Delinea Secret Server

nShield® HSM Integration Guide

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Chapter 1. Introduction

Delinea Secret Server (Secret Server) includes support for the Entrust nShield Hardware Security Module (HSM). The nShield HSM brings an additional layer of security by protecting the Delinea Secret Server encryption key. This document describes the procedure to integrate Delinea Secret Server with the nShield HSM.

1.1. Product configurations

Entrust has successfully tested nShield HSM integration in the following configurations:

Product	Version
Delinea Secret Server	11.8.000001
SQL Server 2022	16.0.1000 Express Edition
SQL Server Management Studio 21	21.1.3
IIS	10.0.20348.1
Base OS	Microsoft Windows Server 2022

1.2. Supported nShield hardware and software versions

Entrust has successfully tested with the following nShield hardware and software versions:

HSM	Security World Software	Firmware	Netimage
Connect 5c	13.6.11	13.4.5 (FIPS 140-3 certified)	13.6.11
nShield XC	13.6.11	12.72.3 (FIPS 140-2 certified)	13.6.7

1.3. Supported nShield features

Entrust has successfully tested nShield HSM integration with the following features:

Feature	CNG Cryptography Provider	PKCS #11 API
Softcards	No	Yes

Feature	CNG Cryptography Provider	PKCS #11 API
Module Only Key	Yes	Yes
Operator Card Set (OCS)	Yes but without a passphrase	Yes
nSaaS	Supported but not tested	Supported but not tested

1.4. Requirements

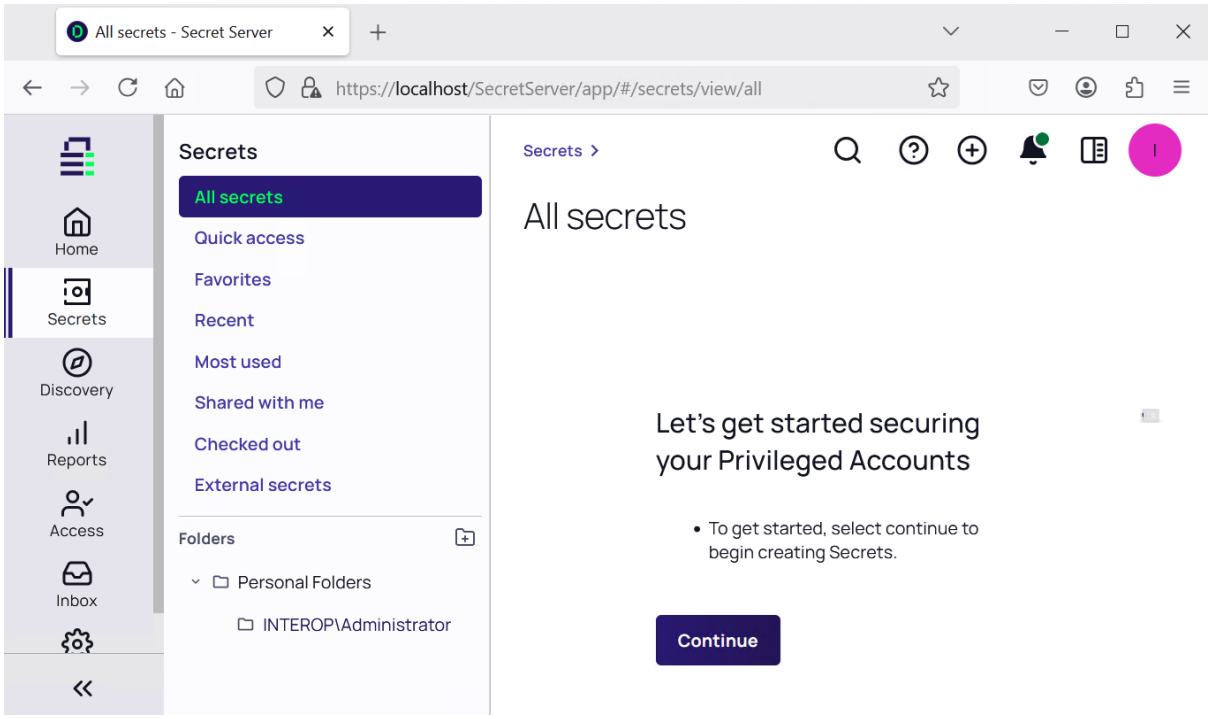
- Access to Delinea Secret Server license from your Delinea sales representative.
- Access to the Entrust TrustedCare Portal.
- An Entrust nShield HSM.
- A dedicated Windows server.
- Network environment with usable ports 9004 and 9005 for the HSM.

Familiarize yourself with the nShield Documentation.

- The importance of a correct quorum for the Administrator Card Set (ACS).
- Whether Operator Card Set (OCS) protection or Softcard protection is required.
- If OCS protection is to be used, a 1-of-N quorum must be used.
- Whether your Security World must comply with FIPS 140 Level 3 or Common Criteria standards. If using FIPS 140 Level 3, it is advisable to create an OCS for FIPS authorization. For more information see FIPS 140 Level 3 compliance.
- Whether to instantiate the Security World as recoverable or not.

Chapter 2. Deploy and configure the Delinea Secret server

The Secret Server was deployed on a domain joined Windows virtual machine. Microsoft IIS was installed on the virtual machine, and bound to the virtual machine certificate. The Secret Server connected to an existing Microsoft SQL database. This database was also installed on the same virtual machine. A domain managed service account was created for the above connections. All permissions where set according to Delinea Documentation - Secret Server Setup.



Chapter 3. Deploy and configure the nShield HSM

All steps in this section are performed on the server running the Secret Server.

3.1. Install the Entrust nShield HSM

Install the nShield Connect HSM locally, remotely, or remotely via the serial console. Condensed instructions are available in the following Entrust nShield Support articles.

- How To: Locally Set up a new or replacement nShield Connect.
- How To: Remotely Setup a new or replacement nShield Connect.
- How To: Remotely Setup a new or replacement nShield Connect XC Serial Console Model.

For detailed instructions see the nShield v13.6.11 Hardware Install and Setup. Guides.

3.2. Install the Security World software and create a Security World

1. Install the Security World software. For detailed instructions see the nShield Security World Software v13.6.11 Installation Guide.
2. Add the Security World utilities path to the system path. This path is typically `C:\Program Files\nCipher\nfast\bin`.
3. Open the firewall port 9004 for the HSM connections.
4. If you are using remote administration, open firewall port `9005` for the Entrust nShield Trusted Verification Device (TVD).
5. Inform the HSM of the location of this client computer as described Configuring the nShield HSM to use the client.
6. Configure this client to use the HSM as described Configuring client computers to use the nShield HSM.
7. Open a command window and run the following utility to confirm that the HSM is **operational**:

```
C:\Users\Administrator.INTEROP>enquiry
Server:
 enquiry reply flags  none
 enquiry reply level  Six
 serial number        xxxx-xxxx-xxxx xxxx-xxxx-xxxx
 mode                 operational
```

```
 version              13.6.11
...
Module #1:
 enquiry reply flags  UnprivOnly
 enquiry reply level  Six
 serial number        xxxx-xxxx-xxxx
 mode                 operational
 version              13.4.5
...
Module #2:
 enquiry reply flags  UnprivOnly
 enquiry reply level  Six
 serial number        xxxx-xxxx-xxxx
 mode                 operational
 version              12.72.3
...
```

8. Create your Security World if one does not already exist or copy an existing one. Follow your organization's security policy for this. For more information see Create a new Security World.

