Delinea Secret Server

nShield® HSM Integration Guide

11 Apr 2023

Contents

1. Introduction

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

1.1. Product configurations

Entrust has successfully tested nShield HSM integration with Delinea Secret Server in the following configurations:

Product	Version
Secret Server	11.2.000003 - Platinum Edition
SQL Server 2019	15.0.2000.5 Express Edition (64-bit)
SQL Server Management Studio	18.12.1
IIS	10.0.17763.1
Base OS	Microsoft Windows Server 2019

1.2. Supported nShield features

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

Feature	Support
Softcards	No
Module Only Key	Yes
Operator Card Set (OCS)	Yes[1]
nSaaS	Supported but not tested

[1] The OCS can only be used if it is generated without a passphrase.

Security World	Support
FIPS 140-2 Level 2	Yes

Security World	Support
FIPS 140-2 Level 3	No

1.3. Supported nShield hardware and software versions

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

1.3.1. Connect XC

Security World Software	Firmware	Netimage	OCS	Softcard	Module
12.80.4	12.72.1 (FIPS Certified)	12.80.5	✓		✓
12.80.4	12.50.11 (FIPS Certified)	12.80.4	✓		✓
12.80.4	12.60.15 (CC Certified)	12.80.4	✓		✓

1.3.2. Connect +

Security World Software	Firmware	Netimage	OCS	Softcard	Module
12.80.4	12.72.0 (FIPS Certified)	12.80.5	✓		✓
12.80.4	12.50.8 (FIPS Certified)	12.80.4	✓		✓
12.40 Compatibility Package	2.55.4 (CC Certified)	12.45.1	✓		✓

1.3.3. nShield 5c

Security World Software	Firmware	Netimage	OCS	Softcard	Module
13.2.2	13.2.2 (FIPS Pending)	13.2.2	✓		✓

1.4. Requirements

The following are needed for this integration:

- A server running Secret Server, and connected to a domain.
- A local installation of SQL or access to a remote SQL server.
- An nShield Connect HSM.

2. Procedures

Follow these steps to install and configure the Secret Server with a nShield HSM. The entire installation will be done on the same server running the Secret Server.

1. Install the Security World software and create a Security World
2. Automatically start the nShield service agent at startup
3. Create the OCS
4. Configure the CNG API
5. Enable the nShield Connect HSM

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

1. Install and configure the Security World software. For instructions, see the *Installation Guide* and the *User Guide* for the HSM.
2. Add the Security World utilities path `C:\Program Files\nCipher\nfast\bin` to the Windows system path.
3. Open port 9004 in the firewall for inbound and outbound traffic for the HSM connection.
4. Open port 9005 in the firewall for inbound and outbound traffic for remote administration using a nShield Trusted Verification Device (TVD).
5. Install the nShield Connect HSM locally, remotely, or remotely via the serial console. See the following nShield Support articles, and the *Installation Guide* for the HSM:
    - https://nshieldsupport.entrust.com/hc/en-us/articles/360021378272-How-To-Locally-Set-up-a-new-or-replacement-nShield-Connect
    - https://nshieldsupport.entrust.com/hc/en-us/articles/360014011798-How-To-Remotely-Setup-a-new-or-replacement-nShield-Connect
    - https://nshieldsupport.entrust.com/hc/en-us/articles/360013253417-How-To-Remotely-Setup-a-new-or-replacement-nShield-Connect-XC-Serial-Console-Model
6. Run the `enquiry` utility to verify that the HSM is correctly configured:

```
C:\Users\Administrator>enquiry
Server
 enquiry reply flags    none
 enquiry reply level    Six
 serial number          <ESN-of-HSM>
 mode                   operational
...
Module #1
 enquiry reply flags    none
 enquiry reply level    Six
 serial number          <ESN-of-HSM>
 mode                   operational
...
```

7. Create your Security World if one does not already exists. Follow your organization's security policy for this. Create extra ACS cards, one for each person with access privilege, plus spares.

```
new-world -i -m <module_number> -Q <K/N>
```

