DigiCert® PKI Platform

HSM Installation and Configuration for SafeNet

Version 8.19

February 12, 2020

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Introduction

This document describes the installation and configuration steps for SafeNet Network HSM to be used by the DigiCert PKI Enterprise Gateway and Autoenrollment server.

Revision History

No.	Date	Summary
1.	2019/05/10	Create a new entry
2.	2019/05/20	1. Updated all the screenshots in "**Install LunaClient**" because the location path included '¥' instead of '\' (backslash). 2. Added "**Create CSR and Install Certificate**" chapter for each HSMs
3.	2019/07/17	1. Added "**SafeNet DPoD Cloud HSM**" 2. Added "**Get RA Certificate in PKI-Manager**" as an Appendix
4.	2019/08/16	1. Added "**Create Service Credentials as Application Owner**" section. 2. Added "**Download Client as Application Owner**" section. 3. Added Step 9 under the "**Configure LunaClient**".
5.	2019/08/30	1. The algorithm of signature for PKCS#10(CSR) has been changed from **SHA1 to SHA256.**
6.	2019/11/20	1. Removed the **SafeNet Network HSM** version 2. **Provider Type** changed to **0** as Provider Type is not defined for KSP
7.	2020/01/06	1. Updated **SafeNet Network HSM Luna Client** version **7.3.0-165** with **7.4.1-2**. 2. Added **SafeNet Network HSM Luna Client** version **10.1.0.32**. 3. Updated all screenshots in **Install LunaClient**. 4. Updated codes with client version **10.1.0.32** in **Configure Luna HSM Client, Configure HA (High Availability),** and **Configure CSP**.

8.	2020/01/17	5. Updated **SafeNet DPoD Cloud HSM** Client, Software, and Firmware versions. 6. Updated codes with Client, Software, and Firmware versions in **Install Service Client for Windows, Configure LunaClient,** and **Configure CSP**.
9.	2020/02/11	1. Added "**Integration for Java Environment**" new topic on both SafeNet Network HSM and DPoD Cloud HSM 2. Updated SafeNet DPoD Cloud HSM Client version to **v10.1.0-32**

Supported HSMs

HSM Type	Client Version	Software Version	Firmware Version
SafeNet Network HSM (*a, *b)	6.1	6.1	6.10.9
SafeNet Network HSM (*a, *c, *d)	7.4.1-2	7.2.0-220	7.2.0 LunaPED FW Version: 2.8.0-1
SafeNet Network HSM (*a, *c, *d)	10.1.0.32	7.2.0-220	7.2.0
SafeNet DPoD Cloud HSM	10.1.0.32	7.3.0	The service client can be downloaded from your site. Firmware Version: 7.3.0 CV Firmware Version: 1.3.0

*a : Both Export and Signing variants were qualified with the supported HSM types.

*b : SafeNet Network HSM 7 Luna PCI, and Luna G5 are functionally identical and the above qualified versions of SafeNet Network HSM 7 should work with Luna PCI and Luna G5.

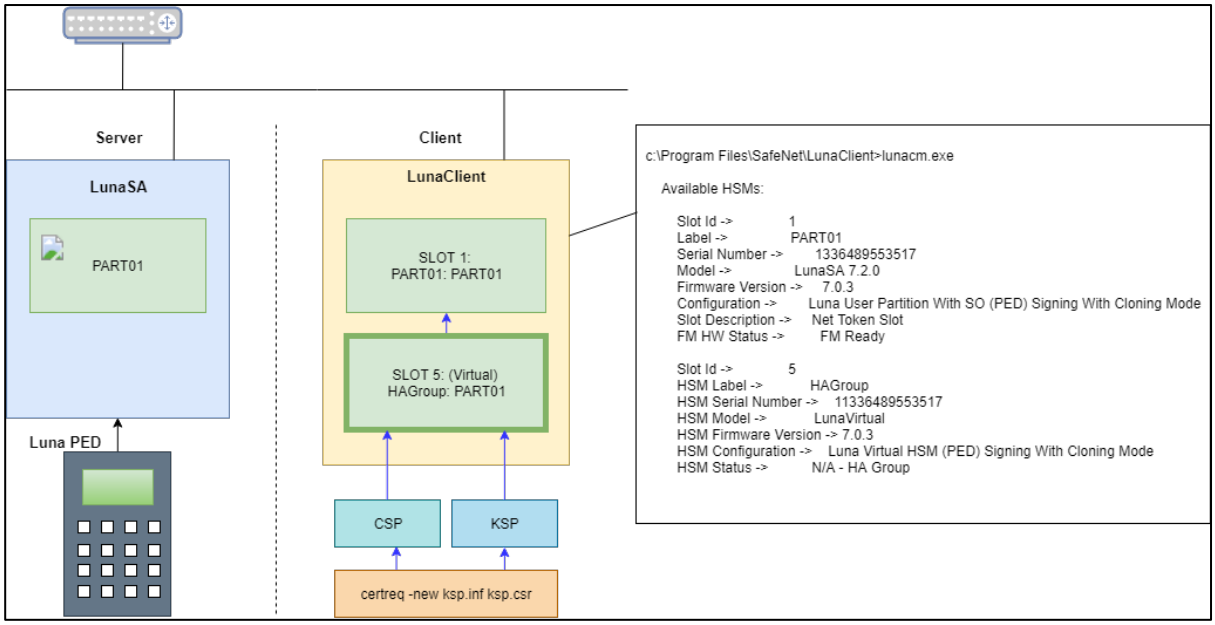
*c : If the listed Luna Client and Software versions are deployed, the Luna SA 6 HSM should also work, although not formally qualified by DigiCert.

*d : SafeNet Network HSM 7 supports FIPS and non-FIPS Mode, Cloning and Export Mode.

SafeNet Network HSM

The SafeNet Network HSM 7 (formerly known as Luna SA) is network HSM which allows to create a partition to store a key, such as the RA key required to strongly authenticate to the DigiCert PKI Platform. It includes many features that increase security, connectivity, and ease-of-administration in dedicated and shared security applications.

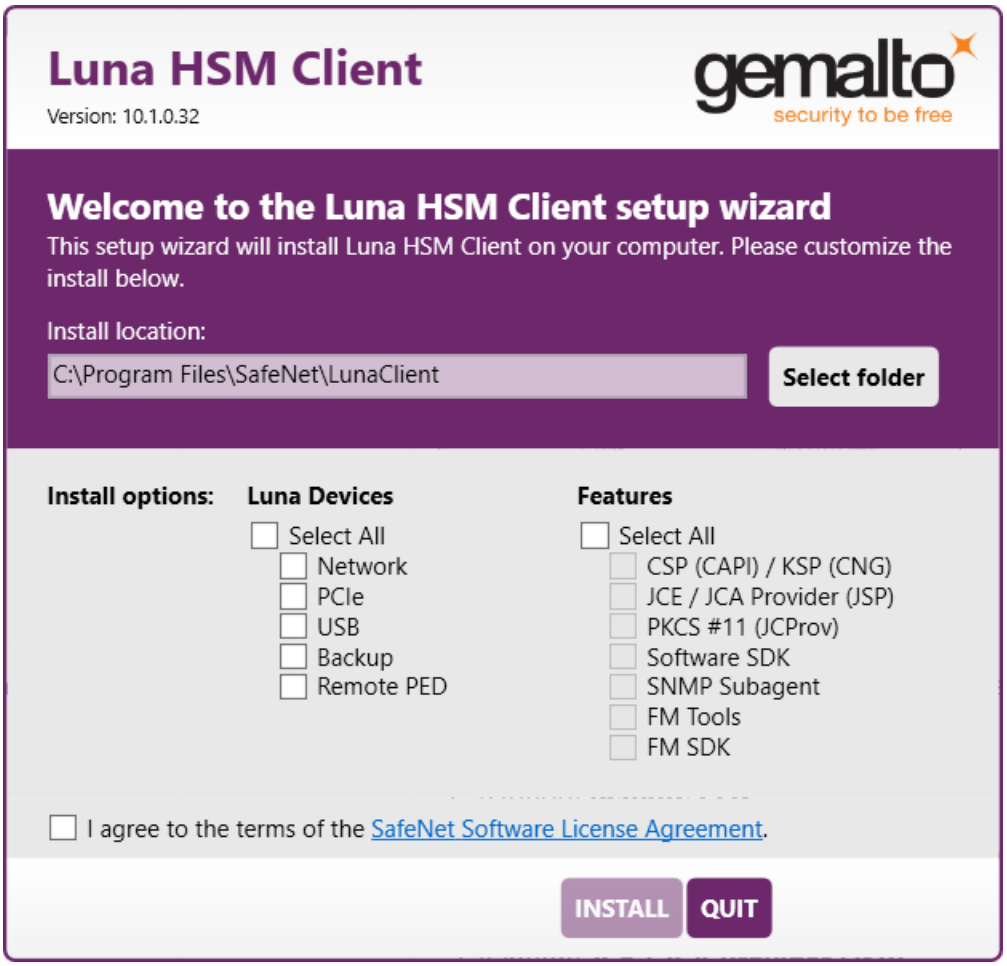
To access the partition of SafeNet Network HSM 7, we can use the Luna HSM Client through Network Trust Link Service (NTLS).



Install Luna HSM Client

In the Client location, follow the steps below to install the Luna HSM Client software:

1. Run LunaHSMClient.exe as Administrator.



2. Select Install options and features.

   Check the following **Luna Devices** (some options and features are optional, depending on your environment):

   a) Network

   b) (Optional) **Remote PED**

   Check the following **Features**. (Option: depends on your environment):

   c) **CSP(CAPI) / KSP(CNG)**

   d) (Optional) **JCE / JCA Provider (JSP)**

   e) (Optional) **PKCS #11 (JCProv)**

Check Software License Agreement, and then Click INSTALL.

3. Wait for completion.

The progress bar will get displayed at the bottom of the dialog.

4. Once the Installation is completed, the UNINSTALL and MODIFY button will get displayed. Click QUIT.

Configure Luna HSM Client

Before following the steps, a partition must be created, named as <PARTITION-NAME> throughout the rest of this document.

Follow the below steps to configure the Luna HSM Client:

1. Open a Command Prompt and run the following commands.

```
> cd C:\Program Files\SafeNet\LunaClient
> lunacm.exe
```

2. Create a Network Trust Link (NTL) - this is a one-step setup.

   If you have already created an NTL, you can skip to Step 3.

```
lunacm:> clientconfig deploy -server <SERVER-HOSTNAME> -client <CLIENT-
HOSTNAME> -par <PARTITION-NAME>
Please wait while we set up the connection to the HSM. This may take several
minutes...
Please enter appliance admin role user's password:
Command Result : No Error

lunacm.exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.
      Slot Id ->              1
        Label ->                <PARTITION-NAME>
```

```
        Serial Number ->        1314971349473
        Model ->                LunaSA 7.2.0
        Firmware Version ->     7.2.0
        Configuration ->        Luna User Partition With SO (PED) Signing
With Cloning Mode
        Slot Description ->     Net Token Slot
        FM H Status ->          FM Ready

        Current Slot Id: 1

lunacm:> clientconfig v

The following Luna SA Slots/Partitions were found:

Slot    Serial #                Label
====    ================        =====
   1       1314971349473        <PARTITION-NAME>

Command Result : No Error
```

If you do not want to follow the one step setup (Step 2), follow the below steps:

a) Obtain the Server Certificate.

The Server Certificate has been created on the HSM, so we need to copy it from the server.

```
> pscp -scp admin@<SERVER-HOSTNAME>:server.pem .
```

b) Add Server for the Client side.

```
> vtl addServer -n <SERVER-HOSTNAME> -c server.pem
New server <SERVER-HOSTNAME> successfully added to server list.
```

c) Create a Client certificate.

```
> vtl createCert -n <CLIENT-HOSTNAME>
Private Key created and written to: C:\Program
Files\SafeNet\LunaClient\cert\client\<CLIENT-HOSTNAME>Key.pem
Certificate created and written to: C:\Program
Files\SafeNet\LunaClient\cert\client\<CLIENT-HOSTNAME>.pem
```

d) Upload the Client certificate to the Server.

```
> pscp -scp cert\client\<CLIENT-HOSTNAME>.pem admin@<SERVER-HOSTNAME>:
admin@<SERVER-HOSTNAME>'s password:
<CLIENT-HOSTNAME>.pem         | 1 kB |   1.1 kB/s | ETA: 00:00:00 | 100%
```

Now, at the Server,

e) Register the Client and connect to the HSM via SSH.

```
lunash:> client register -client <CLIENT-HOSTNAME> -hostname <CLIENT-
HOSTNAME>
```

```
'client register' successful.
Command Result : 0 (Success)
```

f) Assign a partition to a Client and connect to the HSM via SSH.

```
lunash:> client assignPartition -client <CLIENT-HOSTNAME> -partition
<PARTITION-NAME>
'client assignPartition' successful.
Command Result : 0 (Success)
```

Now, at the Client,

3. Confirm connection settings.

The working directory is "C:\Program Files\SafeNet\LunaClient"

```
> vtl listServers
Server: <SERVER-HOSTNAME> HTL required: no

> vtl verify
vtl (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights reserved.

The following Luna SA Slots/Partitions were found:

Slot    Serial #               Label
====    ================       =====
  1 1314971349473              <PARTITION-NAME>
```

4. Configure Logging (Optional)

The working directory is "C:\Program Files\SafeNet\LunaClient". The name of the log folder is "c:\temp" in the following example and it can be changed.

```
> vtl logging configure c:\temp
Success setting log path to c:\temp
> vtl logging show
Client logging written to: c:\temp\LunaCryptokiLog.htm
```

Configure HA (High Availability)

1. Create an HA Group.

Open Command Prompt and run the following client commands.

```
> cd C:\Program Files\SafeNet\LunaClient
> lunacm.exe
lunacm:> slot set -s <SLOT-NUMBER>
lunacm:> hagroup creategroup -se <SERIALNUMBER> -label <HA-LABEL>

Enter the password: ************

New group with label "HAGroup" created with group number <SERIALNUMBER>.
Group configuration is:
```

```
HA Group Label: <HA-LABEL>
HA Group Number: 11336489553517
HA Group Slot ID: Not Available
Synchronization: enabled
Group Members: 1336489553517
Needs sync: no
Standby Members: <none>

Slot # Member S/N Member Label Status
====== ========== ============ ======
1 1336489553517 <PARTITION-NAME>alive

Command Result : No Error

lunacm.exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.

Available HSMs:

Slot Id -> 1
Label -> <PARTITION-NAME>
Serial Number -> 1336489553517
Model -> LunaSA 7.2.0
Firmware Version -> 7.0.3
Configuration -> Luna User Partition With SO (PED) Signing With Cloning Mode
Slot Description -> Net Token Slot
FM HW Status -> FM Ready
Slot Id -> 5
HSM Label -> <HA-LABEL>
HSM Serial Number -> 11336489553517
HSM Model -> LunaVirtual
HSM Firmware Version -> 7.0.3
HSM Configuration -> Luna Virtual HSM (PED) Signing With Cloning Mode
HSM Status -> N/A - HA Group

Current Slot Id: 1
```

NOTE: Both “Configure CSP” and “Configure KSP” must be configured again if you run the steps above.

2. Enable "HA Only"

```
lunacm:> slot set -s <HA-SLOT-NO>
        Current Slot Id:    <HA-SLOT-NO>     (Virtual HSM 7.0.3 (PED) Signing
With Cloning Mode)
Command Result : No Error

lunacm:> hagroup ho -e
        "HA Only" has been enabled.
Command Result : No Error

lunacm:> hagroup ho -s
        This system is configured to show only HA slots.  (HA Only is
enabled)
```

```
Command Result : No Error
```

Configure CSP

NOTE: Please note that for the deployment of the Autoenrollment Server, you need to configure CSP.

For SafeNet CSP, the utility **register.exe** (64-bit version) takes care of the registry. To configure CSP, open a command prompt and run the following commands.

Register CSP Library

```
C:\Program Files\SafeNet\LunaClient\CSP>register.exe /library

Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
enhanced RSA and AES provider for Microsoft Windows.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
Cryptographic Services for Microsoft Windows.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
SChannel Cryptographic Services for Microsoft Windows.
```

Register the partition

```
C:\Program Files\SafeNet\LunaClient\CSP>register.exe

register.exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.

 ************************************************************************
 *                                                                      *
 *       Safenet LunaCSP, Partition Registration                        *
 *                                                                      *
 *       Protect the HSM's challenge for the selected partitions.       *
 *                                                                      *
 *       NOTE:                                                          *
 *            This is a WEAK protection of the challenge.               *
 *            After you have configured all applications that will use  *
 *            the LunaCSP and ran them once, you MUST run:               *
 *                register /partition /strongprotect                    *
 *            to strongly protect the registered challenges.            *
 *                                                                      *
 ************************************************************************

This is a destructive procedure and will overwrite any previous
registrations.

Do you wish to continue?: [y/n]y
Do you want to register the partition named '<PARTITION-NAME>'?[y/n]: y
Enter challenge for partition '<PARTITION-NAME>' : <Only hit "Enter" then the
PED Authentication will be requested>

Success registering the ENCRYPTED challenge for partition '<PARTITION-
NAME>:1'.
Only the LunaCSP will be able to use this data.
```

```
Registered 1 partition(s) for use by the LunaCSP.
```

Register the HA partition

Run the following commands if HA is configured.

```
c:\Program Files\SafeNet\LunaClient\CSP>register.exe /h
register.exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.

 ********************************************************************************
 *                                                                              *
 *       Safenet LunaCSP, Partition Registration                                *
 *                                                                              *
 *       Protect the HSM's challenge for the selected partitions.               *
 *                                                                              *
 *       NOTE:                                                                  *
 *            This is a WEAK protection of the challenge.                       *
 *            After you have configured all applications that will use          *
 *            the LunaCSP and ran them once, you MUST run:                      *
 *                register /partition /strongprotect                            *
 *            to strongly protect the registered challenges.                    *
 *                                                                              *
 ********************************************************************************

This is a destructive procedure and will overwrite any previous
registrations.

Do you wish to continue?: [y/n]y
Do you want to register the partition named '<HA-LABEL>'?[y/n]: y
Enter challenge for partition '<HA-LABEL>' :************

Success registering the ENCRYPTED challenge for partition '<HA-LABEL>:1'.
Only the LunaCSP will be able to use this data.

Registered 1 partition(s) for use by the LunaCSP.
```

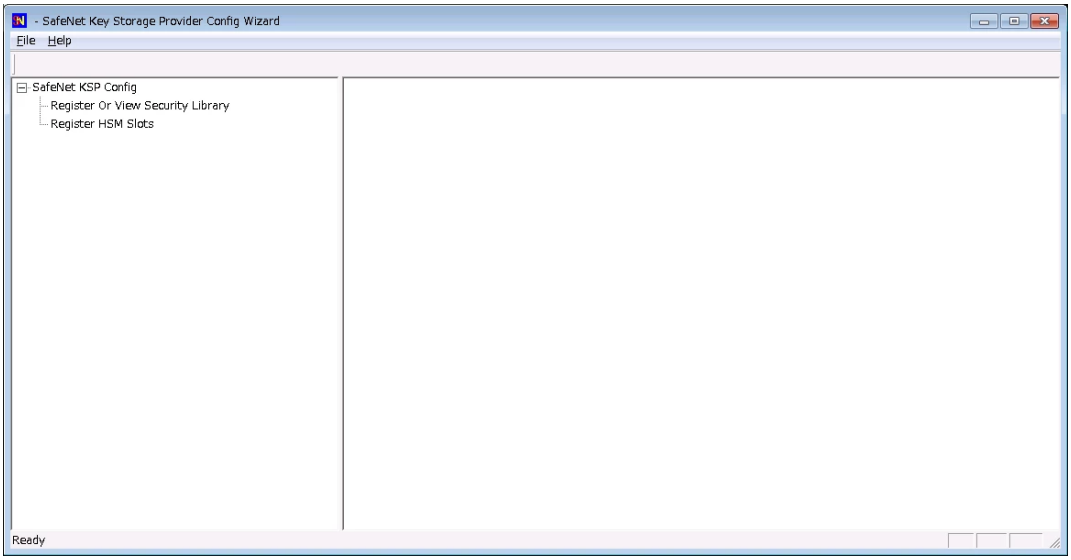
Configure KSP

NOTE: Please note that for the deployment of the Enterprise Gateway Server, you need to Configure KSP.

