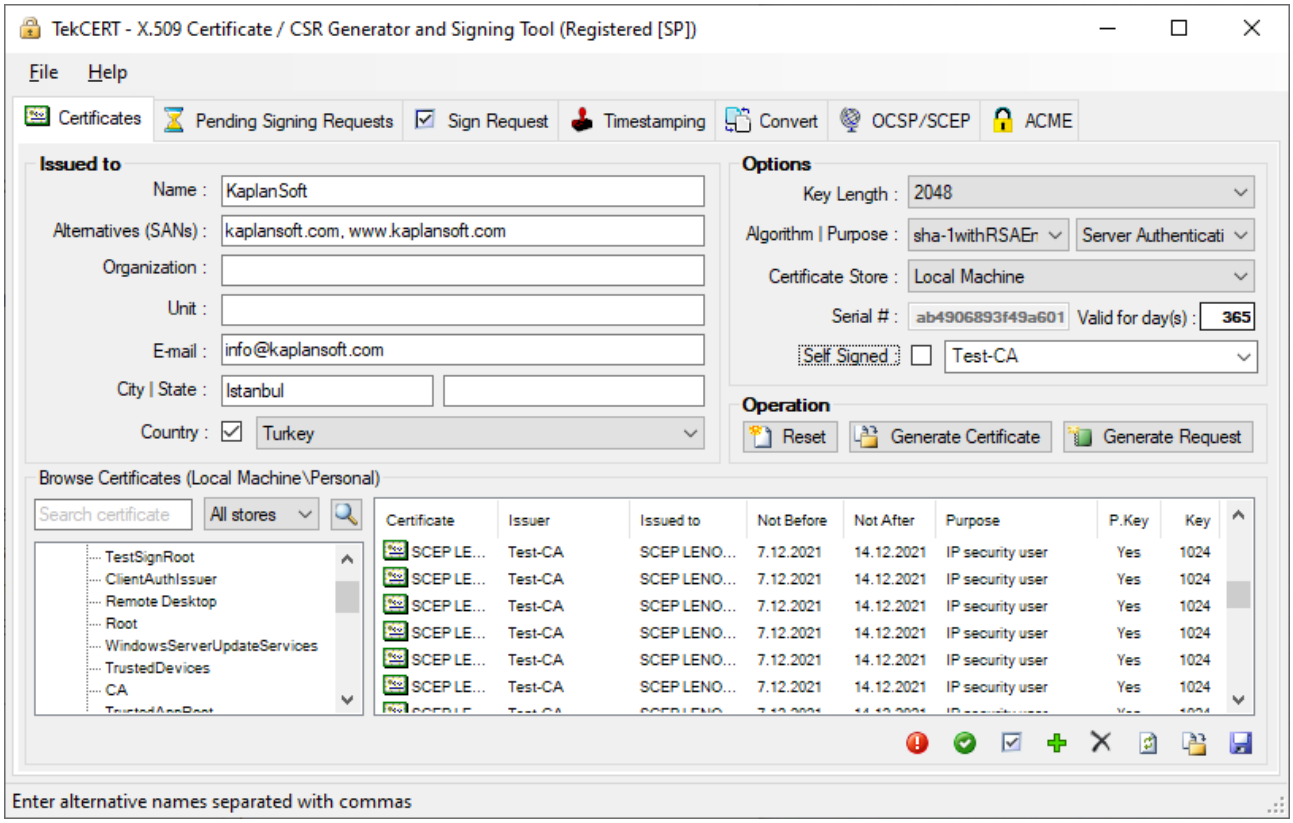

Figure - 1. Certificates tab

You can copy certificates from one store to another by dragging. You can also check the validity of a certificate, add to trusted root authorities, delete, import and export a certificate. You can import and export .pfx, .pem and .cer formats. You can export certificates with their private keys in .pfx and .pem format.

TekCERT also allows you to export only public or private key of a certificate in PEM format. Please right click on a certificate entry and see options.

TekCERT creates a local CA certificate automatically if a certificate is not available to sign certificate when started. A CA certificate valid for one month is created in freeware mode. You should create a new CA certificate after applying a commercial license.

Creating Certificates Using Let's Encrypt

You need to create a contact entry in ACME tab to access Let's Encrypt services prior to creating and sign certificates using Let's Encrypt. Enter a valid e-mail address as Contact E-mail and click Update Contact button. This will automatically create contact entry for Let's Encrypt.

TekCERT can generate and sign certificates using Let's Encrypt services. This feature requires a commercial license. You need to select Let's Encrypt as CA prior to generating a certificate. When TekCERT is co-located with an Internet Information Server *(IIS)* installation, TekCERT will automatically place ACME challenge file under root directory of the virtual server /.well-known\acme-challenge directory if a configured virtual server found for the domain name. When TekCERT is co-located with a Microsoft DNS server installation, and the name server points to the local machine, TekCERT will automatically create TXT records for the DNS token and automatically finalize certificate signing process. Otherwise, if the DNS A record for the FQDN in the certificate points to another server, TekCERT will display a file save dialog which allows you to save challenge file. You must copy this file to the configured web server root /.well-known/acme-challenge directory prior to complete signing process through ACME tab. TekCERT will create a pending signing request entry after saving challenge file. Select pending request in ACME tab and click Process Pending Request button to complete signing process.