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

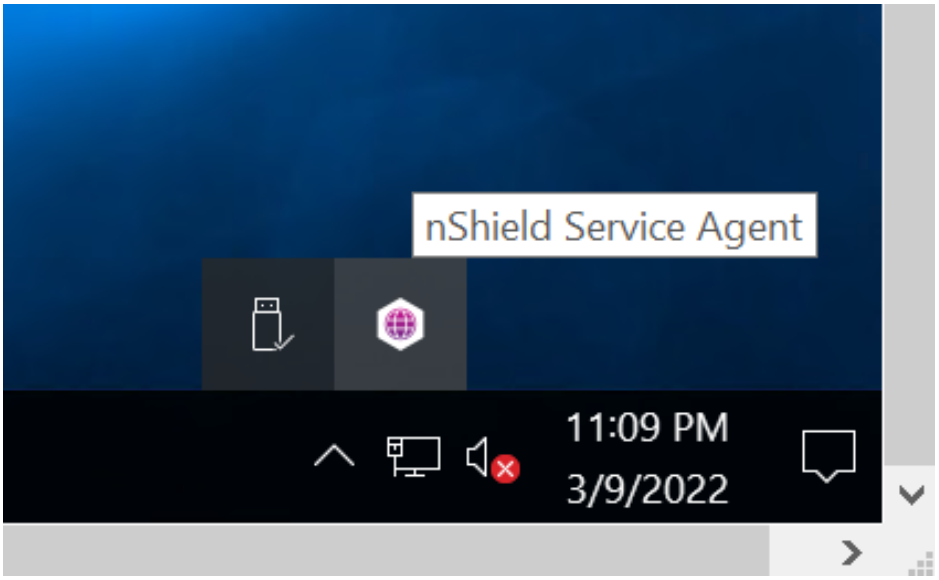
8. Run the `nfkminfo` utility to confirm the Security World is **operational** and **usable**:

```
C:\Users\Administrator>nfkminfo
World
 generation     2
 state          0x37270008 Initialised Usable ...
...
Module #1
 generation     2
 state          0x2 Usable
...
Module #1 Slot #0 IC 0
 generation     1
 phystype       SmartCard
 ...
 error          OK
...
Module #1 Slot #1 IC 0
 generation     1
 phystype       SoftToken
 ...
 error          OK
...
```

2.2. 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. Copy and paste the shortcut to the **Startup** folder.
4. Reboot.
5. Notice the nShield service agent icon shown below.



2.3. Create the OCS

The Secret Server private keys generated by the CNG Key storage provider can be protected with an OCS or Module only.

- OCS are smartcards that are presented to the physical smartcard reader of a HSM, or remotely via an nShield TVD. The maximum required number of cards K must be equal to 1 in the Secret Server application. The total number of cards N can be up to 64. This limit cannot be exceeded. For more information on OCS use, properties, and K-of-N values, see the *User Guide* for your HSM.
- Module protection are logical tokens with no passphrase.

The following steps create the OCS. You have the option to create it now, or defer until the next section while configuring the CNG.

Skip the remaining part of this section and go to Configure the CNG API if using Module protection.

1. Ensure the `/opt/nfast/kmdata/config/cardlist` file contains the serial number of the card(s) to be presented, or an asterisk wildcard.
2. Open a command window as administrator.
3. Run the `createocs` command as described below. Press **Return** when prompted to enter a passphrase. That is, a blank passphrase.

   Follow your organization's security policy for the values of K/N, where K=1 as

mentioned above. Use the same passphrase (left blank) for all the OCS cards in the set (one for each person with access privilege, plus spares). Note that `slot 2`, remote via TVD, was used to present the card in this integration.

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

```
# createocs -m1 -s2 -N SecretServer -Q 1/1 -p

Creating Cardset:
 Module 1: 0 cards of 1 written
 Module 1 slot 0: Admin Card #1
 Module 1 slot 2: blank card
 Module 1 slot 3: empty
 Module 1 slot 2:- no passphrase specified - writing card
Card writing complete.

cardset created; hkltu = 5481cad7a4b86705678e262162e95ec9318d43e6
```

Add the `-p` (persistent) option to the command above to have authentication after the OCS card has been removed from the HSM front panel slot, or from the TVD. Otherwise the authentication provided by the OCS is non-persistent and only available while the OCS card is inserted in the HSM front panel slot, or the TVD.

4. Verify the OCS was created:

```
# nfkminfo -c
Cardset list - 1 cardsets:  (P)ersistent/(N)ot, (R)emoteable/(L)ocal-only
 Operator logical token hash               k/n timeout  name
 5481cad7a4b86705678e262162e95ec9318d43e6  1/1  none-PL SecretServer
```

The `rocs` utility also shows the OCS:

```
# rocs
`rocs' key recovery tool
Useful commands: `help', `help intro', `quit'.
rocs> list cardset
No. Name                    Keys (recov) Sharing
  1 SecretServer            0 (0)        1 of 1; persistent
rocs> exit
```

