Luna PCI-E

Utilities Reference Guide

SafeNet. THE DATA PROTECTION COMPANY

Document Information

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Revision	Date	Reason
A	26 February 2014	Initial release.
B	17 April 2014	Updates to the SFF Backup feature.
C	04 July 2014	Solaris client support.

Trademarks

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SafeNet invites constructive comments on the contents of this document. Send your comments, together with your personal and/or company details to the address below.

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PREFACE
About the Utilities Reference Guide

This document describes how to use the various utilities included with the Luna client. It contains the following chapters:

This preface also includes the following information about this document:

For information regarding the document status and revision history, see "Document Information" on page 2.

Customer Release Notes

The customer release notes (CRN) provide important information about this release that is not included in the customer documentation. It is strongly recommended that you read the CRN to fully understand the capabilities, limitations, and known issues for this release. You can view or download the latest version of the CRN for this release at the following location:

- http://www.securedbysafenet.com/releasenotes/luna/crn_luna_hsm_5-4.pdf

Audience

This document is intended for personnel responsible for maintaining your organization's security infrastructure. This includes Luna HSM users and security officers, key manager administrators, and network administrators.

All products manufactured and distributed by SafeNet, Inc. are designed to be installed, operated, and maintained by personnel who have the knowledge, training, and qualifications required to safely perform the tasks assigned to them. The information, processes, and procedures contained in this document are intended for use by trained and qualified personnel only.

It is assumed that the users of this document are proficient with security concepts.

Document Conventions

This document uses standard conventions for describing the user interface and for alerting you to important information.

Notes

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

CAUTION: Exercise caution. Contains 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. They 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

Format	Convention
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.) • Dialog box titles (On the Protect Document dialog box, 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.)

Format	Convention
	• User input (In the Date box, type April 1.)
italics	In type, the italic attribute is used for emphasis or to indicate a related document. (See the *Installation Guide* for more information.)
<variable>	In command descriptions, angle brackets represent variables. You must substitute a value for command line arguments that are enclosed in angle brackets.
[**optional**] [<optional>]	Represent optional **keywords** or <variables> in a command line description. Optionally enter the keyword or <variable> that is enclosed in square brackets, if it is necessary or desirable to complete the task.
{**a**|**b**|**c**} {<a>|<b>|<c>}	Represent required alternate **keywords** or <variables> in a command line description. You must choose one command line argument enclosed within the braces. Choices are separated by vertical (OR) bars.
[**a**|**b**|**c**] [<a>|<b>|<c>]	Represent optional alternate keywords or variables in a command line description. Choose one command line argument enclosed within the braces, if desired. Choices are separated by vertical (OR) bars.

Support Contacts

If you encounter a problem while installing, registering or operating this product, please make sure that you have read the documentation. If you cannot resolve the issue, please contact your supplier or SafeNet support. SafeNet support operates 24 hours a day, 7 days a week. Your level of access to this service is governed by the support plan arrangements made between SafeNet and your organization. Please consult this support plan for further information about your entitlements, including the hours when telephone support is available to you.

Table 1: Technical support contacts

Contact method	Contact	
Address	SafeNet, Inc. 4690 Millennium Drive Belcamp, Maryland 21017 USA	
Phone	United States	(800) 545-6608, (410) 931-7520
	Australia and New Zealand	+1 410-931-7520
	China	(86) 10 8851 9191
	France	0825 341000
	Germany	01803 7246269
	India	+1 410-931-7520
	United Kingdom	0870 7529200, +1 410-931-7520

Contact method	Contact
Web	www.safenet-inc.com
Support and Downloads	www.safenet-inc.com/support Provides access to the SafeNet Knowledge Base and quick downloads for various products.
Technical Support Customer Portal	https://serviceportal.safenet-inc.com Existing customers with a Technical Support Customer Portal account can log in to manage incidents, get the latest software upgrades, and access the SafeNet Knowledge Base.

CHAPTER 1

Certificate Management Utility (CMU)

This chapter provides a detailed description of each of the functions available in the SafeNet Certificate Management Utility. It contains the following topics:

About the CMU Functions

This section provides a detailed description of each function available in the Certificate Management Utility.

The command function is the first parameter on the command line that invokes the CMU application. It does not require a leading dash character. All options follow the command function and do employ leading dashes. Only a single command function can be specified with each invocation of the CMU application.

cmu <function> <-parameter_name[=parameter_value]>

Most functions take parameters, some of which may be mandatory, and some optional. Parameters may, in turn, take values. If a parameter takes a value, then the general syntax is to write the command "cmu", followed by a space, followed by a function name, followed by a space, followed by a leading dash "-" and parameter name and an equal sign "=" and a value, with no spaces from the dash to the end of the parameter value. Multiple parameters are separated by spaces.

Authentication

Where an operation requires authentication, you must provide the appropriate Password (for a Password Authenticated HSM) or the appropriate PED Key (via Luna PED, for a Trusted Path HSM).

cmu certify

This function creates an X.509 V3 certificate from a PKCS #10 certificate request. The parent certificate and corresponding private key must already exist on the token or HSM. The private key is located on the token using the public key info inside the parent certificate.

Syntax

cmu certify <parameters>

Mandatory Parameters

Parameter	Description
-handle=<handle#>	This is a mandatory parameter that defines the handle to parent certificate. If this parameter is omitted and there is only one certificate on the HSM, that certificate is automatically selected. If this parameter is omitted and there are multiple certificates on the HSM, the user is asked to select the certificate.
-inputfile	This parameter defines the name of the file that contains the PKCS #10 certificate request.
-startDate	This parameter defines the validity start of the certificate, in the format YYYYMMDD.
-endDate	This parameter defines the validity end of the certificate, in the format YYYYMMDD.
-serialNumber	This parameter defines the serial number of the certificate, in big-endian hexadecimal form.

Optional Parameters

Parameter	Description
-keyusage	This is an optional parameter that defines the key usage extension for the certificate. It can be set to any of the following: digitalsignature, nonrepudiation, keyencipherment, dataencipherment, keyagreement, keycertsign, crlsign, encipheronly, decipheronly. This parameter may appear more than once in the parameter set to define multiple usages, or it can be used once with a comma separated list of usage types.
-md5WithRsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-MD5withRSAEncryption. The default is to use sha1WithRsa.
-sha1WithRsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA1withRSAEncryption. The default is to use sha1WithRsa.
-label	This is an optional parameter that defines the label attribute for the certificate object that gets created on the HSM. If omitted, the common name of the subject DN is used instead.
-sha224withrsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA224withRSAEncryption. The default is to use sha1WithRsa.

Parameter	Description
-sha256withrsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA256withRSAEncryption. The default is to use sha1WithRsa.
-sha384withrsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA384withRSAEncryption. The default is to use sha1WithRsa.
-sha512withrsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA512withRSAEncryption. The default is to use sha1WithRsa.
-sha1withdsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA1withDSAEncryption. The default is to use sha1WithRsa.
-sha1withecdsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA1withECDSAEncryption. The default is to use sha1WithRsa.
- sha224withecdsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA224withECDSAEncryption. The default is to use sha1WithRsa.
-sha256withecdsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA256withECDSAEncryption. The default is to use sha1WithRsa.
-sha384withecdsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA384withECDSAEncryption. The default is to use sha1WithRsa.
- sha512withecdsa	This is an optional parameter that defines the signature algorithm for the certificate to be pkcs-1-SHA512withECDSAEncryption. The default is to use sha1WithRsa.
-id	This optional parameter defines the CKA_ID attribute for the certificate object that gets created on the HSM. If omitted, the CKA_ID attribute of the private key is used instead.
-certificatepolicy	This optional parameter defines the certificate policy to be used.
-keyids	This optional parameter indicates to use a subject key identifier from the parent. Set to True or False (or 1 or 0).

Example

```
cmu certify -input=testCert.req -h=8
```

- create and sign a new certificate using certificate 8 as the parent.

cmu delete

This function deletes a key, certificate, or generic data object on the token. A confirmation message is presented to the user, describing the class and label of the object about to be deleted.

Syntax

cmu delete <parameters>

Required Parameters

Parameter	Description
-handle=<handle#>	The handle of the object to be deleted. The parameter "-handle" is followed by an equal sign "=", followed by the handle of the object (no spaces).

Optional Parameters

Parameter	Description
-force	This optional parameter can be used to suppress the user confirmation step.

Example

The following command deletes the key or certificate referenced by object handle 14 without a request for confirmation of the delete operation:

```
cmu delete -handle=14 -force
```

The following command queries the user for a handle of an object to delete. The user is asked to confirm the deletion operation:

```
cmu delete
```

cmu export

This function exports an X.509 certificate from the token or HSM to a file. The supported formats are Raw (binary) and PEM (base 64 encoding).

Syntax

cmu export

Required Parameters

Parameter	Description
-handle=<handle#>	The handle to the X.509 certificate to be exported from the HSM to a file. The parameter "-handle" is followed by an equal sign "=", followed by the handle of the object (no spaces).
-outputfile	This mandatory parameter defines the name of the file that receives the certificate.

Optional Parameters

Parameter	Description
-binary	This is an optional parameter that defines the exported certificate format to be raw binary instead of the default PEM (base64) encoding.

Example

The following command outputs the certificate with handle 7 to file test.cer in PEM format:

```
cmu export -handle=7 -output=test.cer
```


cmu generatekeypair

This function generates an asymmetric key pair on the token or HSM. An optional input filename can be used to specify a file from which mandatory and optional attributes are to be read.

For DSA key generation, the domain parameters (Prime, Subprime, and Base) are required, and must be provided either as part of the command, or as responses to interactive prompting. If one is provided at the command line, then all three must be provided in that manner. If none are provided at the command line, then all three are prompted for interactive entry.

You may not provide only one or two of the parameters at the command line. Providing just one or two domain parameters is considered an error, and the command halts with an error message.

Syntax

cmu generatekeypair <parameters>

Required Parameters

Parameter	Description
-modulusBits	This mandatory parameter defines the length in bits of the modulus value for the generation of RSA key pairs. It must be set to a value between 1024 and 4096 that is a multiple of 64 bits.
-publicExponent	This mandatory parameter defines the public exponent value to use in the generation of RSA key pairs. It must be set to a value of 3, 17 or 65537.

Optional Parameters

Parameter	Description
-binary	This is an optional parameter that defines the exported certificate format to be raw binary instead of the default PEM (base64) encoding.
-inputFile	This optional parameter defines the name of a file from which to obtain additional parameter settings, one per line, of the form name=value.
-keyType	This optional parameter defines the type of asymmetric keys to generate. This parameter is not required if the key type can be established by the presence of other parameters. (e.g. If modulusBits and/or publicExponent parameters are present, then -keyType=RSA is redundant). Currently, only RSA key pairs are supported.
-label	This optional parameter defines a label to be applied to both of the newly generated keys. If a multiple word label is required, the label value must be enclosed within quotation marks.
-labelPublic	This optional parameter defines a label to apply to the public key from the newly generated key pair.
-labelPrivate	This optional parameter defines a label to apply to the private key from the newly

Parameter	Description
	generated key pair.
-modifiable	This optional parameter defines the modifiable setting for each of the keys in the key pair. It must be set to True or False (or 1 or 0).
-id	This optional parameter defines the Id field for the newly generated keys. It must be set to a big-endian hexadecimal integer value.
-startDate	This optional parameter defines the startDate field for the newly generated keys. The format for the value is YYYYMMDD.
-endDate	This optional parameter defines the endDate field for the newly generated keys. The format for the value is YYYYMMDD.
-subject	This optional parameter defines the subject field for the newly generated keys. It must be set to a big-endian hexadecimal integer value. The subject field is typically set to the DER encoding of the subject distinguished name for the key.
-encrypt	This optional parameter defines the encrypt setting for the public key in the newly generated key pair. It must be set to True or False (or 1 or 0), with False being the default. If this parameter is set to True, then the decrypt setting for the private key should also be set to True. Note that an HSM is often configured such that no key can have multiple functions. Thus if encrypt is set True, then wrap and verify need to be False.
-decrypt	This optional parameter defines the decrypt setting for the private key in the newly generated key pair. It must be set to True or False (or 1 or 0), with False being the default. If this parameter is set to True, then the encrypt setting for the public key should also be set to True. Note that an HSM is often configured such that no key can have multiple functions. Thus if decrypt is set True, then unwrap and sign need to be False.
-sign	This optional parameter defines the sign setting for the private key in the newly generated key pair. It must be set to True or False (or 1 or 0), with False being the default. If this parameter is set to True, then the verify setting for the public key should also be set to True. Note that an HSM is often configured such that no key can have multiple functions. Thus if sign is set True, then unwrap and decrypt need to be False.
-verify	This optional parameter defines the verify setting for the public key in the newly generated key pair. It must be set to True or False (or 1 or 0), with False being the default. If this parameter is set to True, then the sign setting for the private key should also be set to True. Note that an HSM is often configured such that no key can have multiple functions. Thus if verify is set True, then encrypt and wrap need to be False.
-wrap	This optional parameter defines the wrap setting for the public key in the newly generated key pair. It must be set to True or False (or 1 or 0), with False being the default. If this parameter is set to True, then the unwrap setting for the private key should also be set to True. Note that an HSM is often configured such that no key can have multiple functions. Thus if wrap is set True, then encrypt and verify need to be False.
-unwrap	This optional parameter defines the unwrap setting for the private key in the newly

Parameter	Description
	generated key pair. It must be set to True or False (or 1 or 0), with False being the default. If this parameter is set to True, then the wrap setting for the public key should also be set to True. Note that an HSM is often configured such that no key can have multiple functions. Thus if unwrap is set True, then decrypt and sign need to be False.
-extractable	This optional parameter defines the extractable setting for the private key in the newly generated key pair. It must be set to True or False (or 1 or 0), with False being the default.
-curvetype	This optional parameter defines the name of a curve type for ECDSA keys. Enter values 1-5 (1-NISTP 192 / 2-NISTP 224 / 3-NISTP 256 / 4-NISTP 384 / 5-NISTP 521).
-prime	This optional parameter defines a prime length for DSA key generation.
-subprime	This optional parameter defines a subprime bits length for DSA key generation.
-base	This optional parameter defines a base length for DSA key generation.