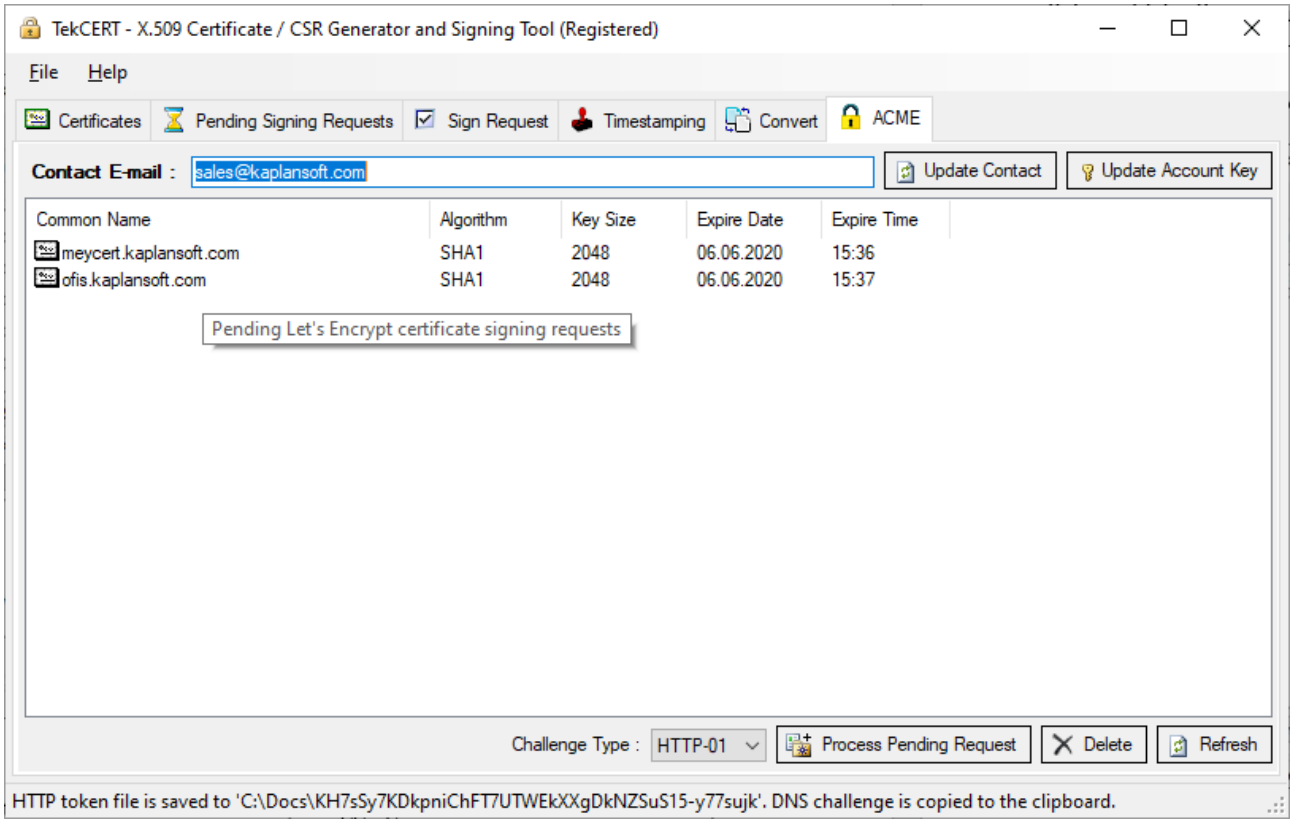

Figure - 2. ACME tab

You can select which certificate store will be used to store signed certificates prior to processing the pending request.

TekCERT can also reply to HTTP validation requests if domain name points to TekCERT installed host and there is not any HTTP server running on TCP port 80.

You can create certificates through the command line interface of TekCERT. You can automate renewal of Let's Encrypt signed certificate by creating scheduled tasks. Please see Command Line Interface section.