ACS cards cannot be duplicated after the Security World is created. You may want to create extras in case of a card failure or a lost card.

9. Confirm that the Security World is "Usable*:

```
C:\Users\Administrator.INTEROP>nfkminfo
World
 generation  2
 state       0x3737000c Initialised Usable ...
 ...
Module #1
 generation 2
 state      0x2 Usable
 ...
Module #2
 generation 2
 state      0x2 Usable
 ...
```

3.3. Select the protection method

The following protection methods are available to authorize access to Secret Server keys protected by the HSM.

- Operator Cards Set (OCS) are smartcards that are presented to the physical smartcard reader of an HSM. For more information on OCS use, properties, and K-of-N values, see Operator Card Sets (OCS).
- Softcards are logical tokens (passphrases) that protect the key and authorize its use. For more information on softcards use, see Softcards.

- Module protected keys are simply protected by a module key. For more information on module protection use see Module protection.

Follow your organization's security policy to select an authorization access method.

Depending on the protection method select, you may need to define some environment variables. You have the option to set these environment variables with the Windows `set` command, or edit file `C:\Program Files\nCipher\nfast\cknfastrc`. The Windows `set` command is preferred. As reference, all environment variables are listed in nShield PKCS #11 library environment variables.

Enable softcard protection:

```
C:\Users\Administrator.INTEROP>set CKNFAST_LOADSHARING=1
```

Enable module protection:

```
C:\Users\Administrator.INTEROP>set CKNFAST_FAKE_ACCELERATOR_LOGIN=1
```

Sample `C:\Program Files\nCipher\nfast\cknfastrc` file:

```
# Enable Softcard protection
CKNFAST_LOADSHARING=1

# Enable Module protection
CKNFAST_FAKE_ACCELERATOR_LOGIN=1

# OCS Preload file location and card set state
NFAST_NFKM_TOKENSFILE="C:\Program Files\nCipher\nfast\preloadtoken"
CKNFAST_NONREMOVABLE=1
```

3.4. Create the OCS

The OCS quorum and passphrase must be set as shown next.

Feature	CNG Cryptography Provider	PKCS #11 API
Quorum K	1	1
Passphrase	None. Left blank	<passphrase>

Recovering from a power failure requires the OCS to be inserted in the HSM or the TVD.

1. Ensure file `/opt/nfast/kmdata/config/cardlist` contains the serial number of the card(s) to be presented or an asterisk wildcard the use of any card.

2. Open a command window as `Administrator`.
3. Create the OCS as described in Create Operator Card Sets (OCSs).

   Follow your organization's security policy for the values of K/N, where K=1 as mentioned above. Use the same passphrase (left blank with CNG) for all the OCS cards in the set (one for each person with access privilege, plus spares).

   In the example below, `slot 2`, remote via TVD, was used to present the card in this integration.

   The `-p` (persistent) option makes the authentication persist after you remove OCS card from the HSM front panel slot or from the TVD.

   After an OCS card set has been created, the cards cannot be duplicated.

```
# createocs -m1 -s2 -N testOCSnopassphrase -Q 1/1

FIPS 140-2 level 3 auth obtained.

Creating Cardset:
 Module 1: 0 cards of 1 written
 Module 1 slot 0: Admin Card #1
 Module 1 slot 2: empty
 Module 1 slot 3: empty
 Module 1 slot 2: blank cardSteps:

 Module 1 slot 2:- no passphrase specified - writing card
Card writing complete.

cardset created; hkltu = 7aaf758bc6790206198ea5218040d4faa09f035f
```

4. Verify that the OCS was created.

```
C:\Users\Administrator.INTEROP>nfkminfo -c
Cardset list - 2 cardsets:  (P)ersistent/(N)ot, (R)emoteable/(L)ocal-only
 Operator logical token hash               k/n timeout  name
 7aaf758bc6790206198ea5218040d4faa09f035f  1/5  none-NL testOCSnopassphrase
 edb3d45a28e5a6b22b033684ce589d9e198272c2  1/5  none-NL testOCS
```

   The `rocs` utility also shows the OCS created.

```
C:\Users\Administrator.INTEROP>rocs
'rocs' key recovery tool
Useful commands: 'help', 'help intro', 'quit'.
rocs> list cardset
No. Name                    Keys (recov) Sharing
  1 testOCSnopassphrase     0 (0)        1 of 5
  2 testOCS                 1 (1)        1 of 5
rocs> exit
```

3.5. Create the softcard

1. Enable softcard protection as described in Select the protection method.
2. Open a command window as an administrator.
3. Create the softcard as described in Create softcards.

   For example

```
# ppmk -n testSC

Enter new pass phrase:
Enter new pass phrase again:
New softcard created: HKLTU d2345678923456723456747 1d3722f8c70f5d864
```

4. Verify the softcard.

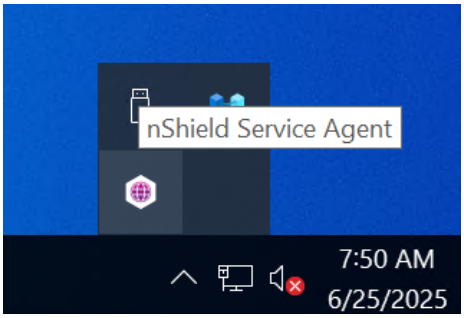
```
# nfkminfo -s
SoftCard summary - 1 softcards:
 Operator logical token hash              name
 9252345678923456234567897bde3753d24e7744  testSC
```

   The `rocs` utility also shows the new softcard.

```
# rocs
`rocs' key recovery tool
Useful commands: `help', `help intro', `quit'.
rocs> list cards
No. Name                    Keys (recov) Sharing
  1 testOCS                 0 (0)        1 of 5
  2 testSC                  0 (0)        (softcard)
rocs> quit
```

3.6. Automatically start the nShield service agent at startup

1. Create a shortcut of `C:\Program Files\nCipher\nfast\bin\nShield_service_agent.exe` and place temporarily on the desktop.
2. Select the **Windows** key + **R**, type **shell:startup**. Then select **OK**.
3. Move the shortcut to the **Startup** folder.
4. Reboot.
5. Notice the nShield service agent icon shown below.