Example

RSA

```
C:\Program Files\SafeNet\LunaClient>cmu gen -modulusBits=2048 -publicExp=65537 -sign=T -verify=T
Select token
[1] Token Label: myPartition1
[2] Token Label: myPartition1
Enter choice: 2
Please enter password for token in slot 2 : ******************
C:\Program Files\SafeNet\LunaClient>cmu list
Select token
[1] Token Label: myPartition1
[2] Token Label: myPartition1
Enter choice: 2
Please enter password for token in slot 2 : ******************
handle=14       label=NewPublicVerifyingKey
handle=15       label=NewPrivateSigningKey
C:\Program Files\SafeNet\LunaClient>
```

DSA - Domain Parameters at Command Line

```
cmu generatekeypair -keytype DSA -slot 6 -prime 0xfcec6182e-
b206b43c03e36c0ead-
abff56a0c2e79def44bc8f2e53699096d1ff270f159785d756921dbff9773ae08483b662fc07df7512ff68b2e5565fd7982e20c244
 -subprime 0xd3807353b51c5f71b22ac3d0c7e394148fcedc61 -base
0x42e3778e6ec31b0d-
b07a6b370d7f-
b6fb4a0bca6deaac371f6adbcbeba38ddf76a47c3c3d79276a0e579ce4e347180fd9b4ad461d6cf0eac51fb08cf452f624570051e5
```

DSA - Domain Parameters Entered Interactively

```
cmu generatekeypair -keytype DSA -slot 6
The prime, subprime and base values must be entered as a HEX byte array.
```



```
For example, to enter a 1024-bit prime value, enter a 128-byte HEX byte array using this format:
0xa0383ee692f8...
 The prime value can be a 1024-bit, 2048-bit or 3072-bit value.
Enter a prime value: 0xfcec6182e-
b206b43c03e36c0eadabff56a0c2e79def44bc8f2e53699096d1ff270f159785d7 56921d-
bff9773ae08483b662fc07df7512ff68b2e5565fd7982e20c244832aba121cc0799cc09f2d5414d5f3966211365f
51b83e9ffcccb3d88cdf238f7c2739131ca7aadff662fec1fb0e1d311a404260376fd011fe00d0204c3
Enter a 160 bit subprime value: 0xd3807353b51c5f71b22ac3d0c7e394148fcedc61
Enter a 1024-bit base value: 0x42e3778e6ec31b0d-
b07a6b370d7fb6fb4a0bca6deaac371f6adbcbeba38ddf76a47 c3c3d79276a0e579ce4e347180f-
d9b4ad461d6cf0eac51fb08cf452f624570051e518a75a5bb9c3578a14fd4f27f795b22
acea62b1fdf1032c1266da081c7fb99c4266626587093fd381617238ee1578fc325548dc1c08e5f9322c3b1205e
```


cmu getattribute

This function outputs any viewable attributes for an object. An optional output filename can be used to direct the output to a file.

Syntax

cmu getAttribute <parameters>

Required Parameters

Parameter	Description
-handle=<handle#>	The handle to the object. The parameter "-handle" is followed by an equal sign "=", followed by the handle of the object (no spaces). If this parameter is omitted and there is only one object on the HSM, that object is automatically selected. If this parameter is omitted and there are multiple objects on the HSM, you are prompted to select the object.

Optional Parameters

Parameter	Description
-attributes	This optional parameter lists the attributes to be displayed for the object as a comma separated list. Multiple instances of this option can also be used to define multiple attributes. If this parameter is omitted, all viewable attributes are displayed.
-outputFile	This optional parameter defines the filename to which the attribute set is written. If this parameter is omitted, the attribute set is written to the display.

Example

The following command outputs all of the viewable attributes for the object with handle 46

```
cmu getAttribute -handle=46
```

The following command outputs the label, public exponent and modulus of key 9 to file **keydata.txt**.

```
cmu getAttribute -handle=9 -attribute=label,publicExponent,modulus -outputFile=keydata.txt
```


cmu getpkc

Retrieve a Public Key Confirmation from the HSM.

Syntax

cmu getpkc

Optional Parameters

Parameter	Description
-handle=<handle#>	The handle to the corresponding private key for the PKC. The parameter "-handle" is followed by an equal sign "=", followed by the handle of the object (no spaces).
-outputfile	This mandatory parameter defines the name of the file that receives the PKC.
-pkctype	This mandatory parameter defines the PKC type (1 - TC-TrustCenter, 2 - Chrysalis-ITS).
-verify	This optional parameter sets a flag to verify the PKC against the certificate that signed the PKC. It must be set to True or False (or 1 or 0), with False being the default.

Example

```
cmu getpkc -handle=5 -pkctype=1
```

cmu import

This function imports X.509 certificates from a file to the token or HSM. The file may include a single DER encoded binary certificate or a CMSS PKCS #7 certificate or certificate set. Either type of certificate can be binary or PEM (base 64) encoded. An optional label can be defined as a function parameter. If omitted, the common name of the certificate subject is chosen as the label.

Syntax

cmu import

Required Parameters

Parameter	Description
-inputFile	This parameter defines the name of the file containing the certificate to import.

Optional Parameters

Parameter	Description
-label	This parameter defines a label to apply to the imported certificate. If no label is defined, the Common Name portion of the certificate Subject distinguished name is used instead.

Example

The following example inputs the certificate in **test.cer**

cmu importkey

This function unwraps an RSA, DSA , or ECDSA private key onto the selected token or HSM. The key file may be in any of the following formats:

- PKCS #12(PFX) RSA in a DER-encoded format (.pfx file)
- PKCS #8(Unencrypted PrivatekeyInfo) in RSA or DSA in base 64 PEM, or binary DER format
- PKCS #1 (RSA in base64 PEM, or binary DER) format.

Syntax

cmu importkey <parameters>

Required Parameters

Parameter	Description
-in (Filename)	This parameter defines the full path to the file containing the key to import.
-keyarg (DSA|RSA|ECDSA)	Specifies the key's algorithm.

Optional Parameters

Parameter	Description
-PKCS8	Indicates that the key to import is formatted according to the PKCS#8 standard.
-PKCS12	Indicates that the key to import is formatted according to the PKCS#12 standard. *Note that only the private key portion is unwrapped onto the token. Any certificates in this file are simply ignored. It is assumed that you properly export a PKCS #12 key from Windows keystore (or other source, as appropriate).
-wrapkey (handle)	The handle of the existing key that is to be used as the wrapping key. *Note that this key must have the CKA_WRAP attribute set to true. If this flag is not specified the default behaviour is to autogenerate a 3DES key for the sole purpose of unwrapping the key onto the HSM.
-setkeyattr	Allows the user to manually enter the imported key's attributes. Modifiable key attributes are CKA_DECRYPT, CKA_SIGN, CKA_EXTRACTABLE, and CKA_UNWRAP. The defaults are always 1=true.

Example

```
cmu importkey -in rawrsa1028.pem -keyalg RSA -wrapkey 11 -setkeyattr

cmu importkey -pkcs8 -in pk8privkey.pem -keyalg DSA-keyalg DSA

cmu importkey -in rsakey.pem -keyalg RSA -wrapkey 11
```



```
cmu importkey –in rsakey.pem –keyalg RSA

cmu importkey –PKCS12 –in p12.pfx –keyalg RSA
```

Notes

1. Ideally the private key should be in PKCS#8 format (privatekeyinfo) and not encrypted.
   To convert a private key of either RSA or DSA type: (see PKCS#1 for RSA and PKCS#11 (11.9) for DSA) into a PKCS#8 structure, use the following openssl command:
   openssl pkcs8 -in key.pem -topk8 –nocrypt -out noenckey.pem
2. In the option to the command, the "PKCS" should be in all uppercase letters, as "cmu importkey -PKCS8" or "cmu importkey -PKCS12".
3. If the PKCS#8 structure is already encrypted according to the PKCS#5-PBE standard, then to import via CMU, use the following command:
   openssl pkcs8 -in pk8.pem -out key.pem
   *You will be prompted for the password to decrypt the PrivateKeyInfo.
4. You can export the PrivatekeyInfo contents of a .pfx file by using the following openssl command: openssl pkcs12 –in p12.pfx –out pk12_privkey.pem –nocerts –nodes
   *You will be prompted for the password to decrypt the PrivateKeyInfo.

cmu list

This function lists all objects (keys, certificates and other general data objects) on the HSM that match an optional set of search criteria and that are accessible given the authentication state of the HSM. Search criteria can include many of the object attributes that are available for searching via the PKCS #11 API. If no search criteria are defined, all accessible objects are returned. The content of the entries in the returned list is definable and can include the object handle and/or any combination of viewable object attributes. The default is to include the handle and the label (CKA_ LABEL).

Syntax

cmu list <parameters>

Required Parameters

None

Optional Parameters

Parameter	Description
-display	This is a comma-separated list of attributes to be displayed for each returned object in the list. Multiple attributes can also be specified by repeated use of the display option instead of using the comma-separated list. The attributes supported with the display option are index, handle, class, keyType, label and value. If this parameter is omitted, only the handle and the label are displayed.
-class	This option defines the class of object to list. It can be set to any of data, certificate, public, private and secret.
-keyType	This option specifies the type of keys to list. It can be set to any of rsa, dsa, dh, des, 2des, 3des, rc2, rc4, rc5, cast3, cast5 and generic.
-certificateType	This option specifies the type of certificate to list. It can only be set to x.509 if used.
-label	This option specifies the label that objects must match in order to be listed.
-application	This option specifies the application attribute that objects must match in order to be listed.
-value	This option specifies the value that objects must match in order to be listed.
-issuer	This option specifies the issuer that objects must match in order to be listed.
-serialNumber	This option specifies the serial number that objects must match in order to be listed.
-subject	This option specifies the subject that objects must match in order to be listed.
-id	This option specifies the id that objects must match in order to be listed.
-token	This option specifies whether permanent or temporary objects are to be listed. It can be set to True or 1 for permanent objects and False or 0 for temporary objects.

Parameter	Description
-private	Set to True or False (or 1 or 0).
-sensitive	Set to True or False (or 1 or 0).
-alwaysSensitive	Set to True or False (or 1 or 0).
-extractable	Set to True or False (or 1 or 0).
-neverExtractable	Set to True or False (or 1 or 0).
-local	Set to True or False (or 1 or 0).
-encrypt	Set to True or False (or 1 or 0).
-decrypt	Set to True or False (or 1 or 0).
-sign	Set to True or False (or 1 or 0).
-verify	Set to True or False (or 1 or 0).
-wrap	Set to True or False (or 1 or 0).
-unwrap	Set to True or False (or 1 or 0).
-derive	Set to True or False (or 1 or 0).
startDate	This option specifies the start date that objects must match in order to be listed.
endDate	This option specifies the end date that objects must match in order to be listed.
modulusBits	This option specifies the modulus size that RSA keys must match in order to be listed.
publicExponent	This option specifies the public exponent value that RSA keys must match in order to be listed. It can only be set to 3, 17 or 65537.
- modifiable	Set to True or False (or 1 or 0).

Example

The following example displays the handle and label of each certificate that is accessible on the HSM:

```
cmu list -class=certificate
```

The following example displays the handles of all locally generated RSA private signing keys on the HSM:

```
cmu list -keyType=rsa -local=True -sign=True -display=handle
```

The following example displays the class, type and label of all signing keys on the HSM:

```
cmu list -display=class,keyType,label -sign=True
```


cmu requestcertificate

This function creates a PKCS #10 certificate request for an RSA/DSA/ECDSA key pair on the token or HSM. It must be provided with the handle either to the public key or to the corresponding private key (all of the public key components are contained within the private key). The private key must have Signing capability because it is used to sign the certificate request structure. The signature is done using any of the mechanisms listed below. The subject name is defined by a series of optional RDN components.

If none of these components are provided on the command line, the CKA_SUBJECT of the private key is used as the subject of the certificate request. If the private key does not have its CKA_SUBJECT attribute set, the user will be queried for each of the RDN components. The Subject DN should contain at least the country, organization and common name components.

The signed certificate request is output to the specified file.

Syntax

cmu requestCertificate <parameters>

Required Parameters

Parameter	Description
-publichandle= <pubkeyhandle#>	This is a mandatory parameter that defines the handle to the public key from an RSA key pair to be certified. If this parameter is omitted and there is only one public signing key on the HSM, that key is automatically selected. If this parameter is omitted and there are multiple public signing keys on the HSM, the user is asked to select the public signing key.
-privatehandle =<privkeyhandle#>	This is a mandatory parameter that defines the handle to the private key from an RSA key pair to be certified. If this parameter is omitted and there is only one private signing key on the HSM, that key is automatically selected. If this parameter is omitted and there are multiple private signing keys on the HSM, the user is asked to select the private signing key.
-outputFile	This mandatory parameter defines the file that receives the certificate request.

