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This document guides security administrators through the steps for configuring F5 BIG-IP Systems and integrating them with a SafeNet Luna Network Hardware Security Module (HSM).

**Scope**

This document covers the necessary information to configure and integrate F5 BIG-IP Systems with a SafeNet Luna Network HSM.

**Document Conventions**

This section provides information on the conventions used in this template.

**Notes**

Notes are used to alert you to important or helpful information. These elements use the following format:

```
NOTE: Take note. Contains important or helpful information.
```

**Cautions**

Cautions are used to alert you to important information that may help prevent unexpected results or data loss. These elements use the following format:

```
CAUTION: Exercise caution. Caution alerts contain important information that may help prevent unexpected results or data loss.
```

**Warnings**

Warnings are used to alert you to the potential for catastrophic data loss or personal injury. These elements use the following format:

```
WARNING: Be extremely careful and obey all safety and security measures. In this situation you might do something that could result in catastrophic data loss or personal injury.
```
Command Syntax and Typeface Conventions

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
</table>
| **bold**   | The bold attribute is used to indicate the following:  
- Command-line commands and options (Type `dir /p`).  
- Button names (Click **Save As**.)  
- Check box and radio button names (Select the **Print Duplex** check box.)  
- Window titles (On the **Protect Document** window, click **Yes**.)  
- Field names (**User Name**: Enter the name of the user.)  
- Menu names (On the **File** menu, click **Save**.) (Click **Menu > Go To > Folders**.)  
- User input (In the **Date** box, type **April 1**.) |
| **italic** | The italic attribute is used for emphasis or to indicate a related document. (See the **Installation Guide** for more information.) |
| **Consolas** | Denotes syntax, prompts and code examples. |
Support Contacts

<table>
<thead>
<tr>
<th>Contact Method</th>
<th>Contact Information</th>
</tr>
</thead>
</table>
| Address                 | Gemalto  
4690 Millennium Drive  
Belcamp, Maryland  21017, USA                                                  |
| Phone                   | US  1-800-545-6608                                                                    |
|                         | International  1-410-931-7520                                                       |
| Technical Support       | https://supportportal.gemalto.com                                                   |
| Customer Portal         | Existing customers with a Technical Support Customer Portal account can log in to  |
|                         | manage incidents, get the latest software upgrades, and access the Gemalto Knowledge |
|                         | Base.                                                                                 |
Introduction

Overview

BIG-IP software products are licensed modules that run on top of F5’s Traffic Management Operation System (TMOS). This custom operating system is an event driven operating system designed specifically to inspect network and application traffic and make real-time decisions based on the configurations you provide. The BIG-IP LTM system uses the SafeNet Luna Network HSM to generate and secure the RSA keys used by the Secure Sockets Layer (SSL).

The SafeNet Luna Network HSM is an external hardware security module that is available for use with BIG-IP systems. You can use the SafeNet solution with all BIG-IP platforms, including VIPRION Series chassis and appliances and BIG-IP Virtual Edition (VE). You can also configure multiple HSMs as an HA (high availability) group to use with BIG-IP systems.

NOTE: The BIG-IP system, when in appliance mode, does not support the SafeNet Luna Network HSM installation/uninstallation.

The BIG-IP RSA-based and ECDHE-ECDSA cipher suites use the SafeNet Luna Network HSM. After installation on the BIG-IP system, the SafeNet Luna Network HSM is compatible with Access Policy Manager and Application Security Manager, without additional configuration steps.

For information about using the iControl interface to configure the Luna Network HSM with BIG-IP systems, consult the F5 DevCentral site (https://devcentral.f5.com/ictrl).

The benefits of using a SafeNet Luna Network HSM to generate the RSA keys used for SSL in BIG-IP System are:

- Secure generation, storage and protection of the SSL private keys on FIPS 140-2 level 3 validated hardware.
- Full life cycle management of the keys.
- HSM audit trail.
- Significant performance improvements by off-loading cryptographic operations from SSL servers.