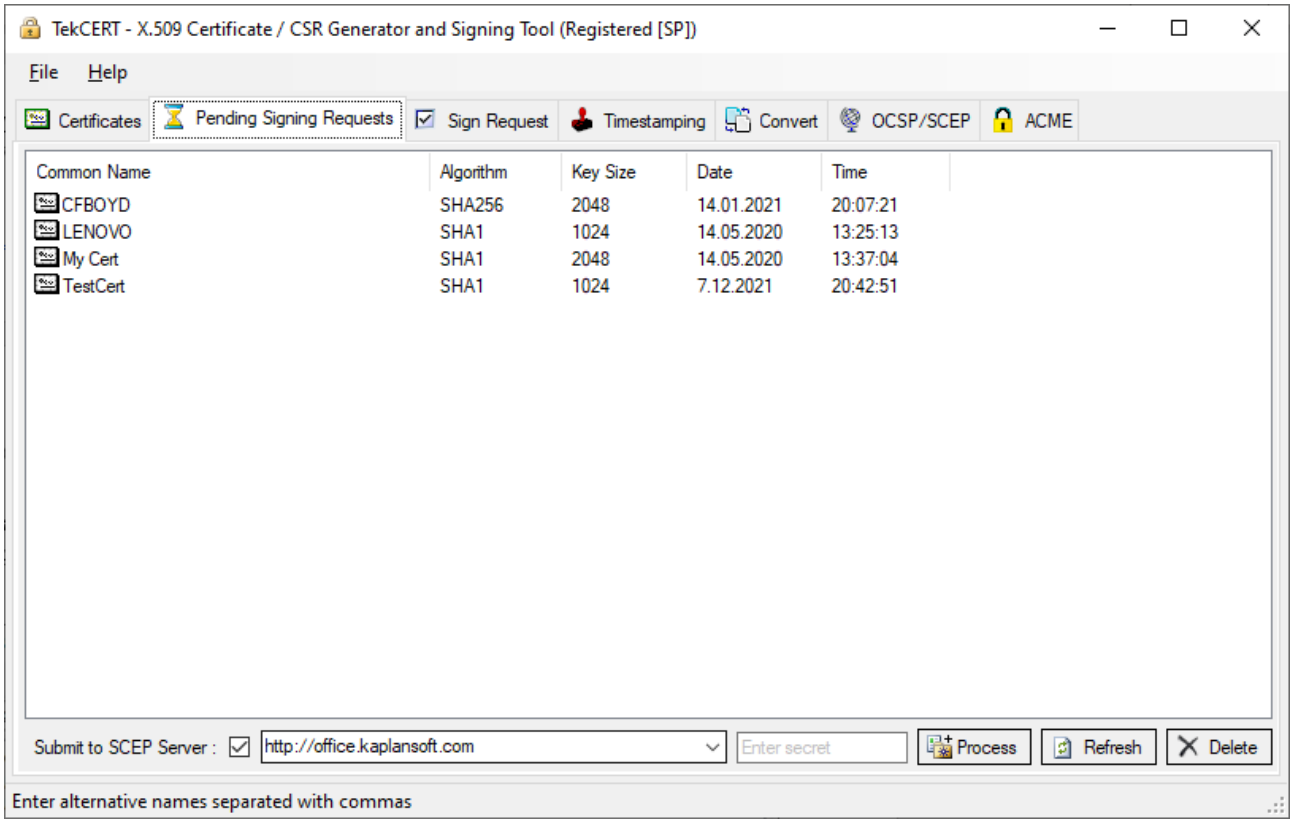

Figure - 3. Pending Signing Requests

Processing Certificate Signing Requests

You can import signed certificate by our CA through Pending Signing Requests tab. Select pending entry, click Process button and select signed certificate either in .pem or .cer format. TekCERT will import the signed certificate, associate with its previously generated private key and store in selected certificate store.

TekCERT can act as a SCEP client. You can submit a pending certificate signing request to a SCEP server. TekCERT will alert you if it receives "Pending" response from the SCEP server. You can re-submit your request if SCEP server is ready to approve your request.

You can also renew a certificate with its existing private key. Right click on a certificate listed in Browse Certificate section of Certificates tab and select **Renew certificate with the same key** option. You can select the new certificate signed by your external CA using opened dialog and import it.

Signing a Certificate Signing Request

You can sign a certificate signing request from a remote system using of CA certificates installed on your system through Sign Certificate tab.

You can also sign certificate signing requests using Let's Encrypt services. When TekCERT is co-located with an IIS installation, TekCERT will automatically place ACME challenge file under root directory of the virtual server /.well-known\acme-challenge directory if a configured virtual server found for the domain name. Otherwise TekCERT will display a file save dialog which allows you to save challenge file. You must copy this file to the configured web server root /.well-known/acme-challenge directory prior to complete signing process through ACME tab. TekCERT will create a pending signing request entry after saving challenge file. DNS token is copied to the clipboard. You can create a TXT record using this token if you prefer DNS validation in the final stage. Select pending request in ACME tab and click Process Pending Request button to complete signing process.