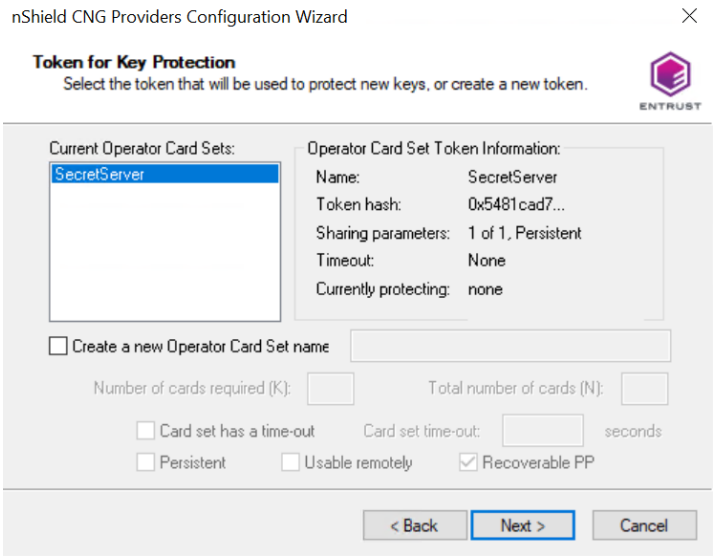
2.4. Configure the CNG API

1. Select the **Windows Start > Entrust > 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. Either:
   - Select **Module Protection**, then select **Next** twice and then select **Finish**.
   - Select **OCS**, select the OCS created above, then select **Next** twice and then select **Finish**.



6. Run `certutil -csptest` on a command window:

```
certutil -csptest > <filename>
```

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

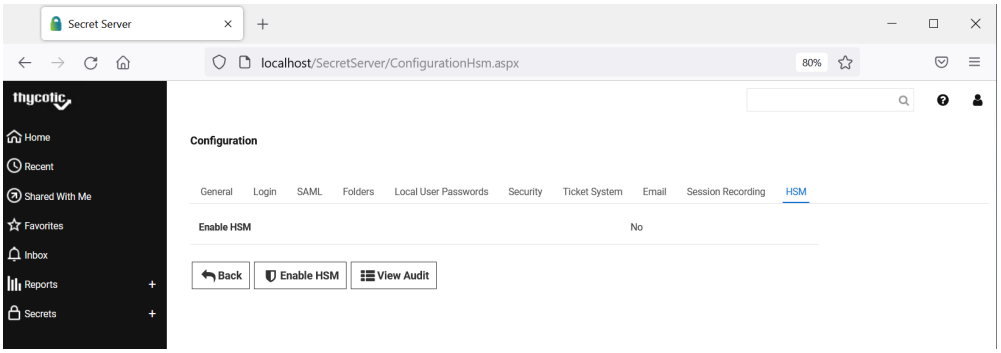
```
Provider Name: nCipher Security World Key Storage Provider
  Name: nCipher Security World Key Storage Provider
  HWND Handle:Binary:
0000    00 00 00 00 00 00 00 00                          ........
  Impl Type: 17 (0x11)
    NCRYPT_IMPL_HARDWARE_FLAG -- 1
    NCRYPT_IMPL_HARDWARE_RNG_FLAG -- 10 (16)

  Version: 786512 (0xc0050)
  Pass
  ...
```

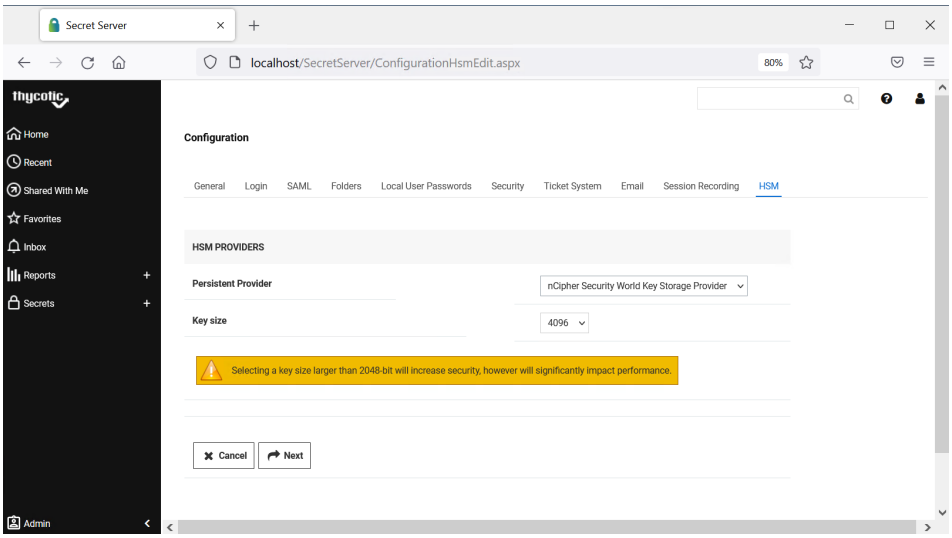
2.5. Enable the nShield Connect HSM

1. Log in to Delinea Secret Server via a browser at https://localhost/SecretServer.
2. From the menu in the left pane, select **Administration > Actions > Configuration > HSM**.