nShield Service Agent
7:50 AM
6/25/2025

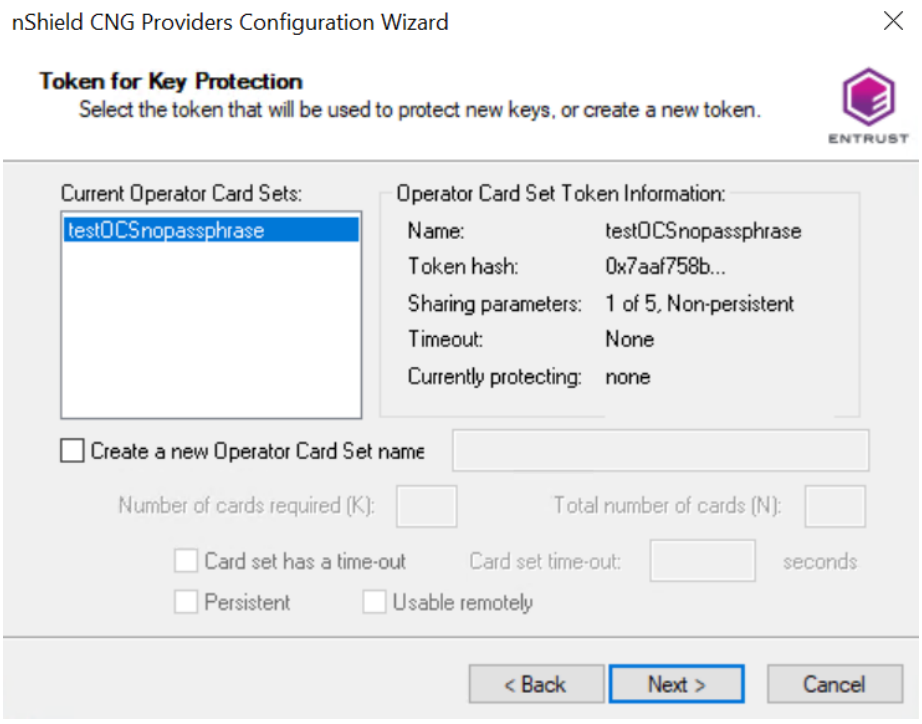
Chapter 4. Integrate Delinea Secret Server with an Entrust nShield HSM

There are two cryptography API options for this integration: the CNG cryptography provider, and the PKCS #11. Both are covered in this section.

4.1. Configure the Delinea Secret Server using the CNG cryptography provider

1. Select **Windows Start > Entrust nShield Security World > CNG configuration wizard**. The **nShield CNG Providers Configuration Wizard** appears.
2. Select **Next** twice.
3. Select **Use the existing security world** if one was created in Install the Security World software and create a Security World.
4. Select **Next** twice.
5. Select the protection method. If you are using OCS protection, insert your OCS card into the proper slot.

   Example for OCS protection:

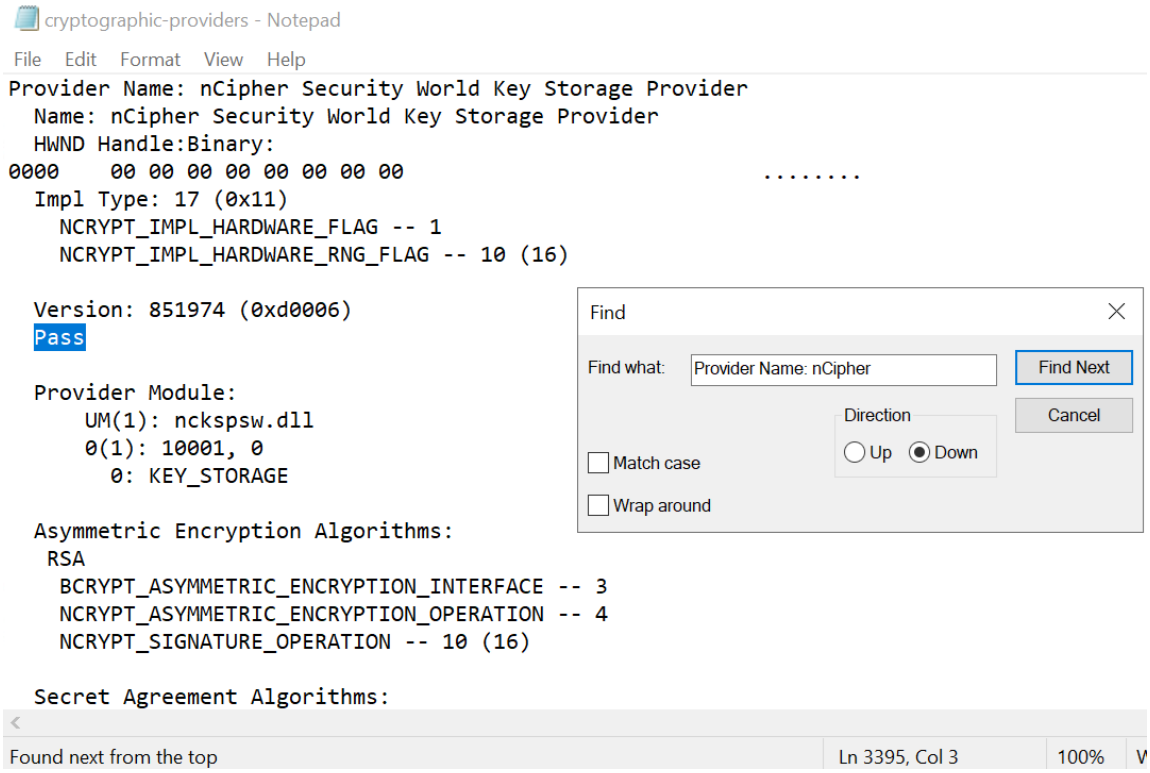


6. Run `certutil -csptest > <filename>` on a command window.

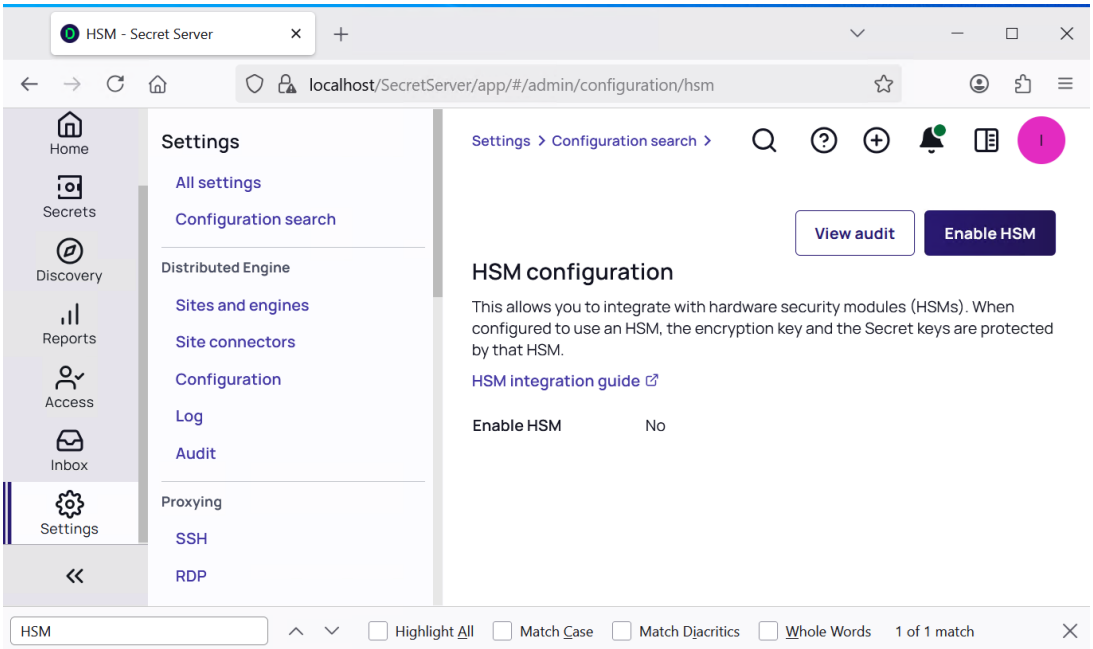
   For example:

```
C:\Users\Administrator.INTEROP>certutil -csptest > Documents\cryptographic-providers
```

7. Search for **Provider Name: nCipher** in the file created above, and make sure that it shows **Pass**.



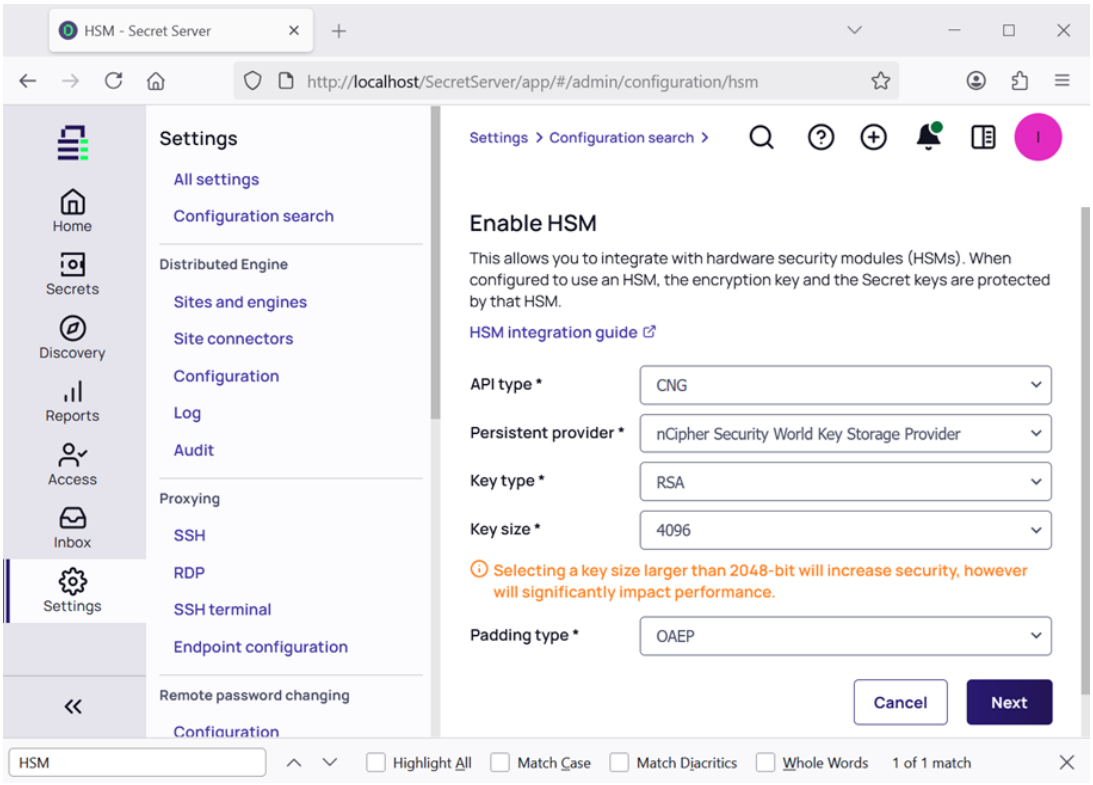
8. Log in to the Delinea Secret Server via a browser at https://localhost/SecretServer.
9. From the menu in the left pane, select **Settings > All settings > General > HSM**. The **HSM configuration** page appears.



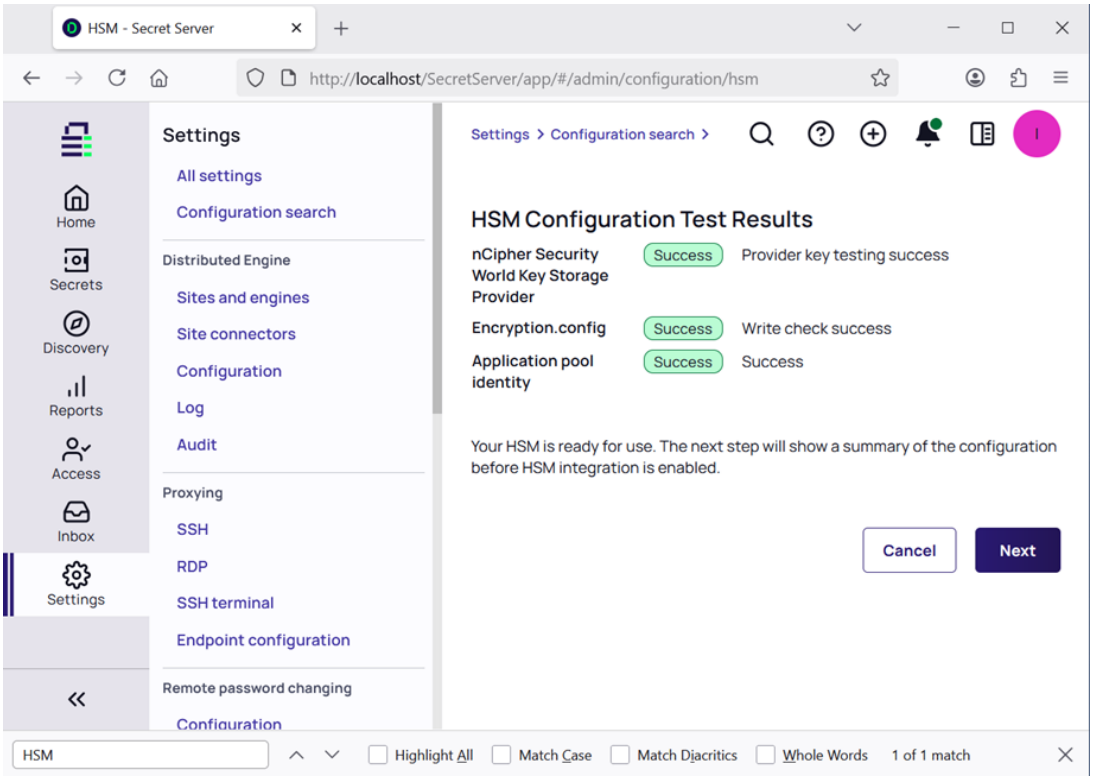
10. Select **Enable HSM**. Then select **Next**.
11. In the **Enable HSM** window, select as follows. Then select **Next**.