Optional Parameters

Parameter	Description
-binary	This is an optional parameter that defines the certificate request format to be raw binary instead of the default PEM (base64) encoding.
-md5WithRsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-MD5withRSAEncryption. The default is to use sha1WithRsa.
-sha1WithRsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-SHA1withRSAEncryption. The default is to use sha1WithRsa.
- sha224withrsa	This is an optional parameter that defines the signature algorithm for the certificate

Parameter	Description
	request to be pkcs-1-sha224withRSAEncryption. The default is to use sha1WithRsa.
- sha256withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha256withRSAEncryption. The default is to use sha1WithRsa.
- sha384withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha384withRSAEncryption. The default is to use sha1WithRsa.
- sha512withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha512withRSAEncryption. The default is to use sha1WithRsa.
- sha1withdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha1withDSAEncryption. The default is to use sha1WithRsa.
- sha1withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha1withECDSAEncryption. The default is to use sha1WithRsa.
- sha224withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha224withECDSAEncryption. The default is to use sha1WithRsa.
- sha256withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha256withECDSAEncryption. The default is to use sha1WithRsa.
- sha384withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha384withECDSAEncryption. The default is to use sha1WithRsa.
- sha512withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha512withECDSAEncryption. The default is to use sha1WithRsa.
-C	This optional parameter defines the two-letter country name for the subject distinguished name (DN) of the certificate request. This parameter should be present in the subject DN.
-S	This optional parameter defines the state or province name for the subject distinguished name of the certificate request. This parameter may be present in the Subject DN.
-L	This optional parameter defines the locality (typically the city) for the subject distinguished name of the certificate request. This parameter may be present in the Subject DN.
-O	This optional parameter defines the organization name for the subject distinguished name (DN) of the certificate request. This parameter should be present in the subject DN.
-OU	This optional parameter defines the organization unit name for the subject distinguished name (DN) of the certificate request. This parameter may be present in the subject DN

Parameter	Description
-CN	This optional parameter defines the common name for the subject distinguished name (DN) of the certificate request. This parameter should be present in the subject DN.

Example

The following example creates a PEM encoded PKCS #10 certificate request for key 6:

```
cmu requestCert -publichandle=6 -privatehandle=7 -C=CA -L=Ottawa -O="Rainbow-Chrysalis" -
CN="Test Certificate" -outputFile=testCert.req
```


cmu selfsigncertificate

This function creates a self-signed X.509 certificate for an RSA, DSA, or ECDSA key pair on the token or HSM. It must be provided with the handles to both the public key and the corresponding private key (all of the public key components are contained within the private key). The private key must have Signing capability since it is used to sign the certificate request structure. The signature is done with any of the mechanisms listed below. The subject name is defined by a series of optional RDN components.

If none of these components are provided on the command line, the CKA_SUBJECT of the private key is used as the subject of the certificate. If the private key does not have its CKA_SUBJECT attribute set, the user will be queried for each of the RDN components. The Subject DN should contain at least the country, organization and common name components.

The certificate will, by default, have a keyUsage setting of keycertsign. The certificate is stored as a PKCS #11 certificate object on the token. The CKA_ID attribute of the certificate is defined by an optional parameter. If this parameter is omitted, the CKA_ID of the private key is used.

Syntax

cmu selfSignCertificate <parameters>

Required Parameters

Parameter	Description
-publichandle= <pubkeyhandle#>	This is a mandatory parameter that defines the handle to the public key from an RSA key pair to be certified. If this parameter is omitted and there is only one public signing key on the HSM, that key is automatically selected. If this parameter is omitted and there are multiple public signing keys on the HSM, the user is asked to select the public signing key.
-privatehandle =<privkeyhandle#>	This is a mandatory parameter that defines the handle to the private key from an RSA key pair to be certified. If this parameter is omitted and there is only one private signing key on the HSM, that key is automatically selected. If this parameter is omitted and there are multiple private signing keys on the HSM, the user is asked to select the private signing key.
-startDate	This parameter defines the validity start of the certificate, in the format YYYYMMDD.
-endDate	This parameter defines the validity end of the certificate, in the format YYYYMMDD.
-serialNumber	This parameter defines the serial number of the certificate, in big-endian hexadecimal form.

Optional Parameters

Parameter	Description
-keyusage	This is an optional parameter that defines the key usage extension for the certificate. It can be set to any of the following: digitalsignature, nonrepudiation, keyencipherment,

Parameter	Description
	dataencipherment, keyagreement, keycertsign, crlsign, encipheronly, decipheronly. This parameter may appear more than once in the parameter set to define multiple usages, or it can be used once with a comma separated list of usage types. If no key usage is specified, a default setting of keycertsign is used.
-label	This is an optional parameter that defines the CKA_LABEL attribute for the certificate object that gets created on the HSM. If omitted, the common name of the issuer and subject DN is used instead.
-id	This is an optional parameter that defines the CKA_ID attribute for the certificate object that gets created on the HSM. If omitted, the CKA_ID attribute of the private key is used instead.
-md5WithRsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-MD5withRSAEncryption. The default is to use sha1WithRsa.
-sha1WithRsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-SHA1withRSAEncryption. The default is to use sha1WithRsa.
- sha224withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha224withRSAEncryption. The default is to use sha1WithRsa.
- sha256withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha256withRSAEncryption. The default is to use sha1WithRsa.
- sha384withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha384withRSAEncryption. The default is to use sha1WithRsa.
- sha512withrsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha512withRSAEncryption. The default is to use sha1WithRsa.
- sha1withdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha1withDSAEncryption. The default is to use sha1WithRsa.
- sha1withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha1withECDSAEncryption. The default is to use sha1WithRsa.
- sha224withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha224withECDSAEncryption. The default is to use sha1WithRsa.
- sha256withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha256withECDSAEncryption. The default is to use sha1WithRsa.
- sha384withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha384withECDSAEncryption. The default is to use sha1WithRsa.
- sha512withecdsa	This is an optional parameter that defines the signature algorithm for the certificate request to be pkcs-1-sha512withECDSAEncryption. The default is to use

Parameter	Description
	sha1WithRsa.
-C	This optional parameter defines the two-letter country name for the subject distinguished name (DN) and issuer Distinguished Name of the certificate. This parameter should be present in each DN.
-S	This optional parameter defines the state or province name for the subject DN and issuer DN of the certificate. This parameter may be present in each DN.
-L	This optional parameter defines the locality (typically the city) for the subject DN and issuer DN of the certificate. This parameter MAY be present in each DN.
-O	This optional parameter defines the organization name for the subject DN and issuer DN of the certificate. This parameter SHOULD be present in each DN.
-OU	This optional parameter defines the organization unit name for the subject DN and issuer DN of the certificate. This parameter MAY be present in each DN.
-CN	This optional parameter defines the common name for the subject DN and issuer DN of the certificate. This parameter SHOULD be present in each DN.

Example

The following example creates a self-signed certificate for RSA key 4:

```
cmu selfSign -publichandle=4 -privatehandle=5 -C=CA -O=Rainbow-Chrysalis -CN="Test Root Cer-
tificate" -startDate=20120101 -endDate=20151231 -serialNum=0133337f
```


cmu setattribute

This function sets any modifiable attributes for an object. An optional input filename can be used to specify a file from which the new attribute values are to be read.

Syntax

cmu setAttribute <parameters>

Required Parameters

Parameter	Description
-handle=<handle#>	This is a mandatory parameter that defines the handle to the object on the HSM. If this parameter is omitted and there is only one object on the HSM, that object is automatically selected. If this parameter is omitted and there are multiple objects on the HSM, the user is asked to select the object

Optional Parameters

Parameter	Description
-inputFile	This optional parameter names a file from which to obtain additional attribute settings. The settings in this file shall be one per line and of the form: attributeName=attributeValue.
-label	This optional parameter defines a new value for the label of an object on the HSM.
-application	This optional parameter defines a new value for the application attribute of a data object on the HSM.
-value	This optional parameter defines a new value attribute for an object on the HSM. It must be set to a big-endian hexadecimal integer value. Note that the value attribute can be changed only for data objects, not for certificates or keys.
-issuer	This optional parameter defines a new issuer attribute for a certificate on the HSM. It must be set to a big-endian hexadecimal integer value. Note that this field is informational, typically set to the DER encoding of the issuer field within the certificate, and changing it does not affect the actual issuer field within the certificate itself.
-serialNumber	This optional parameter defines a new serial number attribute for a certificate on the HSM. It must be set to a big-endian hexadecimal integer value. Note that this field is informational, typically set to the DER encoding of the serial number of the certificate, and changing it does not affect the actual serial number field within the certificate itself.
-subject	This optional parameter defines a new subject field for an object on the HSM. It must be set to a big-endian hexadecimal integer value. The subject field is typically set to the DER encoding of the subject distinguished name for the key or certificate. Note that the subject is not modifiable for certificate objects once they are created.

Parameter	Description
-id	This optional parameter defines a new ID field for a key or certificate on the HSM. It must be set to a big-endian hexadecimal integer value.
-extractable	This optional parameter defines a new extractable setting for a private key on the HSM. This setting can only be changed from True to False (or from 1 to 0).
-encrypt	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-decrypt	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-sign	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-verify	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-wrap	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-unwrap	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-derive	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.
-startDate	This optional parameter defines a new startDate field for a key on the HSM. The format for the value is YYYYMMDD.
-endDate	This optional parameter defines a new endDate field for a key on the HSM. The format for the value is YYYYMMDD.
-sensitive	Set to True or False (or 1 or 0). Note that an HSM is typically configured such that functional key attributes cannot be changed, so attempting to change this attribute will be rejected by the HSM.

Example

The following example changes the key with handle 43 to be unextractable:

```
cmu setAttribute -handle=43 -extractable=False
```


cmu verifypkc

Verify a Public Key Confirmation from the HSM.

Syntax

cmu verifypkc <parameters>

Required Parameters

Parameter	Description
-inputFile	This parameter defines the name of the file that contains the PKC.
-pkctype	This parameter defines the PKC type (1 - TC-TrustCenter, 2 - Chrysalis-ITS).

Optional Parameters

None.

Example

```
cmu verifypkc –inputFile=test.pkc –pkctype=1
```


CHAPTER 2
CKdemo

This chapter describes how to access and use the **ckdemo** demonstration utility. The **ckdemo** utility is a simple console-based tool that provides a menu of functions that perform operations based on the PKCS#11 API. The ckdemo utility is included with the Luna client and can be used with any Luna HSM.

This chapter contains the following sections:

Accessing the ckdemo Utility

The ckdemo utility is included with the Luna client. How you access it depends on whether you are using Windows or Linux/UNIX.

To access ckdemo from a Linux client

1. Go to the Luna client binary directory.

   cd /usr/safenet/lunaclient/bin

2. Launch the **ckdemo** utility

   ./ckdemo

   The ckdemo main menu is displayed. See "Using the ckdemo Menu" on page 38.

To access ckdemo from a Windows client

1. Navigate to the Luna client installation folder (**C:\Program Files\SafeNet/LunaClient**)
2. Double-click on **ckdemo** to open a console window with the **ckdemo** interface.

   The ckdemo main menu is displayed. See "Using the ckdemo Menu" on page 1.

Using the ckdemo Menu

When you launch the **ckdemo** utility, the **ckdemo** menu is displayed. The **ckdemo** menu provides access to numerous functions in several categories, as illustrated below:

Figure 1: The ckdemo menu

```
TOKEN:
( 1) Open Session  ( 2) Close Session  ( 3) Login
( 4) Logout        ( 5) Change PIN     ( 6) Init Token
( 7) Init Pin      ( 8) Mechanism List ( 9) Mechanism Info
(10) Get Info      (11) Slot Info      (12) Token Info
(13) Session Info  (14) Get Slot List  (15) Wait for Slot Event
                   (18) Factory Reset  (19) CloneMofN
OBJECT MANAGEMENT:
(20) Create object (21) Copy object    (22) Destroy object
(23) Object size   (24) Get attribute  (25) Set attribute
                   (26) Find object    (27) Display Object
(30) Modify Usage Count         (31) Destroy Multiple Objects
(32) Extract Public Key
SECURITY:
(40)  Encrypt file (41) Decrypt file   (42) Sign
(43)  Verify       (44) Hash file      (45) Simple Generate Key
                                       (46) Digest Key
HIGH AVAILABILITY RECOVERY:
(50) HA Init       (51) HA Login       (52) HA Status
KEY:
(60) Wrap key      (61) Unwrap key     (62) Generate random number
(63) Derive Key    (64) PBE Key Gen    (65) Create known keys
(66) Seed RNG      (67) EC User Defined Curves
CA:
(70) Set Domain    (71) Clone Key      (72) Set MofN
(73) Generate MofN (74) Activate MofN  (75) Generate Token Keys
(76) Get Token Cert Info               (77) Sign Token Cert
(78) Generate CertCo Cert              (79) Modify MofN
(86) Dup. MofN Keys                    (87) Deactivate MofN
(88) Get Token Certificates            (112) Set Legacy Cloning Domain
OTHERS:
(90) Self Test
(94) Open Access   (95) Close Access
(97) Set App ID    (98) Options        (100) LKM Commands
OFFBOARD KEY STORAGE:
(101) Extract Masked Object            (102) Insert Masked Object
(103) Multisign With Value             (104) Clone Object
(105) SIMExtract                       (106) SIMInsert
(107) SimMultiSign                     (118) Extract Object
                                       (119) Insert Object
SCRIPT EXECUTION:
(108) Execute Script                   (109) Execute Asynchronous Script
                                       (110) Execute Single Part Script
CLUSTER EXECUTION:
(111) Get Cluster State
```



```
PED INFO:
(120) Set Ped Info  (121) Get Ped Info  (122) Init RPV
(123) Delete RPV
AUDIT/LOG:
(130) Get Config    (131) Set Config    (132) Verify Logs
(133) Get Time      (134) Set Time      (135) Import Secret
(136) Export Secret (137) Init Audit    (138) Get Status
(139) Log External
SRK:
(200) SRK Get State (201) SRK Restore   (202) SRK Resplit
(203) SRK Zeroize    (204) SRK Enable/Disable

(TITLE) menu titles, (99 or FULL) Full Help, (NONE) No help, (0 or EXIT) Quit

Enter your choice:
```

Executing a Menu Function

To execute one of the functions listed in the menu, type the number of the function and press Enter. In general, if parameters or options are required, you are prompted to provide the additional information. Because most of the commands represent separate functions on an HSM, you may need to use more than one command to accomplish a task. For example, many of the commands require that you open a session on a token slot or HSM partition. Other commands require that you first login to the HSM or partition.