   The **Configuration** page appears, with the **HSM** tab selected



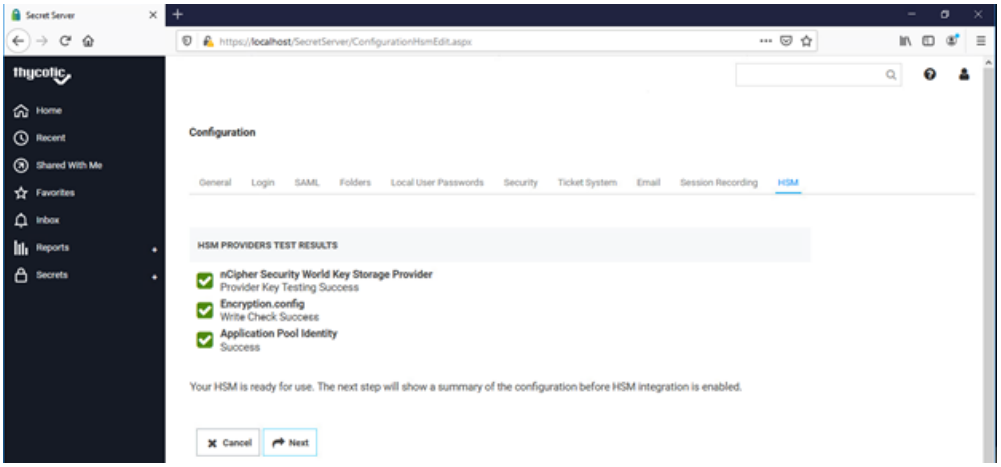
3. Select **Enable HSM** and then select **Next**.
4. Under **HSM Providers**:
    a. For **Persistent Provider**, select **nCipher Security World Key Storage Provider**.
    b. Select the required **Key size**. For example:



    c. Select **Next**.

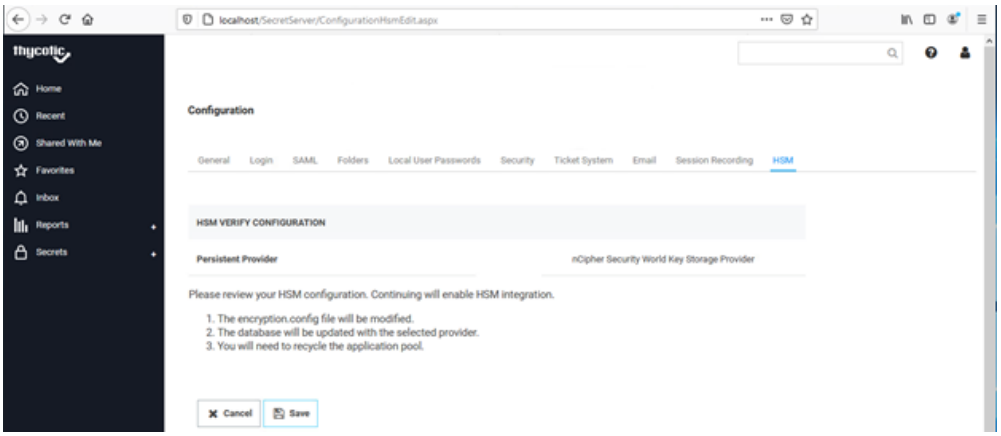
    The HSM provider is tested, and results displayed.

