



Validation Authority OCSP Responder and SafeNet Luna® SA Hardware Security Module (HSM) Deployment Guide

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Section 1 – Introduction

The purpose of this document is to offer the reader a basic installation and configuration guide for the Tumbleweed VA 4.9 Validation Authority Server (OCSP Responder), and the SafeNet Luna SA Hardware Security Module (HSM). The document assumes the reader will have background knowledge of Public Key Infrastructure (PKI) terms and concepts.

1.1 - Summary of Material Covered

Section	Summary of Material Covered
1	Install SafeNet Luna SA, Ethernet-attached HSM hardware and software.
2	Installation and configuration of the VA 4.9 Server for basic OCSP operation. This lesson will also include setup of smart card login for the VA Admin GUI.
3	Requirements for VA Delegated Trust Model implementation.

Figure 1 - Lesson Summary

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1.2 - Summary of Files Included

Summary of files used in this training course:

Filename	Description
eva.pdf	VA 4.9 Server documentation
EVASetup.exe	VA 4.9 Software Installer
publisherSetup.exe	VA 4.9 Publisher – stand-alone Publisher that can fetch HTTP, HTTPS, LDAP, or LDAPS CRL data and publish to VA server.
ocsp_responder_q4.txt ocsp_repeater_q4.txt	The VA 4.9 Repeater and Responder servers require a software license key to install the product. This file needs to be opened and appropriate license cut and pasted into the VA 4.9 Admin GUI.
Readme.txt	VA 4.9 Server ReadMe document
RELEASE_NOTES.txt	VA 4.9 Release Notes
DesktopValidator-win32-release-Standard.exe	Desktop Validator Standard Edition Version 4.9.1
sample dv491config.txt	Sample DV configuration file

Figure 2 - Summary of files used

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Section 2 – Installing the Luna HSM

Product Highlights

- **Most Secure**
 - **Keys always in Hardware**
Luna SA is a HighAssurance HSM.
 - **FIPS 140-2-validated**
Luna SA is validated to FIPS 140-2 Level 2 and Level 3 to meet the demands of the most rigorous security policies.
 - **Hardware Key Management and High-Performance Cryptographic Acceleration**
An integrated HSM provides secure, hardware-based storage for sensitive cryptographic keys and offers over 1,200 cryptographic operations per second (1024-bit RSA decrypt) for the most demanding applications.
 - **Secure Remote Administration and Two-factor Authentication**
Luna SA features secure network administration to simplify management. To prevent unauthorized access, FIPS 140-2 Level 3-validated models offer true two-factor, trusted path, multi-person authentication of HSM administrative users.
- **Ease of Deployment and Integration**
 - **Ethernet-attached for Easy Deployment**
Luna SA features two built-in Ethernet ports for drop-in network deployment, making it easy to add hardware-secured key management and cryptographic acceleration to your applications.
 - **Unparalleled Support and Integration**
Luna SA is fully integrated with the most popular Certificate Authorities (CA), including Microsoft Certificate Services, Entrust Authority, VeriSign. Luna SA also provides SSL acceleration support for Microsoft IIS and Apache Web servers.
- **High Performance and Scalability**
 - **Accelerate multiple SSL Web servers**
Offload computationally intensive SSL connection setups from Web servers with Luna SA configured for shareable hardware SSL acceleration.

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2.1 - Installing Luna Hardware and Software

This section describes the installation and cabling of your Luna HSM hardware. Repeat the steps in this chapter for each HSM to be installed.

2.1.1 - Install Client Software

For interactive installation, install the Luna SA client software on Windows 2000, Windows 2003, or Windows XP as follows:

1. Log in to Windows as Administrator, or as a user with administrator privileges.
2. Insert the **Luna SA Client Software** CD into the CD drive.

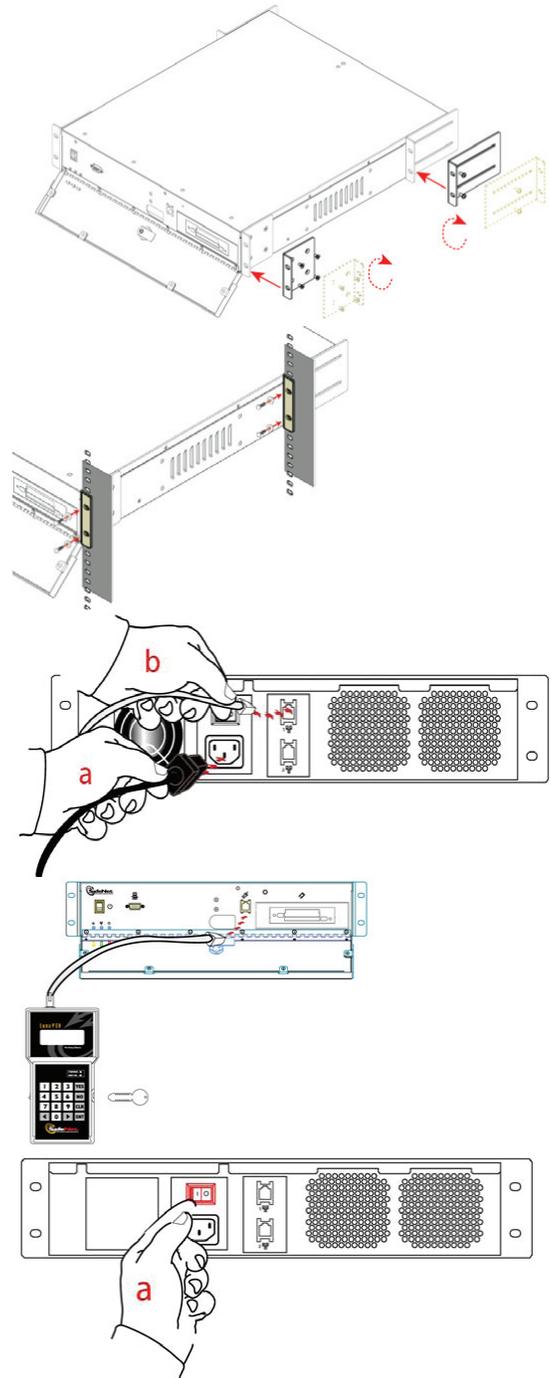
If Autorun is enabled, the Setup program starts automatically. If Autorun is disabled, navigate to the CD-ROM drive using Windows Explorer and double-click the file **setup.exe**.

3. At the **Welcome** screen, click **Next**.
4. When prompted to install optional components, click **Next** to continue without installing the CSP or JSP.
5. When prompted to confirm, click **Yes**.
6. Another installer window appears. Accept all defaults by clicking **Next**.
7. When prompted to install additional components, click **No**.
8. Click **Finish** to complete the installation.

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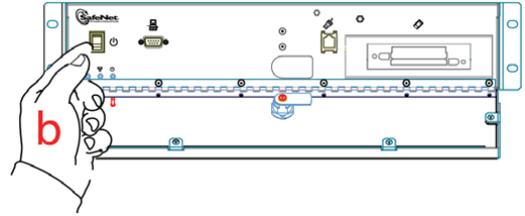
2.1.2 - Install the Luna SA Hardware

1. Install brackets if appropriate for your equipment rack. The brackets can be installed in different orientations and combinations to fit various rack configurations.
2. Mount the appliance in your equipment rack.
3. Insert the power (a) and network (b) cables at the rear panel.
4. Connect the Luna PED at the front panel using the provided PED cable.
5. Set the power switch (a) on the rear panel to the “On” position.

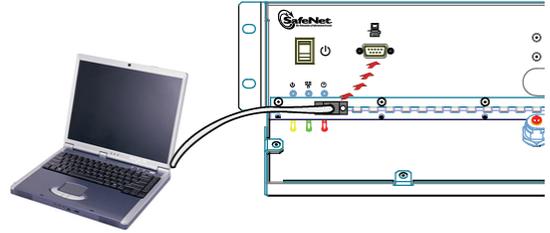


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6. Press and release the **Start** switch (**b**) on the front panel to start the system.



7. Connect a terminal to the serial connector on the front panel.



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2.2 - Configuring the Luna SA Device and Network Parameters

This chapter describes the initial configuration of your Luna SA device.

2.2.1 - Connect to the Luna Device

1. Connect a null-modem serial cable between the serial port on the Luna SA front panel and a dumb terminal or a PC (for example, a laptop) that will serve as the administration computer. A standard null-modem serial cable with DB9 connectors is included with the Luna SA.
2. Use a terminal emulation package provided with your operating system. Set the serial connection parameters:
 - Serial port baud rate: 115200
 - N,8,1 (no parity, 8 data-bits, one stop-bit)
 - VT-100 terminal emulation
 - Hardware flow control
3. When the connection is made, the Luna SA login prompt appears.

```
DEFAULTHOSTNAME ttyS0 login:
```

Notes:

- The [DEFAULTHOSTNAME] is replaced by the new hostname that you assign to your Luna SA later in these instructions. The prompt changes the next time you start an SCLI connection.
 - You may need to press **Enter** several times to initiate the session.
 - You must log in within two minutes of opening an administration session or the connection will time out.
-

2.2.2 - First Time Login and Changing Passwords

4. At the prompt, login as admin. The initial password is chrysalis.

```
login as: admin
admin@<hostname>'s password: chrysalis
```

Note: For security, you are immediately prompted to change the factory-default password for the 'admin' account.

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2.2.3 - Configure IP and Network Parameters

The following procedure assumes you are configuring the Luna SA appliance without DNS.

1. Use the `net show` command to display the current settings and see how they need to be modified for your network.

```

lunash:> net show

Hostname:          DEFAULTHOSTNAME
Domain:            <not set>
IP Address (eth0): 192.168.2.12
HW Address (eth0): 00:03:47:E7:56:1C
Mask (eth0):       255.255.255.0
Gateway (eth0):    192.168.2.1

IP Address (eth1): 192.168.10.41
HW Address (eth1): 00:00:50:0E:35:85
Mask (eth1):       255.255.255.0
Gateway (eth1):    192.168.10.100

Name Servers:      <not set>
Search Domain(s): <not set>

Kernel IP Routing Table:
Destination  Gateway      Genmask      Flags  Metric  Ref   Use  Iface
192.168.2.0  0.0.0.0      255.255.255.0 U       0       0     0   eth0
0.0.0.0      192.168.2.1  0.0.0.0      UG      0       0     0   eth0
127.0.0.0    0.0.0.0      255.0.0.0    U       0       0     0   lo
0.0.0.0      172.20.11.10 0.0.0.0      UG      0       0     0   eth0
    
```

2. Use `net hostname` to set the hostname of the Luna appliance (use lowercase characters).

```
lunash:> net hostname myLunaHostname
```

Note: The `net hostname` command expects a single-word text string. If you supply a name that includes a space, all text after the space is ignored.

3. Restart the **syslog service** to ensure that all logging after this point is recorded against the new hostname.

```

lunash:> service restart syslog

Shutting down kernel logger: [ OK ]
Shutting down system logger: [ OK ]
Starting system logger: [ OK ]
Starting kernel logger: [ OK ]
    
```

Use `net interface` to change network configuration settings.

```
net -interface -static -device <Ethernet-Device(eth0)> -ip
<Ethernet-device-IP-Address> -netmask <Netmask-IP-Address> -
gateway <Gateway-IP-Address>
```

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```

lunash:>network interface device eth0 -ip 192.168.0.10 -netmask
255.255.255.0 -gateway 192.168.0.254

NOTICE: The network service must be restarted for new network settings
to take effect.
If you are sure that you wish to restart the network, then type
'proceed', otherwise type 'quit'

> proceed
Proceeding...
Restarting network service...
Shutting down loopback interface: [ OK ]
Setting network parameters: [ OK ]
Bringing up loopback interface: [ OK ]
Bringing up interface eth0: [ OK ]
Command Result : 0 (Success)
    
```

4. View the new network settings with:

```

lunash:> net show

Hostname:          DEFAULTHOSTNAME
Domain:            <not set>
IP Address (eth0): 192.168.0.10
HW Address (eth0): 00:03:47:E7:56:1C
Mask (eth0):       255.255.255.0
Gateway (eth0):    192.168.0.254

IP Address (eth1): 192.168.10.50
HW Address (eth1): 00:00:50:0E:35:85
Mask (eth1):       255.255.255.0
Gateway (eth1):    192.168.10.100

Name Servers:      <not set>
Search Domain(s): <not set>

Kernel IP Routing Table:
Destination Gateway Genmask Flags Metric Ref Use Iface
192.168.2.0 0.0.0.0 255.255.255.0 U 0 0 0 0 eth0
0.0.0.0 192.168.2.1 0.0.0.0 UG 0 0 0 0 eth0
127.0.0.0 0.0.0.0 255.0.0.0 U 0 0 0 0 lo
0.0.0.0 172.20.11.10 0.0.0.0 UG 0 0 0 0 eth0
    
```

5. Test your network configuration by pinging another server with the lunash net ping <servername> command and having the other server ping this Luna appliance.
6. Verify your client machines network configuration by attempting to ping the Luna appliance by IP address from the Client.

2.2.4 - Set System Date and Time

Before proceeding with HSM and Partition setup, ensure that the Luna HSM Server's system date, time and time zone are appropriate for your network.

1. First, verify the current date and time on the HSM server to see if they need to be changed.

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```
lunash:>status date
Thu Oct 12 20:40:39 EDT 2006
```

or

```
lunash:>status zone
EDT
```

2. If the date, time, or time zone are incorrect for your location, change them using the **lunash sysconf** command. You must set the time zone before setting the time and date, otherwise the time zone change adjusts the time that you just set.

```
lunash:>sysconf -timezone -set Canada/Eastern
Timezone set to Canada/Eastern
```

3. Use **sysconf time** to set the system time and date, <HH:MM YYYYMMDD> in the format shown. Note that the time is set on a 24-hour clock (00:00 to 23:59).

```
lunash:> sysconf -time 20:45 20061012
Thu Oct 12 20:45:05 EDT 2006
```

4. To use ntp, add one or more servers to the Luna appliance's ntp server list, and then activate (enable) the servers. Use the **sysconf ntp** command as follows:

Add servers:

```
lunash:> sysconf -ntp addserver <hostnameoripaddress>
```

Activate servers:

```
lunash:> sysconf -ntp enable
```

Note: If you wish to use Network Time Protocol (ntp), you must set the system time to within 20 minutes of the time given by the servers that you select. If the difference between ntp server time and the Luna appliance time is greater than 20 minutes, the ntp daemon ignores the servers and quits.