Functions that involve authentication or initialization of the HSM invoke the Luna PED for Trusted Path appliances. If the Luna PED is not connected and ready when a command is issued, the command eventually times out. If the Luna PED is connected and ready, it displays a prompt requesting the appropriate action. If you do not provide the requested PED Key or keypad press, the Luna PED eventually times out and returns an error to the calling application (in this case, ckdemo).

The individual ckdemo functions are described in detail in the following sections:

The AUDIT/LOG Menu Functions

The AUDIT/LOG menu provides the following functions:

(130) Get Config

(131) Set Config

(132) Verify Logs

(133) Get Time

(134) Set Time

(135) Import Secret

(136) Export Secret

(137) Init Audit

(138) Get Status

(139) Log External

The CA Menu Functions

The CA menu provides the following functions:

(70) Set Domain

(Not for Luna SA) This option prompts for a text string and sets the token cloning domain name to that value. To clone a key between two Luna CA3 tokens, both tokens must share the same red PED Key.

(71) Clone Key

(Not for Luna SA) This option allows you to clone a key from one Luna RA token to another (or one Luna CA3 token to another). Both tokens must have the same cloning domain name (or red PED Key). Both tokens must have an open and logged on session active.

(72) Set M of N

(Not for Luna SA) If you have a Luna CA3 token (which supports M of N authentication), this option allows you to turn on the M of N token feature. This option alone does nothing to the token, but instead sets a flag specifying that the next token to be initialized should have its M of N feature turned on (assuming, of course, that the token supports it).

(73) Generate M of N

(Not for Luna SA) This option allows you to generate M of N authentication splits, or secret shares. You can generate up to 16 shares (N), and you can specify how many of these shares are needed (M) in order to activate the token (up to 16).

(74) Activate M of N

(Not for Luna SA) This option allows you to authenticate yourself to the token using M of N secret shares generated by option #73 (Generate M of N). You must activate M of N on a token on which M of N has been generated, or you are unable to perform any cryptographic operations with the token.

(75) Generate Token Keys

(Not for Luna SA) Some tokens have the ability to support customer loaded certificates used for key cloning. If your token supports this feature, and you wish to use you own key cloning certificates (rather than the default certificates provided by SafeNet), the first step is to Generate token keys.

Note: If you do this, you are not able to clone to any other Luna CA tokens except those containing your own certificate.

(76) Get Token Cert

(Not for Luna SA) This option is the next step in loading your own key cloning certificate onto the token. This action is done after #75 (Generate Token Keys).

(77) Sign Token Cert

(Not for Luna SA) This option is the final step to load a customer key cloning certificate to the token. This step is done after Steps 75 and 76.

(78) Generate CertCo Cert

(Not for Luna SA) Generate a special-purpose certificate for CertCo application.

(79) Modify MofN

(Not for Luna SA) Modifies the secret splitting vector on a token.

(86) Dup. MofN Keys

(Not for Luna SA) Create duplicates (copies) of all MofN secret splits.

(87) Deactivate MofN

Decache the MofN data.

(88) Get Token Certificates

Extract one of the following certificates from the HSM. You must supply the type and filename of the certificate you want to extract:

- Root certificate
- Hardware origin certificate
- ECC hardware origin certificate
- TWC (token wrapping certificate) version 1, 2, or 3.
- TCTrust device authentication certificate
- CITS device authentication certificate

(112) Set Legacy Cloning Domain

This option sets the legacy Cloning Domain, from a legacy token, into association with the modern cloning domain attached to a current-model Luna HSM, to allow migration of token objects from legacy HSMs.

The CLUSTER EXECUTION Menu Functions

The CLUSTER EXECUTION menu provides the following functions:

(111) Get Cluster State

The HIGH AVAILABILITY RECOVERY Menu Functions

The HIGH AVAILABILITY RECOVERY menu provides the following functions:

(50) HA Init

(Not for Luna SA) Requires that an RSA keypair have been previously created, and the private key cloned to User space of the affected tokens. This option requires the handle to the session (of the User that owns the key pair) and the handle to the login private key itself.

(51) HA Login

(Not for Luna SA) This option initiates several functions (including creation of a TWC [Token Wrapping Certificate] blob and HA Login Challenge (secondary token in the current HA domain) and Acceptance (primary token), as described in

the document Extensions to PKCS#11, Cryptographic Token Interface Standard.

(52) HA Status

Display the current status for a specified HA slot.

The KEY Menu Functions

The KEY menu provides the following functions:

60) Wrap Key

This option allows you to encrypt a key. You must provide the encryption mechanism type, the handle of the wrapping key (used to encrypt the key), and the handle of the key to be wrapped (the one that is going to be encrypted). Currently, the wrapping of private asymmetric keys is not supported.

61) Unwrap Key

This option allows you to import a wrapped (encrypted) key into the token. You are asked for the mechanism to be used for the unwrapping operation as well as what type of key is being unwrapped. Depending on the type of key being unwrapped, you are asked for some information about the key. Then you must provide a key handle of the token key to be used in the unwrapping (decryption) operation, and finally, give the name of the file containing the wrapped key.

62) Generate Random

Number This option generates a specified amount of random data. You are asked how many bytes of random data to generate and then are presented with the random value.

63) Derive Key

This option allows you to use a key derivation mechanism to derive a key on the token. There are several key derivation mechanisms to choose from, and you are presented with a menu of the choices.

64) PBE Key Generation

This option allows you to perform a "Password Based Encryption" key generation. This option is useful because it allows you to put the same key on multiple tokens without ever knowing the key value itself.

65) Create Known Keys

This option attempts to load a known key onto the token. However, due to policy setting on most tokens, this option is not allowed. As an alternative, it is possible to encrypt a known key and then unwrap it onto the token. See the Unwrap Key sample code on the SDK distribution CD.

66) Seed RNG

Provide a seed value to the HSM's Random Number Generator.

67) EC User Defined Curves

Set the desired attributes and point to a file containing Elliptical Curve parameters for generating EC keys.

The OBJECT MANAGEMENT Menu Functions

The OBJECT MANAGEMENT menu provides the following functions:

(20) Create Object

This option allows you to create objects on the token. You can use this option to create data or certificate objects on the token. You are presented with a default template for your new object that you can change or choose to accept as default.

> **Note:** Key generation is not done with this option, instead you should use option #45 - Generate Key

(21) Copy Object

This option allows you to make a copy of a token object and allows you to add/remove/change attributes of the object as you copy it.

(22) Destroy Object

This option allows you to permanently delete a token object from the token.

(23) Object Size

This option asks you for an object handle and returns the total size of the object (how much memory it is occupying on the token).

(24) Get Attribute

This option asks you for an object handle and returns the attributes of that object.

(25) Set Attribute

This option allows you to change the value of an attribute on an object that already exists on the token.

(26) Find Objects

This option searches the token for objects that are available to you as the User or the SO (depending on which identity you used to log in). You specify a type (such as Data Objects, various Key objects, Certificate Objects, etc.). Option (#6) shows all the objects on the token.

(27) Display Object

This option shows all the attributes and associated values for an object on the token (if that object is available to you).

Note: If a key is sensitive, it contains an attribute called CKA_VALUE but this attribute is not displayed because the token does not allow this information to be exported.

(30) Modify Usage Count

This option allows you to increment the current value, or specify a new value, for an object's usage counter. You are prompted for the object handle and whether you want to increment or reset the usage counter for the specified object.

(31) Destroy Multiple Objects

This option allows you to permanently delete multiple token objects from the selected token.

(32) Extract Public Key

This option allows you to specify a public key to extract from the HSM. The key is saved as **publickey.bin** in the current directory, overwriting any existing **publickey.bin** file.

Note: The Extractable attribute must be set to 1 (on) in order for a public key to be extracted from the HSM.

The OFFBOARD KEY STORAGE Menu Functions

The OBJECT MANAGEMENT menu provides the following functions:

(101) Extract Masked Object

Extracts a key off the Luna SA in a masked format, into a file “masked.key”. You can rename the resulting file if you are testing with multiple extractions.

(102) Insert Masked Object

Inserts an extracted, masked blob (file) back onto the Luna SA. You are prompted for the name of the file, which must have been extracted from a Luna SA using the same masking key (i.e., the same Luna SA or a clone of it).

(103) Multisign With Value

Performs the multisign function, after prompting you for the mechanism to use, the number of datablobs to be signed (limited to 5 for this demonstration command), and the data or filenames to be signed.

(104) Clone Object

(Reserved for SafeNet use)

(105) SIMExtract

(106) SIMInsert

(107) SimMultiSign

(118) Extract Object

(119) Insert Object

The OTHERS Menu Functions

The OTHERS menu provides the following functions:

90) Self Test

Not currently supported.

94) Open Access

Creates a token access ID that is independent of any sessions so that the login state can be maintained even when your application exits. Used to allow the same application to return repeatedly for access without requiring a separate login each time. Remains active until Closed (command 95, below) or until the token is removed.

95) Close Access

Kills the ID generated by command 94, above.

97) Set App ID

You are prompted to type in an explicit application ID (in two parts, Major and Minor), rather than having it generated by Chrystoki. Doing so effectively causes all processes (using that Major/Minor application ID) on the machine to be recognized as the same application. Refer to the PKCS#11 Extensions document.

98) Options

This item allows you to change some default options of the CKDemo program. You can turn off help (which prevents the entire menu from being displayed after each command), or select the type of session you wish the Open Session command to use. Use option #0 to exit this menu and return to the CKDemo main menu.

100) LKM Commands

The PED INFO menu functions

The PED INFO menu provides the following functions:

120) Set PED Info

Specify the PED (local or remote) that is associated with the HSM in a specific slot.

121) Get PED Info

Display information describing the PED that is associated with the HSM in a specific slot.

122) Init RPV

Create a Remote PED Vector, and imprint it onto an orange Remote PED Key (RPK), to allow PED functions with a remotely located Luna HSM (which must also have the same RPV).

123) Delete RPV

Remove the Remote PED Vector from the current HSM. Disallows Remote PED operation for this HSM until (if) a new RPV is created or an existing RPV is acquired from an imprinted RPK.

The SCRIPT EXECUTION Menu Functions

The SCRIPT EXECUTION menu provides the following functions:

(108) Execute Script

(109) Execute Asynchronous Script

(110) Execute Single Part Script

The SECURITY Menu Functions

The SECURITY menu provides the following functions:

(40) Encrypt File

This option allows you to encrypt a file. You are asked which encryption mechanism you wish to use, then the filename of the file to be encrypted, and finally the key handle of the key to be used in the encryption operation.

(41) Decrypt File

This option allows you to decrypt an encrypted file. You are asked for the encryption mechanism to use to decrypt the file, name of the file to be decrypted, and the handle of the key to be used for the decryption.

(42) Sign

This option signs a string of data using a token signing mechanism. You are prompted for the signing mechanism that you wish to use, the data to be signed, and the key handle of the signing key (private key when using a Private/Public key pair).

Note: This option takes in a string of data to be signed from the keyboard, rather than a filename of a file containing the data (like encryption does). The signature is saved to a file called SIGN.BIN

(43) Verify

This option verifies a signature against a string of data. You are prompted for the mechanism to be used for verification, the data to be verified and the key handle of the verification key. The signature is read from the file SIGN.BIN that is generated during the sign operation.

(44) Hash

File This option prompts for the hashing mechanism to be used, and the name of the file to be hashed. The hash value is saved to a file called DIGEST.HSH at the end of the operation.

(45) Simple Generate Key

This option performs key generation on the token. You are presented with a menu of possible key types. Depending on the key type being generated, you are asked a list of question about the attributes of the key(s).

(46) Digest Key

This option prompts for a digest mechanism and a key handle. The key value is digested using the selected mechanism.

The SRK Menu Functions

The SRK menu provides the following functions:

(200) SRK Get State

Shows the current state of the Master Tamper Key.

(201) SRK Restore

Gets the external split (SRK) of the Secure Recovery Vector from a connected Luna PED, combines it with the internally-stored split, to regenerate the SRV, and re-validates the MTK

(202) SRK Resplit

Performs a new split of the Secure Recovery Vector and places the external portion of the split onto a PED Key (purple-labeled key called the Secure Recovery Key or SRK).