3rd Party Application Details

This integration guide uses the following third party applications:

- F5 BIG-IP LTM System
Supported Platforms

**SafeNet Luna HSM**: SafeNet Luna Network HSM appliances are purposefully designed to provide a balance of security, high performance, and usability that makes them an ideal choice for enterprise, financial, and government organizations. SafeNet Luna Network HSMs physically and logically secure cryptographic keys and accelerate cryptographic processing.

**NOTE**: BIG-IP is tested with Luna Clients in HA & FIPS Mode.

Prerequisites

Before beginning the integration, ensure that you have completed the following:

**Configure the SafeNet Luna Network HSM 7.x**

Before you get started ensure the following:

1. Ensure the HSM is setup, initialized, provisioned and ready for deployment.
2. Create a partition on the HSM to be used by BIG-IP.

**NOTE**: Follow the *SafeNet Luna Network HSM Product Documentation* for detailed steps for creating NTLS connection, initializing the partitions and various user roles.

**Configure SafeNet Luna Network HSM to use FIPS Mode**

Under FIPS 186-3/4, the RSA methods permitted for generating keys are 186-3 with primes and 186-3 with aux primes. This means that RSA PKCS and X9.31 key generation is no longer approved for operation in a FIPS-compliant HSM. If you are using the SafeNet Luna Network HSM in FIPS mode, you have to make the following change to the configuration file:

```plaintext
Misc {
  RSAKeyGenMechRemap = 1;
}
```

This setting redirects the older calling mechanism to a new approved mechanism when SafeNet Luna Network HSM is in FIPS mode.

**NOTE**: The above configuration is valid for Luna 7.x and Luna 6.x (F/W Version 6.22.0 and above only). Execute `hsm firmware show in lunash` to verify the firmware version.
Setup F5 BIG-IP

Install and configure F5 BIG-IP LTM. Refer to the F5 BIG-IP documentation for further information about installing and configuring F5 BIG-IP. The product documentation for BIG-IP LTM are available at the following link under Product Manuals section:

https://support.f5.com/csp/home

NOTE: BIG-IP TMOS with SafeNet Luna Network HSM only supports IPv4.

Access to Gemalto Customer Support Portal

The supported SafeNet Luna Client for F5 BIG-IP is password protected on the Gemalto Support Portal is password protected. Please contact Gemalto Customer Support for credentials.
## Integrating F5 BIG-IP with a SafeNet Luna Network HSM

### Configuring F5 BIG-IP to use SafeNet Luna HSM

To configure the BIG-IP system to use the SafeNet Luna Network HSM complete the following:

- Adding the Luna Network Client to the BIG-IP System
- Installing and registering the Luna client
- Setting up the Luna client on a newly added or activated blade
- Generating a key/certificate using tmsh
- Creating a self-signed digital certificate
- Requesting a certificate from a certificate authority
- Configuring a client SSL profile to use an external HSM key and certificate
- Importing a pre-existing SafeNet Luna HSM key into the BIG-IP

### Before you begin

Before you can use SafeNet Luna Network HSM with the BIG-IP system, you must ensure that:

- The SafeNet HSM appliance is installed on your network.
- The SafeNet HSM appliance and the BIG-IP system can communicate with each other.
- The SafeNet HSM appliance has a virtual HSM (HSM Partition) defined before you install the client software on the BIG-IP system.
- Ensure that the BIG-IP system is licensed for external interface and network HSM. If you do not have an external HSM license, you will not be able to proceed past the section *Generating a key/certificate using tmsh* in this integration.

---

**NOTE:** If you install the Luna Network HSM (external HSM) on a system with a FIPS card (internal HSM) installed, the Luna Network HSM takes precedence. You cannot use the SafeNet Luna Network HSM on a BIG-IP system that is running another external HSM.
Adding the Luna Network Client to the BIG-IP System

Before you can set up the SafeNet Luna client software on a BIG-IP system, you must obtain a valid SafeNet Luna client license. To use the Network HSM with your BIG-IP system, you need to obtain the software tarball from SafeNet, and install the Luna client software onto the BIG-IP system.

To add the Luna Network Client to the BIG-IP system

1. Log in to the Gemalto Support portal.

   https://supportportal.gemalto.com

   **NOTE:** The supported SafeNet Luna Client for F5 content on the Gemalto Support Portal is password protected. Please contact Gemalto Customer Support for credentials.