2.2.5 - Generate a New Luna Server Certificate

Although your Luna appliance came with a server certificate, good security practice dictates that you should generate a new one.

1. Use **sysconf regenCert** to generate a new Server Certificate, substituting the appropriate IP address for your device:

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```
lunash:> sysconf regenCert 192.168.0.10
CAUTION: Current Server Certificate and Private Key will be
overwritten. All clients will have to add the server again with new certificate.
Type 'proceed' to generate cert or 'quit' to cancel
> proceed
lunash:>
```

2. From the factory, the Network Trust Link Service (ntls) is bound to the loopback device by default. In order to use the appliance on your network, you must bind the ntlS to one of the two Ethernet ports, ETH0 or ETH1, or to a hostname or IP address.

```
lunash:>ntls bind eth0
Success: NTLs binding network device eth0 set.
NOTICE: The NTLs service must be restarted for new settings to take effect.
If you are sure that you wish to restart NTLs, then type 'proceed', otherwise
type 'quit'
> proceed
Proceeding...
Restarting NTLs service...
Stopping ntlS: [ OK ]
Starting ntlS: [ OK ]
Command Result : 0 (Success)
lunash:>
```

Note: The “Stopping ntlS” operation may fail in the above example because NTLs is not yet running on a new Luna appliance. Just ignore the message. The service starts again, whether the stop was needed or not.

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2.3 – Initializing the Luna SA HSM

You must initialize the HSM to set up the necessary identities, ownership, and authentication at the HSM Server level. To initialize a Luna HSM with Trusted Path (PED) Authentication, you must have the Luna PED (version 1.6.6 or higher) connected and switched on, and in the “Awaiting Command” mode.

When you power on the Luna PED, the screen displays the manufacturer's name and the PED's firmware version. It is not ready to accept commands from the Luna HSM until you press ENT on the keypad and the display changes to "Awaiting Command" state. Before you continue, check that you have at least two sets of PED keys prepared and labeled as necessary.

2.3.1 - Start the Initialization Process

The `hsm init` command takes several options.

For a Trusted Path Luna HSM, values are supplied via Luna PED interaction. The exception is a label for the HSM, which you must fill in at the command line.

1. First you must log in to the HSM with the default (gray) key.
2. Run the `hsm login` command.

```
lunash:>hsm login
Luna PED operation required to login as HSM Administrator - use gray PED key.
'hsm login' successful.
```

3. Run the `hsm init` command.

```
lunash:> hsm init -label myLunaHSM
```

The following warning appears:

```
WARNING: Are you sure you wish to re-initialize this HSM?
All containers/HSM Partitions and data will be erased.
Type 'proceed' to delete the container, or 'quit' to exit now
```

4. Type:

```
proceed
```

Luna PED operation is required to initialize HSM - use gray and blue PED keys.
The first request to appear is:

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5. Insert the gray PED Key into the key slot on the side of Luna PED (you can use any gray PED Key).
6. Turn it clockwise until it stops (about a quarter turn).
7. The **Key In** indicator lights on the Luna PED.
8. Press the **ENT** button on the keypad, to continue. After the gray PED Key, Luna PED requests the first blue PED Key:



9. Remove the gray key, insert the blue HSM Admin PED Key and press **ENT**. A unique HSM Admin PIN is to be imprinted on both the PED Key and the HSM.

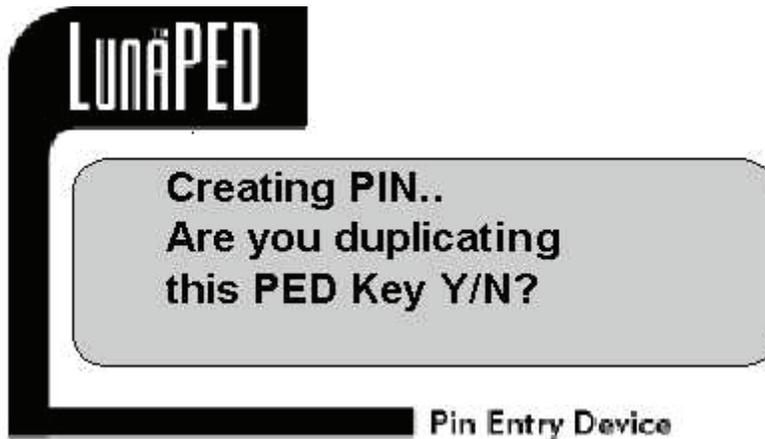
At this time, Luna PED **may** continue with:

"Creating PIN... Do you wish to use a Group PED Key?"

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10. That question only appears for PED keys which have previously been imprinted and will not be prompted on new PED keys. If this is the first HSM you are initializing your response should be **NO** if you are prompted. If this is the second HSM you are initializing and you would like them to share a Blue HSM Admin Key, you should respond **Yes** to use the value already imprinted on the Blue Key.
Next, you are asked to provide a PED PIN.
11. Enter a PIN if you wish, and press **ENT** to inform Luna PED that you are finished entering PED PIN digits, or that you have decided not to use a PED PIN (no digits entered).
12. Confirm by entering the *same PIN* and pressing **ENT** again.

You are then prompted to duplicate your PED key:



“Are you duplicating this key Y/N?”

13. It is recommended to have at least one backup set of imprinted PED Keys stored in a safe place, in case of loss or damage to the primary keys.
 - a. If you respond **NO**, Luna PED imprints just the one blue HSM Admin key and goes on to the next step in initialization of the HSM.
 - b. If you respond **YES**, Luna PED imprints the first blue key and then asks for more blue PED Keys until you have imprinted (duplicated) as many as you require.
14. Remove the imprinted blue PED key and insert a new blue HSM Admin PED Key to be overwritten and press **ENT**. If the PED keys have already been imprinted, you may be prompted to overwrite the Key before continuing. Press **ENT** to continue and overwrite the key.
15. When you are done duplicating PED keys, press **NO** to stop the duplication press and continue.

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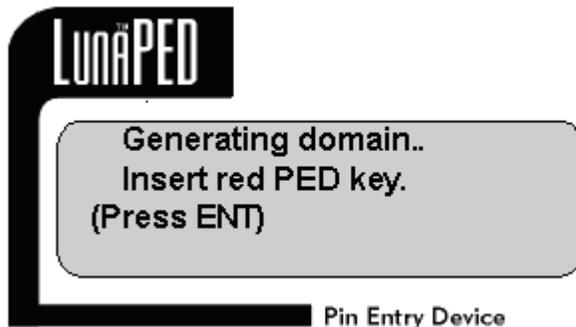
The Luna PED now prompts for an imprinted blue HSM Admin key, because you now must use that key to log in to the HSM as Admin. Leave the blue PED Key initialized in the previous step in place.



16. Press **ENT** on the PED keypad. You may also be prompted for a PED PIN, if one was created when the blue PED Key was imprinted.

Now, you create the domain for future cloning of the HSM, or you adopt the domain from a previous token or Luna HSM, so that the current Luna HSM (or token) can clone with the previous. A common domain (common between HSM and Backup Token) is required for HSM backups.

Luna PED prompts:

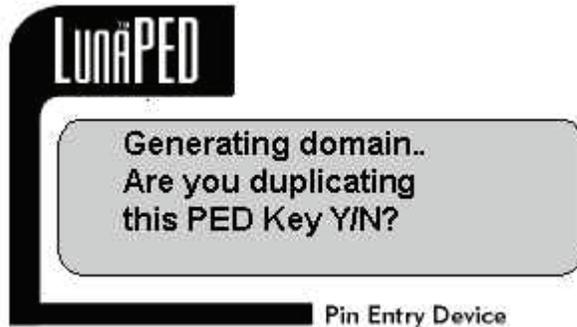


17. Insert a red PED Key and press **ENT**. If the red PED Key is blank, then Luna PED goes ahead and imprints a domain, which is matched on the HSM. However, if Luna PED detects that the red PED Key contains data, then Luna PED prompts whether to keep the existing domain on the key or create a new one.
 - a. When the prompt “Are you creating a new domain?” appears, press **Yes** to create a new cloning domain when initializing the first HSM in your organization. To use the existing cloning domain on future HSMs, press **No**.

Note: This operation will overwrite the contents of the red PED key. Verify your responses before continuing with this step.

Now you are given the opportunity to duplicate the red, domain PED Key:

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Again, you should maintain at least one backup of each imprinted PED Key in secure storage.

18. Remove the imprinted red PED key and insert a new red HSM Cloning Domain PED Key to be overwritten, and press **ENT**. If the PED keys have already been imprinted, you may be prompted to overwrite the Key before continuing. Press **ENT** to continue and overwrite the key.
19. When you are done duplicating PED keys press **NO** to stop the duplication process and continue.

When Luna PED says “Request Successful” and then goes back to “Awaiting Command...,” initialization is finished. Turn your attention back to the **lunash** prompt. When the PED activities are complete, **lunash** displays a “success” message.

```
'hsm init' successful
```

You have initialized the HSM and created an HSM Admin identity.

2.3.2 - Login to the HSM

1. If you do not already have a connection open, connect your administration computer to the serial Console port of the Luna appliance and open a Terminal session, or use SSH to connect via the network.
2. To continue with configuration, you must login to the Luna HSM as HSM Admin. Ensure that the Luna PED is connected to the PED port on your Luna appliance, and that the PED is powered on and "Awaiting Command..."
3. At the **lunash** prompt, type:

```
lunash:> hsm login
```

4. The Luna PED prompts for the blue PED Key. You must provide the blue HSM Admin PED Key that has been imprinted (initialized) for this HSM. If you had set a PED PIN, you are prompted for that as well.

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Note: If you fail three consecutive login attempts as HSM Admin, the HSM is zeroized and cannot be used — it must be re-initialized. Zeroizing destroys all key material. Please note that the Luna HSM must actually receive some information before it logs a failed attempt, so if you forget to insert a PED Key, or forget to turn the Key to the locked position, that is not logged as a failed attempt. Also, when you successfully login, the counter is reset to zero.

2.3.3 - Check HSM Capabilities and Configure HSM Policies as Necessary

HSM capabilities identify the purchased features of the product and are set at time of manufacture. Policies represent the HSM Admin's enabling (or restriction) of those features.

Verify Capabilities

1. Type the **hsm showPolicies** command to display the current capability/policy set for the HSM. Verify that the HSM capabilities match those outlined below under the heading *“The following capabilities describe this HSM, and cannot be altered, except by capability updates.”* If they do not, contact SafeNet Support before proceeding.

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```

lunash:> hsm -showPolicies
HSM Label: Default Label
Serial #: 121212
Firmware: 4.5.3

The following capabilities describe this HSM, and cannot be altered,
except by capability updates.

      Description                               Value
      =====                               =====
Enable PIN-based authentication                Disallowed
Enable PED-based authentication              Allowed
Performance level                             9
Enable M of N                                Allowed
Enable domestic mechanisms & key sizes      Allowed
Enable masking                               Disallowed
Enable cloning                               Allowed
Enable special cloning certificate           Disallowed
Enable full (non-backup) functionality      Allowed
Enable ECC Mechanisms                       Disallowed
Enable non-FIPS algorithms                  Allowed
Enable MofN auto-activation                 Allowed
Enable SO reset of partition PIN            Allowed
Enable network replication                  Allowed
Enable Korean Algorithms                   Disallowed
FIPS Evaluated                              Disallowed
Manufacturing Token                         Disallowed
Enable Remote Authentication               Allowed
Enable offboard storage                    Disallowed
Enable partition groups                     Disallowed

The following policies are set due to current configuration of
this HSM and cannot be altered directly by the user.
      Description                               Value
      =====                               =====
PED-based authentication                     True
Require M of N                              False

The following policies describe the current configuration of
this HSM and may be changed by the HSM Administrator.
Changing policies marked "destructive" will erase
partitions from the HSM.

      Description                               Value           Code           Destructive
      =====                               =====           =====           =====
Allow cloning                               On                7                Yes
Allow non-FIPS algorithms                   Off               12               Yes
Allow MofN auto-activation                  On                13               No
SO can reset partition PIN                  On                15               Yes
Allow network replication                   On                16               No
Allow Remote Authentication                 On                20               Yes
Force user PIN change after set/reset      Off               21               No

Command Result : 0 (Success)
    
```

According to the above example, the fixed capabilities require that this HSM be protected at FIPS 140-2 level 3, meaning that the Luna PED and PED Keys are required for authentication.

The alterable policies have numeric codes. You can alter a policy with the **hsm changePolicy** command, giving the code for the policy that is to change, followed by the new value.

The FIPS 140-2 standard mandates a set of security factors that specify a restricted suite of cryptographic algorithms. The Luna HSM is designed to the

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standard, but can allow activation of additional non-FIPS-validated algorithms if your application requires them.

Verify and Set Policies

2. Verify that the HSM policies match those shown above under the heading “*The following policies describe the current configuration of this HSM and may be changed by the HSM Administrator.*” If you need to modify a policy setting to comply with your operational requirements use the procedure below:

```
lunash:> hsm -changePolicy -policy <policyCode> -value <policyValue>
```

The following example changes code 12 from a value of 1 (On) to 0 (Off).

```
lunash:> hsm -changePolicy -policy 12 -value 0
```

That command assigns a value of zero (0) to the “Allow non-FIPS algorithms” policy, turning it off.

The above example is a change to a destructive policy, meaning that, if you apply this policy, the HSM is zeroized and all contents are lost. For this reason, you are prompted to confirm if that is what you really wish to do. You must now re-initialize the HSM. While this is not an issue when you have just initialized an HSM, it may be a very important consideration if your Luna system has been in a “live” or “production” environment and the HSM contains data, keys, or certificates.