(203) SRK Zeroize

Zeroize the SRK. This action simulates a hardware tamper.

(204) SRK Enable/Disable

Enable splitting of the Secure Recovery Vector into an internal (to the HSM) portion and an external portion (stored on a purple PED Key). Or, disables that function by bringing the external split back into the HSM (requires Luna PED and the purple PED Key with the correct SRV split on it - that purple key then becomes invalid).

The TOKEN Menu Functions

The TOKEN menu provides the following functions:

(1) Open Session

Before you can manipulate objects or perform cryptographic operations on a token, you must have an open session on that token. This command prompts you for the number of the slot on which to open the new session. By default, an exclusive, Read/Write session is opened. If you would like to open a read only or non-exclusive session, you must use the **(98) Options** function and specify that you want to be prompted for session types. See

(2) Close Session

Session Once you are finished using a session, the session should be closed. The Close Session option allows you to close a single session, or to close all the sessions on a specific token.

(3) Login

Once a session is opened, you usually log on to the token. You have a choice between logging on as a User (where you do most of your work with the token) or as Security Officer "SO" (Where you can set up the user PIN and do any token administration operations).

(4) Logout

When you are finished with the token, you should first log out, then close the session.

(5) Change PIN

(Not for Luna SA) This option lets you change the logon password (the PIN) of the currently logged in user. You must supply both the old PIN and the new PIN to complete the operation.

(6) Init Token

(Not for Luna SA) This option allows you to reset a token to its initial state. You are prompted for the following:

- the slot containing the token to be initialized
- the token label (which is simply a text string that you can use for Token Identification)
- a new password for the Security Officer.

Token initialization performs the following actions:

- wipes out any token objects (Keys, certificates, etc)
- clears the user PIN (so that it must be reset by the Security Officer)
- sets the SO PIN to the value that you have specified.

(7) Init PIN

(Not for Luna SA) This command is used to create a user (and thus overwrites an existing user) and is run when you are logged in as the Security Officer.

(8) Mechanism List

This option gives a list of all the encryption/authentication/hashing/key-generation mechanisms supported by the token. If you want to know if the token supports a specific type of encryption, you can check for it in the mechanism list.

(9) Mechanism Info

This option allows you to query a specific mechanism (option #8 - Mechanism List presents a list of them) to find such information as supported key sizes. You are asked for the Mechanism type, which is a numeric value representing the mechanism (these numeric values are given when you request a mechanism list).

(10) Get Info

This option returns basic information on the Dynamic Library that is being used to talk to the token. None of this information is token specific, and it can be viewed even if there is no token present.

11) Slot Info

This option gives specific information on a card slot. The slot description and slot ID are given, as well as some flags to represent if a token is present.

12) Token Info

This option gives information on a token in a specific slot, including the following:

- Token Label

- Token Manufacturer
- Token Model
- Token Flags
- Session Count
- Min and Max PIN Lengths
- Private memory size/free
- Public memory size/free

13) Session Info

This option gives information on an open session. You must have at least one session opened to query session information. For a particular session you can find the session handle, the slot ID, the session state, and any associated session flags.

14) Get Slot List

This option returns a list of card slots available on the system. You are given the option to view all slots, or just the slots which contain tokens.

15) Wait for Slot Event

Runs CK_WaitforSlotEvent (from PKCS#11 Extensions)

18) Factory Reset

This option resets the HSM to its factory settings.

19) Clone M of N

(Not for Luna SA) Copy a clonable secret-splitting vector from one token to another.

CHAPTER 3
Lunadiag

This chapter describes how to use the **lunadiag** utility. It contains the following sections:

Lunadiag Utility

Lunadiag is a diagnostic tool for SafeNet Luna card products. In general, you may never need to use it, other than to confirm a successful Luna installation. If you experience problems with a Luna product and need to contact Customer Support, you may be asked to perform additional tests with Lunadiag, as part of the troubleshooting process. In that circumstance, the support representative will instruct you. Several menu items are self-explanatory. The more obscure items are of interest only to Technical Support in very specific circumstances.

However, if you are an application developer, you may wish to use Lunadiag during your software-development. You have the option to run Lunadiag from the command line of a console window. From the command line, the syntax for for Lunadiag is:

lunadiag [-s=num] [-o=num] [-c=num] <[options]>

Where

`-s=num` Number of slots to test at once.

(Range: 1..64; default: 1)

`-o=num` Offset into slots to begin testing

(Range: 1..64; default: 1)

`-c=num` Command to run (Range: 1..12)

for example, `lunadiag -s=1 -o=1 -c=11`

The spaces are required. The following additional options can be executed, and exit immediately without user prompt.

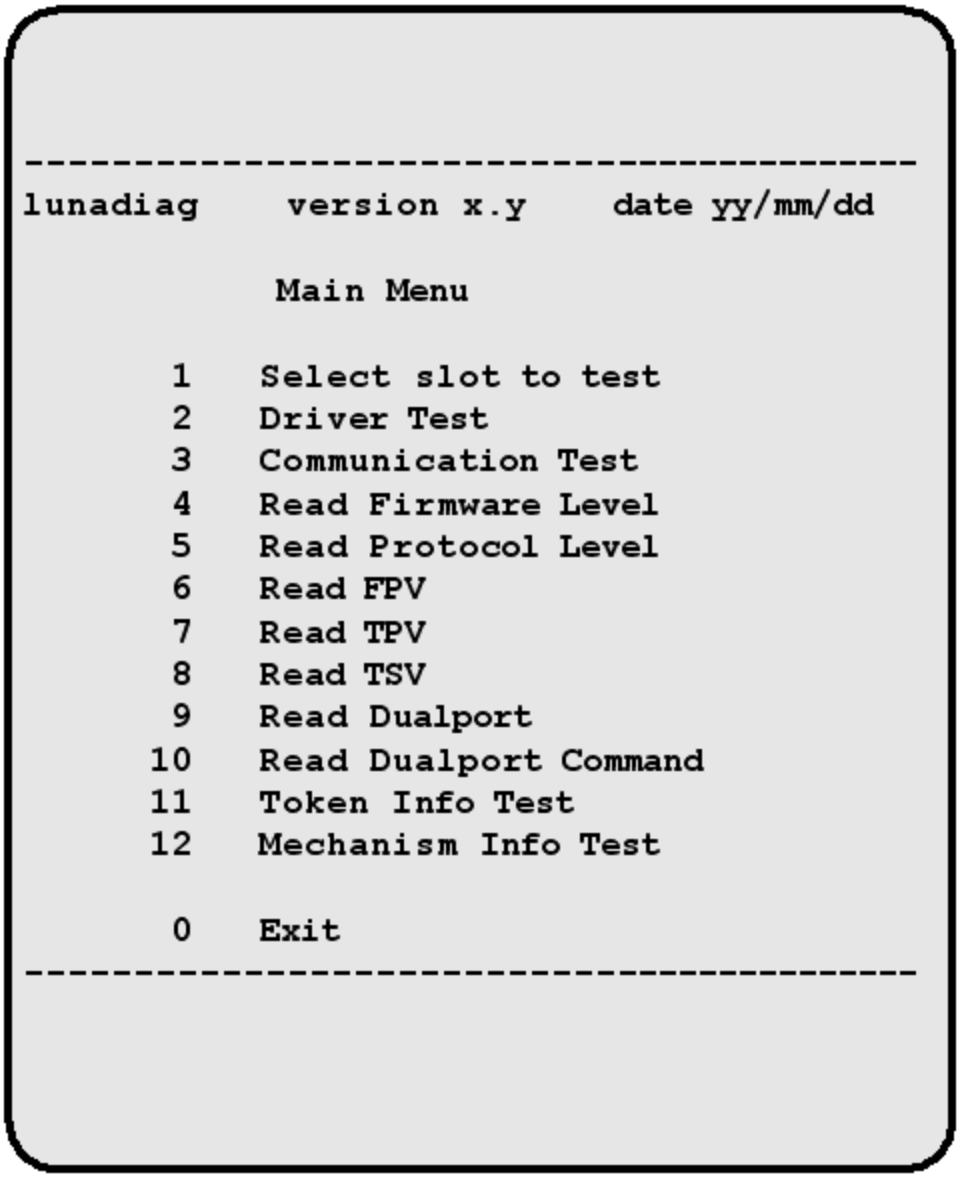
`-CHRYSTOKI` Perform the Chrystoki Library configuration test.

`-DUALPORT` Dump dualport.

`-FIPS` Test for FIPS setting for one token.

Exit code 1 implies FIPS enabled.

Verify Successful Installation



If you can run tests

2 Driver Test

3 Communication Test

and

4 Read Firmware Level

successfully (if they do not return error messages) then the installation was successful.

If there is a problem, check the cable connections to your card reader.

If there is still a problem, remove and re-install the Luna software.

If problems persist, contact Customer Support.

CHAPTER 4
Multitoken

This chapter describes how to access and use Multitoken, a simple demonstration tool that allows you to perform basic cryptographic functions on a Luna HSM. It contains the following topics:

Accessing Multitoken

The multitoken utility is a command line utility included with the Luna Client software.

To access the multitoken utility

1. Open a console window.
2. Go to the Luna Client installation folder/directory:

Windows	C:\Program Files\SafeNet\LunaClient
Linux/Unix	/usr/safenet/lunaclient

3. Launch the multitoken utility:

   ./multitoken

Using Multitoken

The multitoken utility allows you to specify an operation, and one or more "slots" or HSM Partitions on which to perform that operation. The multitoken utility runs the operations and returns a summary, or progress report, of the results.

> ⚠ **CAUTION:** To achieve maximum performance with Luna SA 5.x client applications must spawn 30+ threads. The 10 threads indicated for legacy Luna SA 4.x is not sufficient to stress the current product. The 50 threads needed for earlier Luna SA 5.x releases has been optimized down to 30 threads for best performance.

Syntax

multitoken2 -mode <mode> **-slots** <slot list> [**-nodestroy**] [**-key** <key size>] [**-curve** <curve num>] [**-blob** <blob count>] [**-packet** <packet size>] [**-logfile** <logfile name>] [**-force**] [**-help**] [**-symm**] [**-password** <password>] [**-timed** <fixed time>] [**-nodec**] [**-parmfile** <param file>] [**-noverifyr**] [**-multipartsignatures**] [**-subprime** <subprime size>] [**-noverify**] [**-nslots**] [**-keychoice** <key index>] [**-kdfchoice** <kdf index>] [**-kdfscnt** [counter index>] [**-sharefile** <data file>] [**-noenc**] [**-nosign**] [**-verbose**] [**-alarm** <secs>]

Parameter	Shortcut	Description
-alarm	**-al**	Sound periodic alarm (every <secs> seconds) if error occurs.
-blob	**-b**	Number of data blobs to be signed during each multisign operation.
-curv	**-crv**	ID number of ECC curve. If user-defined (99), then must specify -parmfile.
-force	**-f**	Avoid prompts for responses.
-ped	**-ped**	Specify ped id (-ped 0 for local, -ped 1 for remote). This applies only to the first HSM slot to be specified using the '-s' option.
-help	**-h**	Display help information only.
-key	**-k**	Size of key: asymmetric in bits (default = 1024 for RSA, 2048 for DSA). symmetric in bytes (i.e. 16, 24, 32 for AES/ARIA).
-keychoice	**-kc**	Select key type to derive/generate - specify choice list index.
-kdfchoice	**-kdf**	Select key derivation function - specify choice list index.
-kdfscnt	**-kds**	Select key derivation session counter type - specify choice list index.
-usage	**-u**	Number of times a key is allowed to be used.
-logfile	**-l**	File for results logging.
-mode	**-m**	Operating mode. See mode values available below.
-multipartsig	**-msig**	Use multipart signatures.
-nodec	**-nod**	Decryption operation will not be performed. Only symmetric and asymmetric encryption will be performed and measured.
-nodestroy	**-n**	Leaves created objects on the HSM after test completes.
-noenc	**-noe**	Perform only one encryption operation. Only symmetric and asymmetric decryption will be performed and measured.
-nosign	**-nos**	Perform only one sign operation. Only verify will be performed and measured.
-noverify	**-nov**	Verify operation will not be performed. Only sign will be performed and measured.
-noverifyr	**-nvr**	Do not verify decryption results.
-packet	**-p**	Size of packet used in operation.
-parmfile	**-prm**	File for EC curve parameters or OAEP source data (0 = none for OAEP).
-password	**-pwd**	Specify password to use for token.
-prftype	**-prf**	Specify the type of PRF to use for PRF based key derivation.
-sharefile	**-shf**	Shared data file used for operation.

Parameter	Shortcut	Description
-slots	**-s**	List of of slots to use (slot numbers separated by commas).
-subprme	**-sub**	Size of the subprime in bits.
-symm	**-sym**	Select symmetric key mechanism for symderive/pbegen or key choice for symgen (can also use -kc).
-timed	**-t**	Fixed amount of time to run (seconds).
-nslots	**-ns**	Slots and threads to be specified as slot number times (x or X) number of threads, then comma for next pair. Ex. -ns 1x5,2X10 This will create 5 threads on slot 1 and 10 threads on slot 2.
-verbose	**-v**	Show all thread performances. Default is only first and last threads.

Operating Modes

The following table lists the available operating modes for the multitoken utility. The operating mode is specified using the **-mode** parameter.