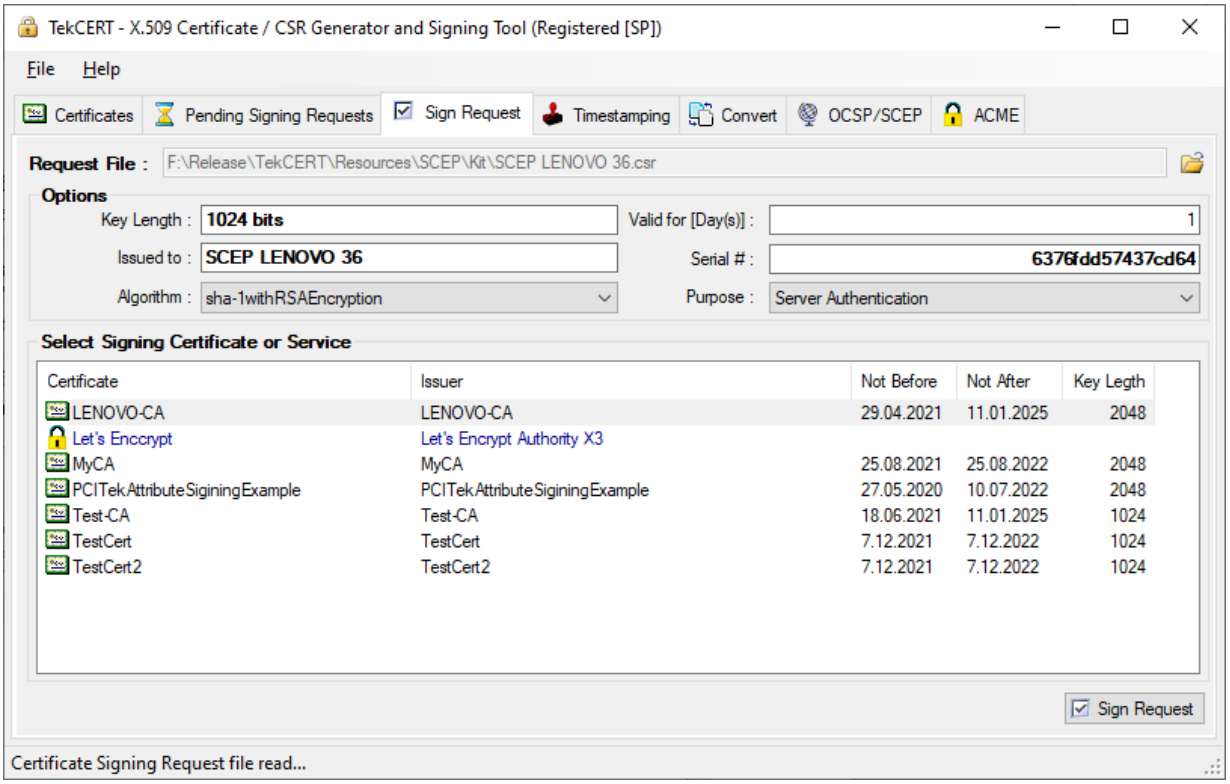

Figure - 4. Sign Request tab

Certificate Conversation

You can convert various certificate to each through Convert tab. Selected certificate types are

- **PEM**, with or without private key, you can supply private key in separate file. Private keys can be encrypted with one following encryption algorithms;
    - DES-CBC
    - DES-EDE3-CBC
    - AES-128-CBC
    - AES-192-CBC
    - AES-256-CBC

TekCERT uses DES-EDE3-CBC while exporting a certificate in PEM format with an encrypted private key *(Commercial edition only)*. Leave Destination Certificate Key Password blank if you do not want export private key encrypted.

- **CER** *(DER Binary encoded)*
- **PFX** *(PKCS#12)*

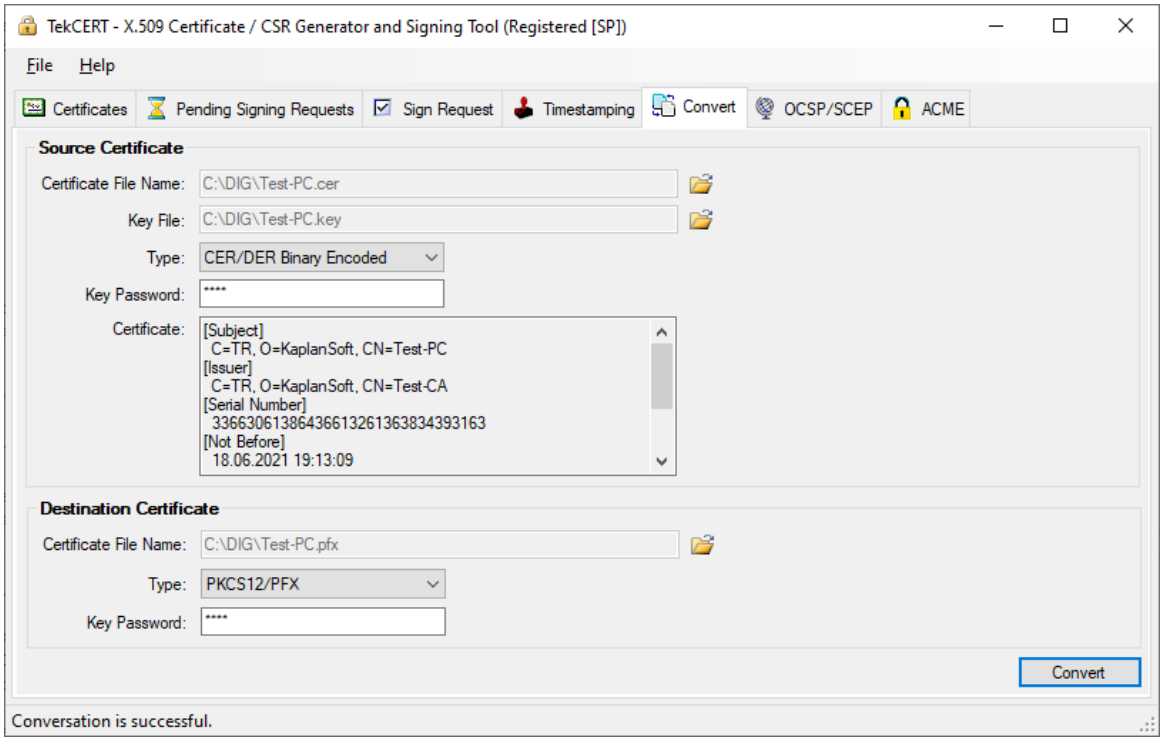

Figure - 5. Convert tab

Timestamp Signing

TekCERT can create timestamp signing requests, sign timestamp signing requests and verify them based on RFC 3161. The freeware version supports timestamping through the GUI. Commercial licenses enable you to use timestamping functions through the command line and the HTTP interface.