Parameter	Value
API type	CNG
Persistent provider	nCipher Security World Key Storage Provider
Key type	RSA
Key size	Your selection
Padding type	OAEP (PKCS1 is not supported)

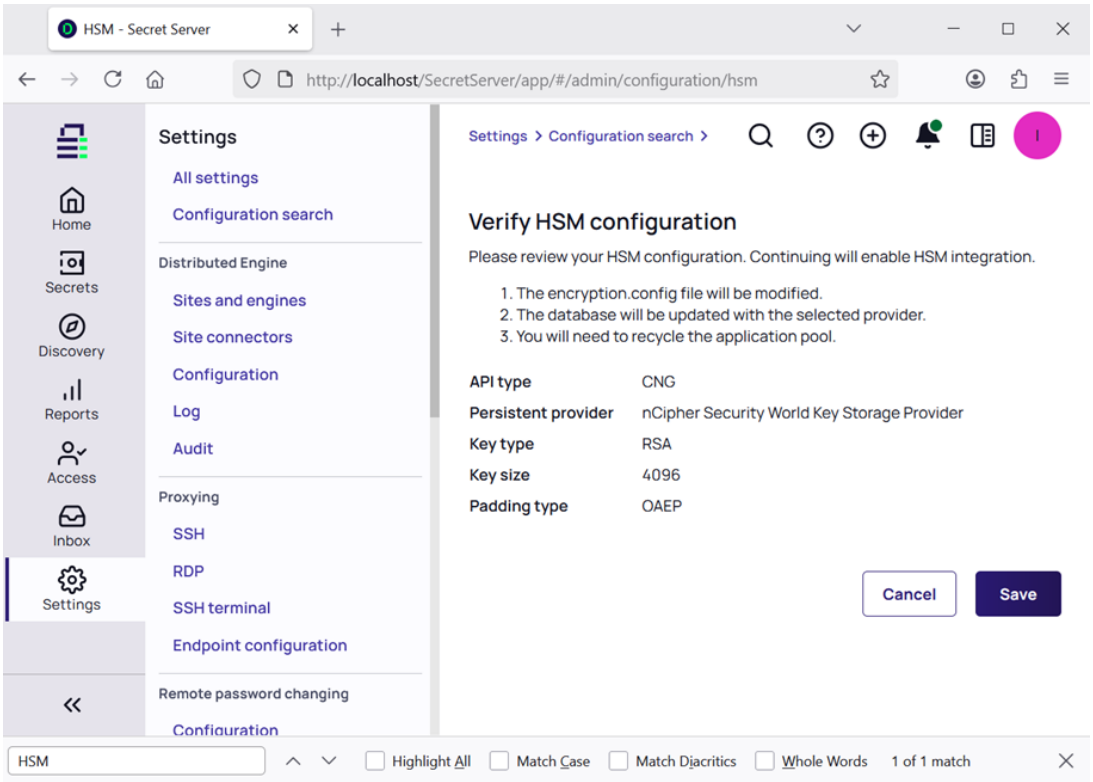
For example:



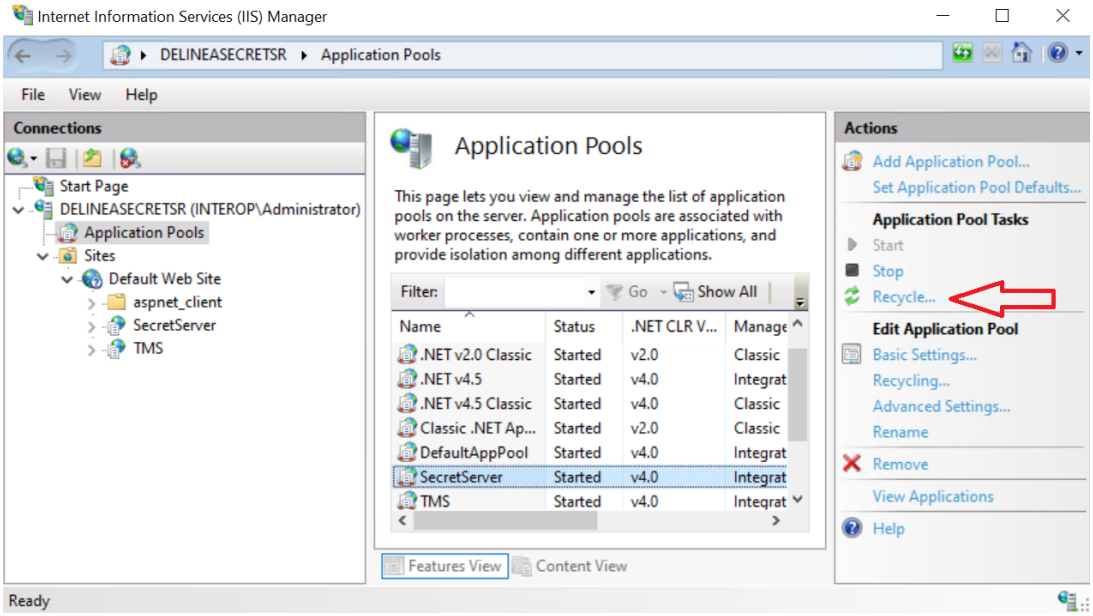
12. Check the **HSM Provider Test Results**. Then select **Next**.