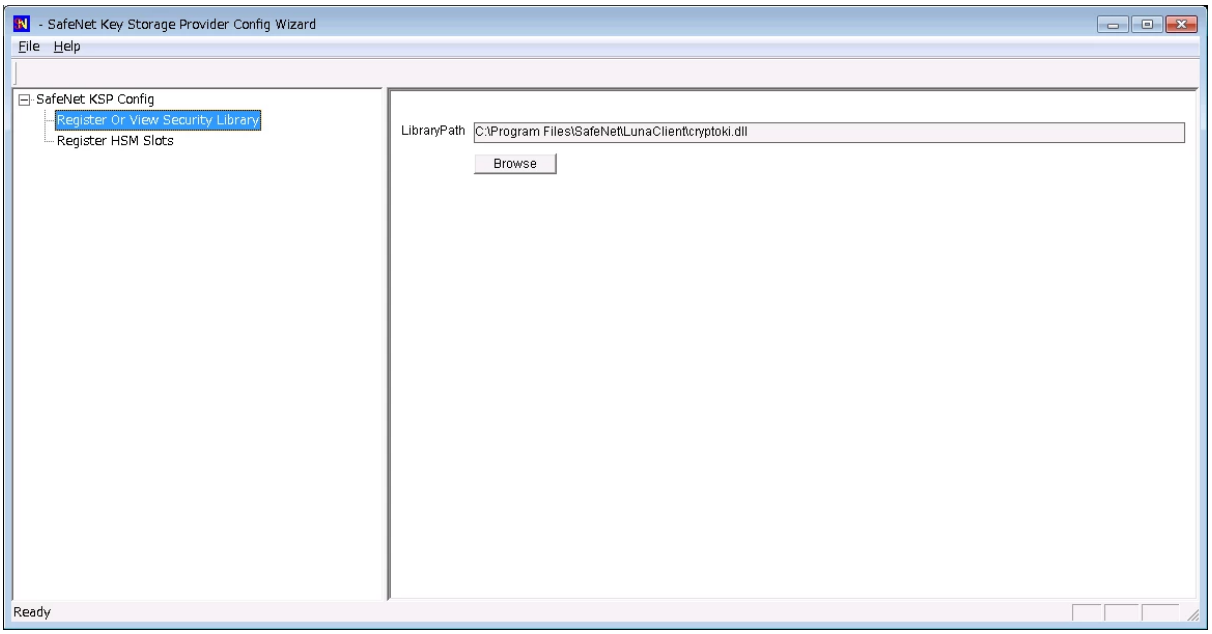
To configure KSP (CNG), run KspConfig.exe (Default location is "C:\Program Files\SafeNet\LunaClient\KSP\").

Follow instructions for the use of the graphical **KspConfig.exe** as described in KSP for CNG in the SDK Reference Guide.

The following window will appear.



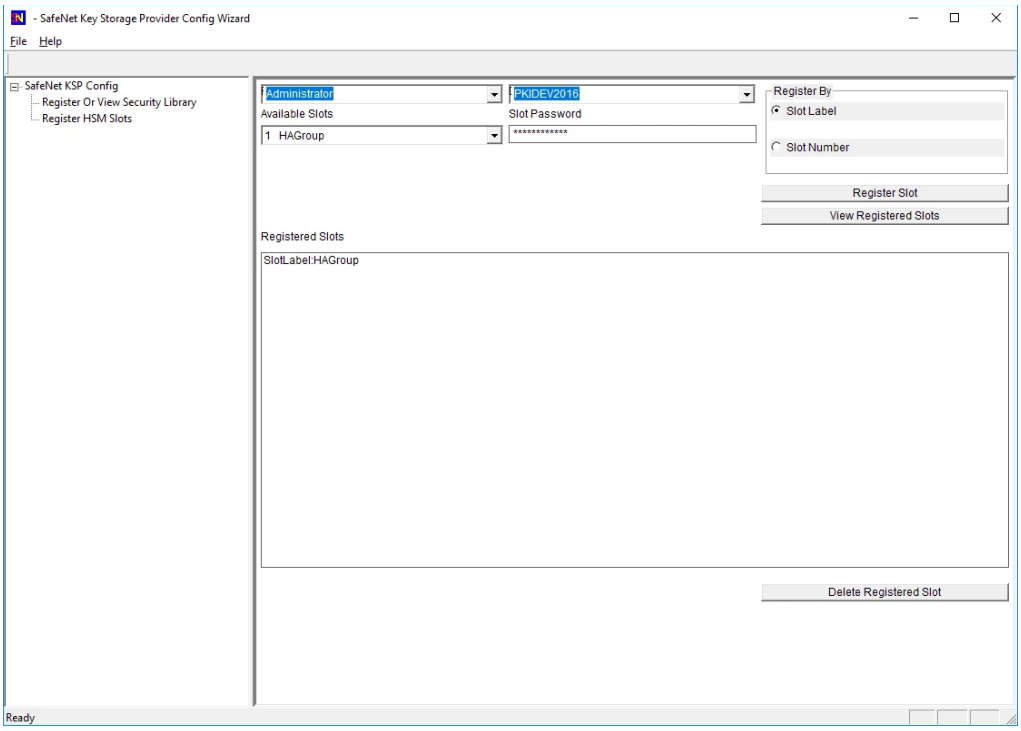
Double-click **Register Or View Security Library**, and then confirm the value "C:\Program Files\SafeNet\LunaClient\cryptoki.dll".



Double-click **Register HSM Slots** for Administrator/<Domain Name>

- Select Administrator
- Select <Domain Name>
- Select "HA Group" for **Available Slots**
- Enter Slot Password

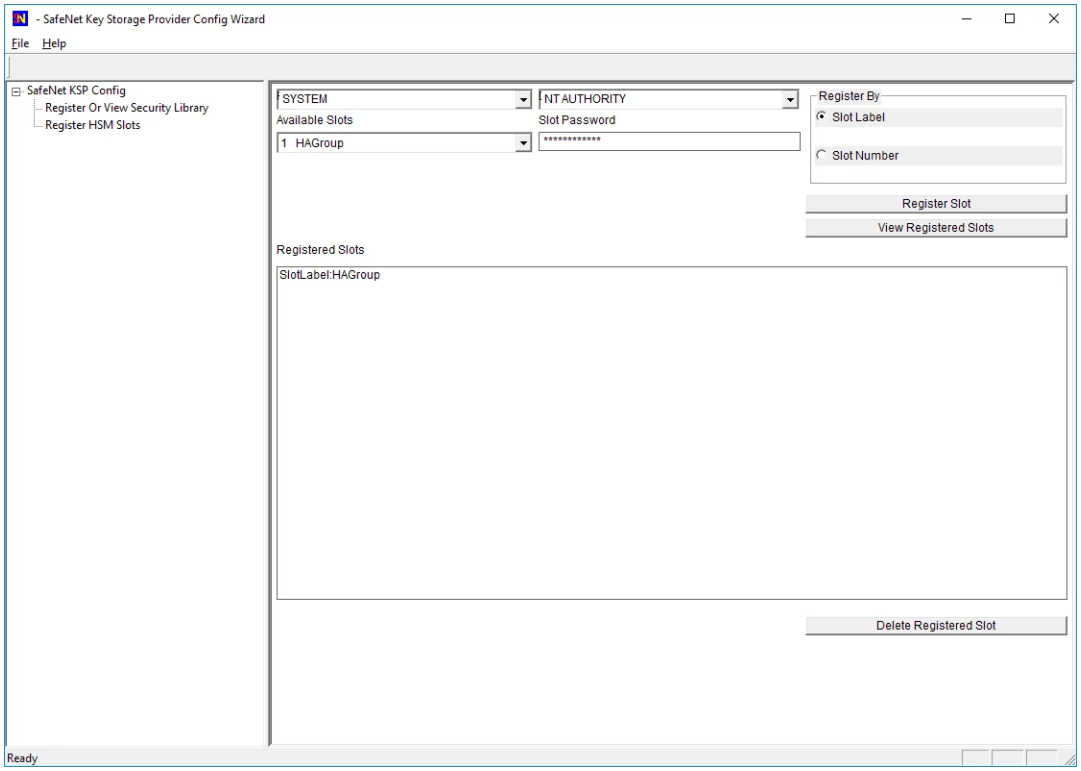
Click **Register Slot**.



Double-click **Register HSM Slots** for SYSTEM/NT AUTHORITY.

- Select SYSTEM
- Select NT AUTHORITY
- Select "HA Group" for **Available Slots**
- Enter Slot Password

Click **Register Slot.**



NOTE: When you click "**Register Slot**", there is no change on "Registered Slot", but this step is necessary.

When registering the Luna KSP (with the Luna KSPConfig utility), use the following user and domain combinations:

- The user and domain performing these procedures.
- The user and domain running the web application and using the private key.
- The local user and NT Authority domain user.
- The LocalSystem and NTAuthority of the system.

NOTE: If you implement the Autoenrollment server, you must also install and register the Luna CSP. Refer to the SafeNet product documentation for details.

Generate CSR and Install Certificate

1. Create the information file for CSR.

    a) To generate CSR using certreq.exe through CSP, the ProviderName must be "Luna Cryptographic Services for Microsoft Windows". The sample of inf file is as follows;

```
[NewRequest]
KeyUsageProperty = "NCRYPT_ALLOW_ALL_USAGES"
RequestType = PKCS10
ProviderName = "Luna Cryptographic Services for Microsoft Windows"
ProviderType = 1
Subject = "CN=Registration Authority"
KeyContainer = "CSPRA20190418"
MachineKeySet = TRUE
HashAlgorithm = SHA256
KeyAlgorithm = RSA
KeyLength = 2048
```

    b) To generate CSR using certreq.exe through KSP, the ProviderName must be "SafeNet Key Storage Provider".The sample of inf file is as follows;

```
[NewRequest]
KeyUsageProperty = "NCRYPT_ALLOW_ALL_USAGES"
RequestType = PKCS10
ProviderName = "SafeNet Key Storage Provider"
ProviderType = 0
Subject = "CN=Registration Authority"
KeyContainer = KSPRAID20190418
MachineKeySet = TRUE
HashAlgorithm = SHA256
KeyAlgorithm = RSA
KeyLength = 2048
KeyUsage = 0xf0
```

2. Generate CSR through HSM

NOTE: <inf-file> is the file created at step #1, <csr-file> is an output file.

    a) Open command prompt and run the following command.

```
> certreq -new <inf-file> <csr-file>
```

    b) The CSR file will be generated as follows;

```
-----BEGIN NEW CERTIFICATE REQUEST-----
MIIDjzCCAncCAQAwITEfMB0GA1UEAwwWUmVnaXN0cmF0aW9uIEF1dGhvcml0eTCC
....
C610uaqncn6FvLu5pygZYFEVtOanCXNQRRUWiDGWKjHF+10GMh+V5YUur55T4W80
0uwK
-----END NEW CERTIFICATE REQUEST-----
```

3. Install a certificate.

    a) Open command prompt (on the folder where the PKCS#7 file exists) and run the following command.

```
> certreq -accept <issued-cert>
```

    b) Before running the command, the trusted root certificate must be installed. If not, the following error will be displayed.

```
Certificate Request Processor: A certificate chain could not be built to a
trusted root authority. 0x800b010a (-2146762486 CERT_E_CHAINING)
```

Integration for Java Environment

Register Luna Provider

You must update the java.security configuration file to use the SafeNet security providers and the HSM.

To configure the java.security file:

1. Open the Java security configuration file java.security in a text editor. The file is available at <JDK_installation_directory>\jre\lib\security.
2. Update the Luna Providers in the java.security file so they appear as follows:

```
security.provider.1=sun.security.provider.Sun
security.provider.2=sun.security.rsa.SunRsaSign
security.provider.3=com.sun.net.ssl.internal.ssl.Provider
security.provider.4=com.sun.crypto.provider.SunJCE
security.provider.5=sun.security.jgss.SunProvider
security.provider.6=com.sun.security.sasl.Provider
security.provider.7=org.jcp.xml.dsig.internal.dom.XMLDSigRI
security.provider.8=sun.security.smartcardio.SunPCSC
security.provider.9=com.safenetinc.luna.provider.LunaProvider
```

3. Save the changes to the java.security file.

Enabling the HSM keystore

You must configure the Java Code Signing utility to use the keystore located on the HSM.

To enable the HSM keystore

1. Copy the LunaProvider.jar files from the <Luna_installation_directory>\JSP\lib to the Java extension folder located at <JDK_installation_directory>\jre\lib\ext.
2. Set the environment variables for JAVA_HOME and PATH.

NOTE: We recommend setting the PATH variable in Windows environments using the System Environments menu.

Install RA Certificate

Refer section "**Using an RA Certificate on HSM**" of **DigiCert® PKI Enterprise Gateway Deployment Guide** document.

SafeNet DPoD Cloud HSM

The SafeNet DPoD (**Data Protection on Demand)** service provides "HSM on Demand" which is one of HSM on Demand Services. This section introduces how to generate key on Cloud HSM and use it. Please see the SafeNet Official Guide if you need details or other information. Click "?" icon on your site on SafeNet DPoD Service, to avail the guide.

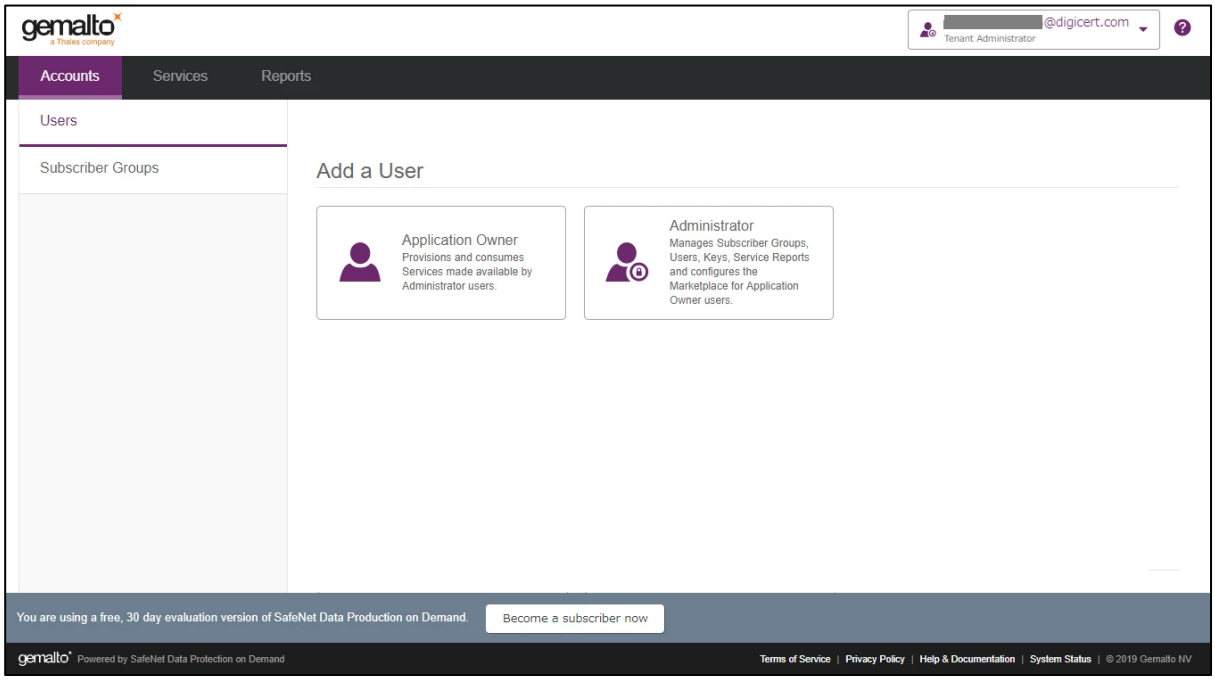
Before proceeding, we should understand the 3 types of users in the DPoD role hierarchy which are as follows:

No	Type	Responsibility	Note
1	Service Provider Administrators	Managing and distributing additional DPoD tenants.	On this document, there is no description about this user. Please see the SafeNet Official Guide.
2	Tenant Administrators	Managing an enterprise tenant and distributing cryptographic resources in the form of services to application owners.	The user can create, subscribe group and Application Owner, and also configure services.
3	Application Owners	Managing cryptographic services, and consuming cryptographic resources in an enterprise tenant.	