5. Check the **HSM Provider Test Results**. For example:



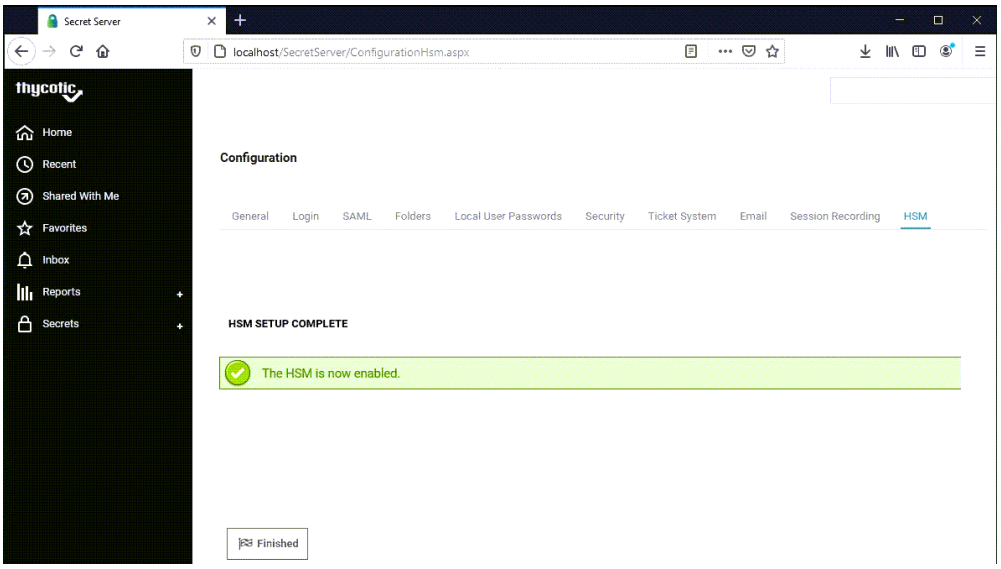
6. Select **Next**.

   A verification page appears.



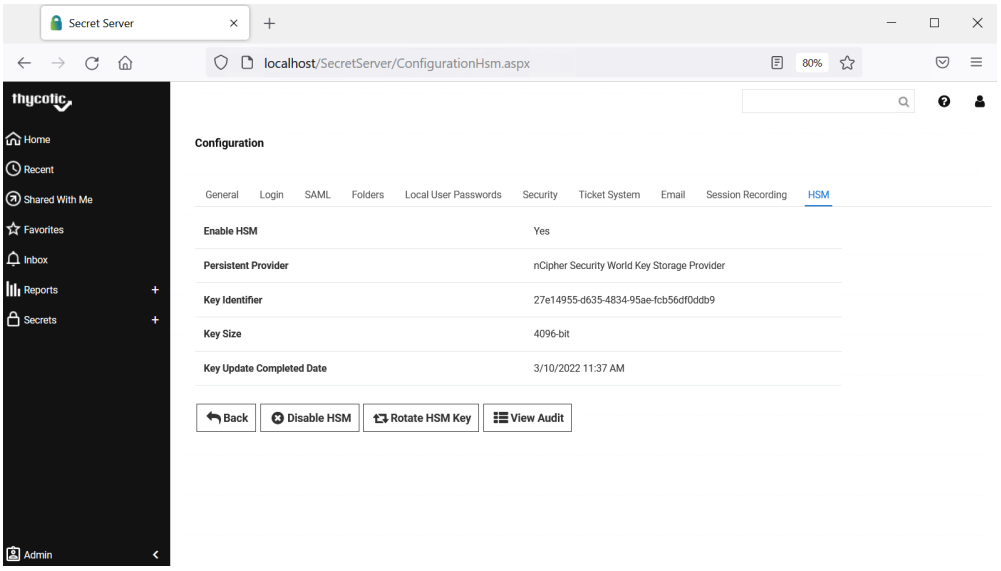
7. Select **Save** to update the HSM configuration.

   A confirmation page appears.



8. Select **Finish**.

   The nShield Connect HSM is now enabled, and the Secret Server encryption key is stored on it. The nShield Connect HSM configuration details appear on the Secret Server **HSM** tab.



9. Verify the key generated by the Secret Server is stored in the nShield Connect HSM using the `nfkmverify` utility.

```
C:\Users\Administrator>nfkmverify

** [Security world] **
    Ciphersuite: DLf3072s256mAEScSP800131Ar1
    128-bit security level
    1 Administrator Card(s)
     (Currently in Module #1 Slot #0: Card #1)
    HKNSO 78b1cbd1814e6f711cc64fe84dae2fe3bd32584a
    Cardset recovery ENABLED
    Passphrase recovery ENABLED
    Common Criteria CMTS 419221-5 disabled
    Strict FIPS 140-2 level 3 (does not improve security) disabled
    SEE application non-volatile storage ENABLED
    real time clock setting ENABLED
    SEE debugging ENABLED
    SEE debugging restricted
    Foreign Token Open authorization ENABLED
    Generating module ESN <ESN-of-HSM> currently #1 (in same incarnation)

Verification successful, confirm details above.  0 keys verified.
```

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