You need to have at least one certificate created for the Timestamp Signing purpose if you plan to sign timestamp requests locally. This certificate will be listed in the Timestamping tab when it is created. You can also submit timestamping requests to remote Time Stamping Authorities through HTTP. Received responses can be saved to file.

You can specify a hash algorithm to be used to generate message imprint found in timestamping request. You can also add a certificate request option in timestamping requests. Time Stamping Authority will place the public key of the signing certificate to the response when this option is set.

You can verify a signature file *(Timestamp response)* with or without signed source file. TekCERT will re-calculate the hash of the input file and compare it with the one found in signature file when input file is also specified while verifying. Otherwise TekCERT will check only the signature file and verify based on the procedure described in RFC 6488.

TekCERT will reply to timestamping requests when it is enabled. Please see OCSP Responder section for HTTP parameters of timestamping.
Please see Command Line Interface section for details on command line options for timestamping.

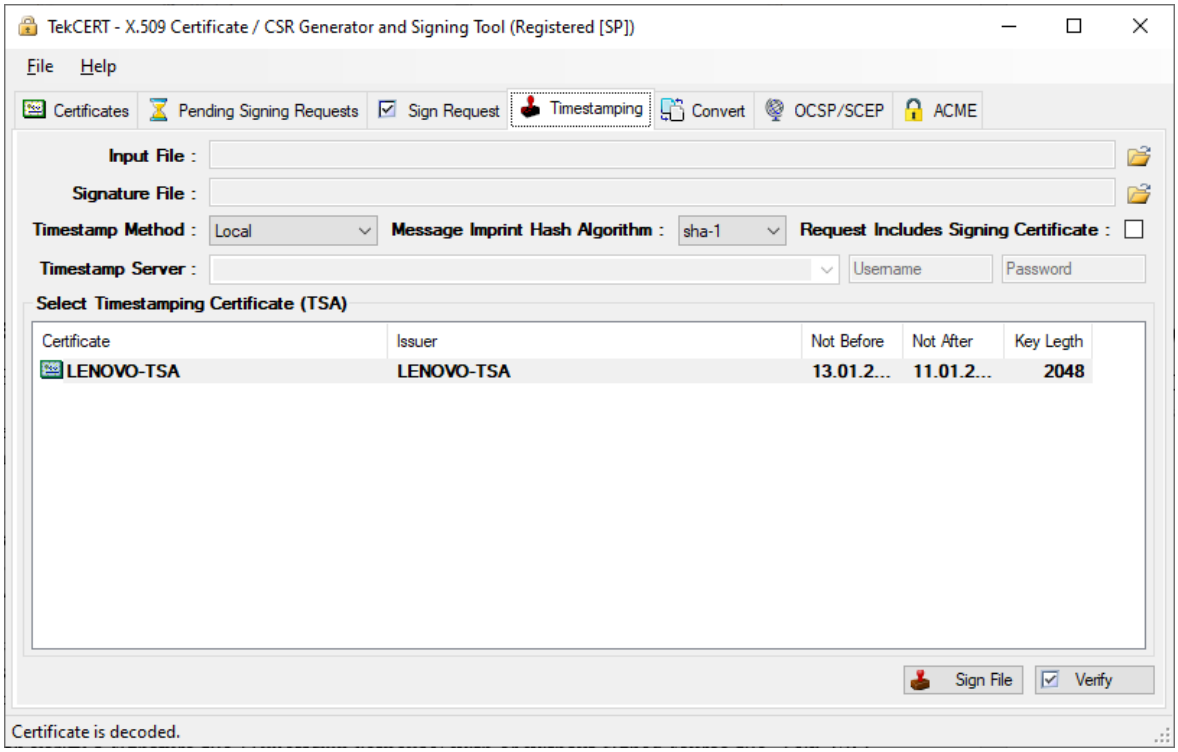

Figure - 6. Timestamping tab

Command Line Interface

Run TekCERT from the command line with -h parameter to see command line options. Open command line prompt as shown below after clicking start button;

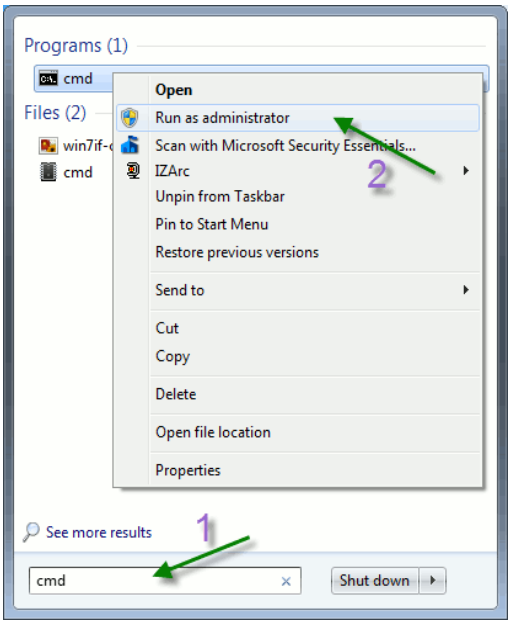

Figure - 7. Run CMD as Administrator

Sample certificate generation;

```
C:\Program Files (x86)\TekCERT>tekcert -g -a SHA1 -p 1 -v 365 -l 1024 -n "TestCert" -c US

Certificate 'TestCert' is generated in Local Machine store.
```