2. Download the Luna Network Client for F5 from the support portal.

   **NOTE:** For supported SafeNet Luna client and HSM versions with BIG-IP TMOS versions information, see the Interoperability Matrix for BIG-IP TMOS with SafeNet Clients and HSM supplemental document available in the AskF5 Documentation.

3. Log in to the command-line interface of the BIG-IP system using an account with administrator privileges.

4. Create a directory under `/shared` named `safenet_install`.

   ```
   # mkdir /shared/safenet_install
   ```

5. Copy the SafeNet Luna Client software tarball to `/shared/safenet_install`

Installing and registering the Luna client

You need to install and register the Luna client so that you can use the Luna Network HSM with the BIG-IP system.

**NOTE:** If you are setting up the Luna client on a VIPRION system, you only need to run the configuration script on the primary blade. The system propagates the configuration to the additional active blades following installation.

To install and register the Luna client

1. Log in to the command-line interface of the BIG-IP system using an account with administrator privileges.

2. If you are not installing on a VIPRION system, or you are using a self IP address to communicate with the HSM, proceed to step 3. If not, disable the `ip check` on the HSM using Luna Shell (Lush).

   ```
   # ntlsls ipcheck disable
   # service restart ntlsls
   ```

   This step allows the same certificate to be used from multiple IP addresses, identifying multiple blades.
3. Install and register the Luna client on the BIG-IP system, using the parameters indicated.

   nethsm-safenet-install.sh

   - Parameters for a standard installation, or on the standalone or primary blade of a VIPRION system.
     --hsm_ip_addr=<luna_sa_device_IP_address> --image=<Luna_x.x_Client_Software.tar>

     The following example sets up the Luna client v7.1 where the Luna Network HSM has an IP address of 10.164.74.111:
     # nethsm-safenet-install.sh --hsm_ip_addr=10.164.74.111 --image=Luna_7.1_Client_Software.tar

     The system will prompt for Luna SA admin password and partition password.

     From Luna v7.x onwards, you need to initialize the partition and CO/CU user roles using root before entering the password. After initializing the partition and user roles enter the CO password and press Enter.

     **NOTE:** The VIPRION system propagates the configuration to additional active blades, but you need to reload the PATH environment variable on any blades with already-open sessions: source ~/.bash_profile

   - Parameters when multiple HSMs are configured as an HA group.
     --hsm_ip_addr="<SafeNet HSM1_IP_address> <SafeNet HSM2_IP_address>" --hsm_ha_group=<Label name for the SafeNet HSM HA group> --image=<Luna_x.x_Client_Software.tar>

     The following example sets up the Luna client v7.1 for an HA group named **F5_Luna_HA** where the SafeNet Luna Network HSMs in the group have IP addresses of 10.10.10.100 and 10.10.10.101:
     # nethsm-safenet-install.sh --hsm_ip_addr="10.10.10.100 10.10.10.101" --hsm_ha_group=luna_ha_test --image=Luna_7.1_Client_Software.tar

     Install all components when prompted during the installation, you need to register your client IP address with the SafeNet Luna Network HSM and assign the Luna client to a previously defined HSM partition.

     Before entering the partition password, you need to initialize the partition and CO/CU user roles using root. Use the same password for all HA members. After initializing the partition and user roles enter the CO password and press Enter.

     **NOTE:** By default, the script sets up the SafeNet Luna client software to use 20 threads. To adjust this number, run this command before you restart the pkcs11d service: `tmsh sys crypto fips external-hsm num-threads <integer>`. Changing the number of threads affects performance.

### Setting up the Luna client on a newly added or activated blade

After you set up the Luna client on the primary blade of a VIPRION system, the system propagates the configuration to the additional active blades. If you subsequently add a secondary blade, activate a disabled blade, or power-on a powered-off blade, you need to run a script on the new secondary blade.