Please refer to the *Luna SA Online Help System* for a description of all HSM Policies and their meanings.

3. For each policy that must be modified, use the procedure described above to set the correct value.
4. If you have changed a destructive policy, it will now be necessary to repeat the steps to reinitialize the HSM as described above in *Start the Initialization Process*.

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2.4 – Creating an HSM Partition

Within the HSM, separate cryptographic workspaces must be initialized and designated for clients. A workspace, or Partition, and all its contents are protected by encryption derived (in part) from its authentication. Only a Client that presents the proper authentication is allowed to see the Partition and to work with its contents. This chapter describes how to setup an HSM Partition for Trusted Path Authentication.

2.4.1 - Login to the HSM

1. If you do not already have a connection open, connect your administration computer to the serial Console port of the Luna appliance, and open a Terminal session, or use SSH to connect via the network.
2. To create HSM Partitions, you must login to the Luna HSM as HSM Admin. Ensure that the Luna PED is connected to the PED port on your Luna appliance and that the PED is powered on and "Awaiting Command..."
3. At the lunash prompt, type:

```
lunash:> hsm login
```

4. The Luna PED prompts for the blue PED Key. You must provide the blue HSM Admin PED Key that has been imprinted (initialized) for this HSM. If you had set a PED PIN, you are prompted for that as well.

Note: If you fail three consecutive login attempts as HSM Admin, the HSM is zeroized and cannot be used — it must be re-initialized. To reset the Luna appliance, so that the HSM can be re-initialized, switch the power off for 30 seconds and then restart. Zeroizing destroys all key material. Please note that the Luna HSM must actually receive some information before it logs a failed attempt, so if you forget to insert a PED Key, or forget to turn the Key to the locked position, that is not logged as a failed attempt. Also, when you successfully login, the counter is reset to zero.

2.4.2 - Initialize the Partition

Having logged in you can now use the lunash `partition create` command, to create an HSM Partition. You must supply a label or name for the new Partition when you issue the command:

1. Create and name an HSM Partition. Type:

```
lunash:> partition -create -name <name-for-new-Partition>
```

Luna PED then requests the black Owner PED key with the message

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```
Creating PIN..  
Insert black PED key.  
(Press ENT)
```

2. Insert a new black HSM Partition Owner PED key and press ENT. A unique Partition Owner PIN is to be imprinted on both the PED key and the HSM Partition.

Luna PED may continue with:

```
Creating PIN..  
Do you wish to use a group PED Key Y/N
```

3. Decide whether this should be a group PED Key, enter **YES** or **NO** on the PED keypad, and press **ENT** to confirm overwrite if prompted.

Next, you are asked to provide an optional PED PIN. The Luna PED will display the following:

```
Creating PIN..  
Enter new PED PIN:  
0>
```

4. You must press **ENT** to inform Luna PED that you are finished entering PED PIN digits, or that you have decided not to use a PED PIN (no digits entered).
5. When you provide a PED PIN – even if it is the null PIN (by just pressing **ENT** with no digits) – Luna PED requests it a second time to ensure that you entered it correctly. Press **ENT** again to confirm the PIN.

You are then prompted by the Luna PED:

```
Creating PIN..  
Are you duplicating this PED Key Y/N?
```

6. Respond **YES** to duplicate additional black PED keys. The PED asks for more black PED Keys, until you have imprinted (duplicated) as many as you wish and respond **NO** to this question. Generate the number of PED keys specified in the table on the appropriate *Luna HSM Partition Setup Worksheet in Appendix E*.

The Luna PED now generates and displays the Client Password (login secret); by which Clients will later authenticate themselves to this HSM Partition.

```
Login secret value  
btqx-EFGH-3456-7/K9  
Please write it down.  
(Press ENT)
```

7. You must record the Login Secret Value from the Luna PED screen for later use with your application. Verify that you have written it down legibly as it will never be shown again. This is the HSM Partition password, used to authenticate Client applications that wish to use the HSM Partition on the Luna HSM. It might be best to use a text editor, because the majority of errors tend to occur when reading hand-written values.

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The Luna PED times out after eight minutes. You must complete recording the password and press the ENT button before time-out occurs.

When you press ENT on the Luna PED keypad, control returns to lunash, where a success message is displayed:

```
partition create successful
```

At the same time, Luna PED goes back to:

```
Awaiting command..
```

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2.4.3 - Check Partition Capabilities and Configure Partition Policies as Necessary

Most Partition capabilities have corresponding policies that the HSM Admin or SO can set to customize the behavior of individual partitions. The exception to this is the use of Luna PED without challenge on a Luna device that uses Trusted Path Authentication. Challenges (HSM Partition Passwords) are always used when the Luna device uses Luna PED (Trusted Path Authentication).

Partition capabilities are determined by the license. Your Luna appliance is licensed with some number of partitions of a certain type, with all those partitions having the same capability settings. The HSM Admin can make the partitions all behave differently by turning on and off various policy settings on each partition. By default policies are set to the same value as the capabilities, so if the capability allows something, the corresponding policy will be on.

Partition capabilities identify the purchased features of the product and are set at time of manufacture. Policies represent the Partition Owner's enabling (or restriction) of those features.

Verify Capabilities

Type the `partition -showPolicies` command, to display the current capability/policy set for the partition. Verify that the partition capabilities match those shown below under the heading *“The following capabilities describe this partition and can never be changed.”* If they do not, contact SafeNet Support before proceeding.

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```

lunash:> partition -showPolicies -partition myPartition1
Partition Name: myPartition1
Partition Num: 332211001
    
```

The following capabilities describe this partition and can never be changed.

Description	Value
Enable private key cloning	Allowed
Enable private key wrapping	Disallowed
Enable private key unwrapping	Allowed
Enable private key masking	Disallowed
Enable secret key cloning	Allowed
Enable secret key wrapping	Allowed
Enable secret key unwrapping	Allowed
Enable secret key masking	Disallowed
Enable multipurpose keys	Allowed
Enable changing key attributes	Allowed
Enable PED use without challenge	Allowed
Allow failed challenge responses	Allowed
Enable operation without RSA blinding	Allowed
Enable signing with non-local keys	Allowed
Enable raw RSA operations	Allowed
Max non-volatile storage space	5
Max failed user logins allowed	10
Enable high availability recovery	Allowed
Enable activation	Allowed
Enable auto-activation	Allowed
Minimum pin length (inverted: 255 - min)	249
Maximum pin length	255
Enable RA-type wrapping	Disallowed

The following policies are set due to current configuration of this partition and may not be altered directly by the user.

Description	Value
Challenge for authentication not needed	True

The following policies describe the current configuration of this partition and may be changed by the HSM Security Officer.

Description	Value	Code
Allow private key cloning	On	0
Allow private key unwrapping	On	2
Allow secret key cloning	On	4
Allow secret key wrapping	On	5
Allow secret key unwrapping	On	6
Allow multipurpose keys	On	10
Allow changing key attributes	On	11
Ignore failed challenge responses	On	15
Operate without RSA blinding	On	16
Allow signing with non-local keys	On	17
Allow raw RSA operations	On	18
Max non-volatile storage space	5	19
Max failed user logins allowed	10	20
Allow high availability recovery	On	21
Allow activation	On	22
Allow auto-activation	On	23
Minimum pin length (inverted: 255 - min)	249	25
Maximum pin length	255	26

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Verify and Set Policies

The alterable policies have numeric codes. You can alter a policy with the `partition -changePolicy` command, giving the code for the policy that is to change, followed by the new value.

1. Verify that the partition policies match those shown below under the heading “*The following policies describe the current configuration of this partition and may be changed by the HSM Security Officer*” above. If you need to modify a policy setting use the steps that follow.
2. To change a Partition Policy, at the **lunash** prompt, type:

```
lunash:> partition changePolicy -partition <name of HSM Partition> -policy  
<policy code> -value <new policy value>
```

For example, to change the Activation Policy for a Partition labeled **myPartition1**, type:

```
lunash:> partition changePolicy -partition myPartition1 -policy 22 -value  
1 (allows Activation mode to be on)  
partition changePolicy successful  
Policy allow Activation is now set to: 1
```

Please refer to the *Luna SA Online Help System* for a description of all Partition Policies and their meanings.

3. For each policy that is to be modified, use the procedure described above to set the correct value.

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2.5 - Configure Luna Client Software

Before an HSM client can use the data stored in a partition, it must be configured so that it can securely communicate with the HSM, and then it must be registered to that partition. The following procedures outline the steps required to perform this configuration.

2.5.1 - Import Luna Appliance Server Cert onto Client (Windows)

1. Open a command prompt window on the Client and change the directory to `c:\Program Files\LunaSA\`. Securely transfer the **server.pem** file from the Luna SA, using the supplied Chrysalis Transfer Program (ctp) utility.

```
c:\Program Files\LunaSA\ > ctp admin@<IP-address-of-HSM>:server.pem .
admin@192.168.0.10's password:
server.pem          100%
|*****|          928
00:00
```

Note: The dot (.) at the end of the command specifies to place the resulting file in the current directory.

2. Verify that the Server Certificate has arrived on the Client:

```
c:\Program Files\LunaSA\> dir
server.pem
```

2.5.2 - Register the HSM Server Certificate with the Client

The supplied client-side tool `vt1`, located at `c:\Program Files\LunaSA\`, is used for managing Luna client/server setup. The `vt1` command is called from the command line or a shell prompt.

Invoke the `vt1 addServer` command so that the client can create a secure connection with the HSM (the server).

```
C:\Program Files\LunaSA > vt1 addServer -n <IP-address-of-HSM> -c <serverCert-file>
```

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2.5.3 - Create a Client Certificate (Windows)

Begin by creating a certificate and private key for the client using the vtl command-line interface. Use the clients IP address, not its hostname for the name attribute. The “-n” (name) is the only mandatory item and must be the client IP address. Additional optional parameters can be added. Refer to the *Luna SA Online Help System* for full command syntax and description.

Execute the following command to create a client certificate and private key.

```
c:\Program Files\LunaSA\ >vtl createCert -n <clientIPAddress>
```

Example

```
C:\Program Files\LunaSA>vtl createcert -n 192.168.0.1
Private Key created and written to: C:\Program
Files\LunaSA\cert\client\192.168.0.1Key.pem
Certificate created and written to: C:\Program
Files\LunaSA\cert\client\192.168.0.1.pem
```

2.5.4 - Export a Client Certificate to a Luna Appliance (Windows)

Next you must send the client certificate that you just created to the Luna appliance.

Enter the following command to transfer the client certificate to the Luna appliance.

```
C:\Program Files\LunaSA\ > ctp .\cert\client\<clientCert>.pem admin@<IP-address-of-
HSM>:
```

You are prompted for the Luna appliance admin password.

Example

```
c:\ Program Files\LunaSA\> ctp .\LunaSA\cert\client\192.168.0.1.pem
admin@192.168.0.10:
```

Note: You must use the “:” after the destination. Without the colon `ctp` does not recognize the supplied destination as a remote server.

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2.5.5 - Register the Client Certificate to the HSM

The client certificate, which has been securely transferred (ctp'd) from the client to the HSM Server, in previous sections, must be registered by the HSM Server. To do so, you must be connected to the HSM Server (the Luna SA) and logged in as “admin”.

Enter the following command to register the client certificate to the HSM

```
lunash:> client -register -client <client's-name> -ip <client's-IP-Address>
```

The <client's-name> above can be any string that allows you to easily identify this client—many people use the hostname, but the <client's-name> can be any string that you find convenient.

The command is expecting to find (on the Luna appliance) a client certificate filename that matches the client's IP address as you provide it here. In other words, this is a check to verify that you are registering the client whose .pem file you created in the previous steps and ctp'd to the appliance.

Example

```
lunash:> client -register -client MyClient -ip 192.168.0.1  
Client registration successful.
```

The Client is now registered with the Luna SA HSM.
You can verify on the Luna SA with the `client -list` command.

```
lunash:> client -list  
registered client 1: MyClient
```

2.5.6 - Assign a Client to a Luna HSM Partition

The final configuration step before your Client can begin using the Luna SA is to assign the Client to a specific Partition. To do so, you must be connected to the HSM Server and logged in as “admin”.

1. Enter the following command to register the client to a partition on the HSM. Use the partition you created in the section *Initialize the Partition*.

```
lunash:> client assignPartition -client <clientname> -partition <partition name>
```

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2. To verify, look at the HSM Partition assigned to the client.

```
lunash:> client -show -client <clientname>
```

Example

```
lunash:> client assignPartition -client myClient1 -partition myPartition1
partition assign successful.
Command Result : 0 (Success)

lunash:>client -show -client myClient1

ClientID:      myClient1
IPAddress:     192.168.0.1
Partitions:    "myPartition1"

Command Result : 0 (Success)
```

The parameter <partition name> is the name of the HSM Partition that was created earlier, following configuration of the HSM.

2.5.7 - Verify Your Setup

Before beginning to use a Client application with your newly configured Luna SA, you can verify that the foregoing setup has been properly performed.

1. On your Client computer, open a command-line console.
2. Go to the Luna directory **c:\Program Files\LunaSA** and type `vtl verify`.

The response should be similar to the following:

```
C:\Program Files\LunaSA>vtl verify

Slot      Serial #      Label
====      =====      =====
1         65003001     MyPartition1
```

If you receive an error message, then some part of the configuration has not been completed properly. Retrace the procedure. At this point, the client and HSM are configured and registered with each other. You can now begin using the Luna HSM with your application.

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Section 3 – Installing VA OCSP Responder

3.1 - Start VA 4.9 OCSP Responder EVASetup.exe.