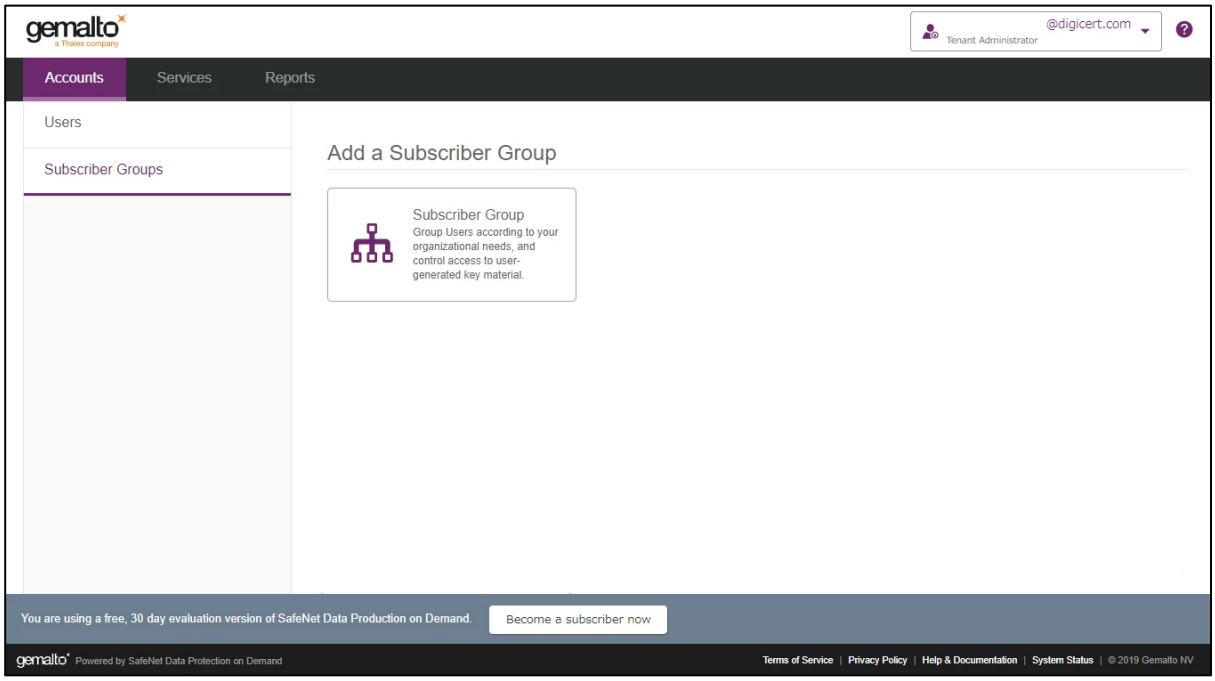
Install LunaClient

Add a Subscriber Group as Tenant Administrator

1. Sign in to DPoD site using your Tenant Administrator credential.

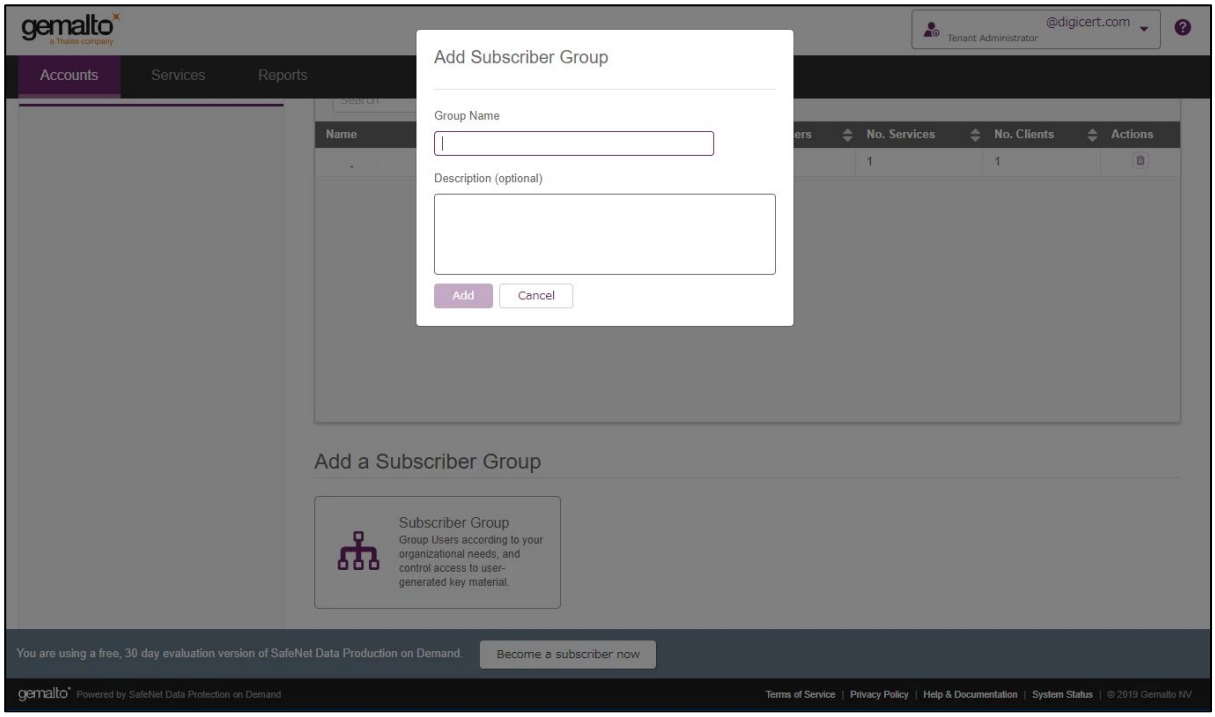


2. Select "**Subscriber Groups**" followed by "**Add a Subscriber Group**".

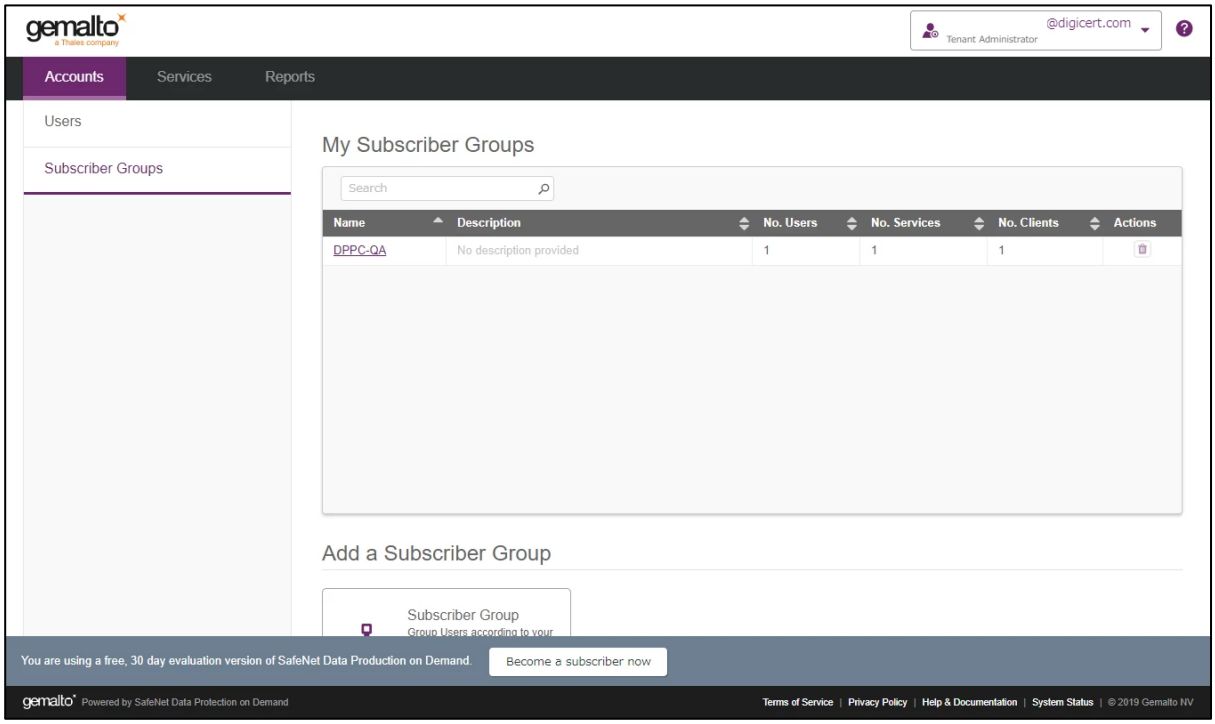


3. Enter "**Group Name**" and "**Description**" and then click "**Add**".

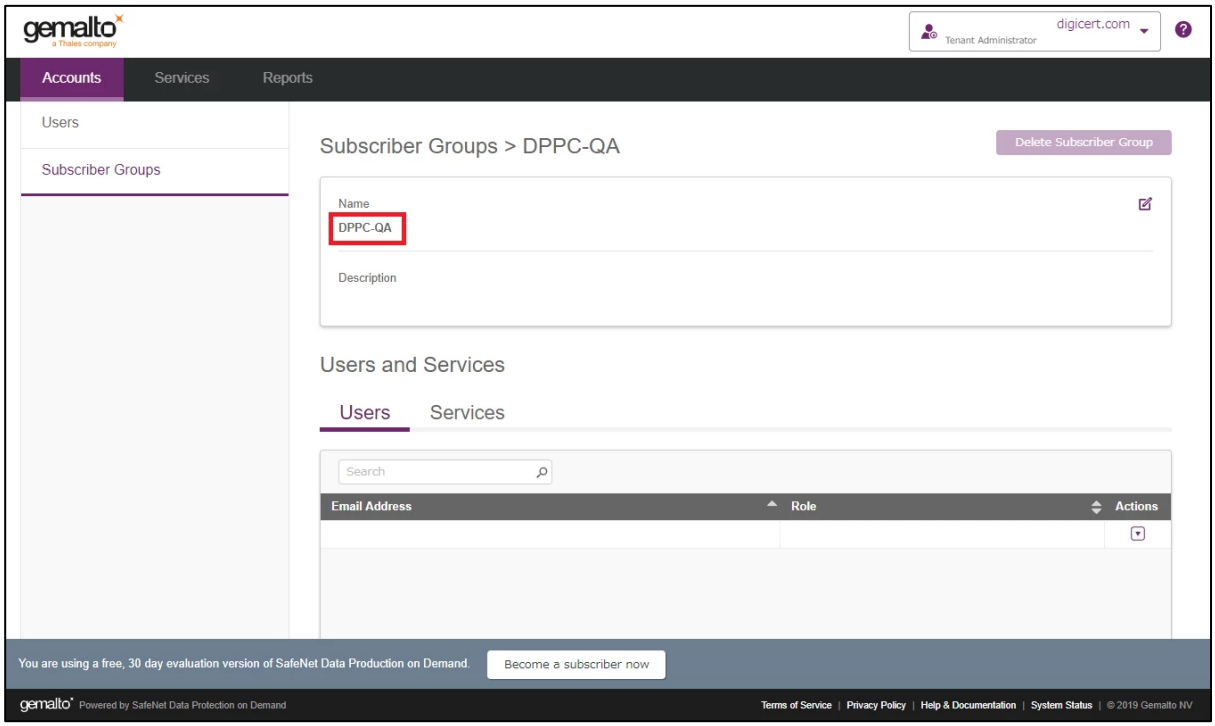
   In this document, "**Group Name**" is "**DPPC-QA**" but you can use any other value.



4. The designated group has been created.

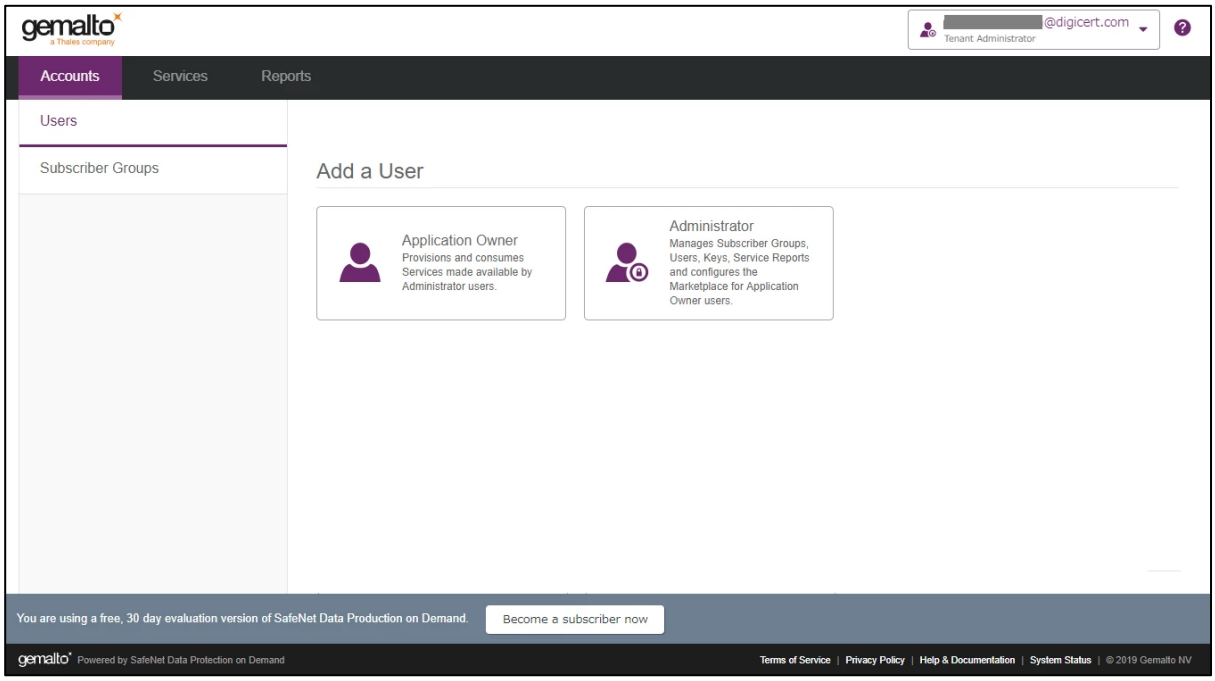


5. Click on the link of group which has been created to view the Group details.

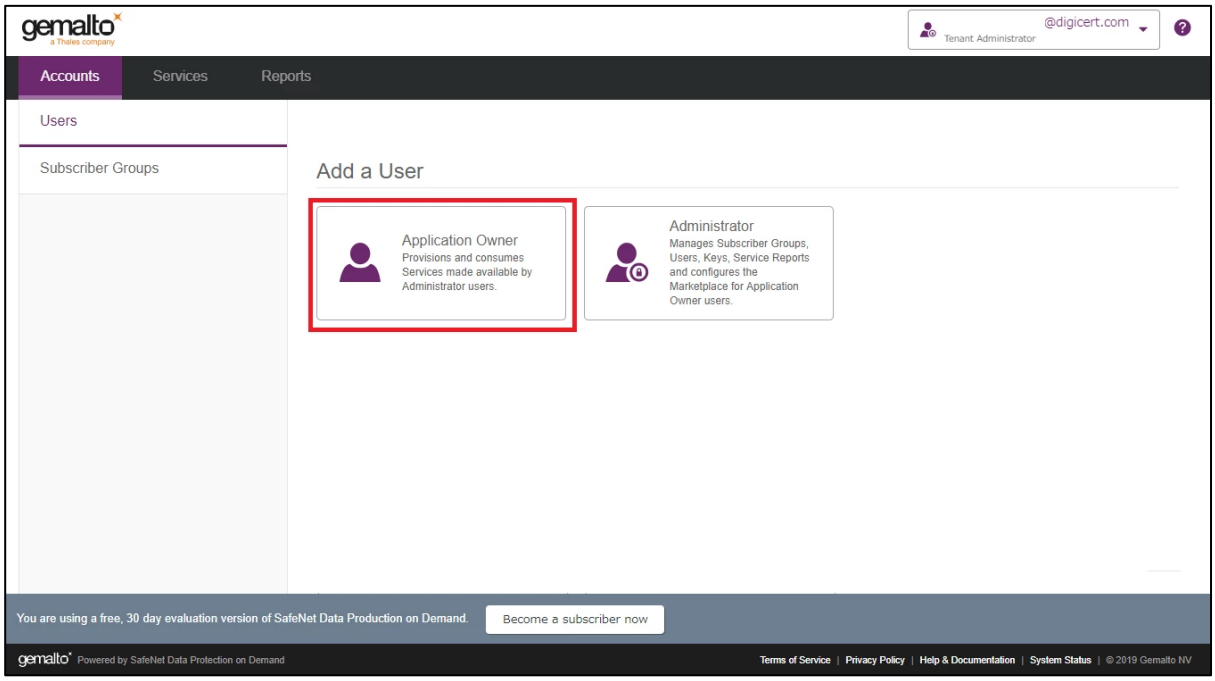


Add an Application Owner as Tenant Administrator

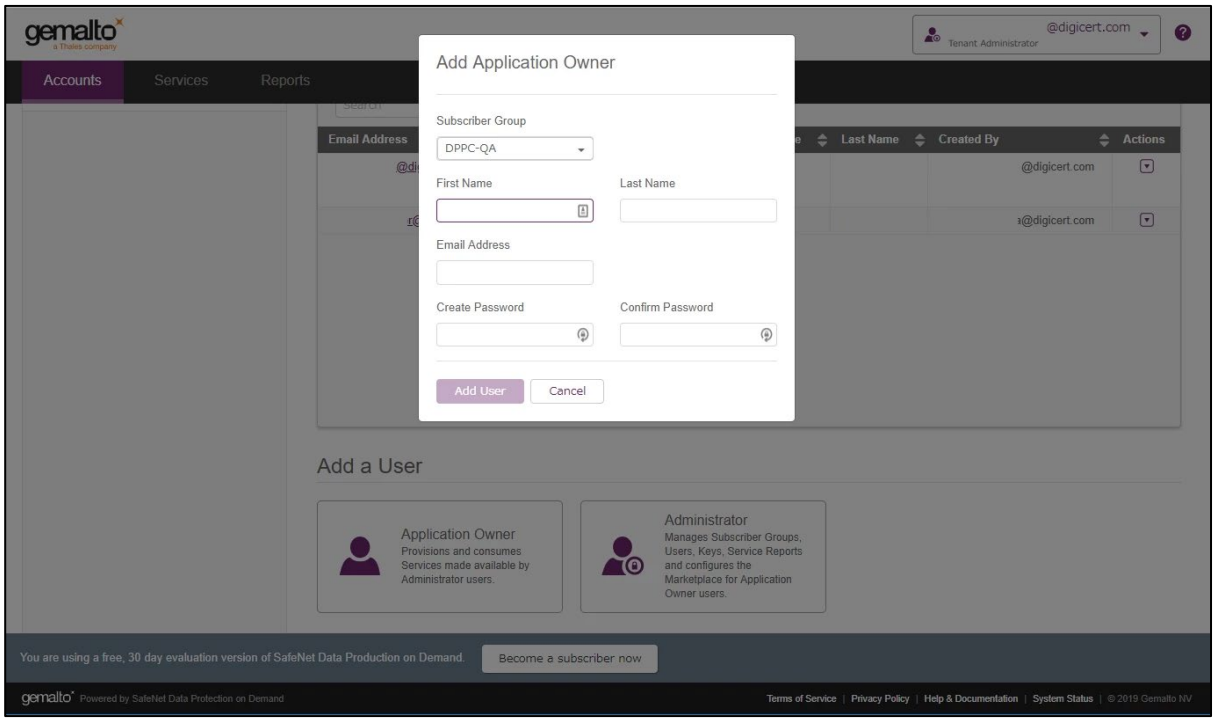
1. Sign in to DPoD site using your Tenant Administrator credential. Select "**Accounts**" tab and click on "**Users**".



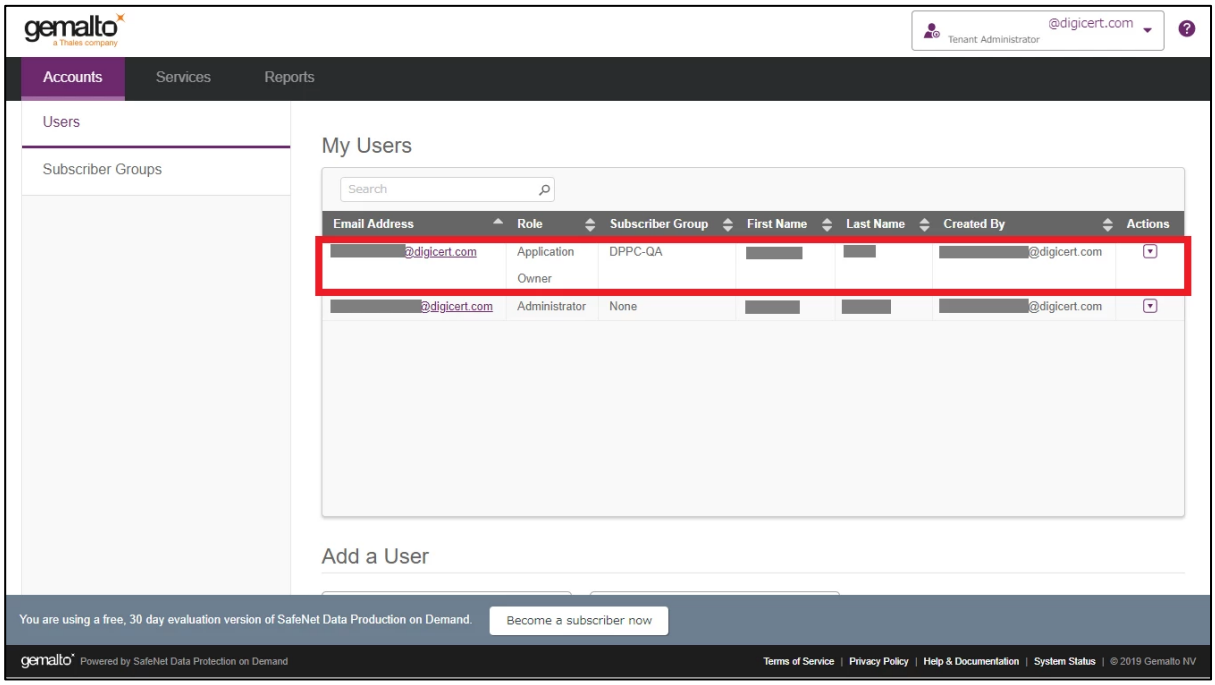
2. Select "**Application Owner**", under Add a User.



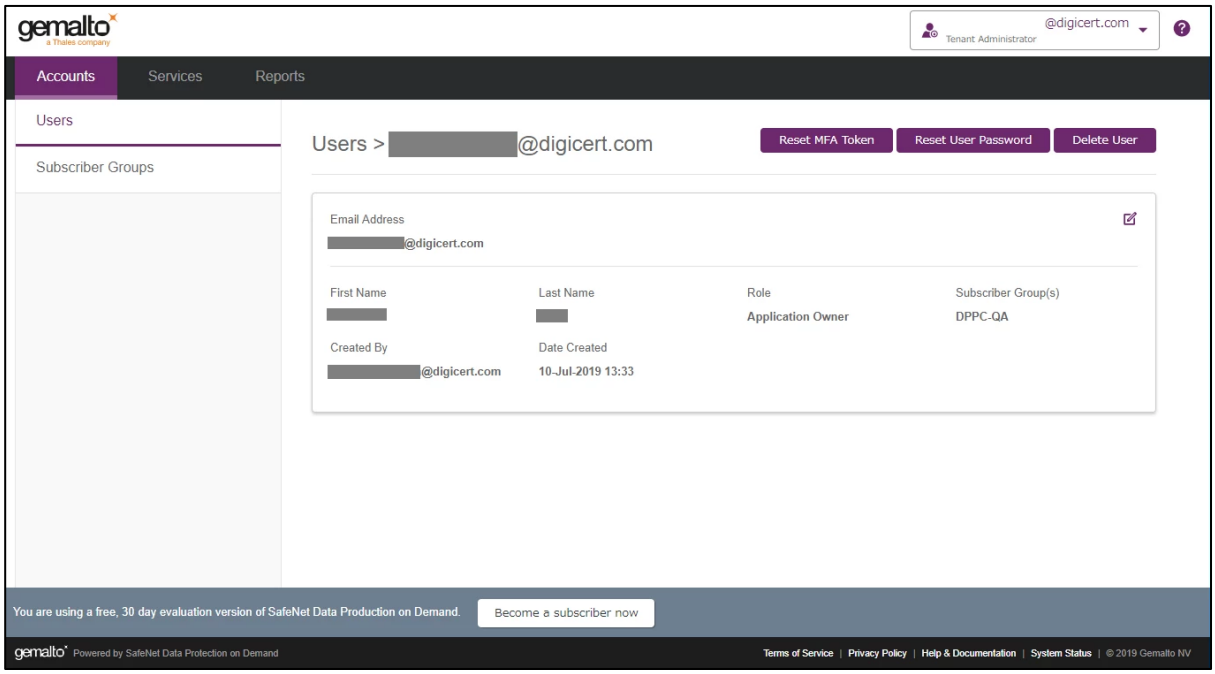
3. Fill out the form with the User details and then click "**Add User**".