Mode	Description
rsakeygen	RSA key generation
rsax931keygen	RSA X9.31 key generation
rsasigver	RSA sign
sha512rsasigver	SHA1 with RSA sign
sha224rsasigver	SHA224 with RSA sign
sha256rsasigver	SHA256 with RSA sign
sha384rsasigver	SHA384 with RSA sign
sha512rsasigver	SHA512 with RSA sign
rsax931sigver	X9.31 RSA sign
sha1rsax931sigver	SHA1 X9.31 RSA sign
sha224rsax931sigver	SHA224 X9.31 RSA sign
sha256rsax931sigver	SHA256 X9.31 RSA sign
sha384rsax931sigver	SHA384 X9.31 RSA sign
sha512rsax931sigver	SHA512 X9.31 RSA sign
sha1rsapsssigver	SHA1 RSA PSS sign
rsaenc	RSA encrypt

Mode	Description
rsaoaepenc	RSA OAEP encrypt
dsakeygen	DSA Key Generation
dsasigver	DSA bare sign
sha1dsasigver	SHA1 DSA sign
sha224dsasigver	SHA224 DSA sign
sha256dsasigver	SHA256 DSA sign
ecdsakeygen	ECDSA Key Generation
ecdsasigver	ECDSA sign
ecdsasha1sigver	SHA1 ECDSA sign
ecdsasha224sigver	SHA224 ECDSA sign
ecdsasha256sigver	SHA256 ECDSA sign
ecdsasha384sigver	SHA384 ECDSA sign
ecdsasha512sigver	SHA512 ECDSA sign
kcdsakeygen	KCDSA Key Generation
kcdsasigver	HAS160 KCDSA 1024-bit sign
kcdsasha1sigver	SHA51 KCDSA sign
kcdsasha224sigver	SHA224 KCDSA sign
kcdsasha256sigver	SHA256 KCDSA sign
kcdsasha384sigver	SHA384 KCDSA sign
kcdsasha512sigver	SHA512 KCDSA sign
pbegen	PBE key generation
symgen	Symmetric key generation
symderive	Symmetric key derivation
rc4enc	RC4 encrypt
des3enc	DES3 ECB encrypt
des3enccbc	DES3 CBC encrypt
des3enccfb8	DES3 CFB8 encrypt

Mode	Description
des3enccfb64	DES3 CFB64 encrypt
des3encofb	DES3 OFB encrypt
desmac	DES3 MAC sign
descmac	DES3 CMAC sign
aesenc	AES ECB encrypt
aesenccbc	AES CBC encrypt
aesencfb8	AES CFB8 encrypt
aesenccfb128	AES CFB128 encrypt
aesencofb	AES OFB encrypt
aesencgcm	AES GCM encrypt
aesmac	AES MAC sign
aescmac	AES CMAC sign
ariaenc	ARIA ECB encrypt
ariaenccbc	ARIA CBC encrypt
ariaenccfb8	ARIA CFB8 encrypt
ariaenccfb128	ARIA CFB128 encrypt
ariacencofb	ARIA OFB sign
ariamac	ARIA MAC sign
ariacmac	ARIA CMAC sign
seedenc	SEED ECB encrypt
seedmac	SEED MAC sign
seedcmac	SEED CMAC sign
extractinsert	Extract Insert masked objects
multisignvalue	Multisign w/ masked key
simextractinsert	SIMExtract Insert masked objects
simmultisign	SIMMultisign w/ masked key
sim3extractinsert	SIM3 Extract Insert masked objects

Mode	Description
md5	MD5 Hashing
sha1	SHA-1 Hashing
sha224	SHA-224 Hashing
sha256	SHA-256 Hashing
sha384	SHA-384 Hashing
sha512	SHA-512 Hashing
sha1hmac	SHA1 HMAC sign
sha224hmac	SHA224 HMAC sign
sha256hmac	SHA256 HMAC sign
sha384hmac	SHA384 HMAC sign
sha512hmac	SHA512 HMAC sign
ecdhderive	ECDH derive key
ecdhcderive	ECDH Cofactor derive key
eciesxorhmacsha1	ECIES XOR enc/dec with HMAC SHA1
eciesxorhmacsha1shared	ECIES XOR enc/dec with HMAC SHA1 and shared data
eciesdes3hmacsha224	ECIES DES3 enc/dec with HMAC SHA224
eciesdes3hmacsha224shared	ECIES DES3 enc/dec with HMAC SHA224 and shared data
eciesaes128hmacsha256	ECIES AES-128 enc/dec with HMAC SHA256
eciesaes128hmacsha256shared	ECIES AES-128 enc/dec with HMAC SHA256 and shared data
eciesaes192hmacsha384	ECIES AES-192 enc/dec with HMAC SHA384
eciesaes192hmacsha384shared	ECIES AES-192 enc/dec with HMAC SHA384 and shared data
eciesaes256hmacsha512	ECIES AES-256 enc/dec with HMAC SHA512
eciesaes256hmacsha512shared	ECIES AES-256 enc/dec with HMAC SHA512 and shared data
randgen	Random number generation

Notes

1. If you are performing RSA operations, you have the option of specifying a key size (512, 1024, 2048, 4096, 8192). If no key size is specified, the default key size of 1024 will be used. For example:

   ```
   Multitoken2 -mode rsasigver -key 512 -slots 1
   ```


2. If you are performing a Multisign operation, you have the option of specifying a key size (512, 1024, 2048, 4096, 8192). If no key size is specified, the default key size of 1024 will be used. You must also specify a blob count, indicating the number of data blobs to be signed during each multisign operation. For example:

```
Multitoken2 -mode multisignvalue -key 512 -blob 10 -s 1,1,2,2,2
Multitoken2 -mode multisignvalue -blob 10 -s 1,1,2,2,2,2
```

3. A thread will be spawned to perform tests on each slot specified. A slot can be specified multiple times, in which case multiple threads will be created for the slot.
4. Options for the followiong modes can be used with the default 1024 bit key size only:
   - sha256rsasign - SHA256 with RSA
   - sha384rsasign - SHA384 with RSA
   - sha512rsasign - SHA512 with RSA

   If you specify a keysize on the command line (any of 1024, 2048 or 4096), the result is the 1024 bit benchmark speed, and a file called "1024" or "2048" or "4096" is created - that is the keysize parameter is parsed as a filename to which results are saved.

Named and User-defined Curves

The Luna HSMs employ named and user-defined curves.Multitoken supports this option, as illustrated in the following example:

```
C:\Program Files\SafeNet\LunaClient>multitoken2 -mode ecdsasigver -s 1,1,1,1,1,1,1,1

Prime field curves:

[0]secp112r1
[1]secp112r2
[2]secp128r1
[3]secp128r2
[4]secp160k1
[5]secp160r1
[6]secp160r2
[7]secp192k1
[8]secp224k1
[9]secp224r1
[10]secp256k1
[11]secp384r1
[12]secp521r1
[13]X9_62_prime192v1
[14]X9_62_prime192v2
[15]X9_62_prime192v3
[16]X9_62_prime239v1
[17]X9_62_prime239v2
[18]X9_62_prime239v3
[19]X9_62_prime256v1

Characteristic two field curves:

[20]sect113r1
[21]sect113r2
[22]sect131r1
[23]sect131r2
[24]sect163k1
[25]sect163r1
```



```
[26]sect163r2
[27]sect193r1
[28]sect193r2
[29]sect233k1
[30]sect233r1
[31]sect239k1
[32]sect283k1
[33]sect283r1
[34]sect409k1
[35]sect409r1
[36]sect571k1
[37]sect571r1
[38]X9_62_c2pnb163v1
[39]X9_62_c2pnb163v2
[40]X9_62_c2pnb163v3
[41]X9_62_c2pnb176v1
[42]X9_62_c2tnb191v1
[43]X9_62_c2tnb191v2
[44]X9_62_c2tnb191v3
[45]X9_62_c2pnb208w1
[46]X9_62_c2tnb239v1
[47]X9_62_c2tnb239v2
[48]X9_62_c2tnb239v3
[49]X9_62_c2pnb272w1
[50]X9_62_c2pnb304w1
[51]X9_62_c2tnb359v1
[52]X9_62_c2pnb368w1
[53]X9_62_c2tnb431r1
[54]Brainpool_P160r1
[55]Brainpool_P160t1
[56]Brainpool_P192r1
[57]Brainpool_P192t1
[58]Brainpool_P224r1
[59]Brainpool_P224t1
[60]Brainpool_P256r1
[61]Brainpool_P256t1
[62]Brainpool_P320r1
[63]Brainpool_P320t1
[64]Brainpool_P384r1
[65]Brainpool_P384t1
[66]Brainpool_P512r1
[67]Brainpool_P512t1

Please pick a curve (0-67) or enter (99) for a user defined curve:99

Please enter the filename for the EC parameters:
```

Here, you would provide the filepath to the file specifying the Elliptical Curve parameters. The format and content of the parameter file follow industry standards, and are discussed in more detail in "Named Curves and User-Defined Parameters" on page 1 in the *SDK Reference Guide*.

CHAPTER 5
Pedserver and Pedclient

This chapter describes how to use the pedserver and pedcient utilities to manage your remote PED devices. It contains the following topics:

Overview

You can use the pedserver and pedclient utilities to manage your remote PED devices.

The pedserver Utility

The pedserver utility has one function. It resides on a computer with an attached Luna PED [Remote], and it serves PED operations to an instance of pedClient that operates on behalf of an HSM. The HSM could be local to the computer that has pedServer running, or it could be on another HSM host computer at some distant location.

See " The pedserver Command" on page 65.

The pedclient Utility

The pedserver utility performs the following functions:

- It mediates between the HSM where it is installed and the Luna PED [Remote] where pedServer is installed, to provide PED services to the requesting HSM(s).
- It resides on a computer with RBS and an attached Luna Remote Backup HSM, and it connects with another instance of pedClient on a distant host of an HSM, to provide the link component for Remote Backup Service.

Thus, in the case where (say) an administrative workstation or laptop has both a Remote PED and a Remote Backup HSM attached, pedClient would perform double duty. It would link with a locally-running instance of pedServer, to convey HSM requests from the locally-connected Backup HSM to the locally-connected PED, and return the PED responses, As well, it would link a locally-running instance of RBS and a distant pedClient instance to mediate Remote Backup function for that distant HSM's partitions.

See " The pedclient Command" on page 62.

The pedclient Command

This is the syntax of the pedClient command, which includes starting and stopping of the service, and an assortment of configuration options. Specify "pedClient" at the command line, plus one of the modes, plus any option applicable to that mode.

```
[root@lunaclient101360 bin]# ./pedClient
Ped Client Version 2.0.0 (20000)

        Error: You must specify a mode.

Usage: pedClient [mode] [options...]

   Explanation of the modes:

     To query if a Ped Client is currently running, and to get details about
     the Ped Client, use this command:
        pedClient -m show [ options... ]

     To shut down an existing Ped Client, use this command:
        pedClient -m stop [ options... ]

     To start the Ped Client, use this command:
        pedClient -m start [ options... ]

     To start the Ped Client for Windows service, use this command:
        pedClient -m start -winservice [ options... ]

     To create a PED ID mapping, use this command:
        pedClient -m setid [ options... ]

     To test a PED ID mapping, use this command:
        pedClient -m testid [ options... ]

     To delete a PED ID mapping, use this command:
        pedClient -m deleteid [ options... ]

     To assign a PED ID mapping to an HSM, use this command:
        pedClient -m assignid [ options... ]

     To release a PED ID mapping from an HSM, use this command:
        pedClient -m releaseid [ options... ]

     To show the existing configuration file settings, use this command:
        pedClient -m config -show

     To restore the internal default configuration file settings, use this command:
        pedClient -m config -create

     To modify the existing configuration file settings, use this command:
        pedClient -m config -set [ options... ]

     To view a more detailed description of the Ped Client, use this command:
        pedClient -m desc


   Explanation of the options:

   Any options that are not specified on the command line will be read from
   the config file.  If the config file cannot be found, internal default settings
   will be used.  Invalid options do not generate an error and are ignored.

     -mode <mode>               -> Specifies the mode that the Ped Server will be
```



```
                              executed in.  The supported modes are "start",
                              "stop", "show", "setid", "testid",
                              "deleteid", "assignid", "releaseid" and
                              "config".
-id                         -> Specifies the PED ID (larger then 0, less then 65535).
                              Applicable to the "setid", "testid", "deleteid",
                              "assignid" and"releaseid" modes.
-id_ip                      -> Specifies the IP or hostname for the PED Server to
                              be linked to the specified PED ID.
                              Applicable to the "setid"  mode.
-id_port                    -> Specifies the port for the PED Server to
                              be linked to the specified PED ID.
                              Applicable to the "setid"  mode.
-id_serialnumber            -> Specifies the serial number of the HSM to be linked
                              to the specified PED ID.
                              Applicable to the "assignid" mode.
-eadmin <0 or 1>            -> Specifies if the administration port is on
                              "localhost" or listening on the external host
                              name.
                              Applicable to "start", "stop", "show" and
                              "config set" modes.
-admin <admin port number> -> Specifies the administration port number.
                              Applicable to "show" and "config set" modes.
-set                        -> When used with "-config", specifies that the
                              configuration file should be updated with values
                              of the other supplied options.
                              Applicable to "config" mode.
-show                       -> When used with "-config", specifies that the
                              contents of the configuration file should be displayed.
                              Applicable to "config" mode.
-idletimeout<int>           -> Specifies the idle connection timeout in seconds.
                              Applicable to "start", "assignid" and "config set"
                              modes.
-ignoreidletimeout          -> Specifies that the idle connection timeout should not
                              apply to the connection established for the specified
                              PED ID to HSM assignement.
                              Applicable to "assignid"  and "config set" modes.
-socketreadtimeout <int>    -> Specifies the socket read timeout in seconds.
                              Applicable to "start", "stop", "show" and
                              "config set" modes.
-socketwritetimeout <int>   -> Specifies the socket write timeout in seconds.
                              Applicable to "start", "stop", "show" and
                              "config set" modes.
-shutdowntimeout <int>      -> Specifies the shutdown timeout in seconds for
                              internal services.
                              Applicable to "start", "stop" and
                              "config set" modes.
-pstartuptimeout <int>      -> Specifies the startup timeout for the detached
                              process.
                              Applicable to "start", "stop" and
                              "config set" modes.
-pshutdowntimeout <int>     -> Specifies the shutdown timeout for the detached
                              process.
                              Applicable to "start", "stop" and
                              "config set" modes.
-loginfo <0 or 1>           -> Specifies if the logger should log "info" messages.
                              Applicable to all modes.
```



```
     -logwarning <0 or 1>       -> Specifies if the logger should log "warning" messages.
                                   Applicable to all modes.
     -logerror <0 or 1>         -> Specifies if the logger should log "error" messages.
                                   Applicable to all modes.
     -logtrace <0 or 1>         -> Specifies if the logger should log "trace" messages.
                                   Applicable to all modes.
     -logfilename <filename>    -> Specifies the log file name.
                                   Applicable to all modes.
     -maxlogfilesize <size>     -> Specifies the maximum log file size in KB
                                   Applicable to all modes.
     -locallogger               -> Specifies that the Remote Ped logger should be used,
                                   not the IS logging system.
                                   Applicable to all modes.

[admin@myluna bin]#
```

pedClient must run on any host of an HSM that needs to be served by a Remote PED.

pedClient must run on any host of a Remote Backup HSM that will be serving remote primary HSMs*.