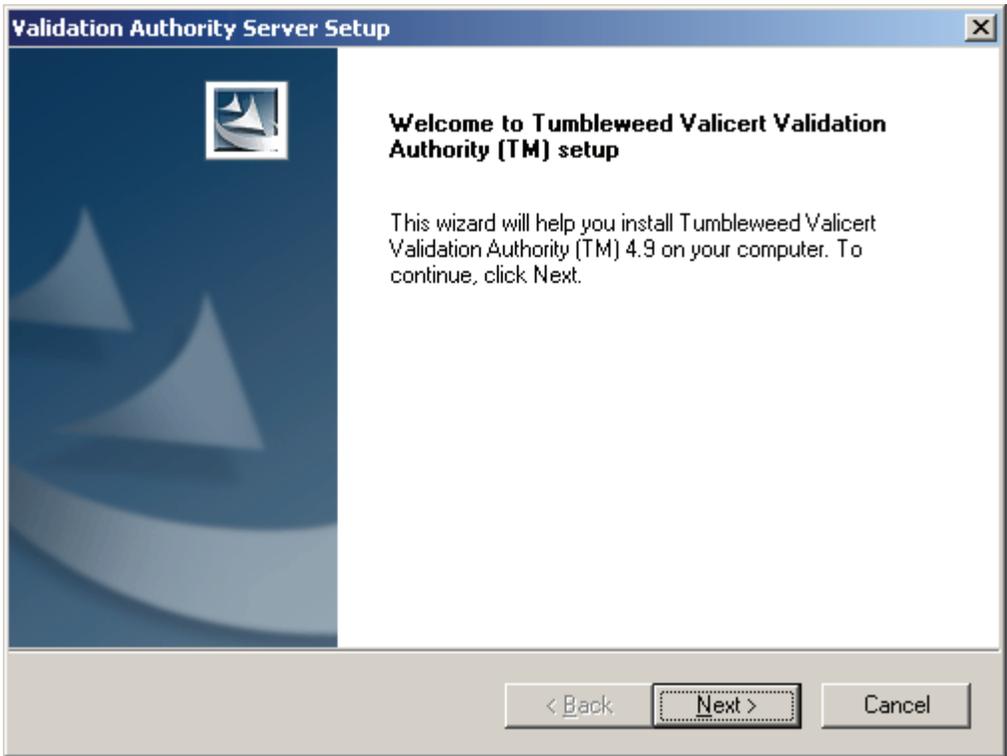


Figure 3 - VA Install Screen Wizard

Click **Next** to begin the installation.

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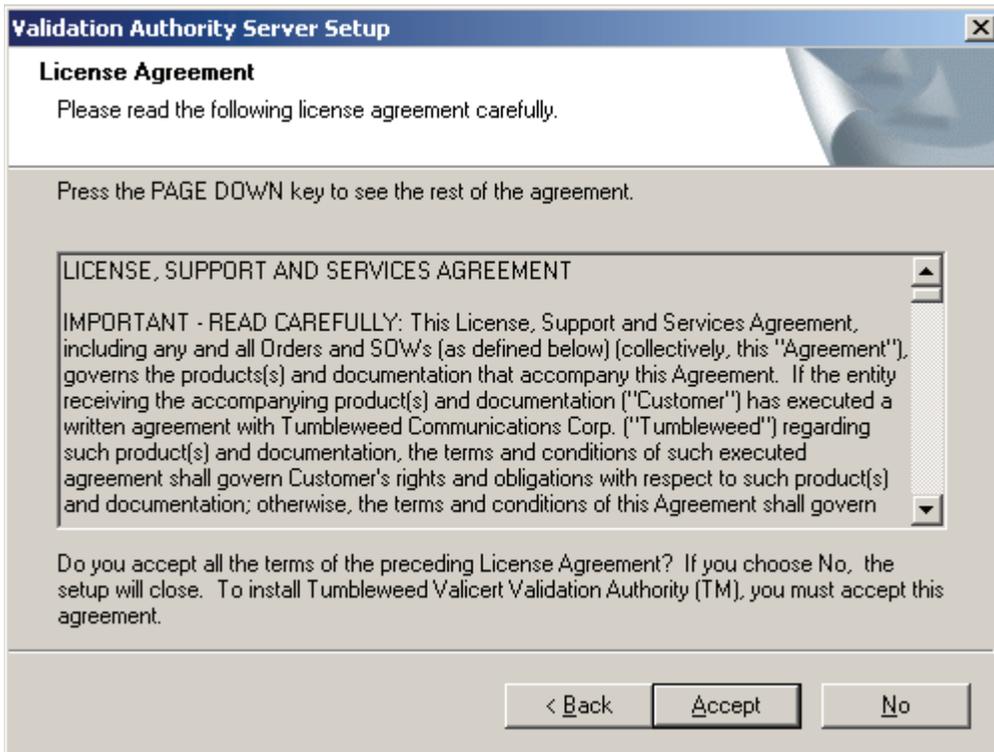
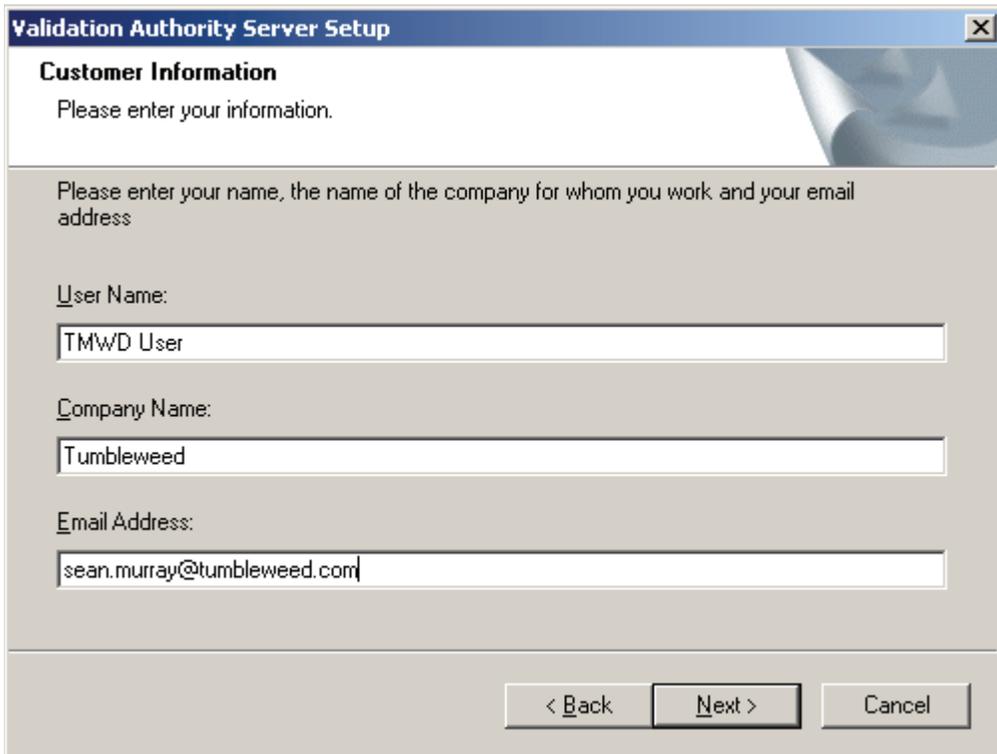


Figure 4 - License Agreement

Click **Accept**.

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The screenshot shows a Windows-style dialog box titled "Validation Authority Server Setup". The "Customer Information" tab is selected. The dialog contains the following text and input fields:

- Customer Information**
Please enter your information.
- Please enter your name, the name of the company for whom you work and your email address
- User Name:**
TMWD User
- Company Name:**
Tumbleweed
- Email Address:**
sean.murray@tumbleweed.com
- Navigation buttons: < Back, Next >, Cancel

Figure 5 - Customer Information

Complete the dialog box shown above. The **Email Address** will be used by the server as a default for administrative e-mail notification features. Click **Next** to continue.

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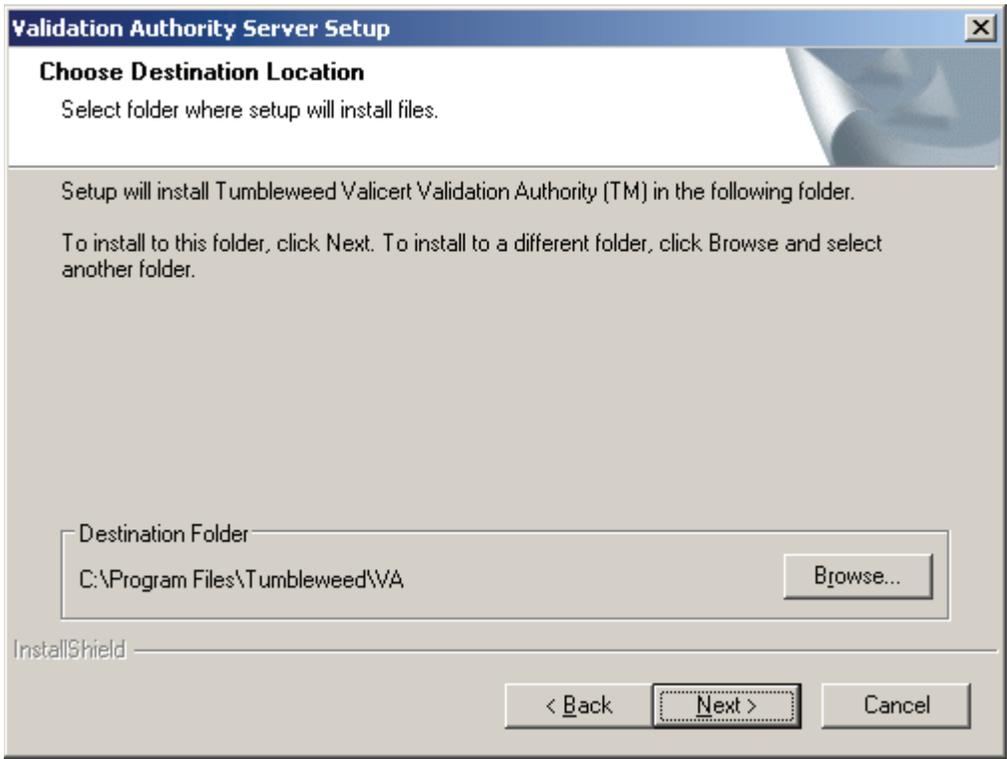


Figure 6 - Destination Folder

Click **Next** to accept the default installation location.

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Validation Authority Server Setup

Customer Information
Please enter your information.

Please specify the host name and the port number of the Valicert Enterprise VA. Also specify its administration port number.

Enterprise VA Server: ST45

VA Administrator Port: 13333

Administration Server User: admin

Administration Server Password: [Masked]

Confirm Administration Server Password: [Masked]

< Back Next > Cancel

Figure 7 - Specify VA Server-Port-Admin-PWD

Enter the following information:

- **Enterprise VA Server:** Hostname for VA Responder.
- **VA Administrator Port:** Port number for the VA Admin GUI to manage the server. The port will be SSL enabled by default; so once installed, you will access this through <https://hostname:13333>.
- **Administrator Server User:** admin – take the default, this is the primary Administrator account added to the server. Additional accounts may be added later.
- **Administration Server Password:** Enter the password for this account and confirm the password in the **Confirm** field.

Click **Next** to continue.

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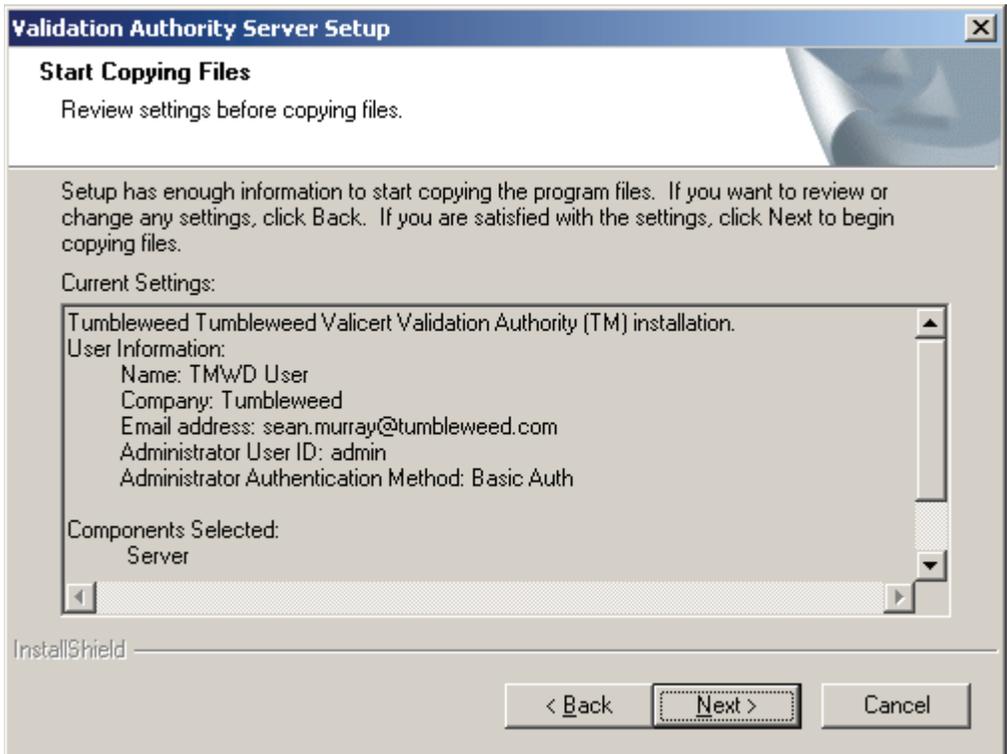


Figure 8 - Copying Files

Click **Next** to continue with the install.