4. The user has been created.

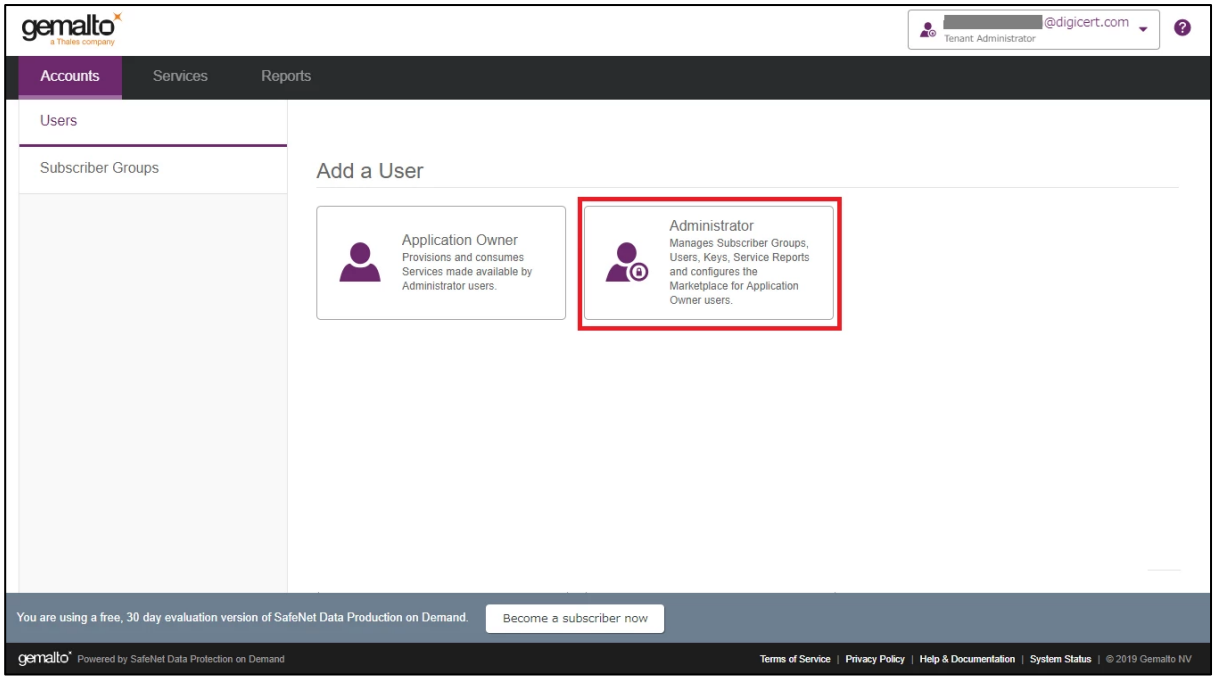


5. Click on the user link created to see the User's profile.

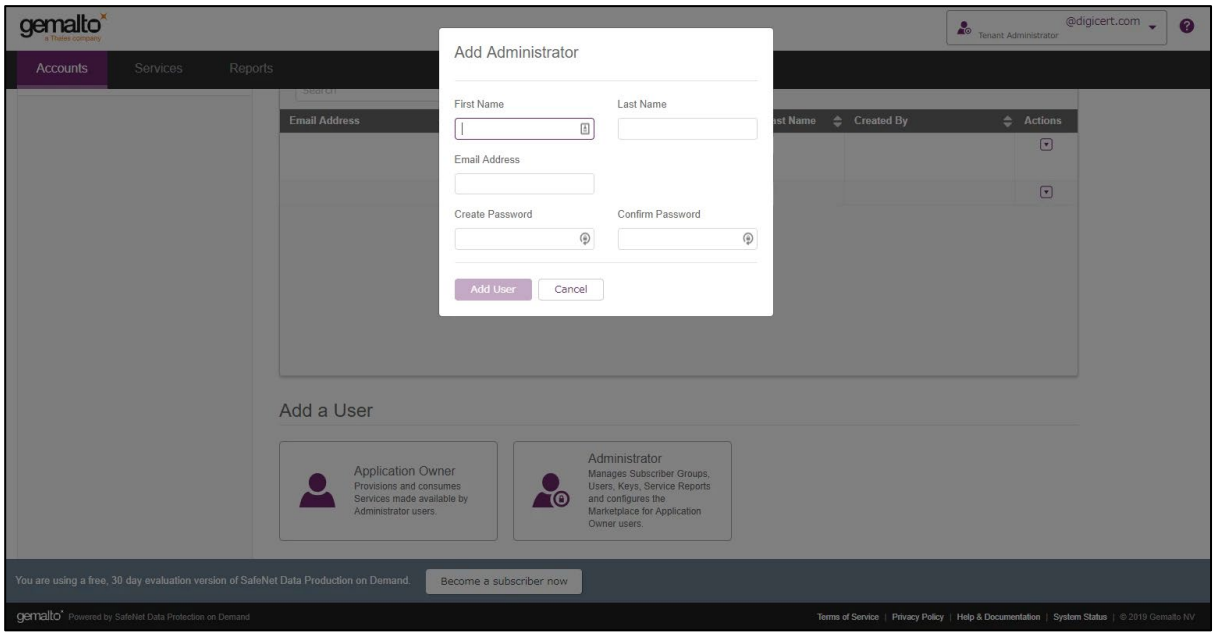


Add Administrator as Tenant Administrator

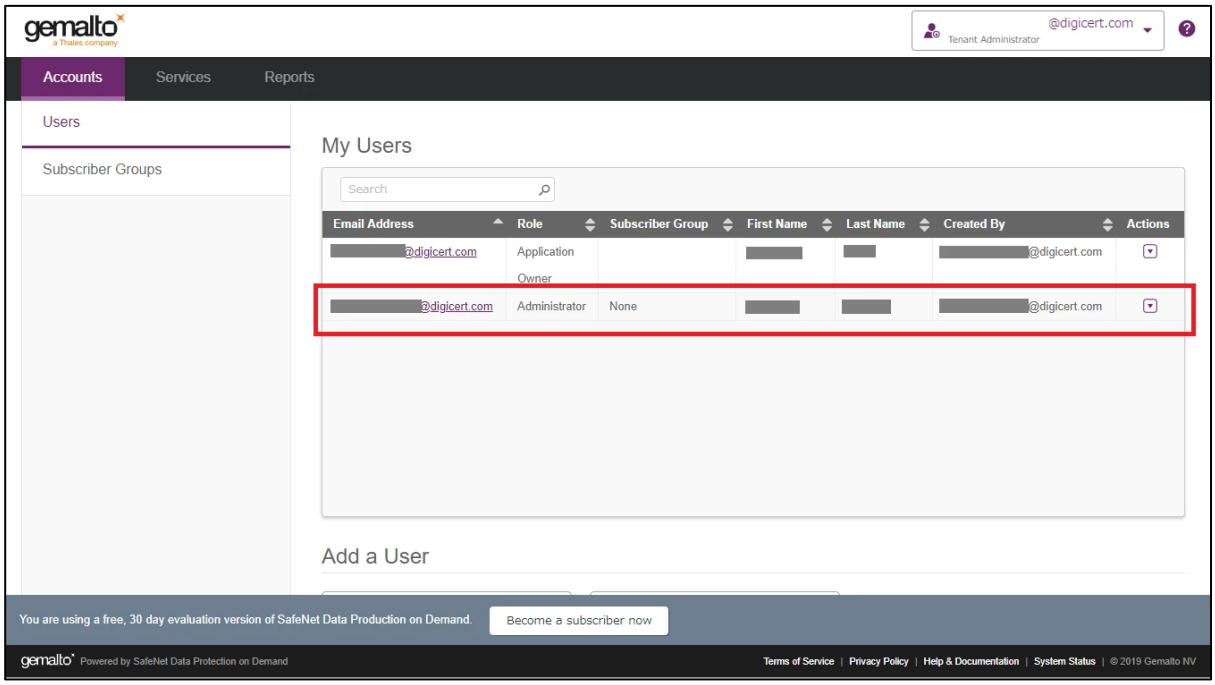
1. Sign in DPoD site and select "**Accounts**" tab followed by "**Users**".
2. Select "**Administrator**".



3. Fill out the form with the Administrator details then click "**Add User**".

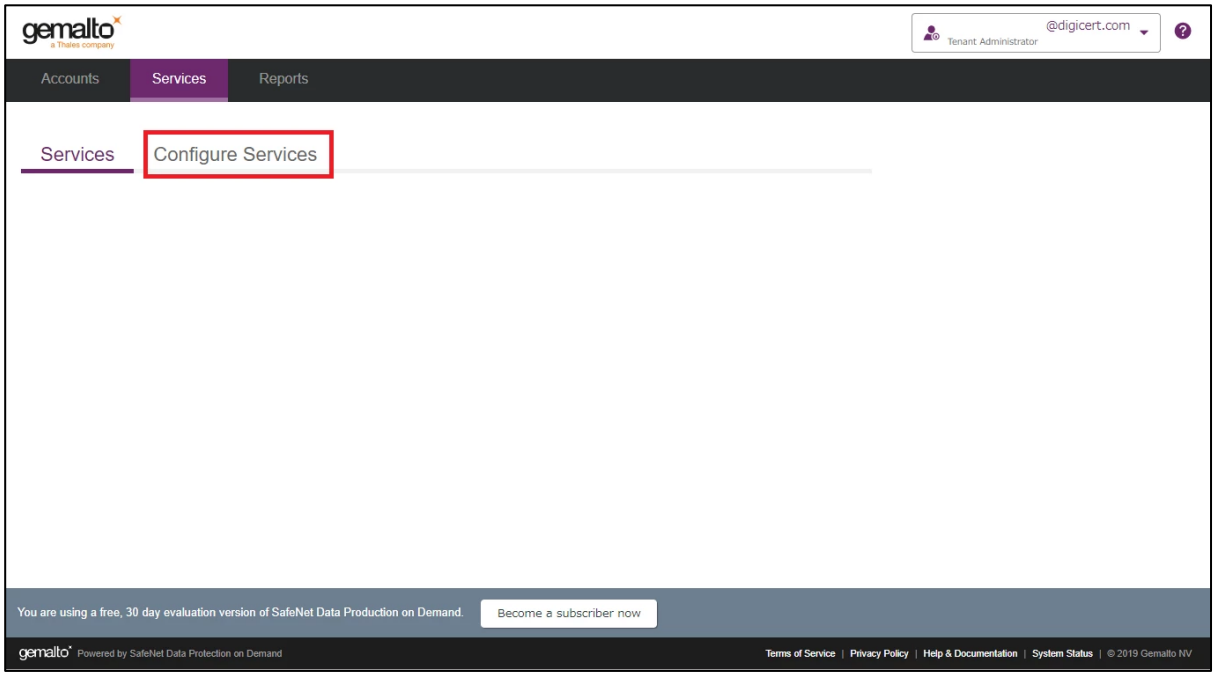


4. The Administrator has been created.

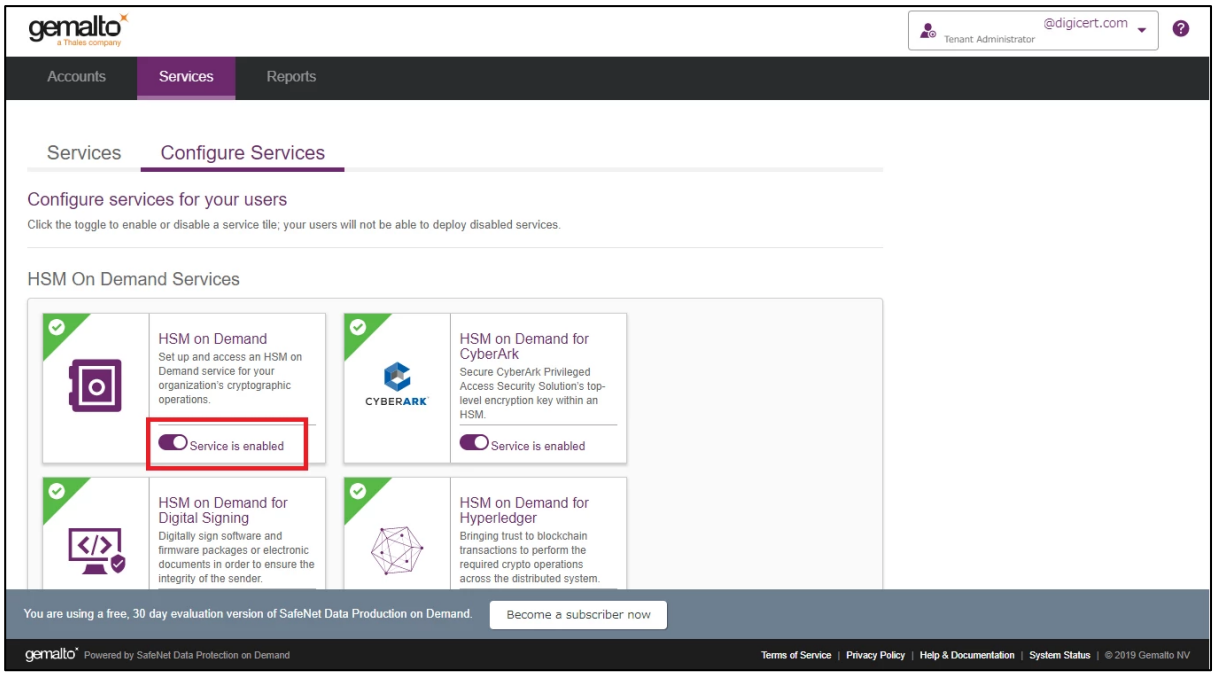


Enable HSM On Demand Services as Tenant Administrator

1. Select "**Services**" tab then click on "**Configure Services**".

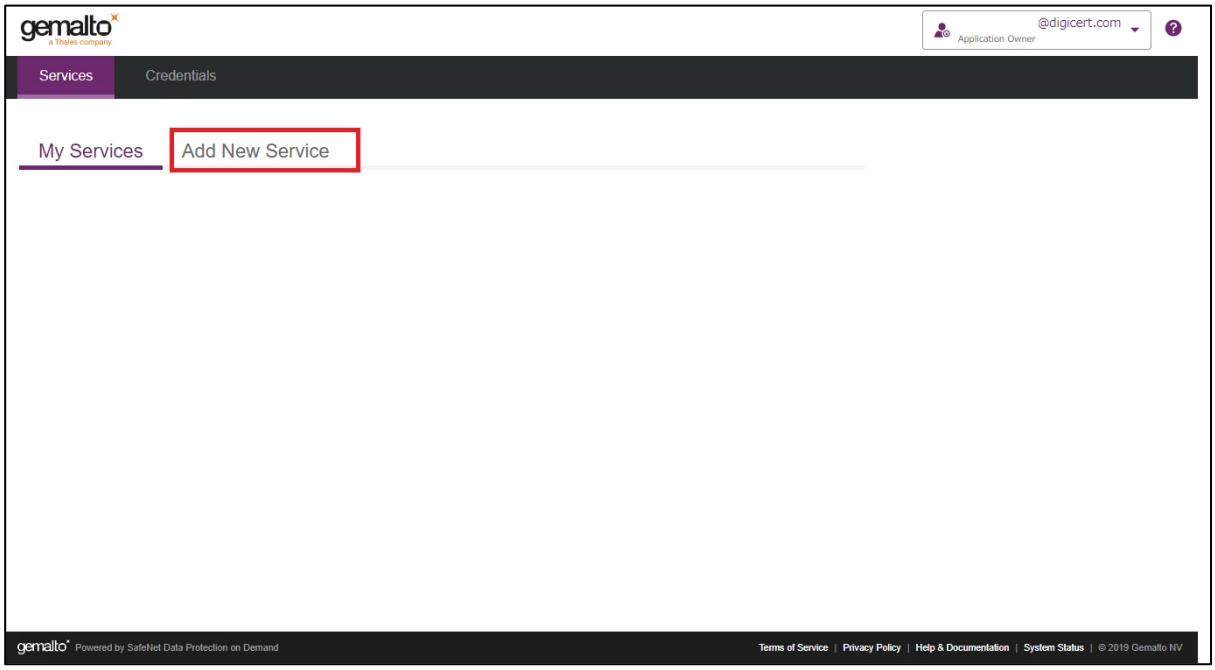


2. HSM on Demand: Set up and access an HSM on Demand service for your organization's cryptographic operations.
3. Under the "**HSM on Demand**" service tile, click the toggle to enable service.