**To set up the Luna client on a newly added or activated blade**

1. Log in to the command-line interface of the system using an account with administrator privileges.
2. Execute the following on any new or re-activated secondary blade:

   # safenet-sync.sh <HSM partition password> -v
3. If you make the new blade a primary blade before running the synchronization script, you need to run the regular client installation and registration procedure on the new primary blade only.

   nethsm-safenet-install.sh

**Generating a key/certificate using tmsh**

Use the Traffic Management Shell (tmsh) to generate a key and certificate.

**To generate a key/certificate using tmsh**

1. Log in to the command-line interface of the system using an account with administrator privileges.
2. Open the TMS Shell (tmsh).
   
   # tmsh
3. Generate the key.

   ```
   create sys crypto key <key_name> gen-certificate common-name <cert_name> security-type nethsm
   ```

   The following example generates a key on HSM named `test_key` and a certificate named `test_safenet.com` with the security type `nethsm`.

   ```
   create sys crypto key test_key gen-certificate common-name test_safenet.com security-type nethsm
   ```
4. Verify that the key was created.

   ```
   list sys crypto key test_key.key
   ```

   Information about the key displays:

   ```
   sys crypto key test_key {
   key-id c31fa09a744ca9a558612b303eb0719
   key-size 2048
   key-type rsa-private
   security-type nethsm
   }
   ```

   When you generate a key/certificate using tmsh, the system creates a HSM private key. It also creates a local key, which points to the HSM key, residing in the HSM.

**Creating a self-signed digital certificate**

If you are configuring the BIG-IP system to manage client-side HTTP traffic, you can complete the following procedure to create a self-signed certificate to authenticate and secure the client-side HTTP traffic.

If you are configuring the system to manage server-side HTTP traffic, you must repeat this task to create a second self-signed certificate to authenticate and secure the server-side HTTP traffic.

**To create a self-signed digital certificate**

1. On the Main tab, click **System > Certificate Management > Traffic Certificate Management**.
   The Traffic Certificate Management screen opens.
2. Click **Create**.
   a. In the **Name** field, type a unique name for the SSL certificate.
   b. From the **Issuer** list, select **Self**.
c. In the **Common Name** field, type a name. This is typically the name of a web site, such as www.siterequest.com.

d. In the **Division** field, type your department name.

e. In the **Organization** field, type your company name.

f. In the **Locality** field, type your city name.

g. In the **State or Province** field, type your state or province name.

h. From the **Country** list, select the name of your country.

i. In the **E-mail Address** field, type your email address.

j. In the **Lifetime** field, type a number of days, or retain the default, **365**.

k. In the **Subject Alternative Name** field, type a name. This name is embedded in the certificate for X509 extension purposes. By assigning this name, you can protect multiple host names with a single SSL certificate.

l. From the **Security Type** list, select **NetHSM**.

m. From the **Key Type** list, **RSA** is selected as the default key type.

n. From the **Size** list, select a size, in bits.

o. Click **Finished**.

**Requesting a certificate from a certificate authority**

Generate a certificate signing request (CSR) that can then be submitted to a third-party trusted certificate authority (CA).

---

**NOTE:** Please consult the CA to determine the specific information required for each step in this task.

---

**To request a certificate from a certificate authority**


2. Click **Create**.
   
a. In the **Name** field, type a unique name for the SSL certificate.

b. From the **Issuer** list, select **Certificate Authority**.

   c. In the **Common Name** field, type a name. This is typically the name of a web site, such as www.siterequest.com.

   d. In the **Division** field, type your department name.

   e. In the **Organization** field, type your company name.

   f. In the **Locality** field, type your city name.

   g. In the **State or Province** field, type your state or province name.

   h. From the **Country** list, select the name of your country.

   i. In the **E-mail Address** field, type your email address.
j. In the **Lifetime** field, type a number of days, or retain the default, 365.

k. In the **Subject Alternative Name** field, type a name.

   This name is embedded in the certificate for X509 extension purposes.

   By assigning this name, you can protect multiple host names with a single SSL certificate.

l. In the **Challenge Password** field, type a password.

m. In the **Confirm Password** field, re-type the password you typed in the **Challenge Password** field.

n. From the **Security Type** list, select **NetHSM**.

o. From the **Key Type** list, **RSA** is selected as the default key type.

p. From the **Size** list, select a size, in bits.

q. Click **Finished**.