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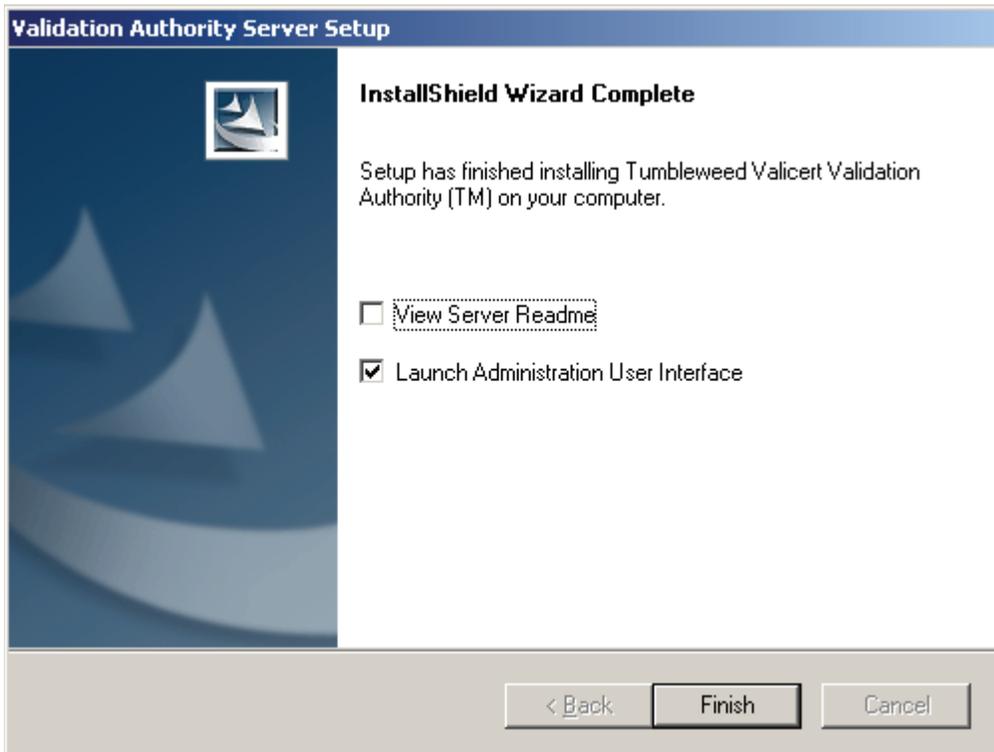


Figure 9 - InstallShield Wizard Complete

Deselect **View Server Readme**, select **Launch Administration User Interface**, and then click **Finish**.



Figure 10 - SSL Alert

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3.2 - Configuration via Admin Interface (Apache Instance)

When the browser comes up, the self-signed SSL certificate is not trusted by the browser. To accept this certificate for now, click **Yes**. You can create a new SSL key and certificate request, and have the VA Admin SSL certificate issued by a Public CA or Enterprise CA as required by local policy.

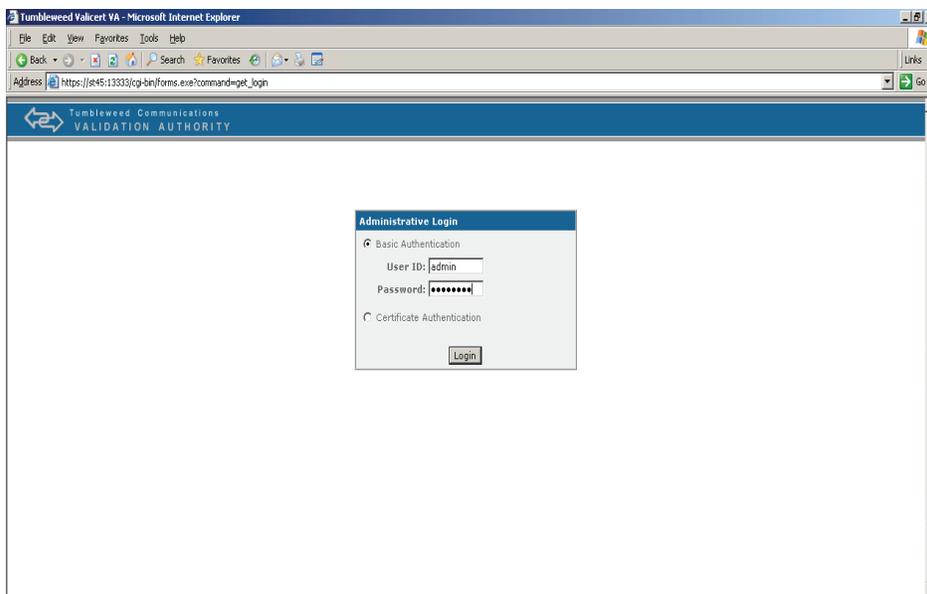


Figure 11 - VA Admin <https://localhost:13333>

Enter the **User ID** and **Password** specified during installation to log in to the VA Admin GUI. Click **Login**.

After completing the installation and specifying the User ID and Password of the Administrator, bring up the admin UI – <https://hostname:port>. The port was a parameter specified during installation. The default port number is 13333. Select basic authentication and log in.

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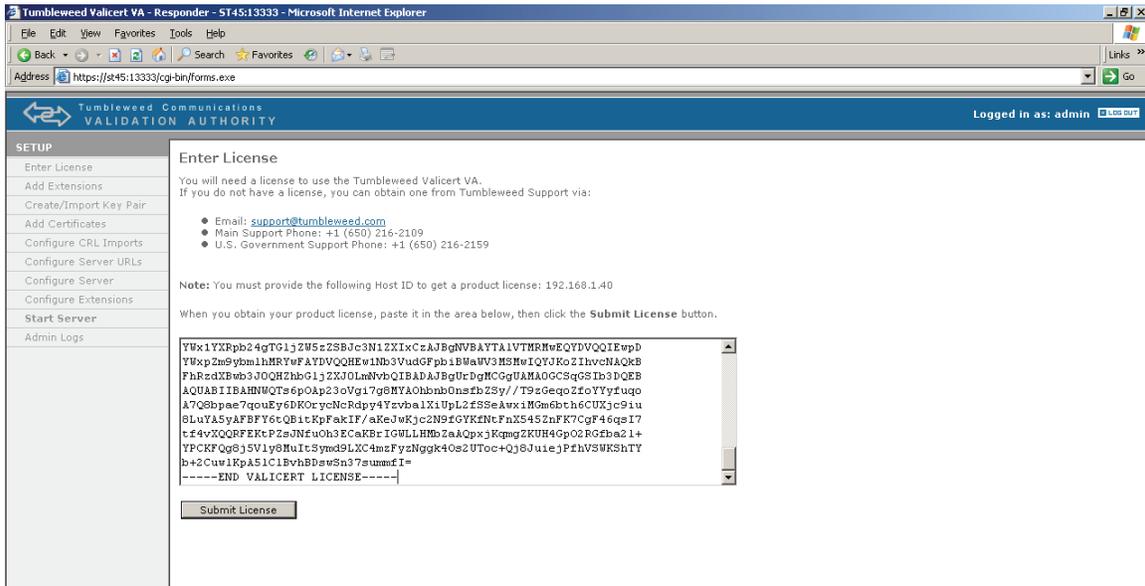


Figure 12 - Enter License

Upon initial startup, the VA Responder will be in SETUP MODE. Click **Enter License**. Open the license file provided by Tumbleweed and copy the entire content, including “-----BEGIN VALICERT LICENSE-----” and “-----END VALICERT LICENSE-----.”

Next, paste the copied license into the GUI and click on **Submit License**. Be aware that there are various Operational Modes, such as VA Responder and VA Repeater. Each mode utilizes a different type of license, so you will want to ensure that you are utilizing a license for an OSCP Responder.

The following graphic provides an example of what to expect after submitting your license file. In this example, notice that the license is an evaluation license set to expire on 12/5/07 and that the license is good for any IP address. Note that the Operation Mode shows as Responder. You will want to verify that all the features you expected within your own license are enabled, and then click on **Next Step**.

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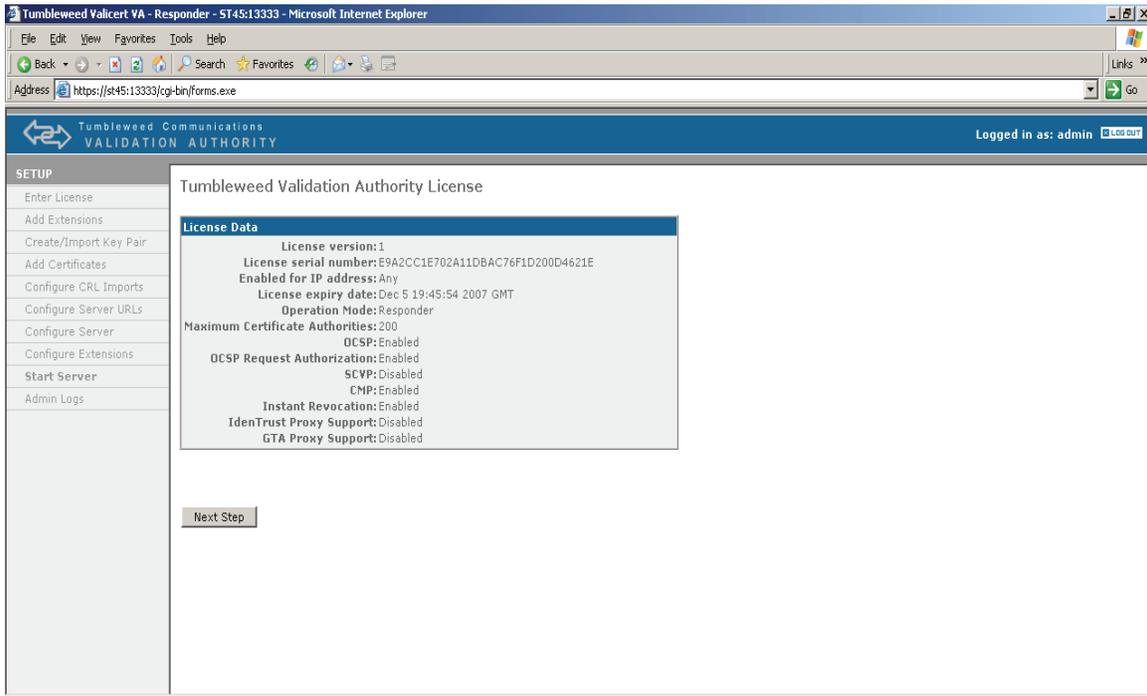


Figure 13 - License Data (Features Enabled)

Install Custom Extensions

Would you like to install any custom extensions to the Tumbleweed Valicert VA?

YES

NO

Figure 14 - Custom Extensions

Unless you are setting up an IdenTrust environment or require Authenticated OCSP Requests, you will select **NO**, and then click **Submit**.

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3.3 - Generating Private Key (OCSP Signing Key)

Key Type Selection

Select the type of key to be generated/imported.

Mandatory

- Signing OCSP Responses [OCSP Protocol]
- Administration Server SSL

Optional

- SSL Communication
- Signing VA-issued CRLs [CRL Mirroring]
- Signing Revocation Announcements for VA Admin [CMP protocol]
- Signing Access Logs
- Signing Mirroring Messages [CRL Mirroring]

Submit Key Type

Figure 15 - Key Type Selection

At a minimum, you must create an OCSP response signing key and associated certificate. Take the default and click on **Submit Key Type**.

Key Generation/Import Mechanism: Signing OCSP Responses [OCSP Protocol]

Select the key generation/import mechanism for this key pair:

- Generate/Import Software Key**
- Generate/Import Hardware Key on custom PKCS11 provider.**
Vendor:
PKCS#11 Library Path:

Submit Key Generation Technique

Figure 16 - Key Generation

For any install that is not using a Hardware Signing Module, you would select **Generate/Import Software Key**. For integration of the VA with the SafeNet Luna SA HSM, you should see that the PKCS#11 drivers from SafeNet were auto-detected. You will need to select the option **Generate/Import Hardware Key on Custom PKCS11 Provider**, and then click **Submit Key Generation Technique**.

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Key Generation/Import Mechanism: Signing OCSP Responses [OCSP Protocol]

Select whether you want to generate a new private key or import a previously generated private key:

- Generate new private key
- Import previously generated private key

Submit Key Generation Or Import

Figure 17 - Generate new private key

For installation of a new VA Responder, select **Generate New Private Key**.

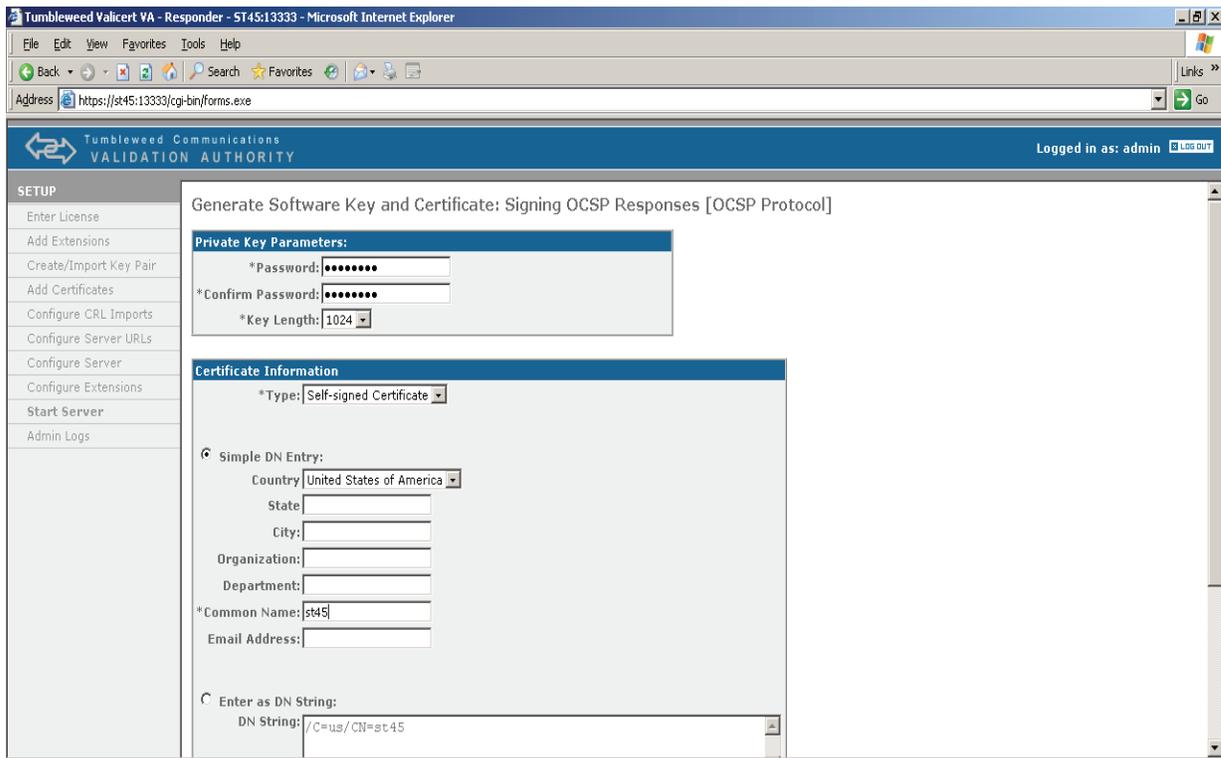


Figure 18 - Generate Software Key and Certificate

In VA 4.9, the UI for creating a VA certificate (self-signed or certificate request) is greatly improved. You have the option of simple DN Attribute entry or entering the DN string. For the Private Key Parameters, you will need to enter the PKCS#11 Token PIN issued by the SafeNet Luna HSM. You will then need to complete the DN information, and click **Submit Certificate Request**.