TekCERT creates certificates with RSA key by default. Add -ECDSA parameter to create a certificate with ECDSA key. Valid key lengths are 256 (ECDsaP256), 384 (ECDsaP384) and 521 (ECDsaP521) for ECDSA.

```
C:\Program Files (x86)\TekCERT>tekcert -g -a SHA1 -p 1 -v 365 -l 256 -n "TestCert" -c US
-ECDSA

Certificate 'TestCert' is generated in Local Machine store.
```

You can specify a specific CA certificate to sign the certificate;

```
tekcert -g -a SHA1 -p 1 -v 365 -l 1024 -n "TestCert" -c US
-ca "5776F320DD7A69ED913C5205F0BFD7AE7AF476BC"
```

TekCERT will submit certificate request to be signed by an SCEP server if you specify the URL of SCEP responder service in the -ca parameter

```
tekcert -g -a SHA1 -p 1 -v 365 -l 1024 -n "TestCert" -c US
-ca "http://office.kaplansoft.com"
```

You can specify SCEP secret by adding -ch parameter;

```
tekcert -g -a SHA1 -p 1 -v 365 -l 1024 -n "TestCert" -c US
-ca "http://office.kaplansoft.com" -ch "secret"
```

TekCERT will retry in every five minutes for one hour duration if it receives “Pending” response from the SCEP server.

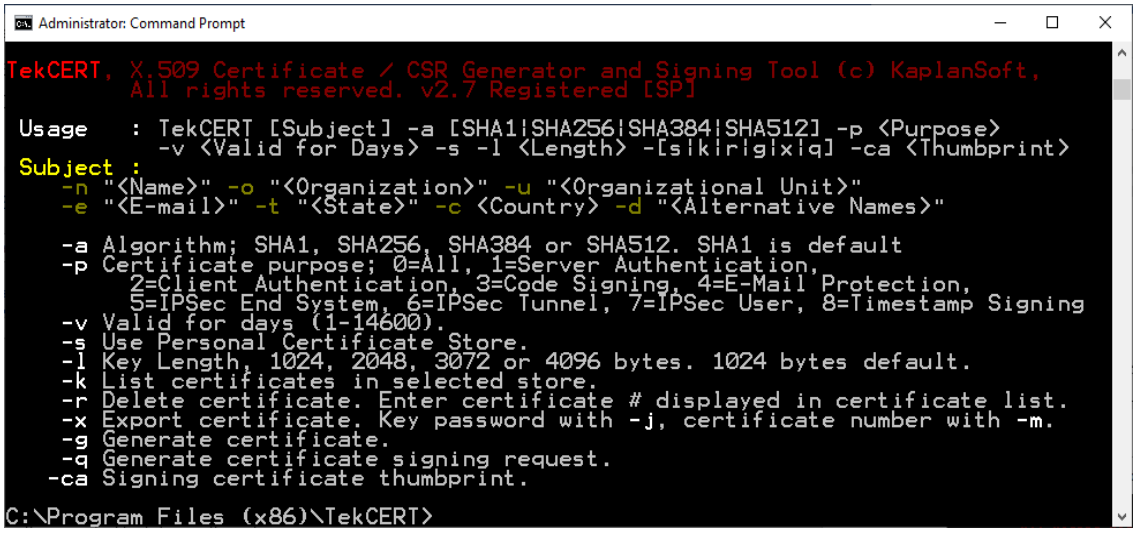

Figure - 8. TekCERT command line options

You can delete old certificates with the same subject name by adding `-df` parameter.

You can also generate certificate signing requests, export and delete certificates from the command line.

Command Line Parameters for Certificate Signing Request Generation

You can create Certificates Signing Requests *(CSR)* through the command line interface;

CSR creation example

```
tekcert -q "c:\Test\test.csr" -a SHA1 -p 1 -v 365 -l 1024 -n "TestCert" -c US
```

Command Line Parameters for Exporting a Certificate, Public or Private Key

Export a certificate

This command export certificate # 36 in personal certificate store

```
tekcert -x "C:\test\mycert.cer" -m 36 -s
```

Export the same certificate with its private key

```
tekcert -x "C:\test\mycert.pfx" -m 36 -s -j "password"
```

Export the public key of the same certificate (PKCS#8)

```
tekcert -xb "C:\test\mycert.pub" -m 36 -s
```

Export the public key of the same certificate (PKCS#8)

```
tekcert -xp "C:\test\mycert.key" -m 36 -s
```

Command Line Parameters for Let's Encrypt Certificate Signing

You can create sign certificate using Let's Encrypt services. Here is a sample;

```
C:\Program Files (x86)\TekCERT>TekCERT -n "forums.tekradius.com" -a SHA256 -ca "LE" -g
Initializing ACME client.
ACME client is initialized. Submitting order.
Challenge received.
HTTP redirection disabled for 'TekRADIUS Forums'
Finalizing the order.
HTTP redirection restored for 'TekRADIUS Forums'
Certificate 'forums.tekradius.com' is generated in Local Machine store [Let's Encrypt].
```