* A distant HSM that appears as a crypto slot at the host of the Backup HSM is not considered "remote" in this sense, and so the Backup HSM's host does not need RBS. This would be the case for (say) a Luna SA partition where the Remote Backup workstation is a registered client of the partition, and therefore has an NTLS link with the Luna SA appliance. In that case, a lunacm session on the Backup workstation sees the Luna SA's partition as just another "local" slot. A slot-to-slot backup operation launched by lunacm at the Backup workstation is a local operation, as is a restore operation. That client relationship implies that the Backup workstation's administrator is entrusted with the partition authentication (black PED Key, challenge secret, red PED Key) for the partition on that distant Luna SA. In many cases, that is a perfectly legitimate assumption. The partition is registered with two "clients" - one is the working, or production client that uses the partition for cryptographic operations; the other is the Backup workstation that connects with the partition only when it is time to perform backup or restore activity.

If, instead, the administrator of the Remote Backup HSM was not entrusted with the authentication secrets of the distant HSM partition, then the administrator could still perform a backup, but it would proceed differently. The backup administrator could connect by SSH or RDP session to a legitimate client computer and use lunacm at that client to launch the backup. The client, already authenticated to the activated Luna SA partition would see the partition as a local slot, but would see the backup HSM and its attached Luna Remote Backup HSM only through the intermediary Remote Backup Service (rbs) running on that Backup workstation and conversing with the distant client computer by means of pedClient instances at each end. This is one version of the method used when the organization (or its customer) prefers a strict separation of roles.

A variant of the RBS method might work from the other direction, with the owner of the client computer doing the work, and the owner of the administrative/backup workstation simply allowing the client to take over the admin/backup workstation for the duration of the backup-or-restore operation. In either case, RBS must reside on the computer with the Luna Remote Backup HSM attached, and pedClient must run on both.

The various methods have their place, depending on your organization's structure and security protocols.

See "RBS - Remote Backup Service " on page 1in the *Administration Guide* for more information.

The pedserver Command

This is the syntax of the pedServer command, which includes starting and stopping of the service, and an assortment of configuration options. Specify "pedserver" at the command line, plus one of the modes, plus any option applicable to that mode.


```
C:\Program Files\SafeNet\LunaClient>pedserver
Ped Server Version 1.0.5 (10005)

        Error: You must specify a mode.

Usage: pedServer [mode] [options...]

   Explanation of the modes:

     To query if a Ped Server is currently running, and to get details about
     the Ped Server, use this command:
        pedServer -mode show [ options... ]

     To shut down an existing Ped Server, use this command:
        pedServer -mode stop [ options... ]

     To start the Ped Server, use this command:
        pedServer -mode start [ options... ]

     To show the existing configuration file settings, use this command:
        pedServer -mode config -show

     To restore the internal default configuration file settings, use this command:
        pedServer -mode config -create [ options... ]

     To modify the existing configuration file settings, use this command:
        pedServer -mode config -set [ options... ]

     To view a more detailed description of the Ped Server, use this command:
        pedServer -mode desc


   Explanation of the options:

   Any options that are not specified on the command line will be read from
   the config file.  If the config file cannot be found, internal default settings
   will be used.  Invalid options do not generate an error and are ignored.

     -mode <mode>               -> Specifies the mode that the Ped Server will be
                                   executed in.  The supported modes are "start",
                                   "stop", "show" and "config".
     -configfile <filename>     -> Specifies the config file to use.  Applicable to all
                                   modes.
     -eserverport <0 or 1>      -> Specifies if the server port is on "localhost"
                                   or listening on the external host name.  Applicable
                                   to "start" and "config set" modes.
     -port <server port>        -> Specifies the server port number.  Applicable to
                                   "start" and "config set" modes.
     -eadmin <0 or 1>           -> Specifies if the administration port is on
                                   "localhost" or listening on the external host
                                   name.  Applicable to "start" and "config set" modes.
     -admin <admin port number> -> Specifies the administration port number.
                                   Applicable to "start", "stop", and "show" modes.
     -force                     -> When used with "-start", specifies that any existing
                                   Ped Server currently running should be shutdown and a new
                                   Ped Server started.  Applicable to "start" mode.
     -set                       -> When used with "-config", specifies that the
```



```
                                configuration file should be updated with values
                                of the other supplied options.  Applicable to "config"
     -show                     -> When used with "-config", specifies that the
                                contents of the configuration file should be displayed.
                                Applicable to "config" mode.
     -idletimeout<int>         -> Specifies the idle connection timeout in seconds.
                                Applicable to "start" and "config set" modes.
     -socketreadtimeout <int>  -> Specifies the socket read timeout in seconds.
                                Applicable to "start", "stop", "show" and
                                "config set" modes.
     -socketwritetimeout <int> -> Specifies the socket write timeout in seconds.
                                Applicable to "start", "stop", "show" and
                                "config set" modes.
     -internalshutdowntimeout <int> -> Specifies the shutdown timeout in seconds for
                                internal services.
                                Applicable to "start", "stop" and "config set"
                                modes.
     -bgprocessstartuptimeout <int> -> Specifies the startup timeout for the detached
                                process.
                                Applicable to "start", "stop" and "config set"
                                modes.
     -bgprocessshutdowntimeout <int> -> Specifies the shutdown timeout for the detached
                                process.
                                Applicable to "start", "stop" and "config set"
                                modes.
     -loginfo <0 or 1>         -> Specifies if the logger should log "info" messages.
                                Applicable to all modes.
     -logwarning <0 or 1>      -> Specifies if the logger should log "warning" messages.
                                Applicable to all modes.
     -logerror <0 or 1>        -> Specifies if the logger should log "error" messages.
                                Applicable to all modes.
     -logtrace <0 or 1>        -> Specifies if the logger should log "trace" messages.
                                Applicable to all modes.
     -logfilename <filename>   -> Specifies the log file name.
                                Applicable to all modes.
     -maxlogfilesize <size>    -> Specifies the maximum log file size in KB
                                Applicable to all modes.
     -pinginterval <int>       -> Specifies the interval in seconds for ping commands.
                                Applicable to "start" and "config set" modes.
     -pongtimeout <int>        -> Specifies timeout in seconds for the ping response.
                                Applicable to "start" and "config set" modes

C:\Program Files\SafeNet\LunaClient>
```

Commands you are likely to use most often are PedServer mode start, to launch the service, and PedServer mode show, to display its current status.

```
C:\Program Files\Safenet\LunaClient>PedServer.exe mode start
Ped Server Version 1.0.5 (10005)
Failed to load configuration file.  Using default settings.
Ped Server launched in startup mode.
Starting background process
Background process started
Ped Server Process created, exiting this process.
C:\Program Files\Safenet\LunaClient>

C:\Program Files\Safenet\LunaClient>PedServer.exe mode show
Ped Server Version 1.0.5 (10005)
```



```
Failed to load configuration file.  Using default settings.
Ped Server launched in status mode.
   Server Information:
      Hostname:                          OTT1-202311
      IP:                                172.20.10.190
      Firmware Version:                  2.5.0-1
      PedII Protocol Version:            1.0.1-0
      Software Version:                  1.0.5 (10005)
      Ped2 Connection Status:            Connected
      Ped2 RPK Count                     1
      Ped2 RPK Serial Numbers            (5b420100834a2301)
   Client Information:                   Not Available
   Operating Information:
      Server Port:                       1503
      External Server Interface:         Yes
      Admin Port:                        1502
      External Admin Interface:          No
      Server Up Time:                    8 (secs)
      Server Idle Time:                  8 (secs) (100%)
      Idle Timeout Value:                1800 (secs)
      Current Connection Time:           0 (secs)
      Current Connection Idle Time:      0 (secs)
      Current Connection Total Idle Time: 0 (secs) (100%)
      Total Connection Time:             0 (secs)
      Total Connection Idle Time:        0 (secs) (100%)
Show command passed.

C:\Program Files\Safenet\LunaClient>
```

PedServer is required to run on any computer that has a Luna Remote PED attached, and is providing PED services.

PedServer always works with an instance of PedClient.

PedClient could be running on a distant HSM host computer, or it could be running on the same computer that has the Remote PED attached and PedServer running. This would normally be the case where a Luna Remote Backup HSM or other HSM is also attached or embedded. In other words, the one computer could be carrying on both halves of the PedClient/PedServer conversation over two ports in its own memory.

See "RBS - Remote Backup Service " on page 1in the *Administration Guide* for more information.

CHAPTER 6
Remote Backup Service (RBS)

This chapter describes how to use the RBS utility to remotely back up your HSMs. It contains the following topics:

RBS Overview

RBS implements the Remote Backup Service. RBS is run on a workstation with a Luna Remote Backup HSM connected.

RBS requires pedClient to be running both on the RBS computer and on the host of the Luna HSM primary (the HSM being backed-up from, or being restored-to). PedClient enables the communication link over which RBS works.

PedClient is also used in conjunction with pedServer to enable Remote PED, and in the case where both the Backup HSM and the Remote PED are connected to the same administrative workstation, you might legitimately have all three of RBS, pedServer, and pedClient running on the one system.

See "Pedserver and Pedclient" on page 62 for more information.

rbs

Access the RBS commands.

Syntax

rbs [**-daemon**] [**-genkey**] [**-nopassword**] [**-config**] [**-help**]

Parameter	Shortcut	Description
-config	**-c**	Runs RBS to select devices to support for Remote Backup. See "rbs config" on page 71.
-daemon	**-d**	Runs RBS in daemon (background) mode. See "rbs daemon" on page 72.
-genkey	**-g**	Runs RBS to generate private key/certificate for Remote Backup. See "rbs genkey" on page 73.
-help	**-h**	Displays help information for the rbs command.
-nopassword	**-n**	Require no password for encoded keys. See "rbs nopassword" on page 74.

Example

```
[admin@myluna bin] # ./rbs --h

Supported Options:
--help                help
--daemon              run as daemon                    [optional] - default   NOT daemon
--genkey              generate private key/certificate [optional]
--nopassword          no password for encoded keys     [optional] - password  required
--config              select devices to support        [optional]

[admin@myluna bin]#
```


rbs config

Runs rbs to select devices to support for Remote Backup.

Syntax

rbs --config

Options

None. "config" is an option of the rbs command.

Example

```
[admin@myluna bin] # ./rbs --config

[admin@myluna bin]#
```

rbs daemon

Runs RBSin daemon (background) mode. RBS is required for Remote Backup.

Syntax

rbs --daemon

Options

None. "daemon" is an option of the rbs command. Default for rbs is non-daemon mode.

Example

```
[admin@myluna bin] # ../rbs/bin/rbs --daemon
Enter password : ********
[admin@myluna bin]#
```


rbs genkey

Runs RBS to generate private key/certificate for Remote Backup.

Syntax

rbs --genkey

Options

None. "genkey" is an option of the rbs command. .

Example

```
[admin@myluna bin] # ./rbs --genkey
Enter password : ********
Verify password: ********
[admin@myluna bin]#
```


rbs nopassword

Require no password for encoded keys. Default is password required.

Syntax

rbs --nopassword

Options

None. "nopassword" is an option of the rbs command. .

Example

```
[admin@myluna bin] # ./rbs --nopassword

[admin@myluna bin]#
```

CHAPTER 7
SAlogin

This chapter describes how to use the **salogin** utility to allow applications that do not provide a native login interface to an HSM to login to a Luna SA HSM. It contains the following topics:

Using the salogin Utility

Cryptographic applications that are not specifically adapted to use an HSM Server can nevertheless be run using Luna SAs, with the aid of the **salogin** utility. This section provides the settings required for some widely-used applications.