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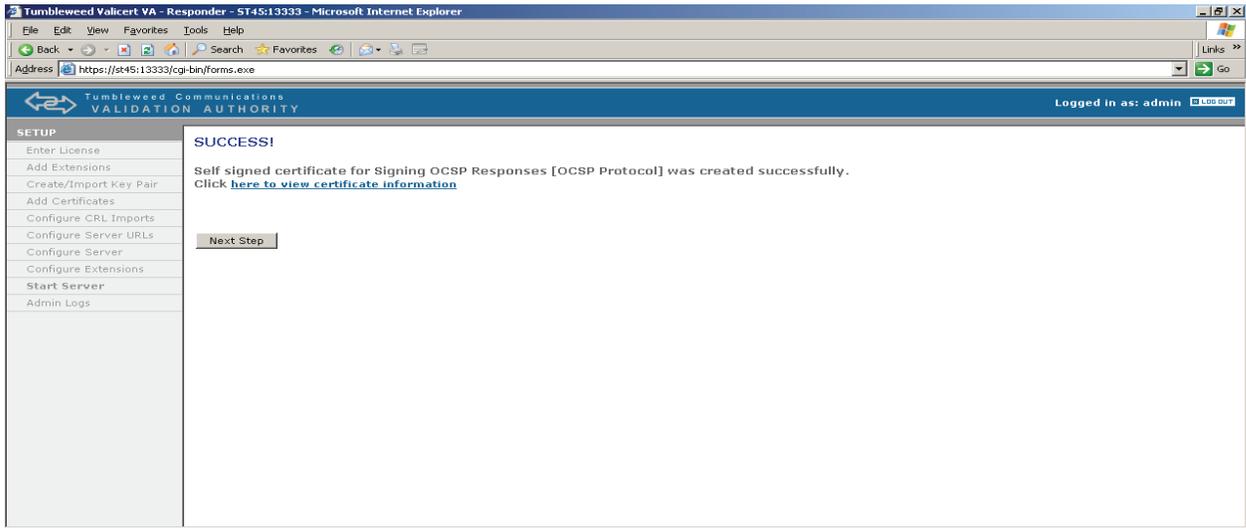


Figure 19 - Success

Click **Next Step**. You have the option to view the self-signed VA certificate just created.

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3.4 – Installing CA Certificates

Install Certificate

Select Destination Certificate Store:

Mandatory Stores

- CA Certificates [OCSP Protocol]
- Signing OCSP Responses [OCSP Protocol]
- Administration Server SSL

Optional Stores

- CA Delegated Certificates [OCSP Protocol]
- Trusted Message Signing Certificates [CRL Mirroring]
- Trusted Responder's CRL Signing Certificates [CRL Mirroring]
- Trusted CAs for Request Authorization [CMP Protocol]
- Administration Server SSL CA Certificate
- SSL Communication
- Signing VA-issued CRLs [CRL Mirroring]
- Signing Revocation Announcements for VA Admin [CMP protocol]
- Signing Access Logs
- Signing Mirroring Messages [CRL Mirroring]

Submit Certificate Store

Figure 20 - Install Certificate

You will need to load at least one CA Certificate that you will be providing OCSP Validation Status for into the Mandatory Stores for **CA certificates [OCSP protocol]**. Accept the default and click **Submit Certificate Store**. On the screen that displays, you will have various methods available to locate the CA Certificates that you wish to import into the VA.

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3.5 – Configuring Certificate Import Method

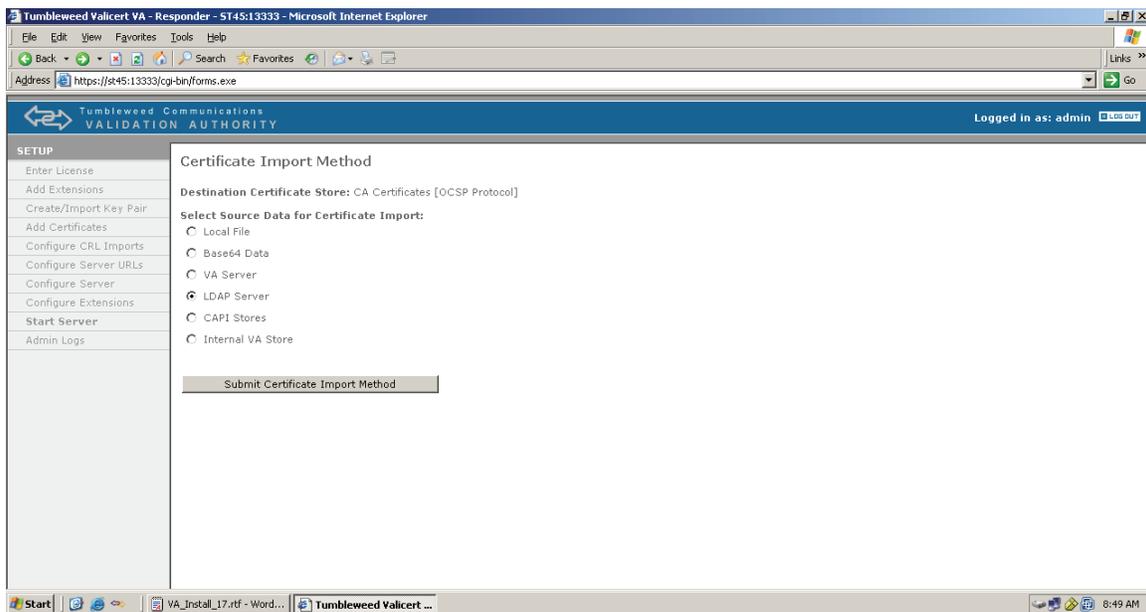


Figure 21 - Certificate Import Method

You can import certificates via a variety of methods, but for the quickest setup for DoD PKI, select **LDAP Server** (which is the default) and click **Submit Certificate Import Method**.

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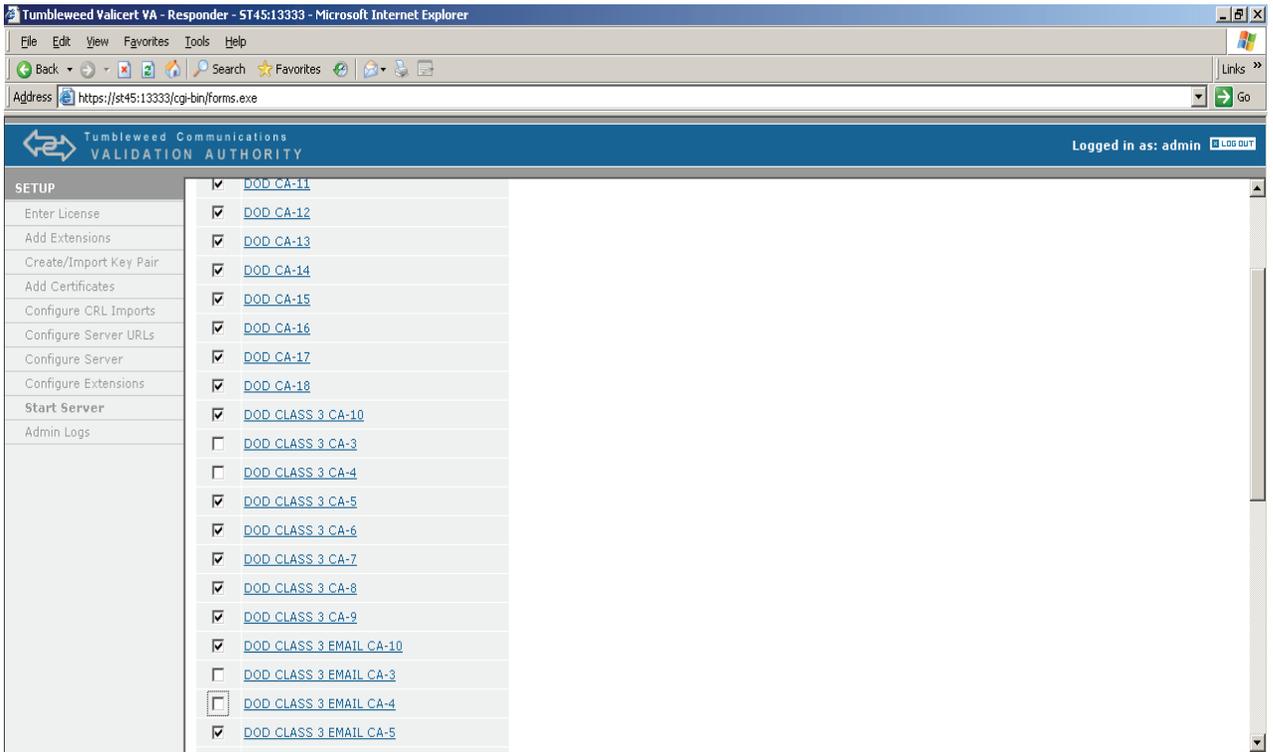


Figure 22 - Select Certificates

When presented with this screen, click **Select All**, and then click **Submit Certificates**.

Note: Before hitting Submit, you may want to deselect **CA-3** and **CA-4**, as well as **Email CA-3** and **Email CA-4**, as these are now expired and will produce errors in the Server Logs.*****

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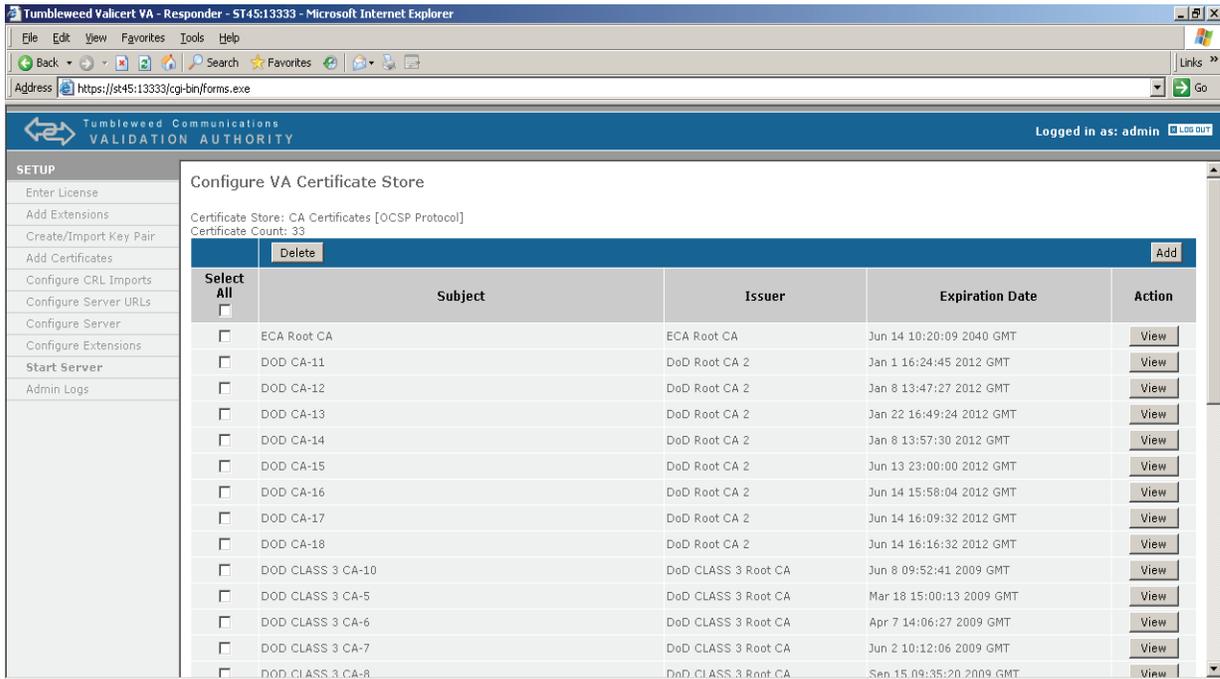


Figure 23 - Configure VA Certificate Store

After clicking **Submit**, a summary of the certificates stored in the selected certificate store will display. Scroll to the bottom of the screen and click **Next Step**.