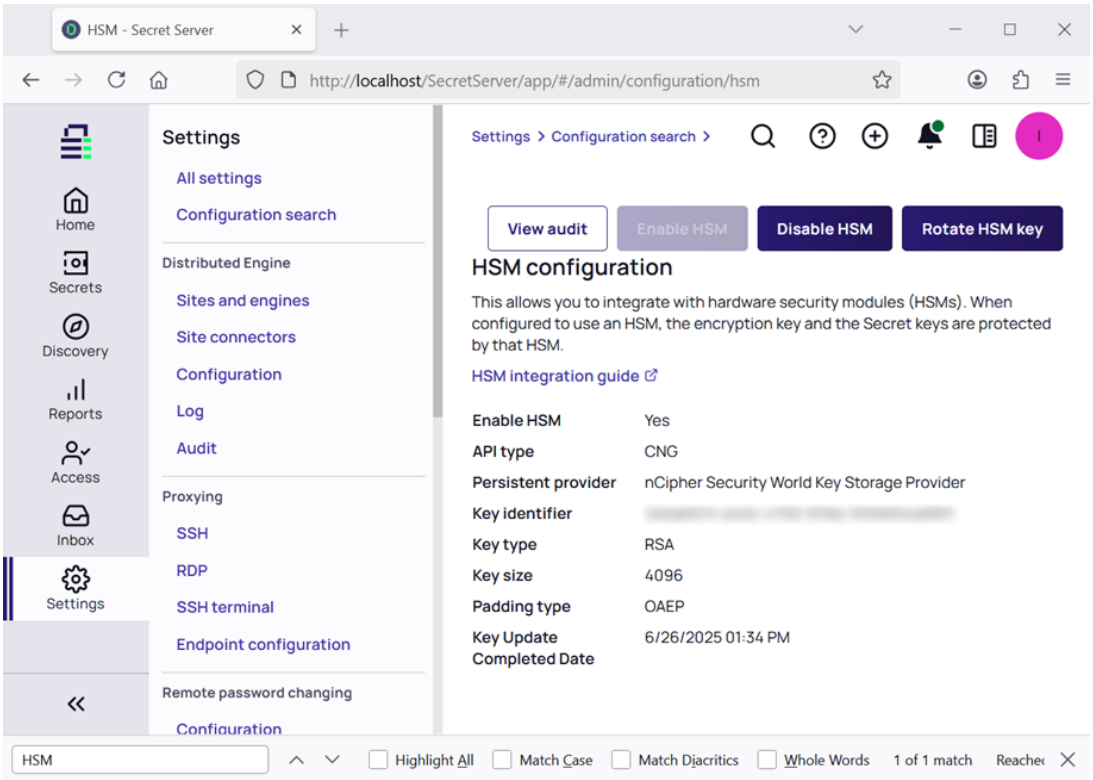
13. In the **Verify HSM configuration** page select **Save**.



14. In the **Notice** about HSM configuration change, recycle the application pool. Then select **Continue**.



15. Refresh the browser. Then from the menu in the left pane, select **Settings > All settings > General > HSM**. Notice the completed HSM configuration.



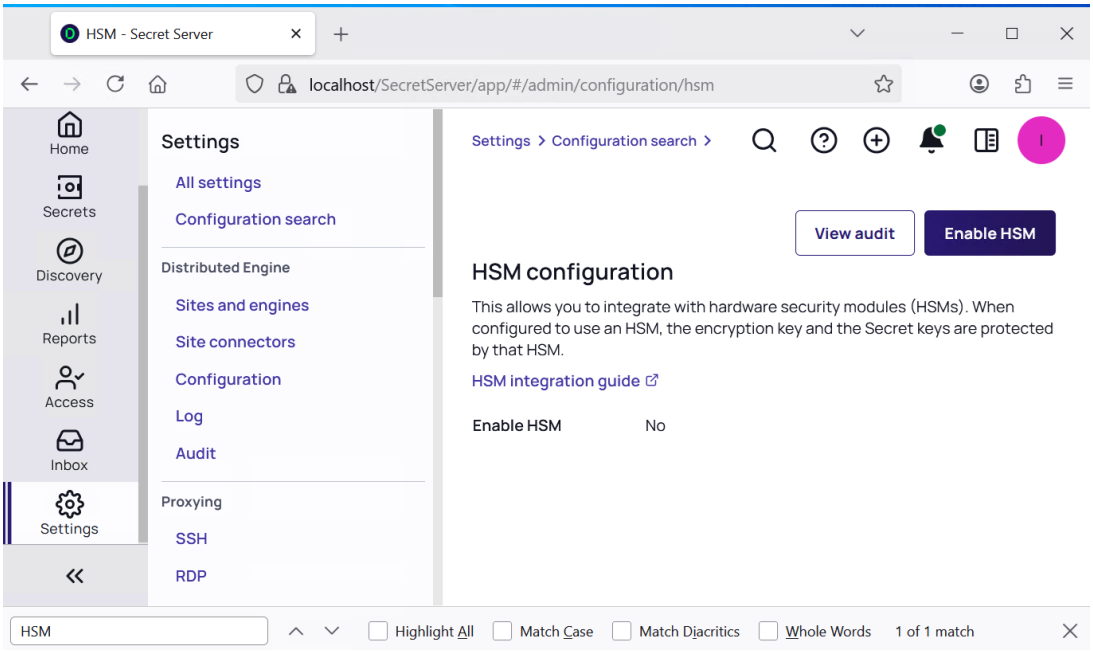
4.2. Configure the Delinea Secret Server using the PKCS #11 API

1. Log in to the Delinea Secret Server via a browser at https://localhost/SecretServer.

2. If the HSM was previously configured using the CNG cryptography provider, select **Disable HSM**, recycle the application pool, and refresh the browser. Otherwise, continue to the next step.
3. Copy the HSM `cryptoki` library (dll) for PKCS #11 to the Secret Sever application pool as shown:

```
C:\Users\Administrator.INTEROP>copy "C:\Program Files\nCipher\nfast\toolkits\pkcs11\cknfast.dll"
C:\inetpub\wwwroot\SecretServer\pkcs11\.
        1 file(s) copied.
```

4. If you are using OCS protection, insert your OCS card into the proper slot.
5. From the menu in the left pane, select **Settings > All settings > General > HSM**. The **HSM configuration** page appears.