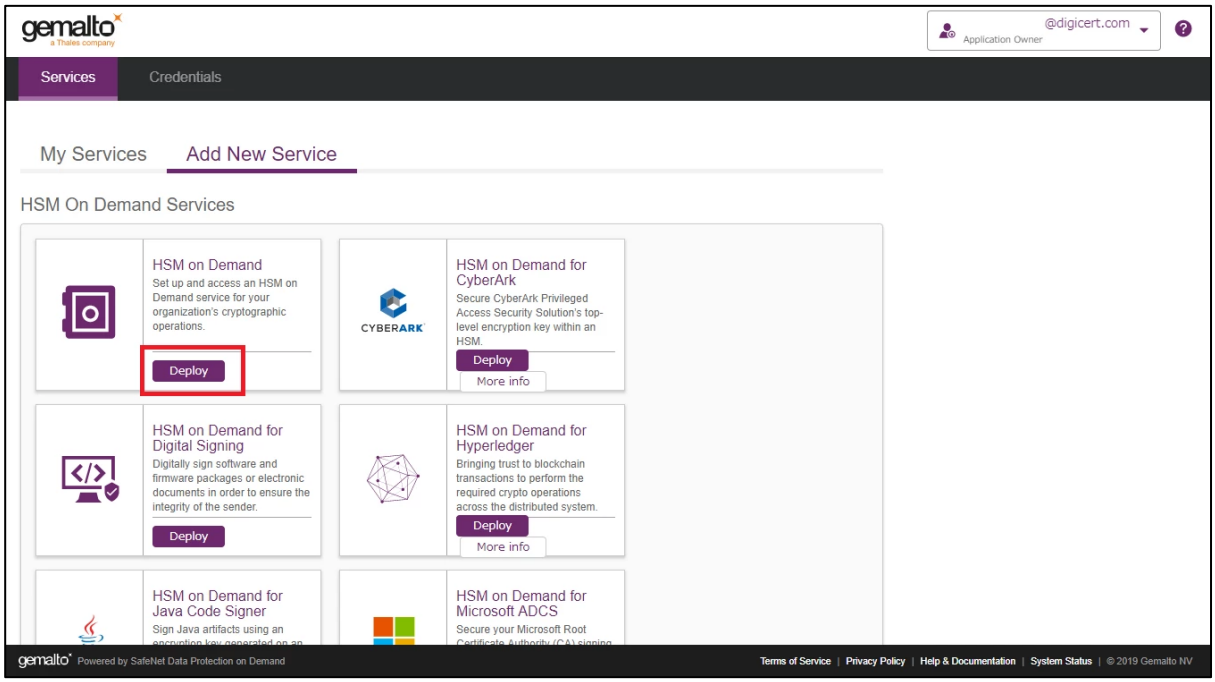


Add New Services and Service Client as Application Owner

1. Sign in as an Application Owner and then select "**Add New Service**".

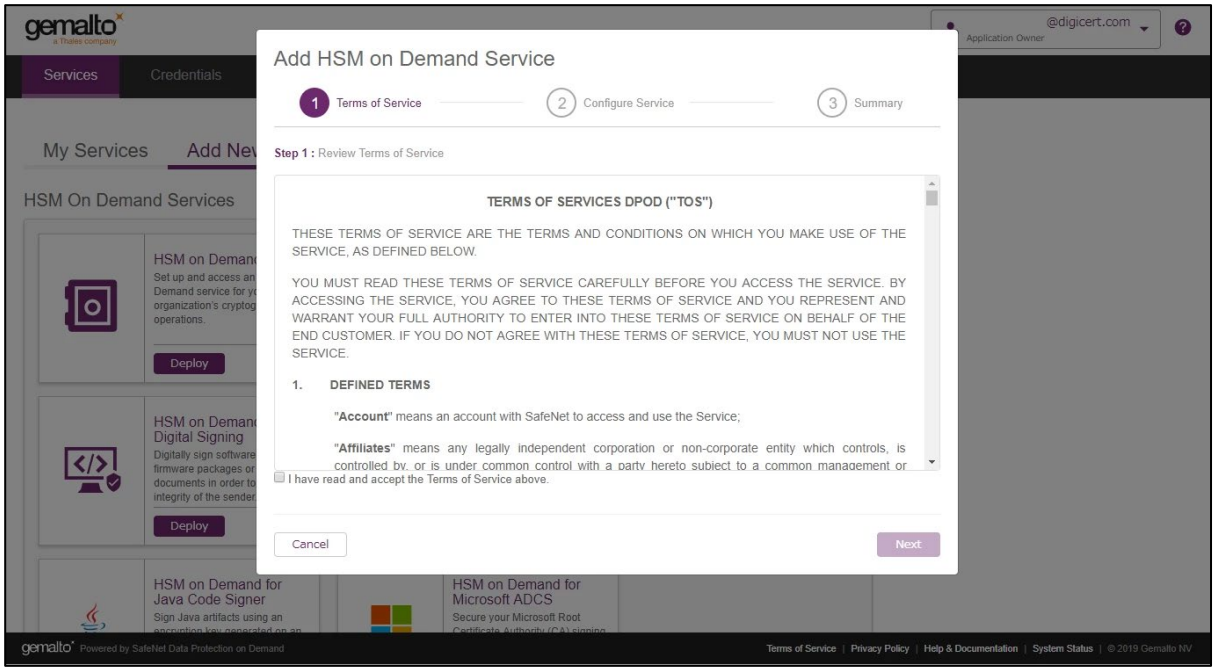


2. Click on "**Deploy**" under the "**HSM on Demand**" service tile.



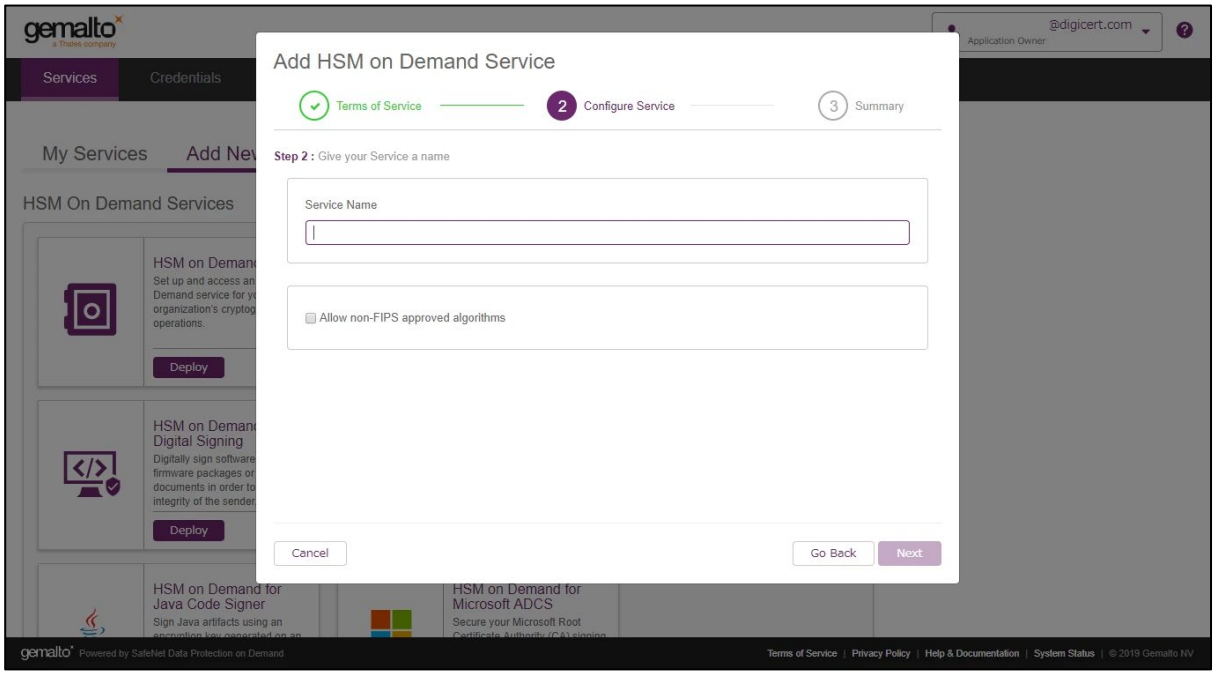
- **Step 1**: Review Terms of Service

  Check "**I have read and accept the Terms of Service above.**" and then click "**Next**".



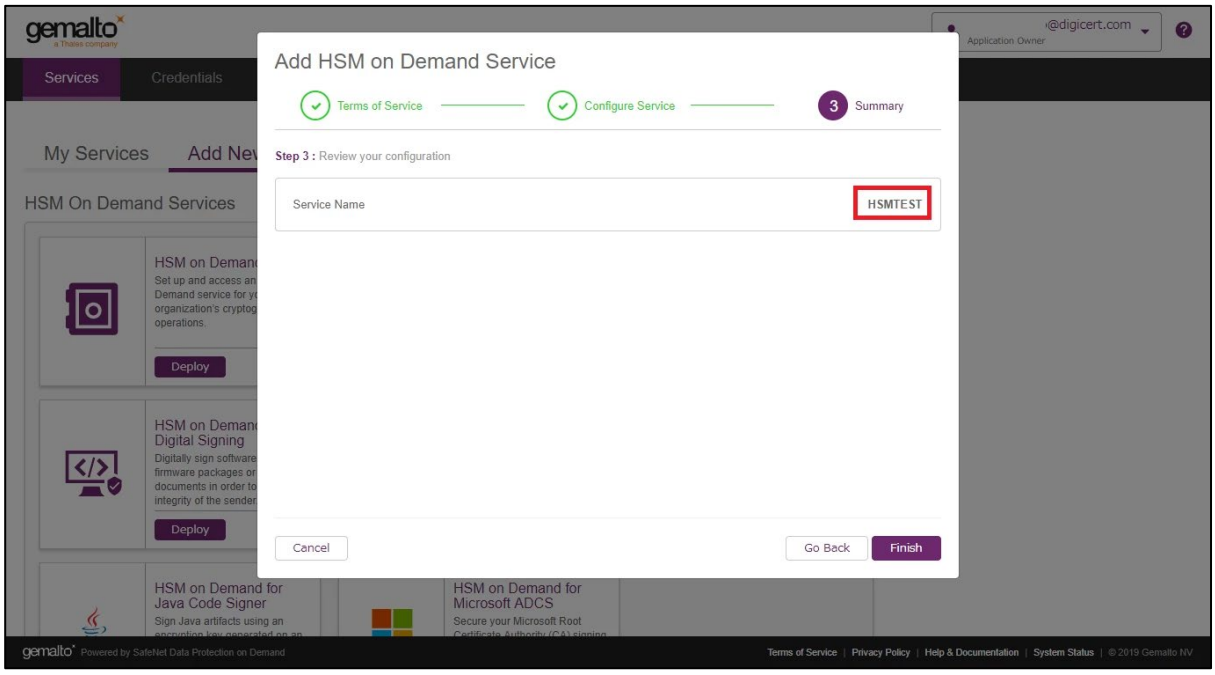
- Step 2: Give your Service a name.

  Enter "Service Name" and check if you allow non-FIPS approved algorithms, and then click "Next".

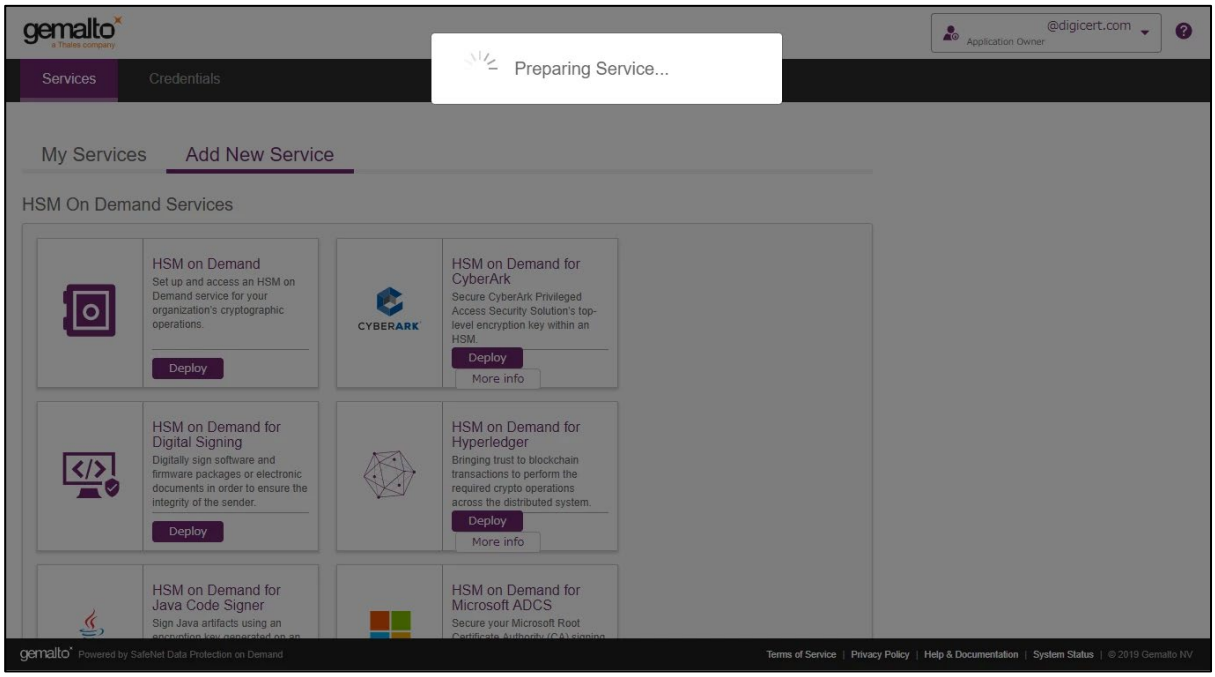


- Step 3: Review your configuration

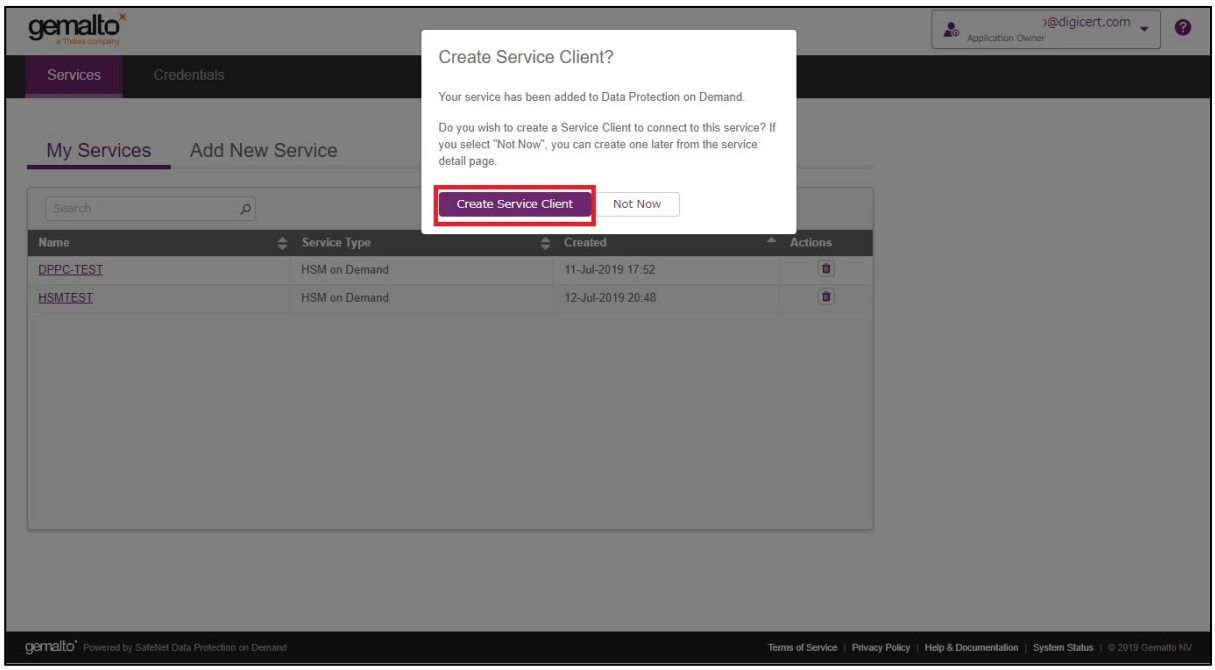
  Confirm your Service Name and click "Finish".



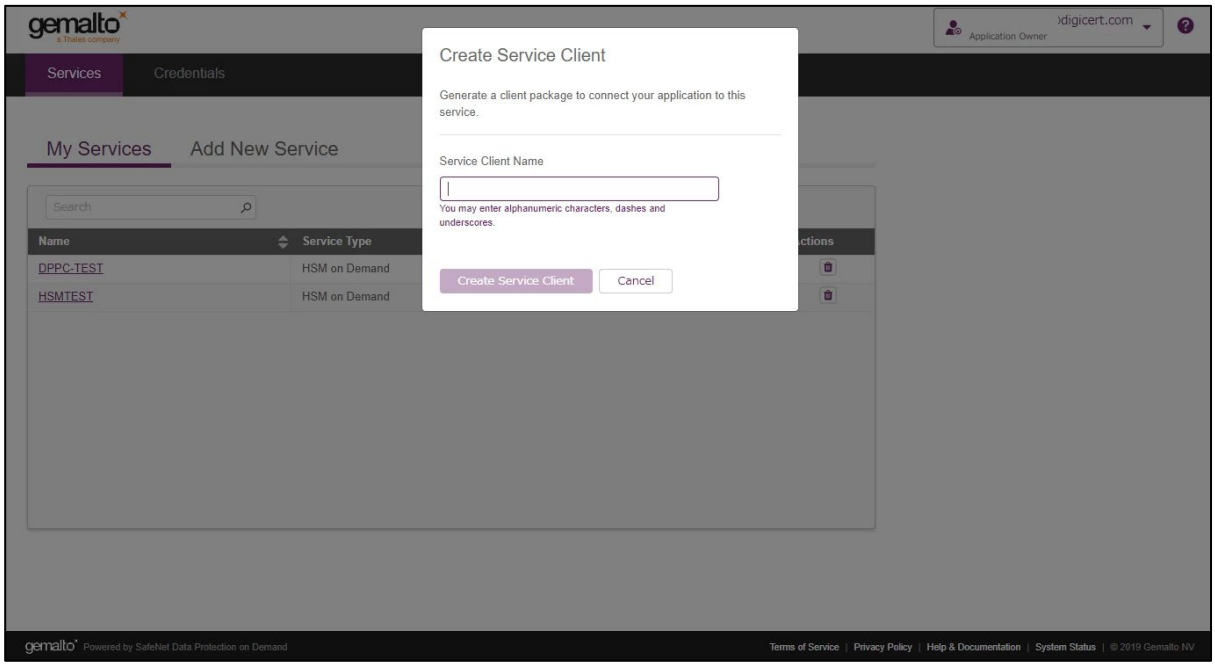
3. It takes several seconds for processing.



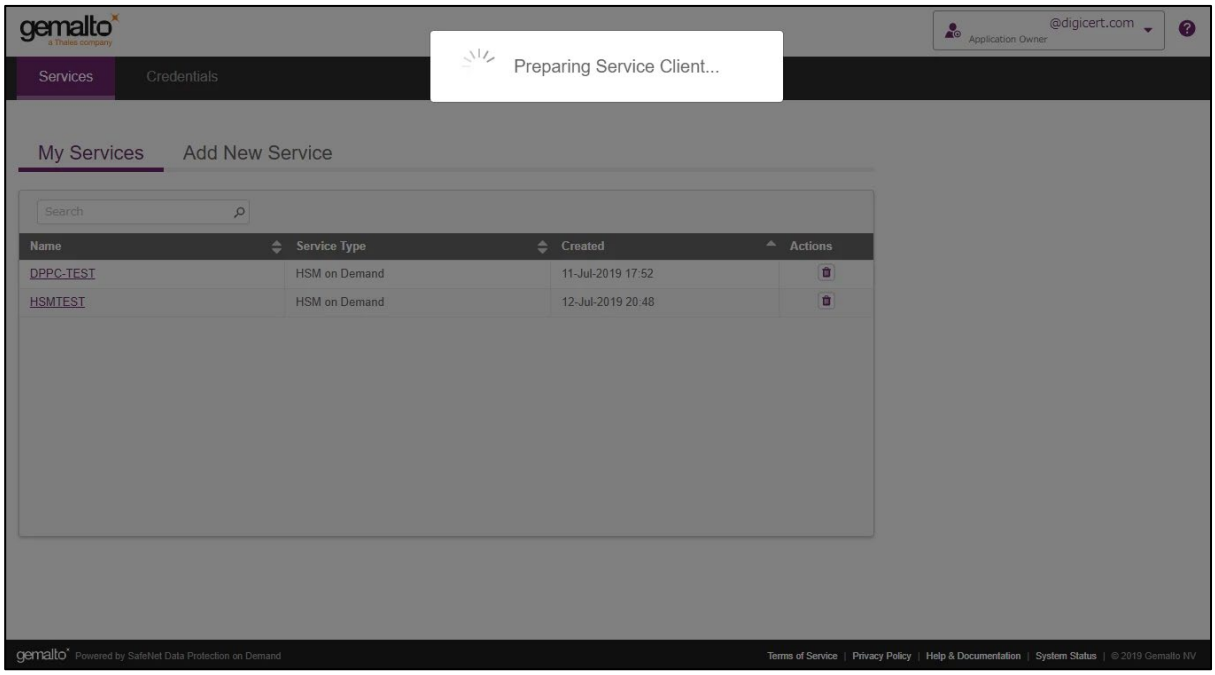
4. Click "**Create Service Client**".



5. Enter "**Service Client Name**" and then click "**Create Service Client**".

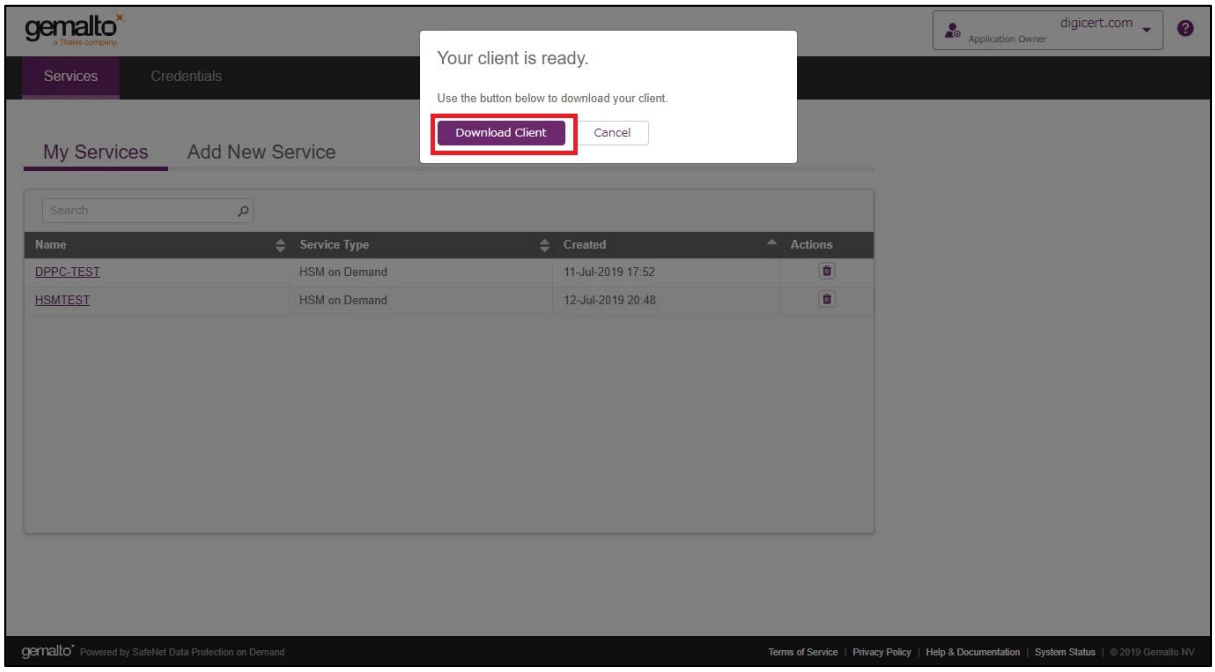


6. It takes several seconds to process.

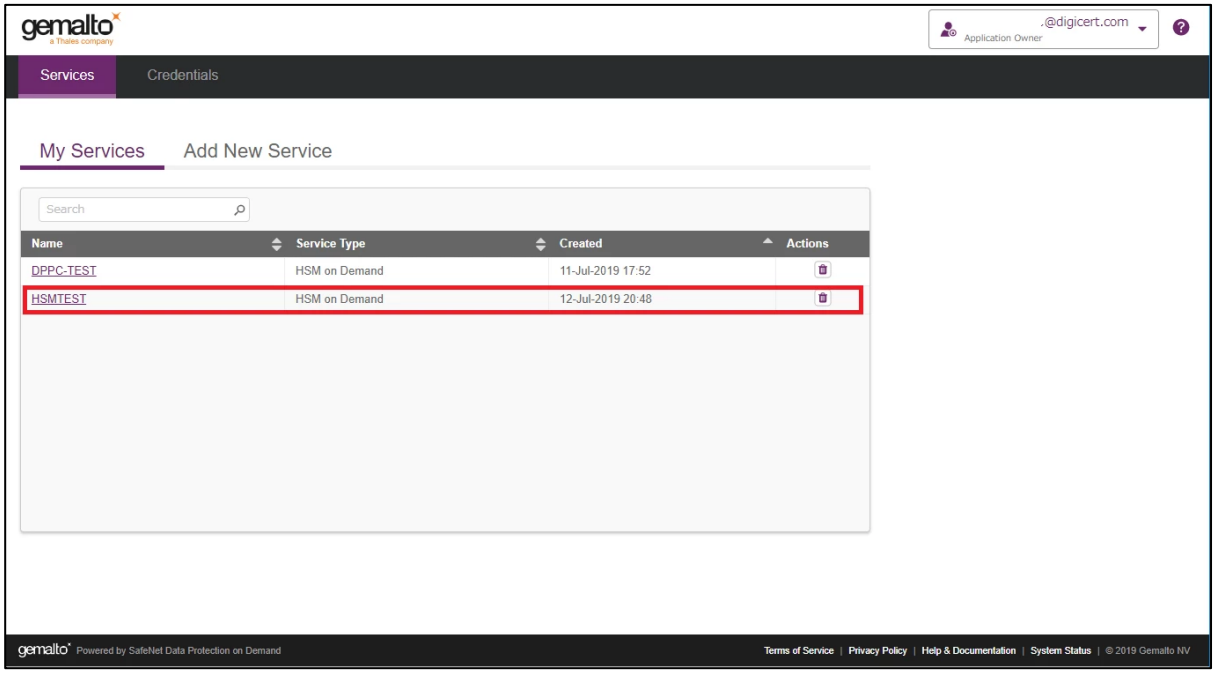


7. Click "**Download Client**" to download the service client software onto your workstation.

   The name of the archive file will be **setup-<Service Client Name>**.zip. All the tools are included into the file.