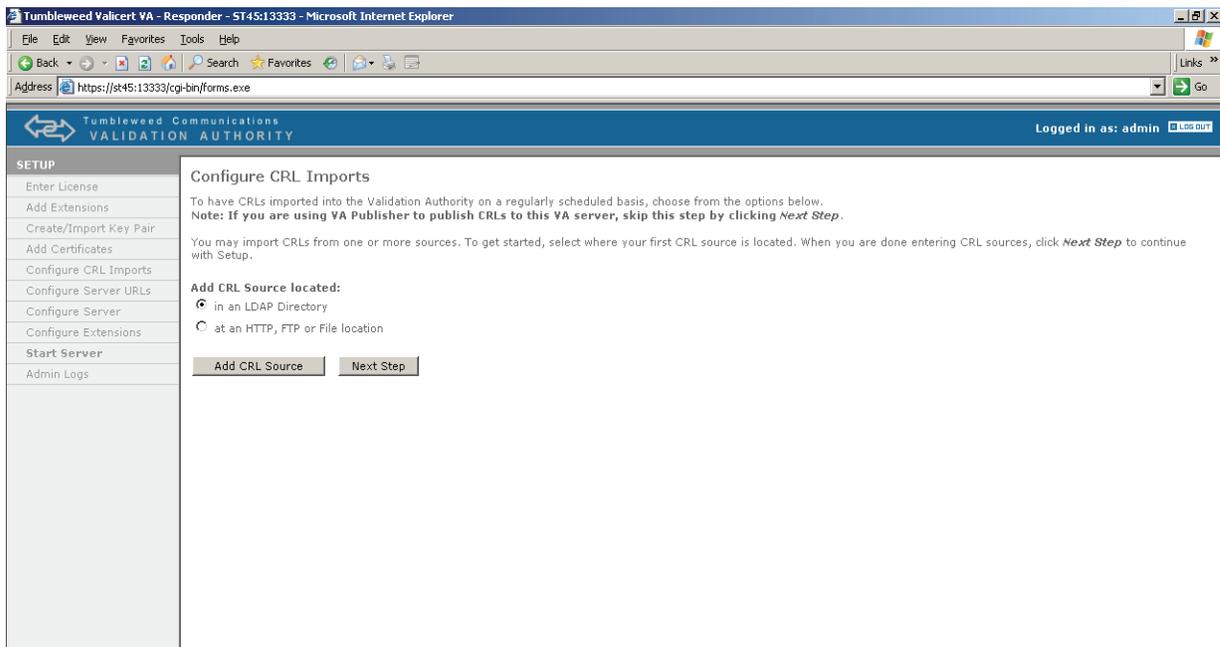


Figure 24 - Configure CRL Imports

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You can use the **Add CRL Source** and specify whether to load the location information from an LDAP, HTTP, FTP, or file location. For DOD and JITC, you will be using LDAP. Click **LDAP** (which is the default), and then click **Add CRL source**. Click **Find Available CRLs**.

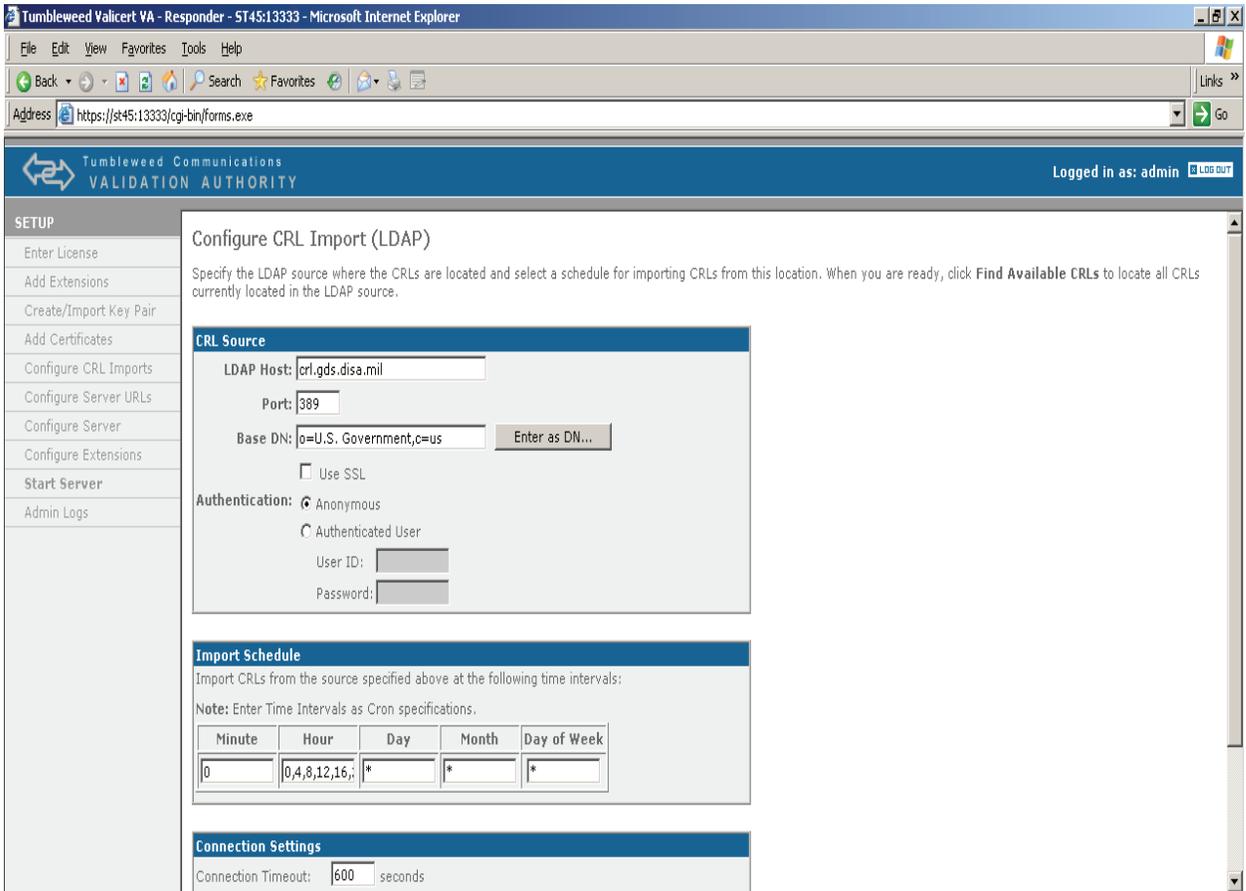


Figure 25 - Configure CRL Import (LDAP)

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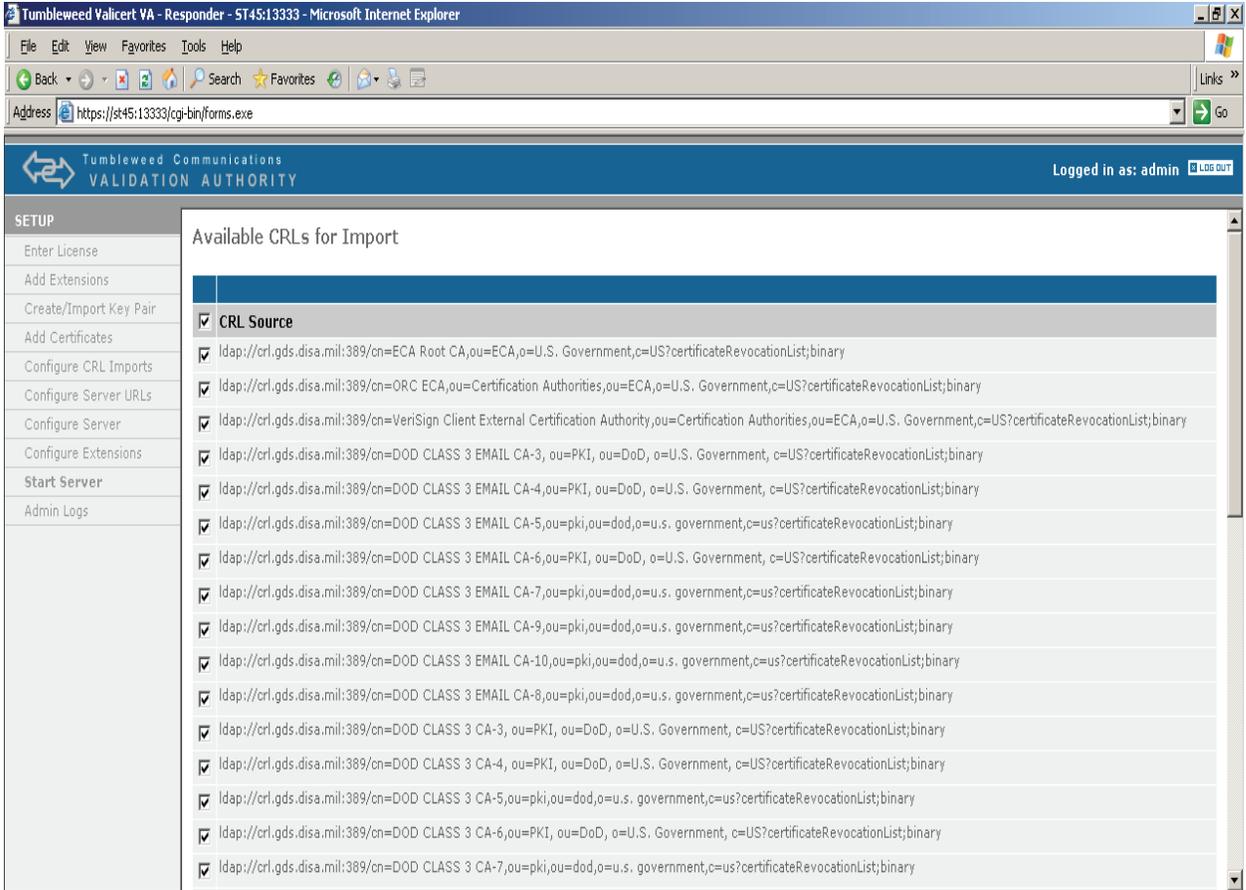


Figure 26 - Available CRLs for Import

The **Available CRLs for Import** window displays. Click **Schedule Import of Checked CRLs**, and then click **Next Step**.

You should make sure your configured hostname and port address match what has been configured for OCSP-enabled applications (e.g., Desktop Validator or Server Validator). You can click on a URL and remove it, and add a hostname and port for the server to listen on. If you select **Use SSL**, you will need to first create an OCSP Responder SSL key and certificate prior to the server being able to bind to this port. After you are done, click **Submit**.

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3.6 - Configure Server URLs

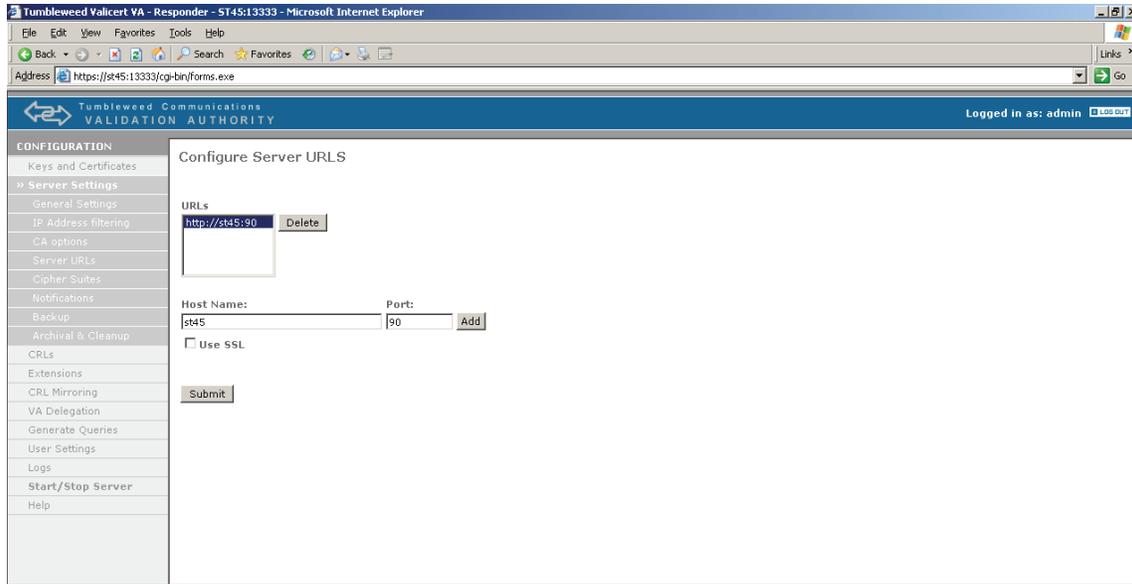


Figure 27 - Configure Server URLs

The OCSP responder will be listening on port 90 for the training. If you are using a machine that is already using Port 80 for IIS or other web services you may have a conflict and will need to choose another port. Here we have chosen port 90.

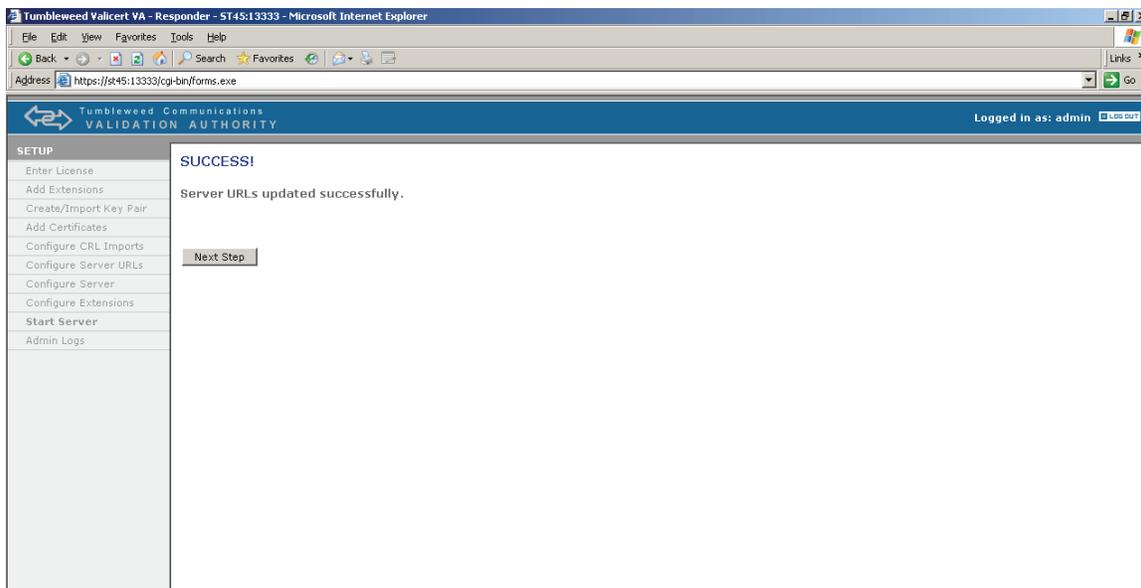


Figure 28 - Success Server URLs updated

After you see the confirmation message, click **Next Step**.