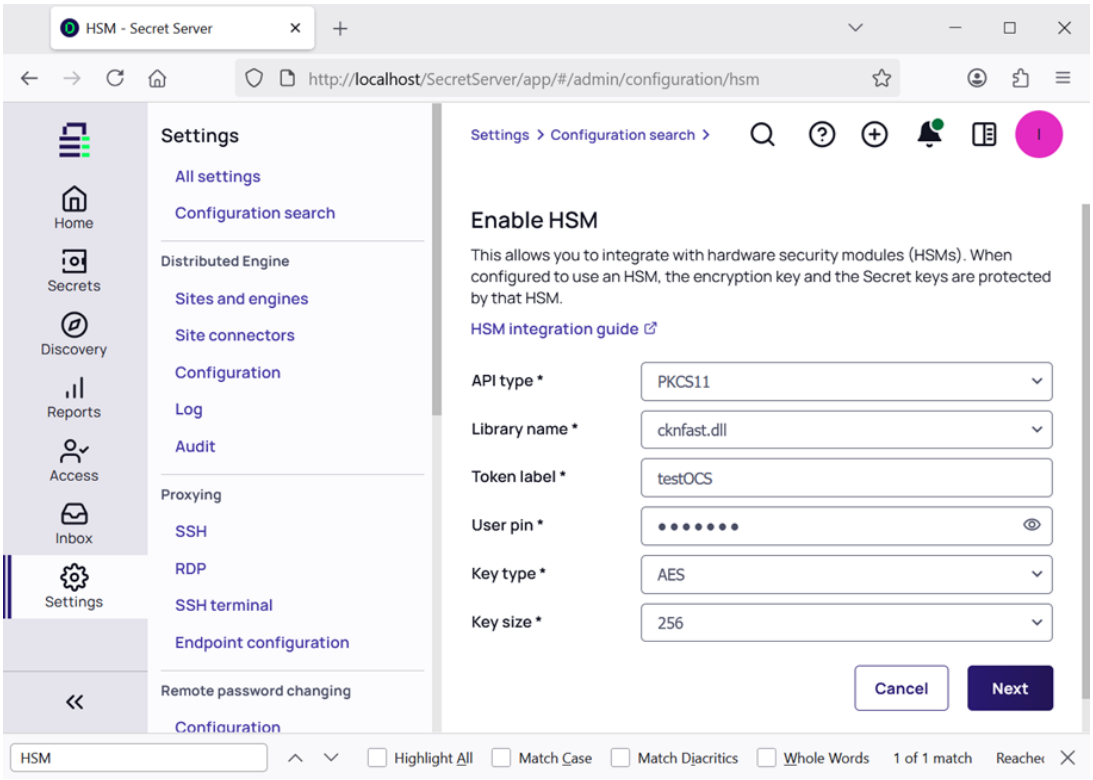


6. Select **Enable HSM**. Then select **Next**.
7. In the **Enable HSM** window, select as follows. Then select **Next**.

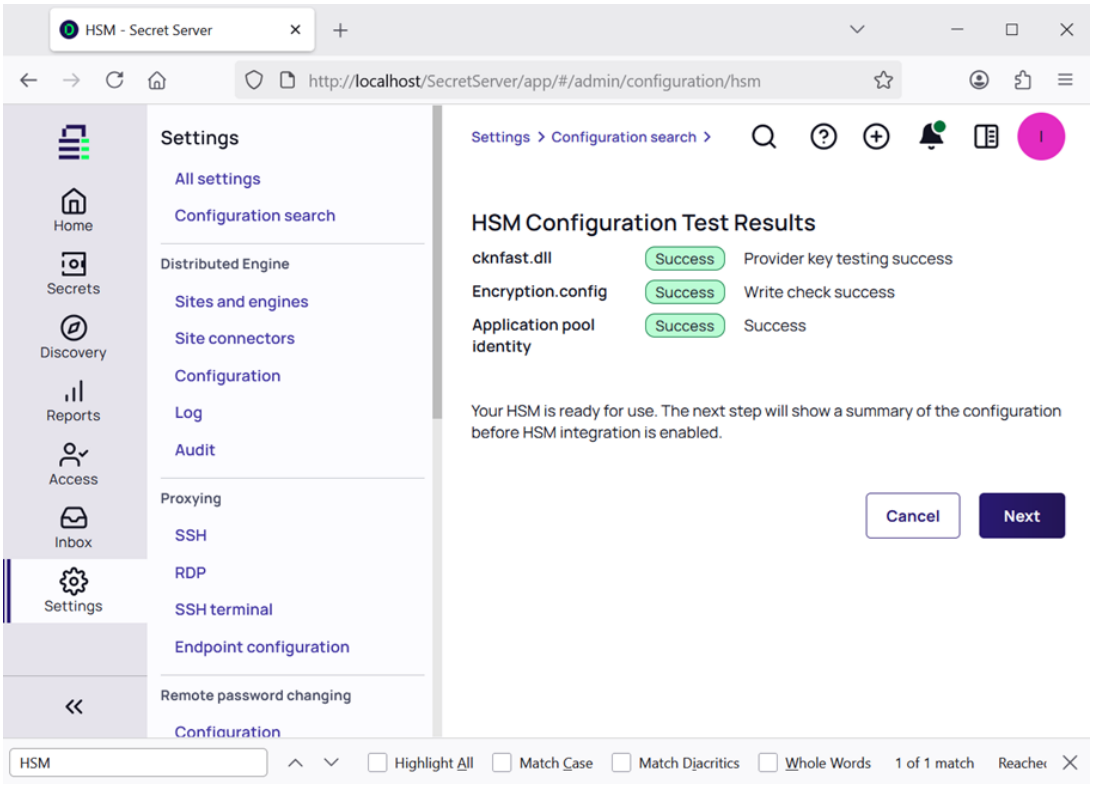
Parameter	Value
API type	PKCS11
Library name	cknfast.dll
Token label	<OCS cardset name>
User pin	<OCS cardset passphrase>
Key type	AES

Parameter	Value
Key size	256

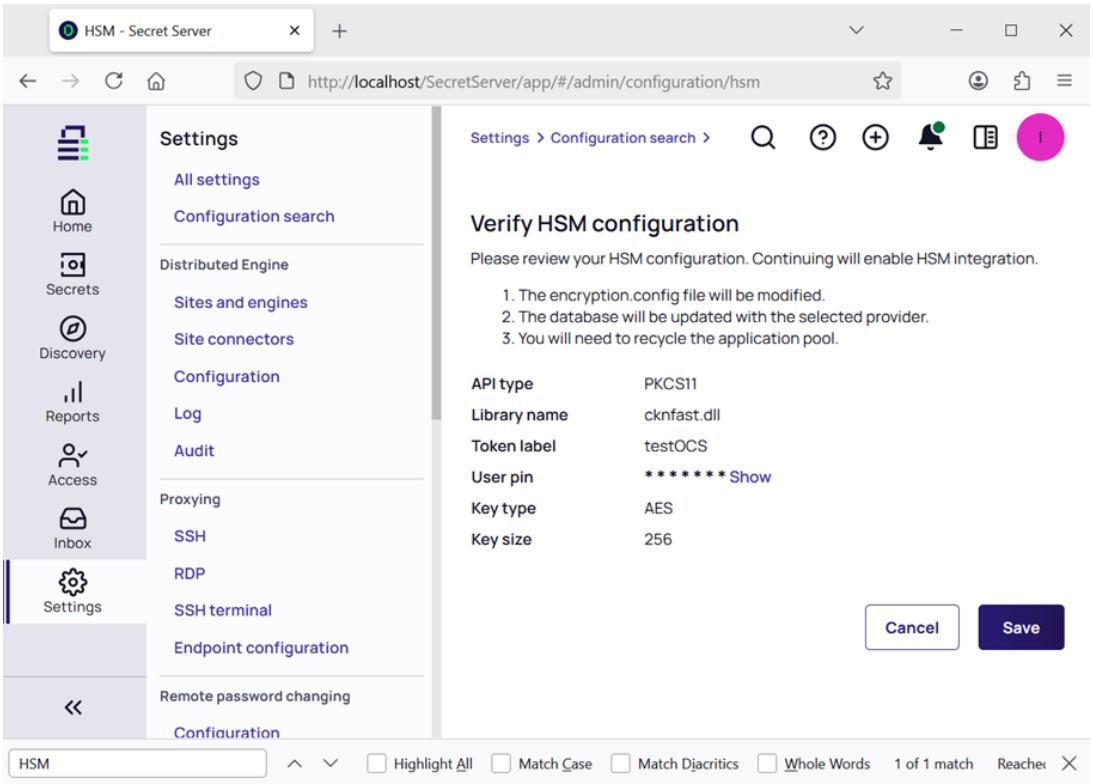
For example:



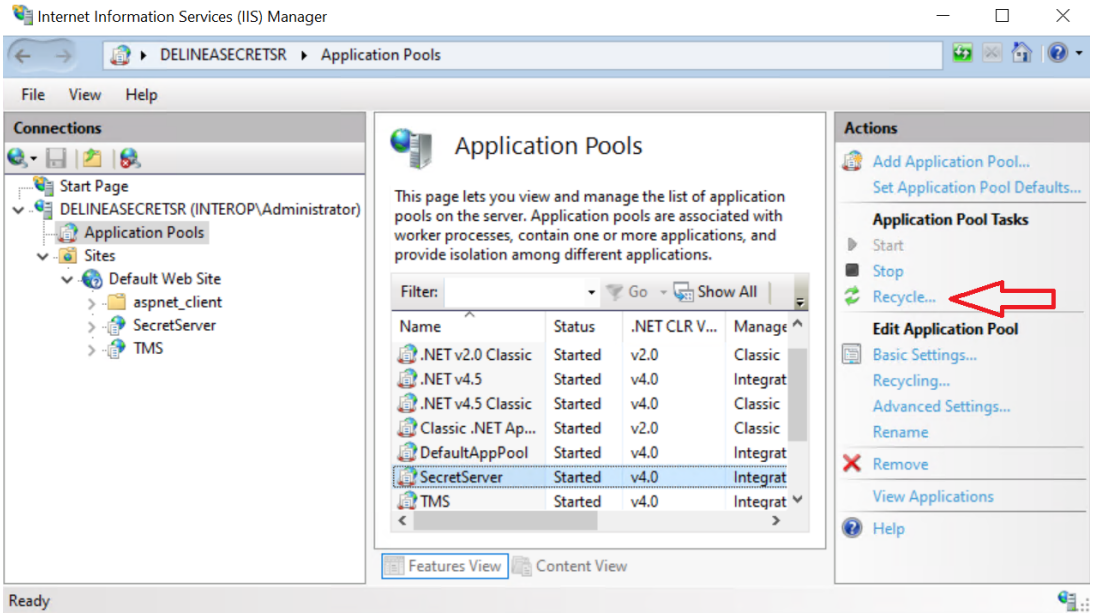
8. Check the **HSM Provider Test Results**. Then select **Next**.



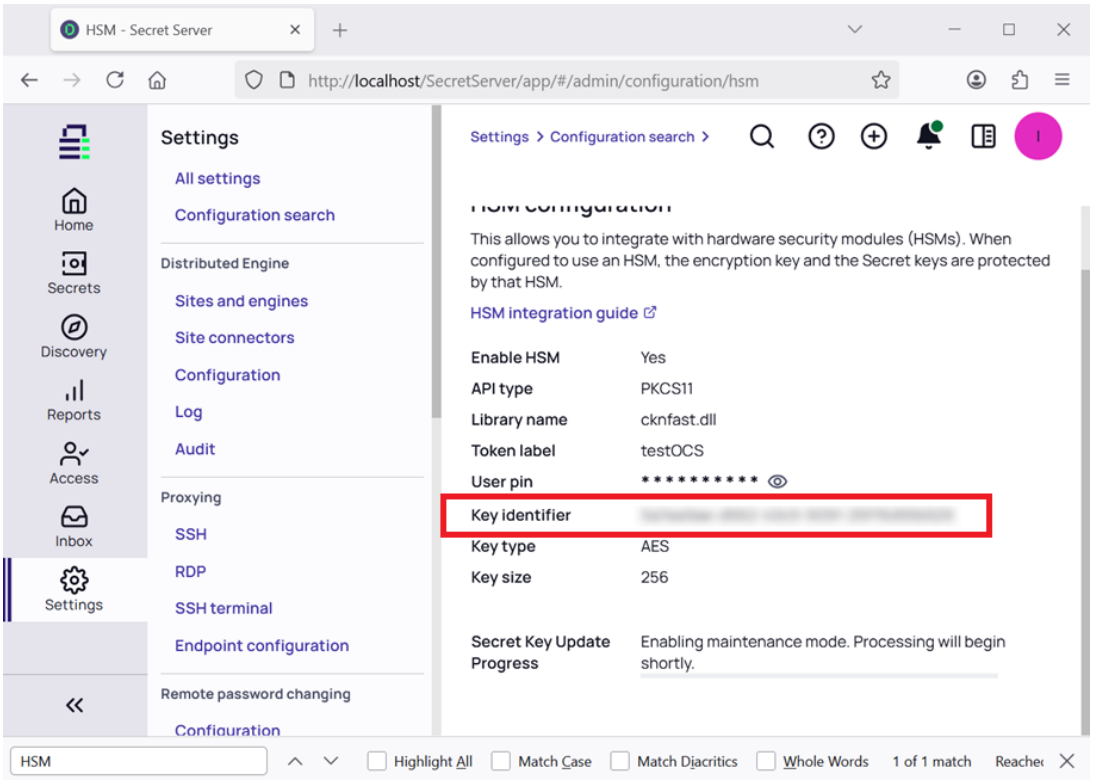
9. In the **Verify HSM configuration** page select **Save**.



10. In the **Notice** about HSM configuration change, recycle the application pool. Then select **Continue**.



11. Refresh the browser. Then from the menu in the left pane, select **Settings > All settings > General > HSM**. Notice the completed HSM configuration.



4.3. Verify integration

1. List the keys protected by the HSM using the `nfkminfo` utility.

```
C:\Users\Administrator.INTEROP>nfkminfo -l
```

```
Keys protected by cardsets:
 key_pkcs11_ucedb3d45a28e5a6b22b033684ce589d9e198272c2-5c65ec9a8fd17ea4ff069e88f552f926d35252d0 `5a7ea9ae-
d562-40c5-9091-25f76d55b529'
```

2. Notice the **Key identifier** in the completed HSM configuration matches the `nfkminfo` utility output above. In this case the key corresponds to the the Delinea Secret Server using the PKCS #11 API.

This completes the integration of Delinea Secret Server with the Entrust nShield HSM. Secrets created in Delinea Secret Server will use encryption keys that are stored in the HSM.

Chapter 5. Additional resources and related products

5.1. nShield HSMs

5.2. nShield as a Service

5.3. Entrust products

5.4. nShield product documentation