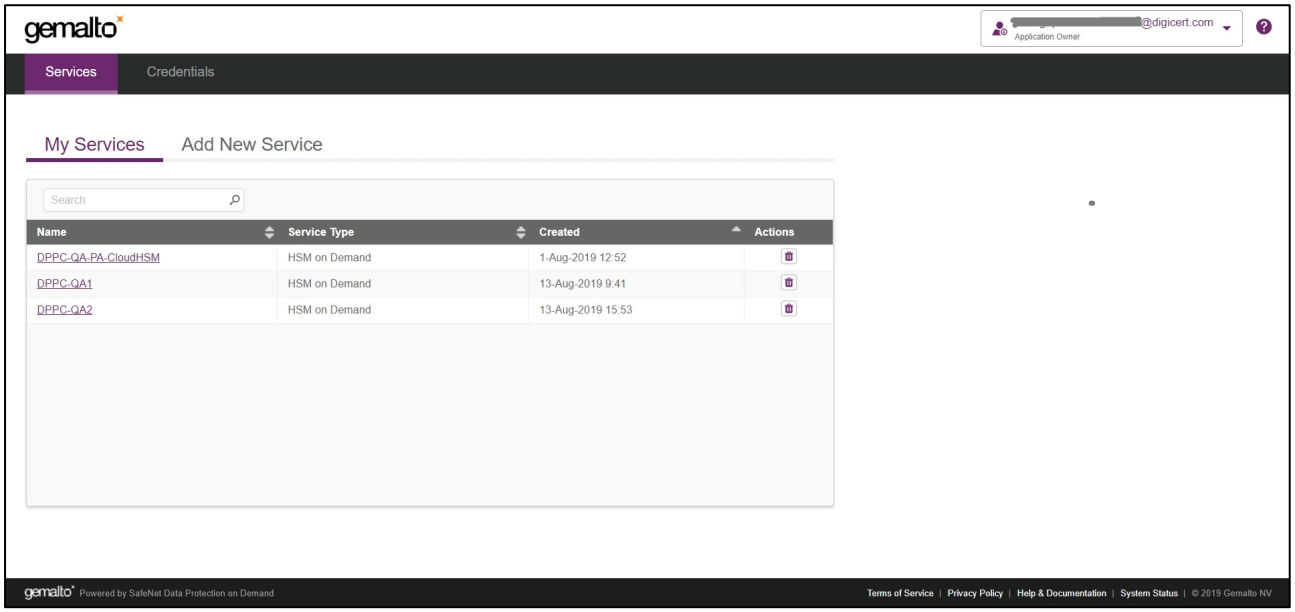


8. Confirm that the service has been created.

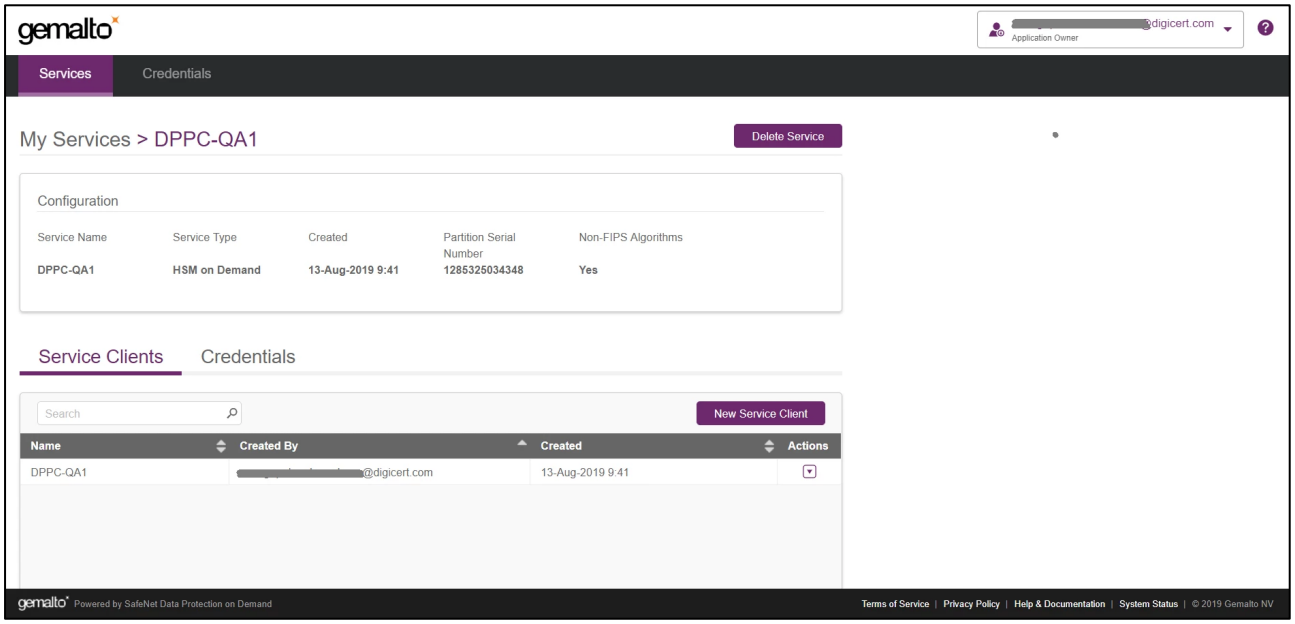


Create Service Credentials as Application Owner

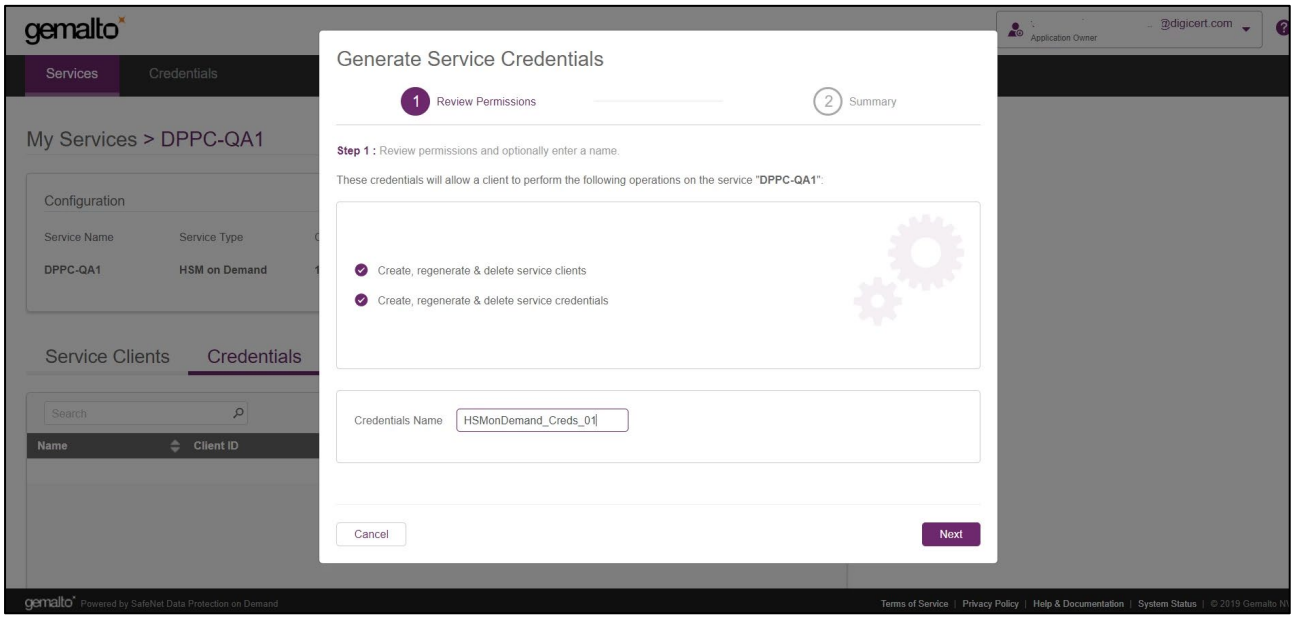
1. Select/Click on the Name under "**My Services**" (For example: DPPC-QA1).



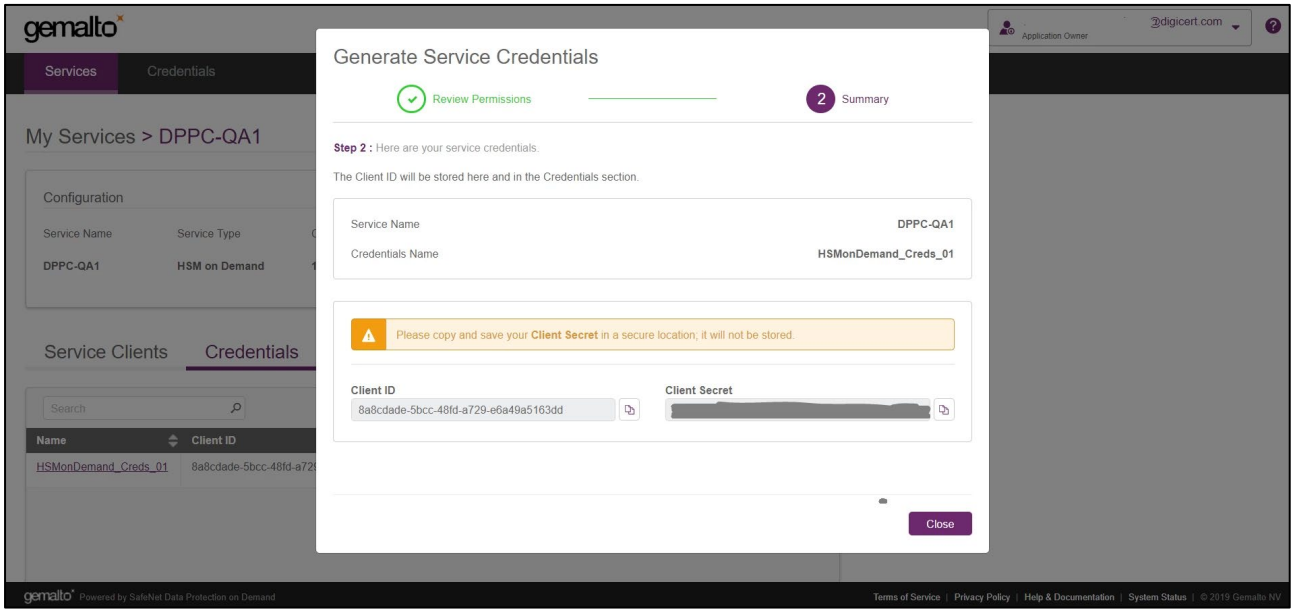
2. Click on "**Credentials**" and then click on "**Create Service Credentials**".



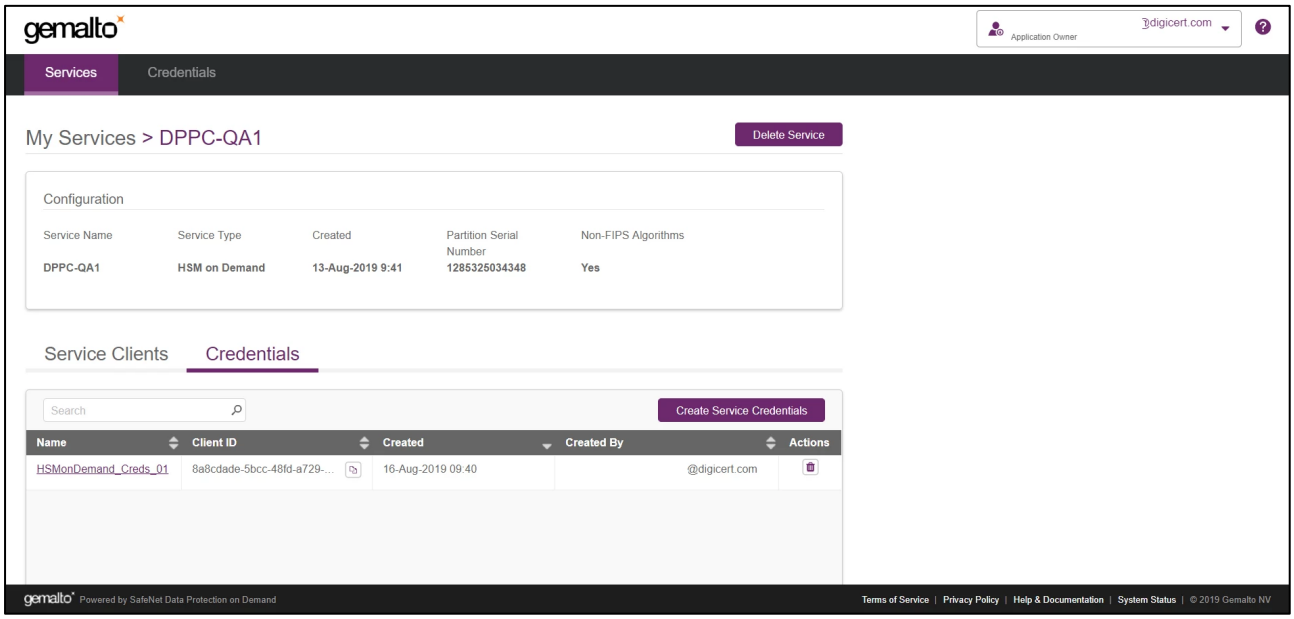
3. Click on "**Next**".



4. Click "**Close**".

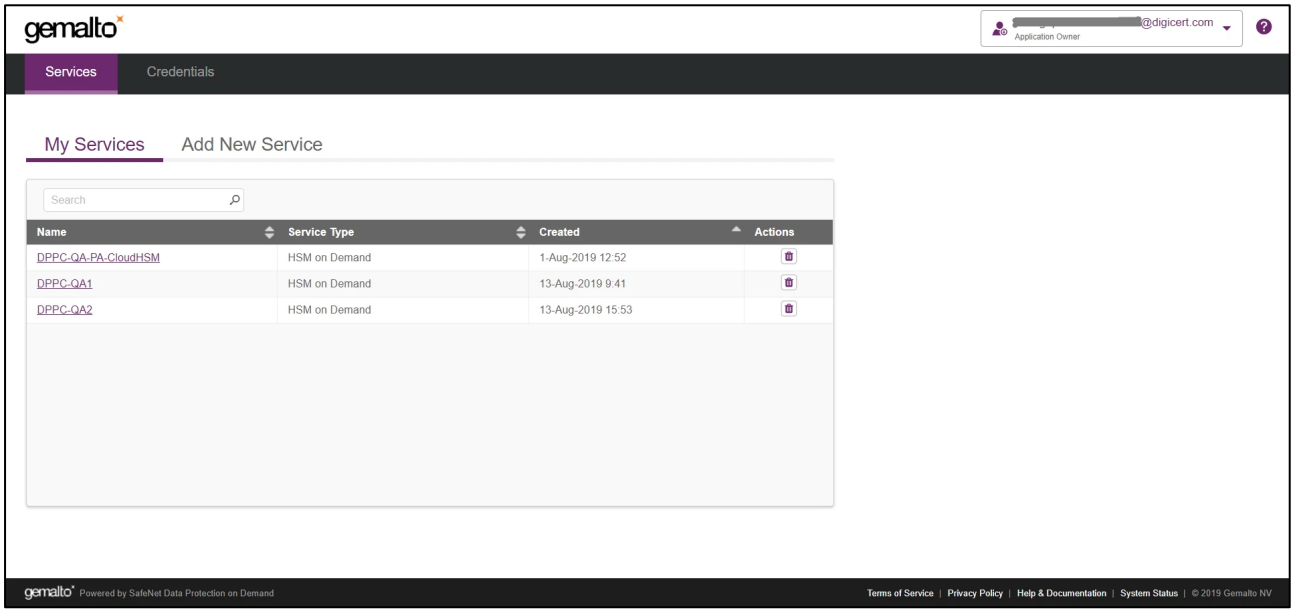


5. Ensure that the Credentials are created.

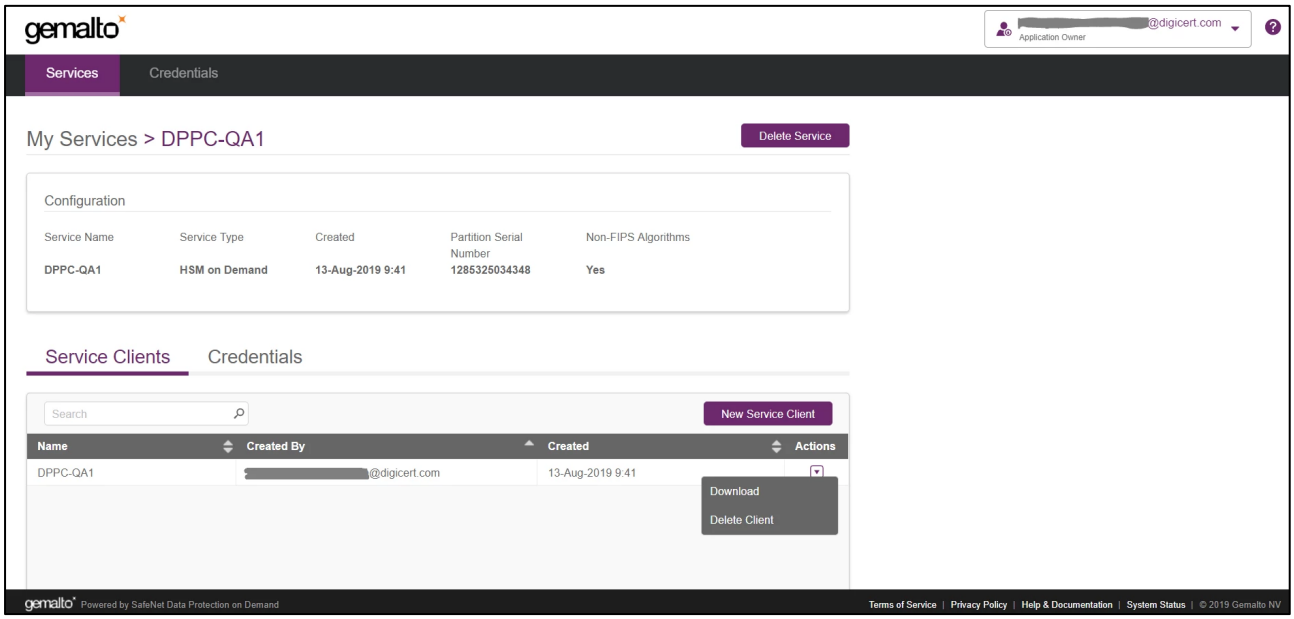


Download Client as Application Owner

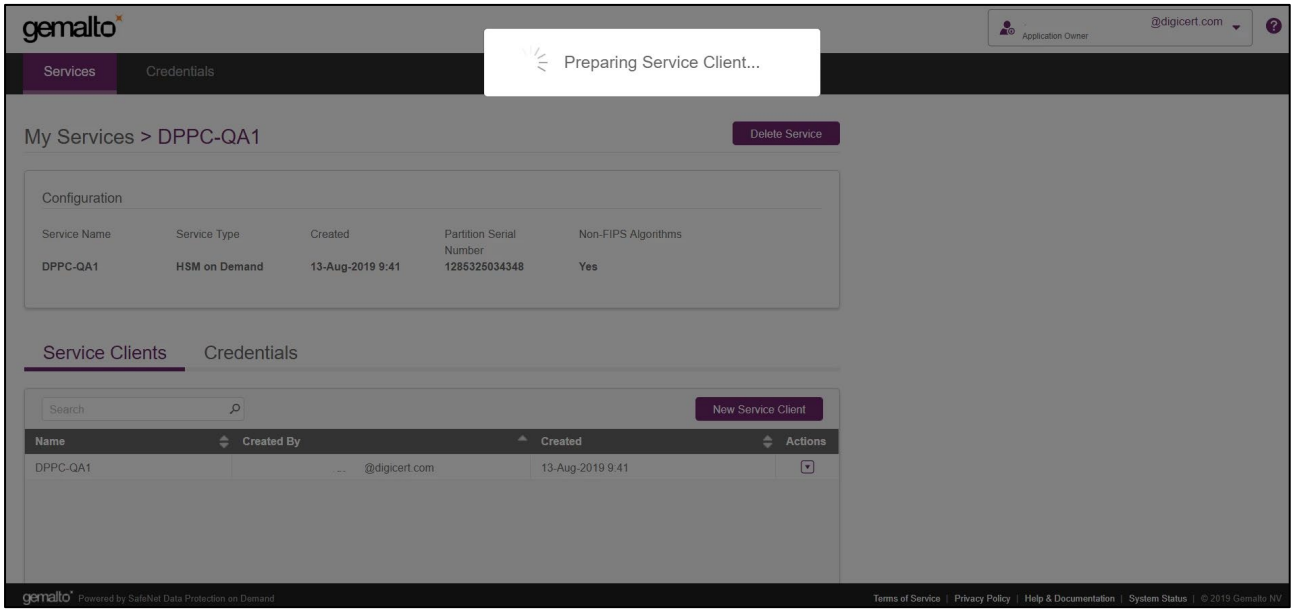
1. Select/Click on the Name under "**My Services**" (For example: DPPC-QA1).