You must use `-ca "LE"` option to instruct TekCERT to sign certificate using Let's Encrypt services. Here is a sample VB script to invoke TekCERT and send an e-mail message for the operation result. Script requires to enter host name as commend line parameter.

```
Option Explicit

dim program1, ret1, objMessage, strArgs, WshShell
Set strArgs  = WScript.Arguments

If strArgs.length < 1 then
 WScript.Echo "Usage : cupdate [Host name]"
 WScript.quit
End If

'''''''''''''''''''''''''''''''''
' Email script
'''''''''''''''''''''''''''''''''
Set objMessage = CreateObject("CDO.Message")
objMessage.Subject = "TekCERT Certificate Update for '" & Trim(strArgs(0)) & "'"
objMessage.From = """TekCERT ACME Update"" <info@kaplansoft.com>"
objMessage.To = "yasin.kaplan@kaplansoft.com"
objMessage.TextBody = ""

objMessage.Configuration.Fields.Item
("http://schemas.microsoft.com/cdo/configuration/sendusing") = 2
objMessage.Configuration.Fields.Item
("http://schemas.microsoft.com/cdo/configuration/smtpserver") = "mail.kaplansoft.com"
objMessage.Configuration.Fields.Item
("http://schemas.microsoft.com/cdo/configuration/smtpserverport") = 25
objMessage.Configuration.Fields.Item
("http://schemas.microsoft.com/cdo/configuration/smtpauthenticate") = 1
objMessage.Configuration.Fields.Update
'''''''''''''''''''''''''''''''''
Set WshShell = WScript.CreateObject ("WScript.Shell")

program1   = "%COMSPEC% /c """"C:\Program Files (x86)\TekCERT\TekCERT.exe"" -n """ &
Trim(strArgs(0)) & """ -a SHA256 -ca ""LE"" -g"""
ret1 = WshShell.Run(program1, 0, True)

if ret1 <> 0 then
 objMessage.HTMLBody = "Certificate update failure (" & ret1 & ")."
else
 objMessage.HTMLBody = "Certificate update is successful."
end if

objMessage.Send
```

You can use this script in task to be created in Windows Task Scheduler for automatic certificate renewals. Please see Errors and Returned Error Codes section for possible return code values.

Command Line Parameters for Timestamping

You can create timestamping requests, sign and verify them through the command line interface;

Timestamp request creation example

```
 tekcert -ts -cr -in "c:\Test\test.bin" -out "c:\output\request.tsq"
```

You can omit output file parameter. TekCERT will save timestamp request in to the same directory with source file with .tsq extension. This would be c:\Test\test.bin.tsq for the example above.

You can add -ha option for hash algorithm to be used for message imprint calculation SHA-1, SHA-256 and SHA-512 algorithms are supported. Default is SHA-1.

```
tekcert -ts -cr -in "c:\Test\test.bin" -out "c:\output\request.tsq" -ha sha256
```

You can also add certificate request field to force timestamping authorith to add public key of the signing certificate to timestamping response;

```
tekcert -ts -cr -in "c:\Test\test.bin" -out "c:\output\request.tsq" -ha sha256 -cert
```

Timestamp request signing locally

```
tekcert -ts -sr -in "c:\output\request.tsq" -out "c:\output\response.tsr"
```

You can specify a timestamping certificate with -tsc option. Certificate thumbprint used to specify the certificate. TekCERT will use default or first available timestamping certificate if this parameter is omitted.

Timestamp request signing using a remote timestamping authority

```
tekcert -ts -sr -in "c:\output\request.tsq" -out "c:\output\response.tsr" -tss
http://tsa.kaplansoft.com -u username -p password
```

TekCERT will try to sign request locally when -tsc or -tss options are not specified. Username and Passwords parameters are optional with -tss parameter. You can omit output file parameter for timestamp signing. TekCERT will save timestamp response in to the same directory with source file with .tsr extension. This would be c:\output\response.tsr for the example above.

Verifying timestamp signature;

```
tekcert -ts -v "c:\output\response.tsr" -in "c:\output\request.tsq"
```

- in parameter is optional. TekCERT will just check timestamp response when original input file is not specified.

Sign code using a remote timestamping authority and a local code signing certificate

```
tekcert -ts -sc -in "c:\output\myapp.exe" -ct CE165EF063A8CB1834E639C9614CE47E045875F7
-tss http://tsa.kaplansoft.com
```

Errors and Returned Error Codes

0	Operation is successful.
1	Specify a valid file name surrounded by double quotes.
2	Please specify operation type.
3	Invalid country code specified. Enter a valid ISO 3166 two characters country code.
4	Freeware version supports only 'sha-1withRSAEncryption'.
5	Specified algorithm is not recognized.
6	Specify a name with -n parameter.
7	Invalid character(s) found in specified name.
8	You can specify maximum 40 years for validity period.