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3.7 – VA Responder Server Configuration Parameters

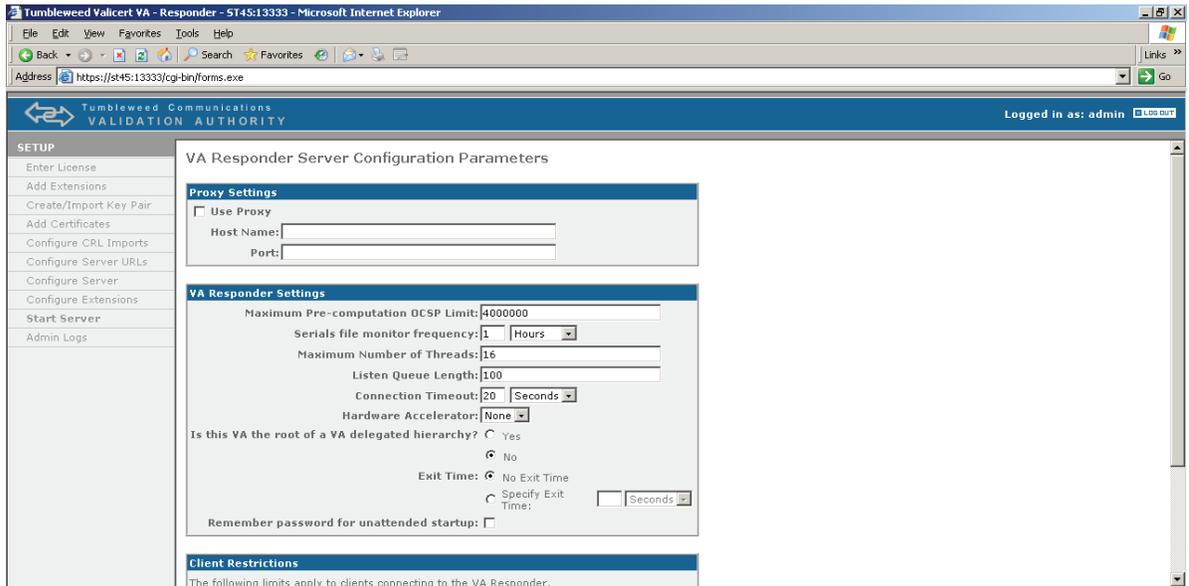


Figure 29 - VA Responder Server Configuration Parameters

For this screen you could just take all the defaults and click **Submit**. However, in a production environment, you may need to add your Proxy Server information in order for the VA to gain external access to CA Repositories, or downstream Responders or Repeaters for Mirroring purposes. Additionally, you should increase the number for **Maximum Number of Threads** to 60 if your Responder has more than 2GB of RAM.

Click **Next Step** after you see the confirmation message. Enter the software or hardware token password, and click **Start Server**.

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3.8 - Start/Stop Server

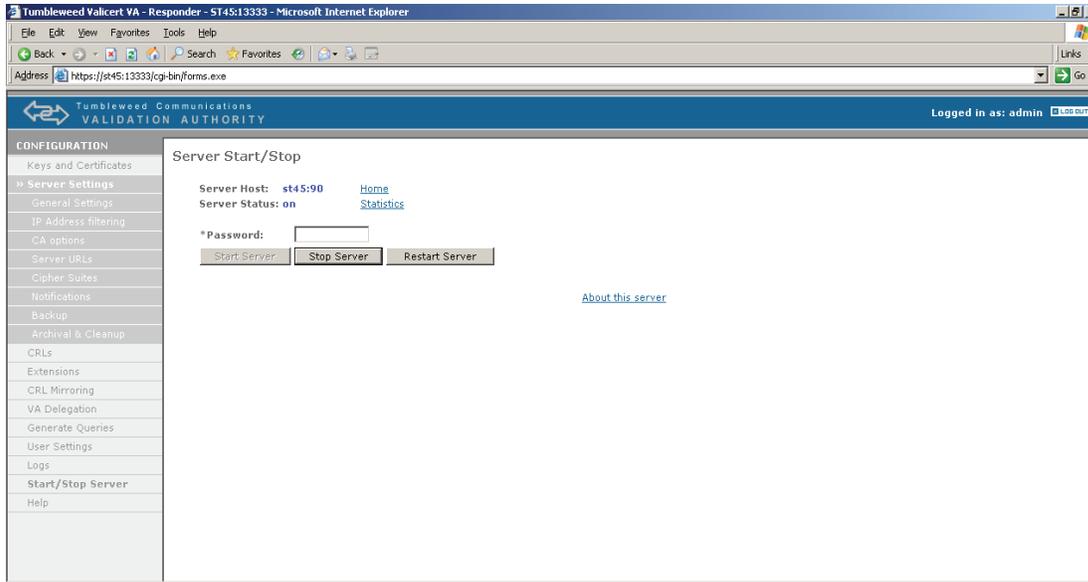


Figure 30 - Server Start/Stop

Upon successful startup, the server status will indicate **On** and offer links to URLs for the OCSP responder Home page and Statistics pages.

3.8.1 – CRL Summary

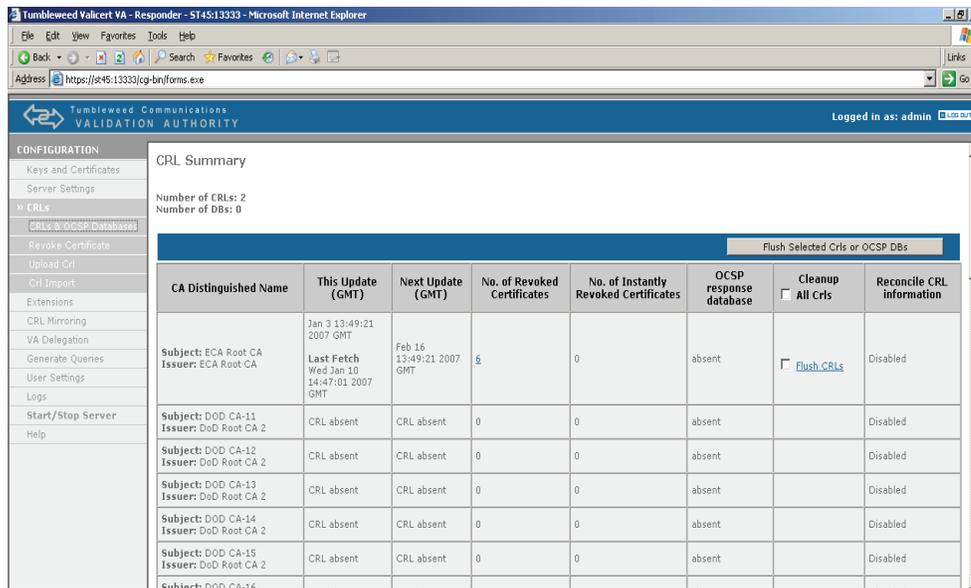


Figure 31 - CRL Summary

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Click **CRLs**. CRLs and OCSP Databases monitor the progress of the server as it loads the CRLs and loads them into its cache. If CRLs do not show up, click **Logs/Server Logs** to view the activities of the server.

3.8.2 – Server Logs

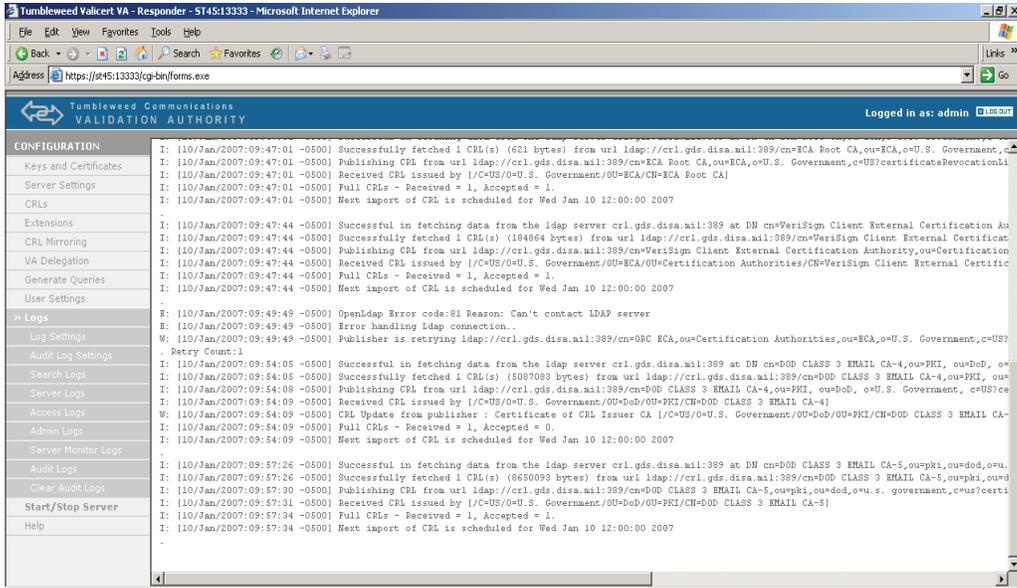


Figure 32 - Logs <> Server Logs

Either while the server is loading up CRL data or after it has completed, you can test the server's processing of OCSP queries with the integrated **Generate OCSP** query capability.

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3.8.3 – Query Generation

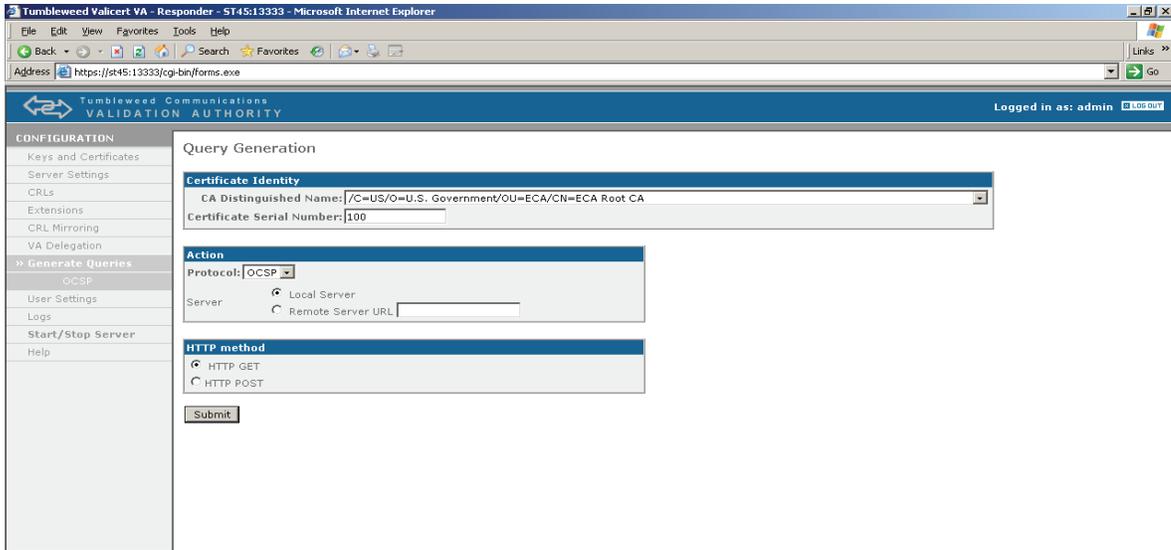


Figure 33 - Query Generation

Click **Generate Queries**.

Select **Certificate Authority** and enter the serial number. Determine if you want to send the query to a local responder or a remote responder.

Click **Submit** and review the printed OCSP response.

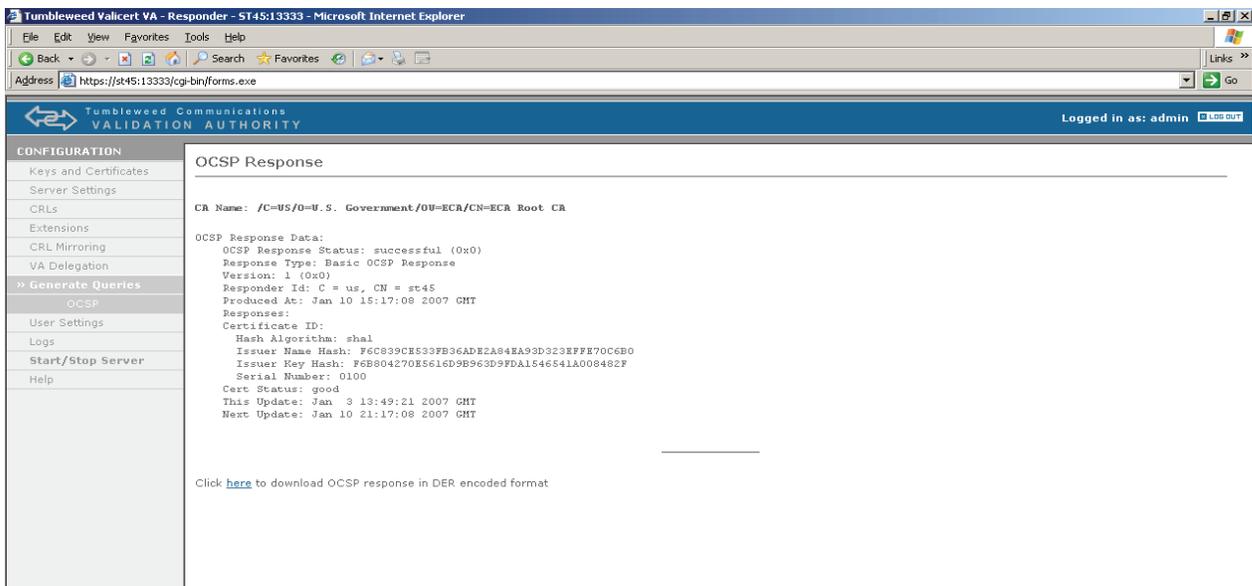


Figure 34 - OCSP Response

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As you can see above, you are presented with the details of the responder id queried, serial number queried, and the certificate status (good, revoked, or unknown).