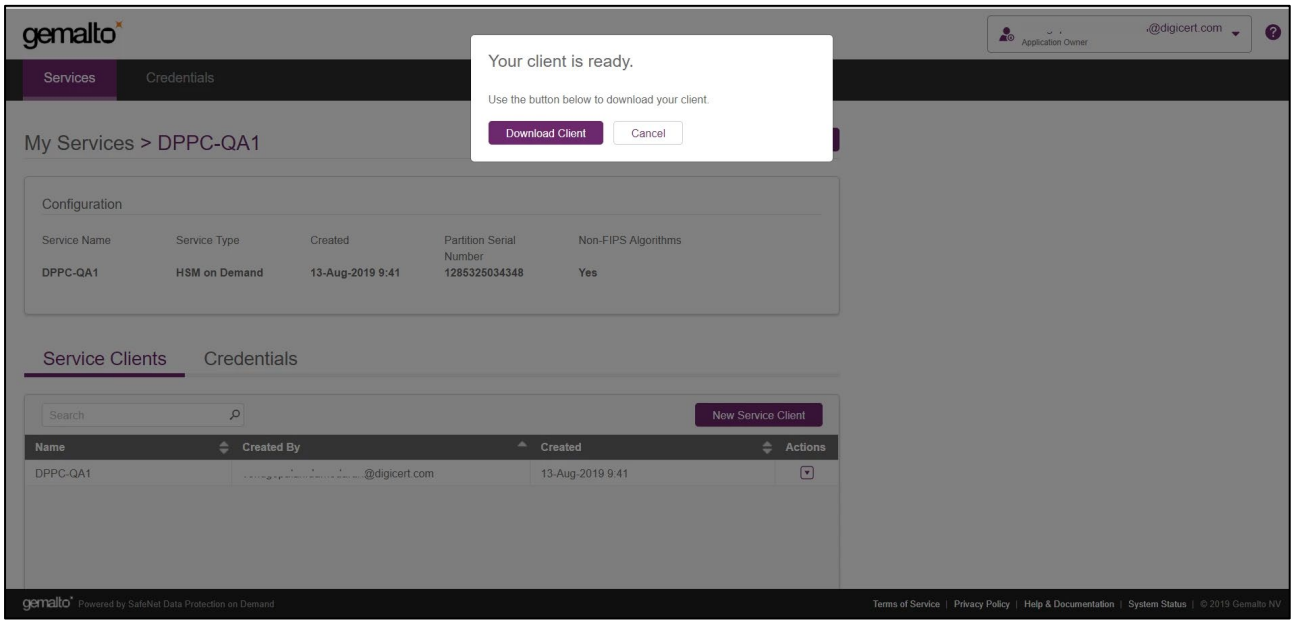
2. Under "**Actions**" column, select "**Download**" to download the client.



3. This will take several seconds to prepare the client for download.



4. Click on "**Download Client**" and then save it.



NOTE: Ensure that you Install/Configure the client that is downloaded in previous step i.e. (Step 4) and ignore the client that was downloaded earlier.

Install Service Client for Windows

The Windows service client installation uses a .zip file to deliver the HSM on Demand (HSMoD) service client materials required for configuring your system's connection to the HSMoD service. The service client .zip includes a pre-configured crystoki-template.ini file along with a client archive file containing a set of library and binary files. Complete the following procedures to access your HSMoD service from a Windows operating system.

1. Extract the downloaded archive file.

   Using the Windows GUI or an unzip tool, unzip the file. The extracted files are as follows:

```
01/31/2020  05:56 AM             1,147 Chrystoki.conf
01/31/2020  05:56 AM               906 crystoki-template.ini
01/31/2020  05:56 AM        26,593,280 cvclient-min.tar
01/31/2020  05:56 AM         7,577,395 cvclient-min.zip
01/31/2020  05:56 AM           176,008 EULA.zip
01/31/2020  05:56 AM             7,709 partition-ca-certificate.pem
01/31/2020  05:56 AM             1,387 partition-certificate.pem
01/31/2020  05:56 AM             6,690 server-certificate.pem
```

2. Extract the cvclient-min-zip file.

   Using the Windows GUI or an unzip tool, unzip the file at the same folder. The extracted files are as follows:

```
02/12/2020  04:51 PM    <DIR>          cert
02/12/2020  04:51 PM    <DIR>          csp
```

```
02/12/2020  04:51 PM    <DIR>          ksp
02/12/2020  04:51 PM    <DIR>          plugins
01/31/2020  05:56 AM             1,147 Chrystoki.conf
10/04/2019  02:09 PM           377,704 ckdemo.exe
10/04/2019  02:09 PM         1,736,040 cmu.exe
10/04/2019  02:09 PM         3,958,120 cryptoki.dll
01/31/2020  05:56 AM               906 crystoki-template.ini
01/31/2020  05:56 AM        26,593,280 cvclient-min.tar
01/31/2020  05:56 AM         7,577,395 cvclient-min.zip
01/31/2020  05:56 AM           176,008 EULA.zip
10/04/2019  02:09 PM           170,856 LunaAPI.dll
10/04/2019  02:09 PM         3,482,472 lunacm.exe
10/04/2019  02:09 PM           613,205 LunaProvider.jar
10/04/2019  02:09 PM           463,720 multitoken.exe
10/04/2019  02:09 PM             7,145 openssl.cnf
01/31/2020  05:56 AM             7,709 partition-ca-certificate.pem
01/31/2020  05:56 AM             1,387 partition-certificate.pem
10/04/2019  02:09 PM           162,152 SafeNetKSP.dll
01/31/2020  05:56 AM             6,690 server-certificate.pem
10/04/2019  02:09 PM               189 setenv.cmd
10/04/2019  02:09 PM            26,087 setenv.ps1
10/04/2019  02:09 PM         2,148,712 vtl.exe
```

NOTE: Extract the cvclient-min.zip within the directory you created in the previous step. Do not extract to a new cvclient-min.zip directory. This location is required for the setenv command in the next step.

Please remove "crystoki.ini" if it exists before moving to next.

3. Set the environment variable.

   Open "Command Prompt" as Administrator, then move to the directory where the cvclient-min file has been extracted and run the following command:

```
> setenv.cmd
Generated C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\crystoki.ini
```

   The crystoki.ini is as follows:

```
[Chrystoki2]
LibNT="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\cryptoki.dll"
LibNT32="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\cryptoki.dll"

[CardReader]
RemoteCommand=1

[Luna]
DefaultTimeOut=5000
PEDTimeout1=100000
PEDTimeout2=200000
PEDTimeout3=20000
KeypairGenTimeOut=2700000
CloningCommandTimeOut=300000
```

```
CommandTimeoutPedSet=720000

[Presentation]
ShowEmptySlots=no

[Misc]
PE1746Enabled=1
ToolsDir="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\"

[XTC]
PartitionCAPath="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\partition-ca-
certificate.pem"
PartitionCertPath00="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\partition-
certificate.pem"
Enabled=1
TimeoutSec=10

[LunaSA Client]
SSLConfigFile="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\openssl.cnf"
ReceiveTimeout=20
TCPKeepAlive=1
NetClient=1
ServerCAFile="C:\Users\test\CloudHSM\setup-DPPC-
CloudHSM\cert\server\CAFile.pem"
ClientCertFile="C:\Users\test\CloudHSM\setup-DPPC-
CloudHSM\cert\client\ClientNameCert.pem"
ClientPrivKeyFile="C:\Users\test\CloudHSM\setup-DPPC-
CloudHSM\cert\client\ClientNameKey.pem"

[REST]
RestClient=1
ClientTimeoutSec=120
ClientPoolSize=32
ClientEofRetryCount=15
ClientConnectRetryCount=900
ClientConnectIntervalMs=1000
CVAppSpecificData=XXXXXXXXXXXXXXXXXXXXXXXXXXXX
PartitionData00=1285325032737, na.hsm.dpondemand.io, 443
SSLClientSideVerifyFile="C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\server-
certificate.pem"
```

NOTE: At that time, "ChrystokiConfigurationPath" will set on this directory.

The "crystoki.ini" file will be generated.

4. Start LunaCM.

   Start LunaCM. From the directory where you unzipped the cvclient-min.zip file, execute lunacm.exe. If the command executes with no errors, your connection is working correctly.

```
>lunacm.exe
lunacm.exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.
       Available HSMs:
       Slot Id ->              3
       Label ->
       Serial Number ->        1285325034359
       Model ->                Cryptovisor7
       Firmware Version ->     7.3.0
       CV Firmware Version ->  1.3.0
       Configuration ->        Luna User Partition With SO (PW) Signing With
Cloning Mode
       Slot Description ->     Net Token Slot
       FM HW Status ->         FM Not Supported
       Current Slot Id: 3
```

NOTE: If you use proxy server, you need to set environment variable of https_proxy as follows;

```
> set https_proxy=http://<proxy-server>/<port>
```

Configure LunaClient

Initialize the partition and users

1. Set the active slot.

   Select the uninitialized application partition.

```
lunacm:> slot set -slot 3
 Current Slot Id: 3  (Luna User Slot 7.3.0 (PW) Signing With Cloning Mode)
Command Result : No Error
```

NOTE: You can verify the slot number by executing "slot list" in lunacm.

2. Initialize the application partition.

   Create a partition for the Security Officer (SO), set the initial password, domain name for cloning purposes, and respond to the prompts:

```
lunacm:> partition init -label DPPC-QA
        Enter password for Partition SO: ********
        Re-enter password for Partition SO: ********
        You are about to initialize the partition.
        All contents of the partition will be destroyed.
        Are you sure you wish to continue?
        Type 'proceed' to continue, or 'quit' to quit now -> proceed
        Neither option -domain nor -defaultdomain nor -importpeddomain was
specified.
        One is required.
        Enter the domain name: *****
        Re-enter the domain name: *****
Command Result : No Error
```

NOTE: Label: DPPC-QA and Domain: DEVJP

3. Log in as Partition SO.

   Run the following command to login into the partition as the Security Officer (SO) - you can use the shortcut "po".

```
lunacm:> role login -name po
        enter password: ********
Command Result : No Error
```

4. Initialize the Crypto Officer role and set the initial password.

   Run the following command to initialize the Crypto Office (CO) role - you can use the shortcut "co":

```
lunacm:> role init -name co
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

5. Log out.

   The Partition SO can create the Crypto Officer, but only the Crypto Officer can create the Crypto User. You must log out to allow the Crypto Officer to login with the newly-set password.

```
lunacm:> role logout
Command Result : No Error
```

NOTE: Once the Crypto Officer logs in and changes the initial credential set by the Partition SO, applications using the CO's challenge secret/password can perform cryptographic operations in the partition. The Crypto Officer can create, modify and delete crypto objects within the partition, and use existing crypto objects (sign/verify). You can also create a limited-capability role called Crypto User that can use the objects created by the Crypto Officer but cannot modify them. The separation of roles is important in some security regimes and operational situations, and where you might be required to satisfy audit criteria for industry or government oversight.

6. Log in as the Crypto Officer.

```
lunacm:> role login -name co
        enter password: ********
Command Result : No Error
```

NOTE: The password for the Crypto Officer role is valid for the initial login only. You must change the initial password using the command role changepw during the initial login session, or a subsequent login. Failing to change the password will result in a CKR_PIN_EXPIRED error when you perform role-dependent actions.

7. If you have not already done so, change the initial password set by the Partition SO.

```
lunacm:> role changepw -name co
        enter existing password: ********
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

8. Create the Crypto User.

```
lunacm:> role init -name cu
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

   The Crypto User can now log in with the credentials provided by the Crypto Officer and change the initial password. The Crypto User can now use applications to perform cryptographic operations using keys and objects created in the partition by the Crypto Officer.

NOTE: The password for the Crypto User role is valid for the initial login only. The CU must change the initial password using the command role changepw during the initial login session, or a subsequent login. Failing to change the password will result in a CKR_PIN_EXPIRED error when they perform role-dependent actions.

9. Login as Crypt User.

```
lunacm:> role logout
Command Result : No Error
lunacm:> role login -name cu
        enter password: ********
Command Result : No Error
```

10. Change the password for Crypto User.

```
lunacm:> role changepw -name cu
        enter existing password: ********
        enter new password: ********
        re-enter new password: ********
Command Result : No Error
```

NOTE: The initial PIN should be changed.

Configure HA (High Availability)

NOTE: The feature does not support on DPoP Service but there are redundant systems with several LunaPCI on Gemalto backend. Therefore, it is not required to configure any HA group.

Configure CSP

For SafeNet CSP, the utility register.exe takes care of the registry. To configure CSP, open command prompt as Administrator and run the following commands.

Register CSP Library

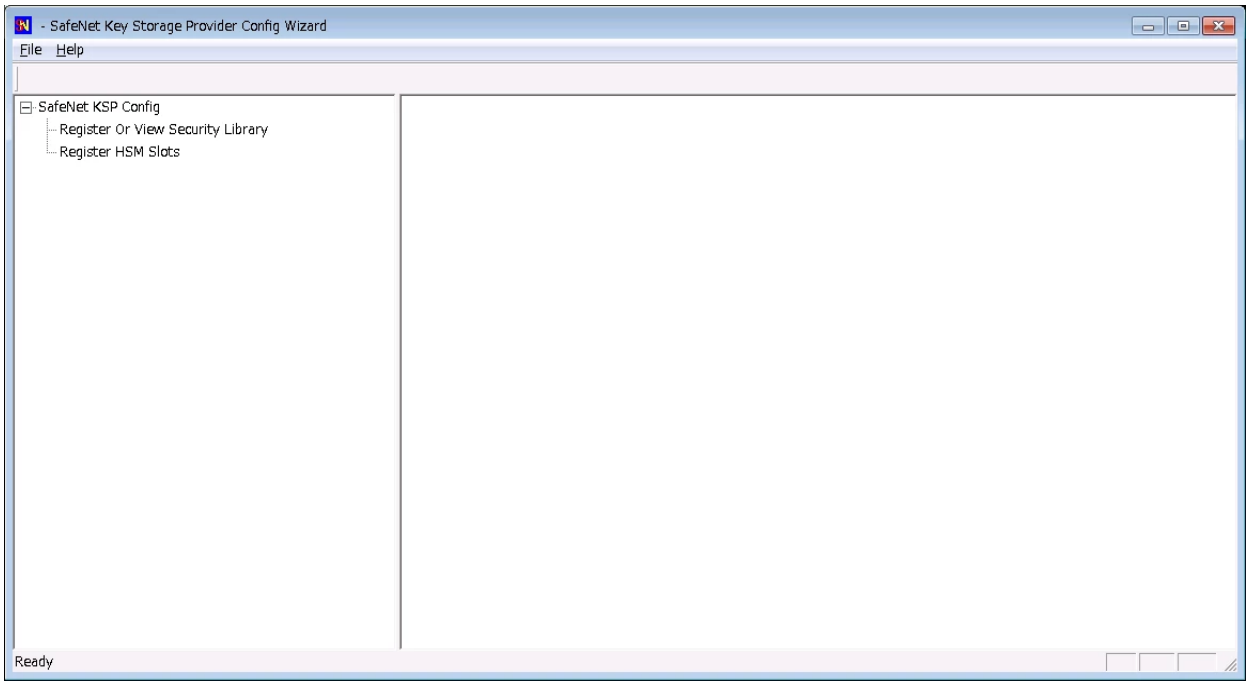
```
C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\csp>register.exe /library
register .exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
enhanced RSA and AES provider for Microsoft Windows !
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
Cryptographic Services for Microsoft Windows !
Success registering SOFTWARE\Microsoft\Cryptography\Defaults\Provider\Luna
SChannel Cryptographic Services for Microsoft Windows !
```

Register the partition

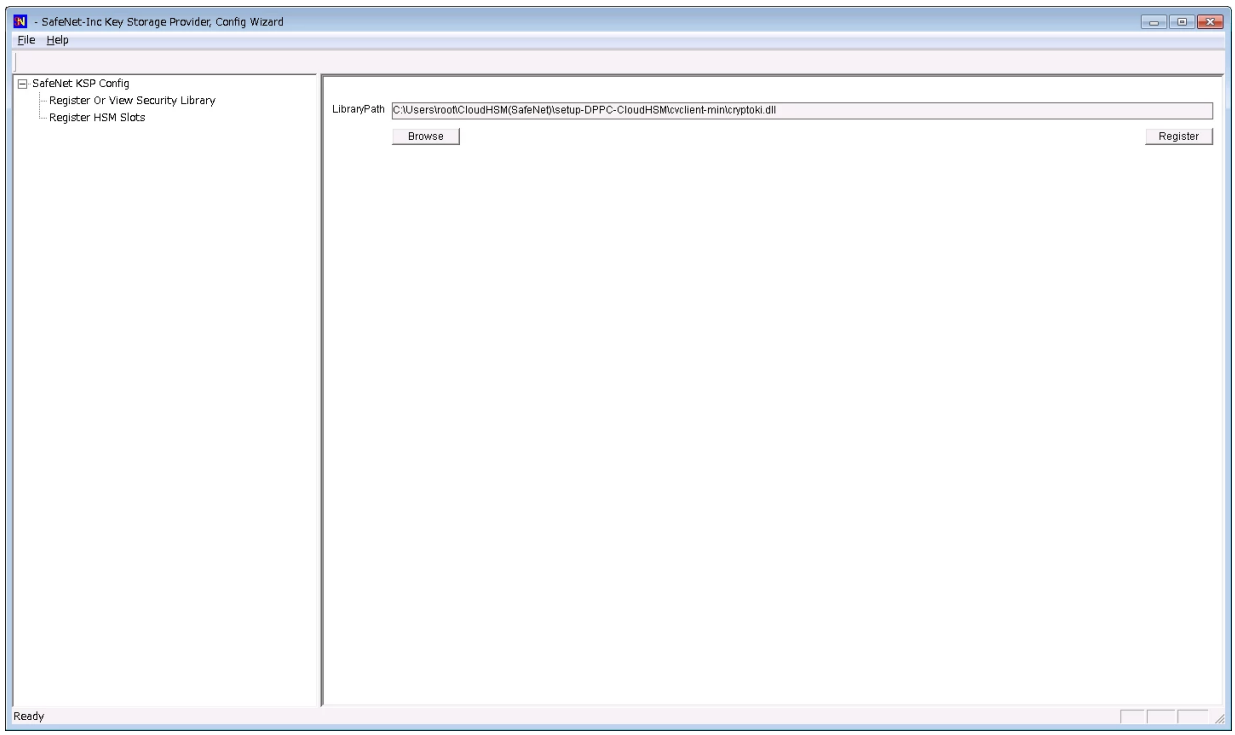
```
C:\Users\test\CloudHSM\setup-DPPC-CloudHSM\csp>register.exe
register .exe (64-bit) v10.1.0-32. Copyright (c) 2019 SafeNet. All rights
reserved.
 ********************************************************************************
 *                                                                              *
 *              Safenet LunaCSP, Partition Registration                         *
 *                                                                              *
 *       Protect the HSM's challenge for the selected partitions.               *
 *       NOTE:                                                                  *
 *            This is a WEAK protection of the challenge!!                      *
 *            After you have configured all applications that will use          *
 *            the LunaCSP, and ran them once, you MUST run:                     *
 *                register /partition /strongprotect                            *
 *            to strongly protect the registered challenges!!                   *
 ********************************************************************************
This procedure is a destructive procedure and will completely replace any
previous settings!!
Do you wish to continue?: [y/n]y
Do you want to register the partition named 'DPPC-QA'?[y/n]: y
Enter challenge for partition 'DPPC-QA' :********
Success registering the ENCRYPTED challenge for partition 'DPPC-QA:3'.
Only the LunaCSP will be able to use this data!
Registered 1 partition(s) for use by the LunaCSP!
```

Configure KSP

1. To configure KSP(CNG), run KspConfig.exe. Follow instructions for the use of the graphical KspConfig.exe as described in KSP for CNG in the SDK Reference Guide. The following window will appear:



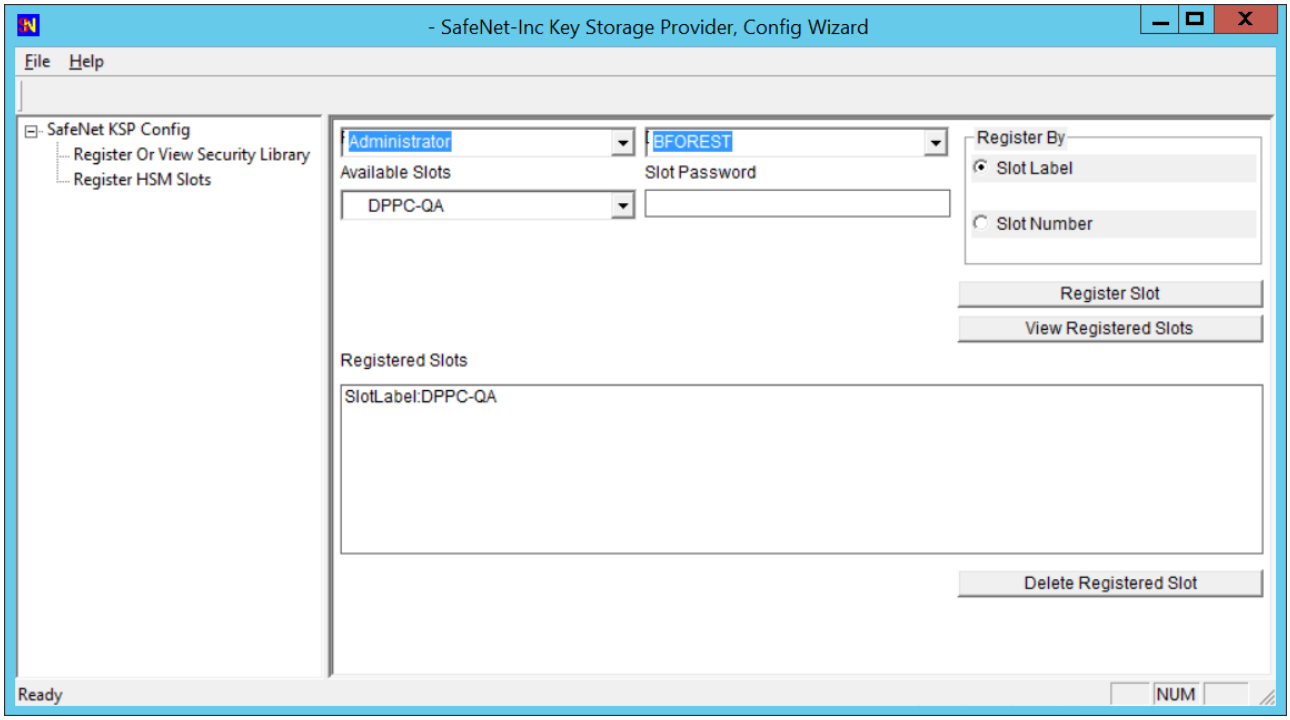
2. Double-click **Register Or View Security Library**, then you can select the value is "<extracted-directory>\cryptoki.dll".



3. Click on "**Register**" button, then you can see the message.

4. Double-click **Register HSM Slots** for Administrator/<Domain Name>
   - Select Administrator
   - Select <Domain Name>
   - Select the Group Name (DPPC-QA) for **Available Slots**
   - Enter Slot Password

5. Click **Register Slot.**



NOTE: When you click "**Register Slot**", there is no change, but this step is necessary.

6. When registering the Luna KSP (with the Luna KSPConfig utility), use the following user and domain combinations:
   - The user and domain performing these procedures.
   - The user and domain running the web application and using the private key.
   - The local user and NT Authority domain user.
   - The LocalSystem and NTAuthority of the system.

NOTE: If you implement the Autoenrollment server, you must also install and register the Luna CSP. Refer to the Luna product documentation for details.

Generate CSR and Install Certificate

1. Create the information file for CSR.

   To generate CSR through certreq.exe via CSP, the ProviderName must be "Luna Cryptographic Services for Microsoft Windows". A sample inf file is shown below:

   ```
   [NewRequest]
   KeyUsageProperty = "NCRYPT_ALLOW_ALL_USAGES"
   RequestType = PKCS10
   ProviderName = "Luna Cryptographic Services for Microsoft Windows"
   ProviderType = 1
   Subject = "CN=Registration Authority"
   KeyContainer = "CSPRA20190717"
   MachineKeySet = TRUE
   HashAlgorithm = SHA256
   KeyAlgorithm = RSA
   KeyLength = 2048
   ```

   To generate CSR through certreq.exe via KSP, the ProviderName must be "SafeNet Key Storage Provider". A sample inf file is shown below:

   ```
   [NewRequest]
   KeyUsageProperty = "NCRYPT_ALLOW_ALL_USAGES"
   RequestType = PKCS10
   ProviderName = "SafeNet Key Storage Provider"
   ProviderType = 0
   Subject = "CN=Registration Authority"
   KeyContainer = "KSPRA20190717"
   MachineKeySet = TRUE
   HashAlgorithm = SHA256
   KeyAlgorithm = RSA
   KeyLength = 2048
   KeyUsage = 0xf0
   ```

2. Generate CSR through HSM.

   Open command prompt as Administrator and run the following command. <inf-file> is the file created at Step 1, <csr-file> is an output file.

   ```
   > certreq -new <inf-file> <csr-file>
   ```

   Then the CSR file will be generated as follows:

   ```
   -----BEGIN NEW CERTIFICATE REQUEST-----
   MIIDjzCCAncCAQAwITEfMB0GA1UEAwwWUmVnaXN0cmF0aW9uIEF1dGhvcml0eTCC
   ....
   C610uaqncn6FvLu5pygZYFEVtOanCXNQRRUWiDGWKjHF+10GMh+V5YUur55T4W80
   0uwK
   -----END NEW CERTIFICATE REQUEST-----
   ```

NOTE: When the following error message is displayed, SafeNetKSP.dll must be copied to c:\Windows\System32.