   The Certificate Signing Request screen displays.

3. Do one of the following to download the request into a file on your system.

   - In the **Request Text** field, copy the certificate.
   - For **Request File**, click the button.

4. Follow the instructions on the relevant certificate authority web site for either pasting the copied request or attaching the generated request file.

5. Click **Finished**.

   The Certificate Signing Request screen displays.

6. Submit the generated certificate signing request to a trusted certificate authority for signature.

### Configuring a client SSL profile to use an external HSM key and certificate

After you have added the SafeNet HSM key and certificate to the BIG-IP system configuration, you can use the key and certificate as part of a client SSL profile. This task describes using the browser interface. Alternatively, you can use the Traffic Management Shell (**tmsh**) command-line utility.

**To configure a client SSL profile to use an external HSM key and certificate**

1. On the Main tab, click **Local Traffic > Profiles > SSL > Client**.

   The Client screen opens.

2. Click **Create**.

   The New Client SSL Profile screen opens.

3. In the **Name** field, type a name for the profile.

4. From the **Parent Profile** list, select **clientssl**.

5. From the **Configuration** list, select **Advanced**.

   This selection makes it possible for you to modify additional default settings.

6. For the Configuration area, select the **Custom** check box.

   The settings in the Configuration area become available for modification.

7. Using the **Certificate Key Chain** setting, specify one or more certificate key chains:

   a. From the **Certificate** list, select the name of a certificate that you imported.
b. From the Key list, select the name of the key that you imported.

c. From the Chain list, select the chain that you want to include in the certificate key chain.

d. Click Add.

8. Click Finished.

After you have created the client SSL profile, you must assign the profile to a virtual server, so that the virtual server can process SSL traffic according to the specified profile settings.

**Importing a pre-existing SafeNet Luna HSM key into the BIG-IP**

A pre-existing key on the SafeNet Luna HSM can be imported to use with BIG-IP.

---

**NOTE:** F5 BIG-IP does not support the ability to import/migrate any existing keys from BIG-IP to HSM.

---

**To import a pre-existing SafeNet Luna HSM key into the BIG-IP**

1. On the Main tab, click **System > Certificate Management > Traffic Certificate Management > SSL Certificate List > Import.**

   The SSL Certificate/Key Source page opens.

2. Within **Import Type**, select **Key**.

   The key name should be the same as the SafeNet Luna HSM key label.

3. Within **Key Name**, select **Overwrite Existing** and from the drop-down menu, select the key you would like to overwrite.

4. Within **Key Source**, select **From NetHSM**.

   For this option to be available, the system must have External HSM licensed, and SafeNet External HSM is configured.

5. Click **Import**.

   You can also import an existing key by using tmsh commands:

   ```
   # tmsh install sys crypto key nethsm_key_label from-nethsm security-type nethsm
   or
   # tmsh install sys crypto key nethsm_key_label from-nethsm
   
   Use the NetHSM key label as the key name. For example:
   ```

   ```
   root@(ssl8519)(cfg-sync Standalone)(Active)(/Common)(tmos)# install sys crypto key nethsm_key_label (tab)
   
   Options:
   from-editor from-nethsm
   
   Properties:
   from-local-file from-url
   ```

   ```
   root@(ssl8519)(cfg-sync Standalone)(Active)(/Common)(tmos)# install sys crypto key nethsm_key_label from-nethsm security-type nethsm
   ```

---

F5 BIG-IP Systems Integration Guide
This completes the F5 BIG-IP integration with SafeNet Luna HSM. The F5 BIG-IP SSL private key is secured on SafeNet Luna HSM.

**Deleting a key from the BIG-IP system**

You perform this task to delete an existing key from the BIG-IP.

**To delete a key from the BIG-IP**

1. On the Main tab, click **System > Certificate Management > Traffic Certificate Management**.
   The Traffic Certificate Management screen opens.
2. From the **SSL Certificate List**, select the check box next to the key you wish to delete.
3. Click **Delete**.

The key you selected is deleted from BIG-IP. The key stored in the SafeNet Luna Network HSM is not deleted.