9 Enter a valid numeric value for "Valid for days"
11 No certificate found in selected certificate store.
12 Listing error
21 Selected certificate cannot be located.
22 Deletion error
31 Private key of this certificate marked as not exportable.
32 You must enter a password for Private Key Protection.
33 Export error
41 Public key export error
51 Selected certificate has not a private key.
52 Private key of this certificate marked as not exportable. Cannot export the private key.
53 Private key export error
61 Encoding error in CSR generation
62 General error in CSR generation
71 General error in certificate signing
81 General error in certificate generation.
91 Timestamp signing is failed. Remote server has returned an error.
92 General error in timestamp signing.
93 Cannot find timestamping certificate.
94 General error in timestamp request generation.
95 Timestamp verify operation is failed. Signature cannot be verified.
96 Timestamp verify operation is failed. Signing certificate cannot be found.
97 Timestamp verify operation is failed. Null signature.
98 Message imprint is not valid.
99 Timestamp verify operation is failed. Invalid content type.
100 General error in Timestamp verify operation.
101 Timestamp request generation is failed. No input file specified.
102 Timestamp request generation is failed. Cannot save generated timestamp request file.
103 Timestamp request generation is failed. Unsupported hash algorithm.
104 Timestamp verify operation is failed. Unsupported hash algorithm.
106 Timestamp signing is failed. Cannot read timestamp request file.
107 Timestamp signing is failed. Timestamp server URL is not entered.
108 Timestamp signing is failed. Cannot save generated timestamp response file.
109 Timestamp verify operation is failed. No input file specified.
110 Specified CA certificate cannot be found

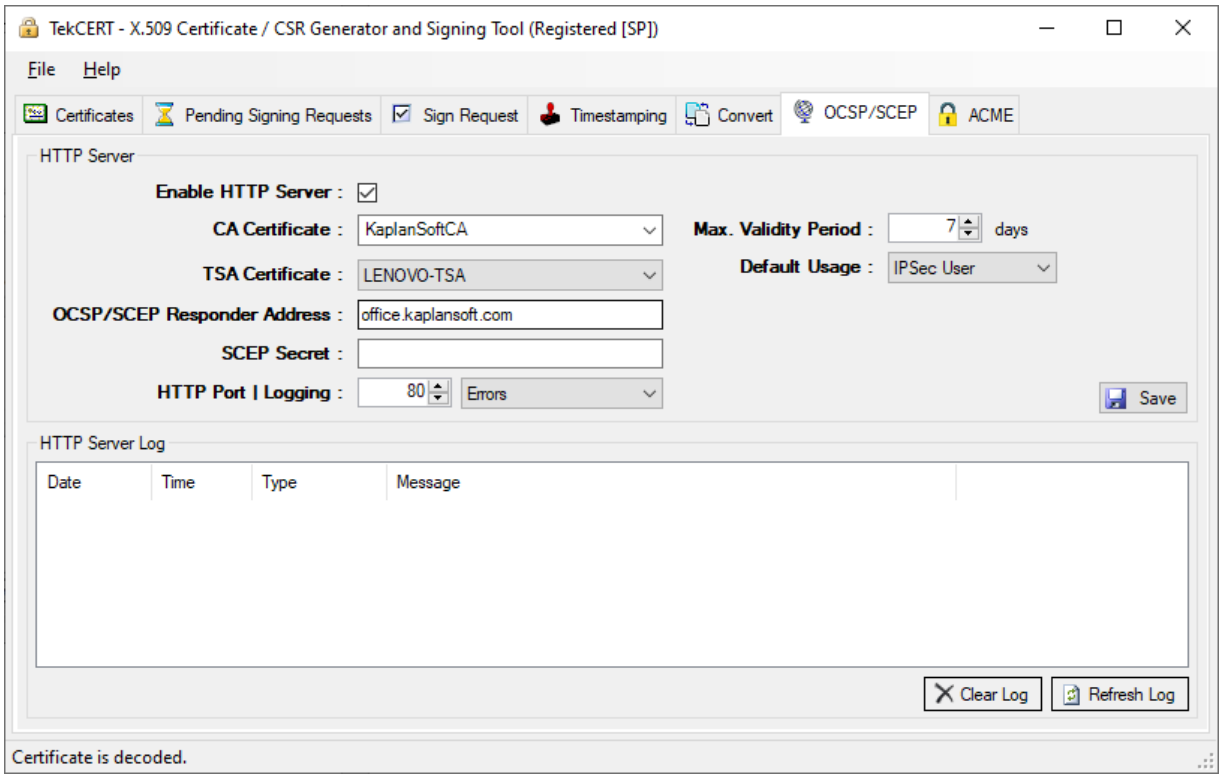

Figure - 9. TekCERT HTTP server parameters

HTTP Server

TekCERT has a built-in HTTP server which functions as OCSP/SCEP responder as described in RFC 6960 and draft-gutmann-scep-14 respectively. HTTP server is enabled by applying SP license. TekCERT will add Authority Information Access attribute to the certificates signed by local CA certificates. This attribute contains an HTTP URL to access TekCERT OCSP responder. TekCERT also maintains a revocation status directory for each locally generated and signed certificate. You can suspend and resume such certificates through TekCERT interface. Please see context menu which is opened when you right click on certificate or functions button below the certificate list.

OCSP Responder configuration is straight forward. Select a default signing certificate after enabling OCSP Responder. TekCERT will generate a CA certificate for this purpose if a CA certificate cannot be found under Local Machine / Personal folder. Default signing certificate is used sign OCSP responses for unknown certificates. Enter an FQDN for OCSP responder address and a TCP port. OCSP Responder keeps a daily rotated activity log under TekCERT application directory. You can set logging level for the log file. Log file can be accessed through file menu of TekCERT GUI.

HTTP server also perform as RFC 3161 time-stamp server. HTTP server will reply time-stamp signing requests when a valid timestamping certificate is configured. You can use Signtool.exe to sign your .exe file as shown below;

```
signtool timestamp /t http://<TekCERT host address> MyFile.exe
```