```
Certificate Request Processor: The system cannot find the file specified.
0x80070002 (WIN32: 2 ERROR_FILE_NOT_FOUND)
```

3. Get RA Certificate

   See "Get RA Certificate in PKI-Manager".

4. Install a certificate.

   Open command prompt (on the folder the PKCS#7 file exists) and run the following command:

   ```
   > certreq -accept <issued-cert>
   ```

   Before running the command, the trusted root certificate must be installed. if not, the following error will be displayed.

   ```
   Certificate Request Processor: A certificate chain could not be built to a
   trusted root authority. 0x800b010a (-2146762486 CERT_E_CHAINING)
   ```

Integration for Java Environment

Register Luna Provider

You must update the java.security configuration file to use the SafeNet security providers and the HSM on Demand Service.

To configure the java.security file:

1. Open the Java security configuration file java.security in a text editor. The file is available at <JDK_installation_directory>\jre\lib\security.
2. Update the Luna Providers in the java.security file so they appear as follows:

   ```
   security.provider.1=sun.security.provider.Sun
   security.provider.2=sun.security.rsa.SunRsaSign
   security.provider.3=com.sun.net.ssl.internal.ssl.Provider
   security.provider.4=com.sun.crypto.provider.SunJCE
   security.provider.5=sun.security.jgss.SunProvider
   security.provider.6=com.sun.security.sasl.Provider
   security.provider.7=org.jcp.xml.dsig.internal.dom.XMLDSigRI
   security.provider.8=sun.security.smartcardio.SunPCSC
   security.provider.9=com.safenetinc.luna.provider.LunaProvider
   ```

3. Save the changes to the java.security file.

Enabling the HSM on Demand Service keystore

You must configure the Java Code Signing utility to use the keystore located on the HSM on Demand Service.

To enable the HSM on Demand Service keystore

1. Copy the LunaAPI.dll and the LunaProvider.jar files from the <Luna_installation_directory> to the Java extension folder located at <JDK_installation_directory>\jre\lib\ext.
2. Set the environment variables for JAVA_HOME and PATH.

NOTE: We recommend setting the PATH variable in Windows environments using the System Environments menu.

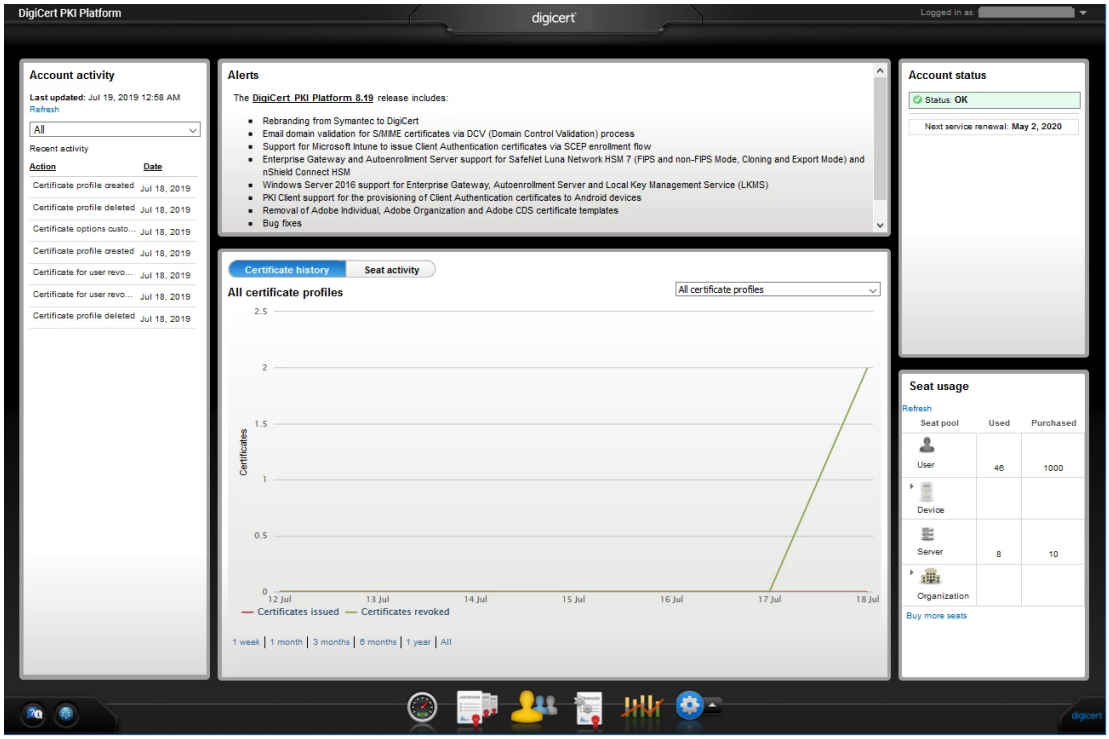
Install RA Certificate

Refer section "Using an RA Certificate on HSM" of DigiCert® PKI Enterprise Gateway Deployment Guide document

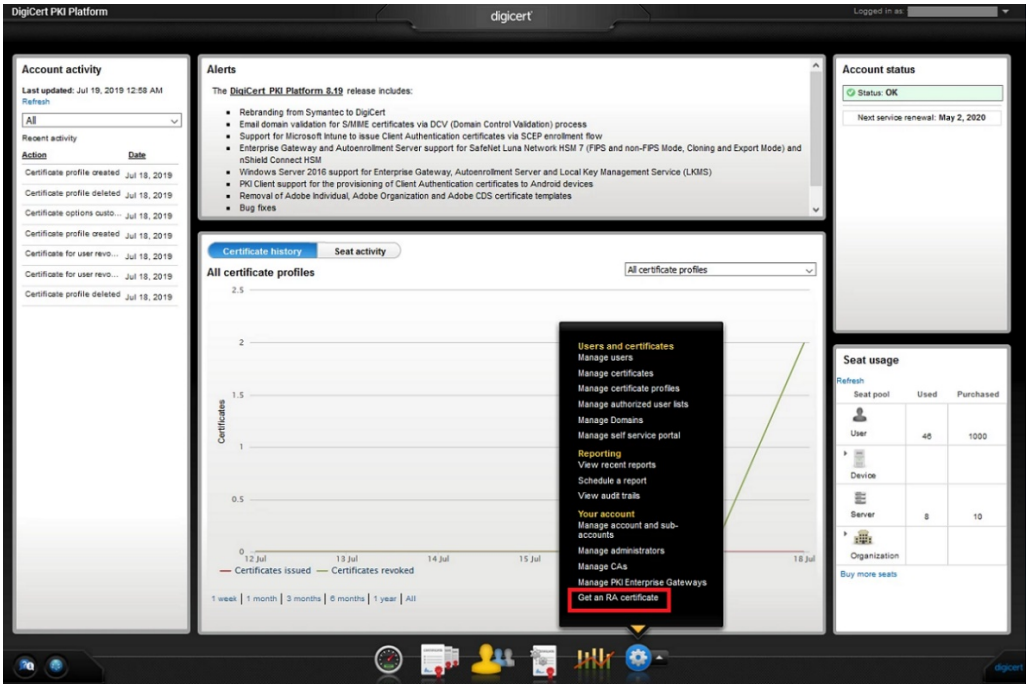
Get RA Certificate in PKI-Manager

The generated CSR(PKCS#10) can be copied and pasted onto the "Get an RA certificate" page on PKI Manager (by an authorized PKI Administrator) and save the resulting RA (PKCS#7) certificate onto a local folder.

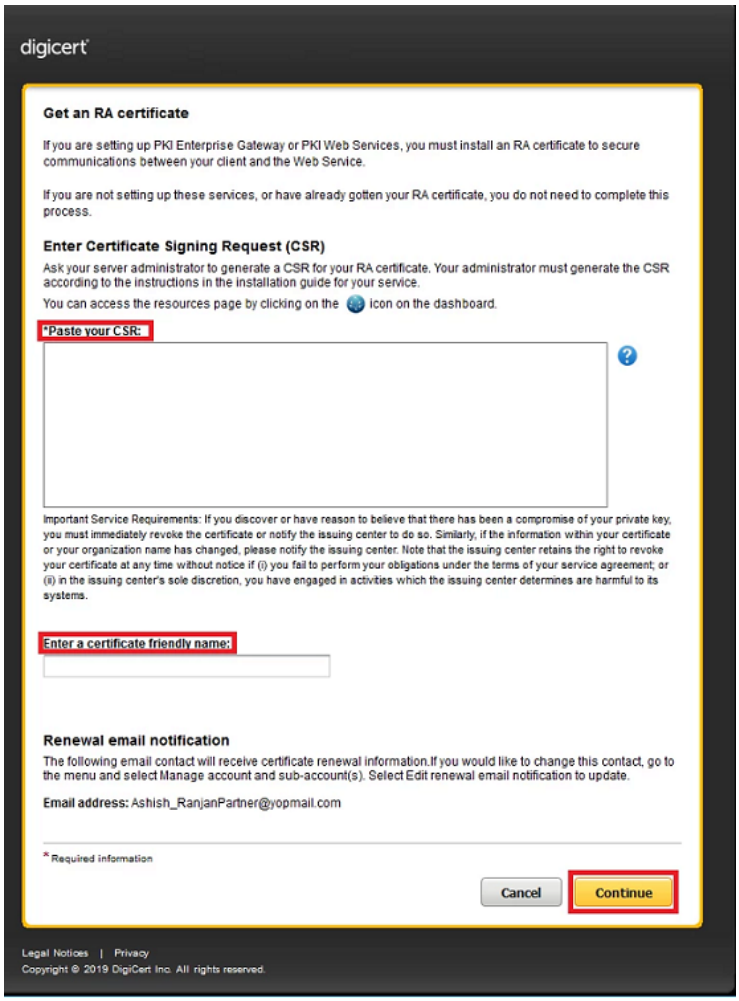
1. Go to PKI Manager and sign in by using your certificate.



2. Click Menu and select "**Get an RA Certificate**".



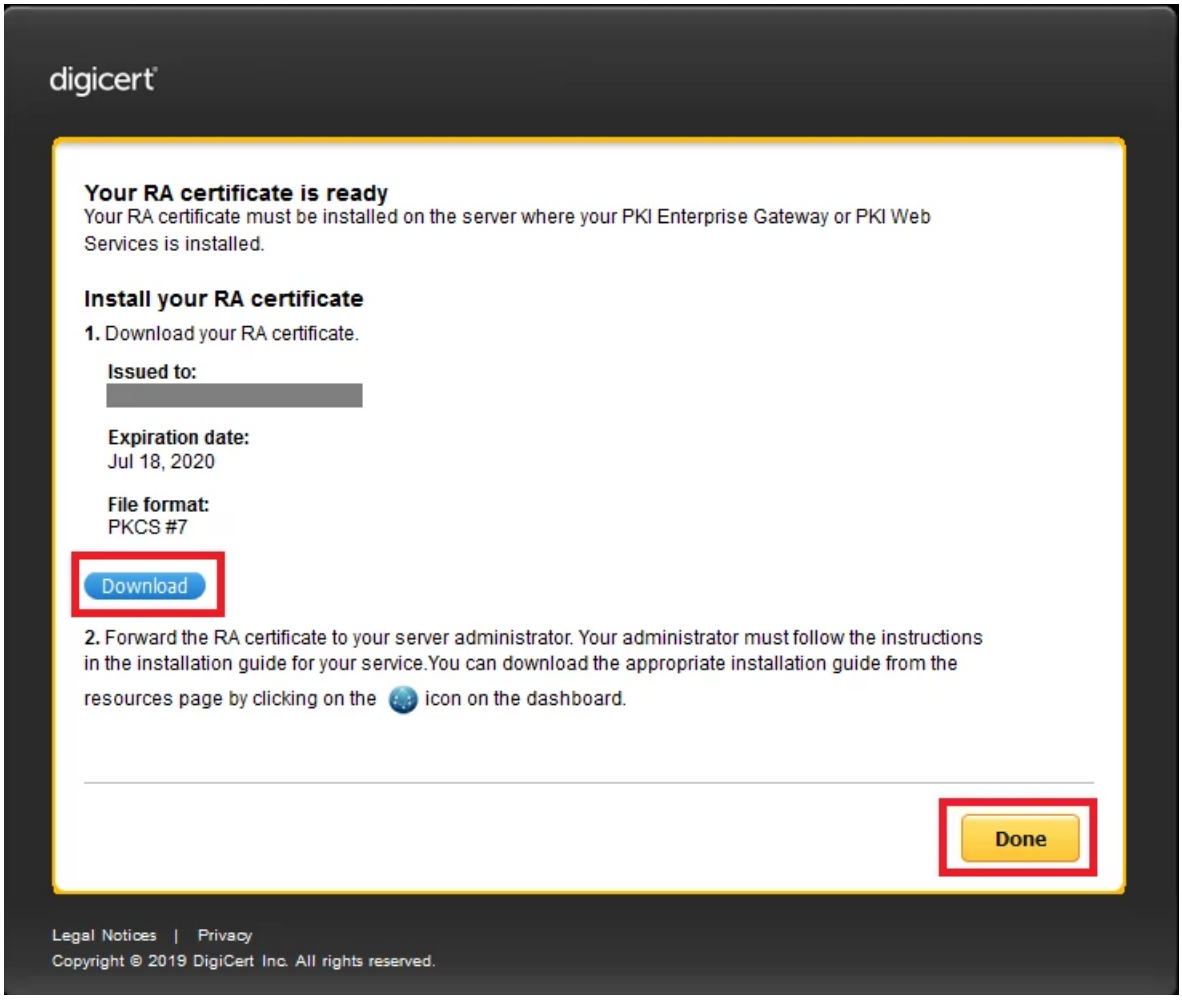
3. Paste your CSR and enter a certificate friendly name and then click "**Continue**".



The CSR looks as follows; Please paste it.

```
-----BEGIN NEW CERTIFICATE REQUEST-----
MIIDjzCCAncCAQAwITEfMB0GA1UEAwwWUmVnaXN0cmF0aW9uIEF1dGhvcml0eTCC
...
zbnTmg1IIY4NSgFcRsbs5j5GQDN86gSKmQ8/EvOjbpC62X3ZDhVmYSMBJUO1Jgv6
1tyz
-----END NEW CERTIFICATE REQUEST-----
```

4. Click "Download" then the PKCS#7 file will be downloaded.



5. Click "Done" to go back to the PKI Dashboard.