An example of a situation where you might use **salogin** is where you wish to use a Luna HSM appliance with openssl, which can be used with HSMs, but which has no inherent ability to provide credentials to the HSM.

The salogin Command

The **salogin** client-side utility is provided to assist clients that do not include the requisite HSM login and logout capability within the client application. Run the utility from a shell or command prompt, or include it in scripts.

The **salogin** utility has a single command, with several arguments, as follows:

>salogin -h
Luna Login Utility 1.0 Arguments:

o		open application access
c		close application access
i	hi:lo	application id; high and low component
s	slot	token slot id number (default = 1)
u		specifies that login should be performed as the Crypto-User if no user type is supplied, the Crypto-Officer will be used
p	pswd	challenge password - if not included, login will not be performed
v		verbose
h		this help

Examples

```
salogin -o -s 1 -i 1:1
# open a persistent application connection
# on slot 1 with app id 1:1
```

```
salogin -o -s 1 -i 1:1 -p HT7bHTHPRp/4/Cdb
# open a persistent application connection
# and login with Luna HSM challenge

salogin -c -s 1 -i 1:1
# close persistent application connection 1:1
# on slot 1
```

Note: The applications in the integrations documents have been explicitly integrated by SafeNet, to work with your SafeNet HSM product. Contact your SafeNet representative.

If you are a developer, you might prefer to create or modify your own application to include support for the HSM or appliance. Refer to the Software Development Kit and the Extensions sections of this document set.

Other options

For java applications you could consider the KeyStore interface. It is internally consistent with the service provider interface defined by SUN/Oracle and does not require any proprietary code or applications.

If you are using an integration that does not refer to a KeyStore then the `salogin` method might be required. You are then limited to working with 1 partition. The type of HSM doesn't matter, as long as it is Luna and visible by the client at the time that the library is initialized.

CHAPTER 8
SCP

This chapter describes how to use the **scp** utility to transfer files. It contains the following sections:

Using the scp Utility

Use this command to securely move updates and certificates and other files from a source computer onto the Luna appliance, or to move appliance certificates or log files out to a client computer.

All packages from SafeNet are signed and encrypted and come with an authorization code (authcode) that must be provided to decrypt and use the package.

Syntax

scp [options] [user@]host:source target

scp [options] source [source...] [user@]host:target

scp [options] -ls user@host:filespec

Options

-p [] preserve file attributes.

-q [] quiet, don't show statistics

-r [] copy directories recursively

-S [<path-to-ssh>] specify the location of SSH

-v [] show verbose messages

-P port [] connect to specified port

-pw passw [] login with specified password

-unsafe [] allow server-side wildcards (DANGEROUS)

Example

```
C:\Program Files\SafeNet\LunaClient>scp test-file.txt admin@myluna:
admin@myluna's password: ********
test-file.txt              |
          0
 kB |   0.1
 kB/s | ETA: 00:00:00 | 100%

C:\Program Files\SafeNet\LunaClient>
```

The colon is required. Type nothing after the colon when moving files onto the Luna appliance. All files that are scp'd to the Luna appliance go to a predetermined directory, which you cannot change (for security reasons). While it is possible to change the filename during scp (by typing a new filename after the colon in the scp command), this is not recommended since most operations expect certain filenames and can fail if those are not found.

```
C:\Program Files\SafeNet\LunaClient>scp test-file.txt admin@myluna:different-file.txt
admin@myluna's password: ********
test-file.txt              |
          0
 kB |   0.1
 kB/s | ETA: 00:00:00 | 100%
C:\Program Files\SafeNet\LunaClient>
```

If the arriving file carries an unexpected name, it may not be handled correctly by subsequent commands

If you have SSH located in a non-standard (UNIX) location, launch the scp command with the "-S" option (that's an uppercase "s"), followed by the path to SSH, before supplying the paths to the source and target files, like:

```
scp -S /usr/bin/ssh <source file> <dest file>
```


CHAPTER 9
VTL

This chapter describes how to use the VTL utility to manage the relationship between your Client computer and one or more Luna appliances.

> **Note:** VTL is a legacy utility that is included for backwards compatibility reasons only. We strongly recommend that you discontinue use of VTL and use lunacm or lunash instead.

This chapter contains the following topics:

VTL Overview

VTL stands for "Virtual Token Library" (our programmers liked the name), and is a command-line utility that is loaded onto each of your Client computers when you install the Luna Software.

Open a command prompt window or console, cd to the directory where you installed your Luna software, and run the "vtl command (with the -h option, to see the available sub-commands).

These are the commands that you use to manage the relationship between your Client computer and one or more Luna appliances. You must have Administrator privileges on your own computer (the computer that you are using as a client to the Luna SA). If you do not also have authority on the Luna device(s), then you need the co-operation of the person who holds that authority.

myname@mycomputer:~>vtl
usage: (select command -h for additional information)

Subcommands

Subcommand	Description
addServer	Use this command to add a server to the client's list of trusted Luna SA Servers (you need to have already imported the server certificate from each Luna SA that you wish to add). See "vtl addServer " on page 82.
deleteServer	Use this command to remove a server/host from the client's list of trusted Luna SA Servers. See "vtl deleteServer " on page 98.
replaceServer	Use this command to replace a named server/host from the client's list of trusted Luna SA Servers with a new named server/host - requires the original server's name [-o], the replacing server's name [-n], and the path to the new server's certificate file [-c]. See " vtl replaceserver" on page 126.
listServers	Use this command to display a list of the Luna SA Servers trusted by this client. See "vtl listServers " on page 122.
createCert	Use this command to create (or re-create) the client's certificate and private key that are used for NTLS (Network Trust Link Service). See "vtl createCert " on page 96.
listSlots	List all PKCS#11 cryptographic device slots that can be seen at this time. See "vtl listSlots " on page 123.
verify	Use this command to verify the Luna SA Servers slots or partitions that are visible. See "vtl verify " on page 128.
haAdmin	Use these commands to create and manage HA groups of several Luna SA appliances, providing load-sharing and redundancy for the cryptographic operations required by this client. See "vtl haAdmin" on page 102
fingerprint	Use this command to display the fingerprint of a specified certificate. See "vtl fingerprint " on page 101.
examineCert	Use this command to display the details of a specified certificate. See "vtl examineCert " on page 99.

Subcommand	Description
backup	Administer backup/backup HSM features - used for Remote Backup (where the backup HSM is connected to a computer remote from your Luna SA. If you connect the Luna Backup HSM directly to your Luna SA, then use the Luna Shell command line and "token backup" commands, instead of VTL. See "vtl backup" on page 83.
supportInfo	Use this command to create a support information file, when one is requested by SafeNet Customer Support. See "vtl supportInfo " on page 127.
logging	Configure logging for Windows computers. See "vtl logging configure " on page 124.

vtl addServer

Name

vtl addServer

Syntax

vtl addServer -n <server hostname> -c <servers cert filename> [-htl]

Description

Adds the specified server to the client's list of trusted Luna Servers. You may wish to check the fingerprint of the server certificate with the vtl fingerprint command before adding it. The server certificate is one that you have imported from the Luna appliance to your Client computer, using scp.

You must be Administrator on your Client computer, or logged in as a user with Administrator privileges.

Options

-n <server hostname> [mandatory] The hostname (or IP address) of the server to add. Use the IP address if the server's certificate uses its ip address instead of its hostname. If you are uncertain what format the server's certificate uses, contact your Luna appliance administrator, or look for the “CN=” field when using the vtl examineCert command.

-c <certificate file> [mandatory] The name (including the path to its location on your computer) of the server's certificate file. Use the 'scp' utility to collect the server's certificate from the Luna appliance, or use the certificate provided by your Luna appliance administrator. You may wish to confirm the authenticity of the certificate by using the vtl fingerprint command.

-htl [optional] Require HTL (host trust link) an additional layer of trust, that separates the link authentication from specific hardware, allowing trust of virtual clients, such as in cloud environments - also can be used to enhance trust for non-virtual/non-cloud clients.

Example

```
$ ./vtl add -n 192.20.9.161 -c server161.pem -htl
New server 192.20.9.161 successfully added to server list..
```


vtl backup

> **Note:** This command will be deprecated in a future release. It is strongly recommended that you use the lunacm utility to backup your Luna SA partitions. See "partition backup" on page 1 in the *Lunacm Command Reference Guide*.

Name

vtl backup - backup Luna SA partition to slot

Syntax

vtl backup -source <slot# or label> -p <source password> -target <slot# or label> -partition <backupHSM partitionname> -r <backupHSM SO password> -u <backup partition user password>

Description

This command is used **remotely** to back up Luna SA partition contents to a specified slot or labeled partition on a backup HSM.

See also:

- "vtl backup append" on page 85
- "vtl backup restore " on page 88
- "vtl backup delete " on page 87
- "vtl backup token" on page 89

If you use this command without any sub-commands, a partition is created on the backup HSM and the objects on the source HSM slot are cloned to the target partition. Or, if the target partition is found, the objects on the source HSM slot are cloned to the target slot, overwriting any objects already there.

If you wish to preserve objects already on the target partition, then use vtl backup append to add the objects from the source to those already on the target.

If you wish to back up your Luna SA partition to a Luna Backup HSM that is connected **locally** to the Luna SA appliance, then use the token backup commands instead.

Options

-source <slot # or label> [mandatory] The slot number or the label of the source HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-p <source password> source user password, if needed

-target <slot # or label> [mandatory] The slot number or the label of the target HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-partition <backup partition name> [mandatory] The name of the target partition on the Backup HSM.

-r <backup HSM SO password> The SO password of the Backup HSM, needed for password-authenticated HSMs only - ignored for PED-authenticated HSMs.

-u <backup HSM User password> The User password of the Backup HSM partition, needed for password-authenticated HSMs only - ignored for PED-authenticated HSMs.

Example

```
bash # ./vtl backup -source 5 -target 1 -partition bck1
Backup partition 'bck1' does not exist on G5backup2.
*** Are you sure you want to create the new backup? [yes/no]: yes
Luna PED operation required to login to p1 - use User or Partition Owner (black) PED key
Please enter the secret challenge: userpin
Luna PED operation required to login to G5backup2 - use Security Officer (blue) PED key

Luna PED operation required to login to G5backup2 - use User or Partition Owner (black) PED key
Luna PED operation required to set legacy cloning domain - use Domain (red) PED key.

Luna PED operation required to login to G5backup2 - use User or Partition Owner (black) PED key
21 objects found on p1/ (slot #5).
Cloning object 0 - success
Cloning object 1 - success
Cloning object 2 - success
Cloning object 3 - success
Cloning object 4 - success
Cloning object 5 - success
Cloning object 6 - success
Cloning object 7 - success
Cloning object 8 - success
Cloning object 9 - success
Cloning object 10 - success
Cloning object 11 - success
Cloning object 12 - success
Cloning object 13 - success
Cloning object 14 - success
Cloning object 15 - success
Cloning object 16 - success
Cloning object 17 - success
Cloning object 18 - success
Cloning object 19 - success
Cloning object 20 - success
21 objects successfully backed up.
bash #.
```


vtl backup append

Name

vtl backup append

Syntax

vtl backup append -source <slot# or label> -p <source password> -target <slot# or label> -partition <backupHSM partitionname> -r <backupHSM SO password> -u <backup partition user password>

Description

This command is used **remotely** to back up Luna SA partition contents to a specified slot or labeled partition on a backup HSM.

See also:

- "vtl backup" on page 83
- "vtl backup restore " on page 88
- "vtl backup delete " on page 87
- "vtl backup token" on page 89

If you wish to preserve objects already on the target partition, then use vtl backup append to add the objects from the source to those already on the target.

If you wish your cloned objects to overwrite any objects already on the target slot, then use vtl backup (without the append sub-command).

If you wish to back up your Luna SA partition to a Luna Backup HSM that is connected **locally** to the Luna SA appliance, then use the token backup commands in the appliance's Luna shell instead.

Options

-source <slot # or label> [mandatory] The slot number or the label of the source HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-p <source password> source user password, if needed

-target <slot # or label> [mandatory] The slot number or the label of the target HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-partition <backup partition name> [mandatory] The name of the target partition on the Backup HSM.

-r <backup HSM SO password> The SO password of the Backup HSM, needed for password-authenticated HSMs only - ignored for PED-authenticated HSMs.

-u <backup HSM User password> The User password of the Backup HSM partition, needed for password-authenticated HSMs only - ignored for PED-authenticated HSMs.

Example

```
bash # ./vtl backup append
 -source 5 -target 1 -partition bck1
Container 'bck1' already exist on G5backup2..
Luna PED operation required to login to p1 - use User or Partition Owner (black) PED key
Please enter the secret challenge: userpin
Luna PED operation required to login to G5backup2 - use Security Officer (blue) PED key

Luna PED operation required to login to G5backup2 - use User or Partition Owner (black) PED key
Luna PED operation required to set legacy cloning domain - use Domain (red) PED key.

Luna PED operation required to login to G5backup2 - use User or Partition Owner (black) PED key
25 objects found on p1/ (slot #5).
21 objects found on G5backup2 (slot #1).
Cloning object 21 - success
Cloning object 22 - success
Cloning object 23 - success
Cloning object 24 - success
4 objects successfully backed up.
bash #.
```

vtl backup delete

Name

vtl backup delete

Syntax

vtl backup delete -target <slot# or label> -partition <backupHSM partitionname>

Description

This command is used remotely to delete backed-up Luna SA partition contents from a specified slot or labeled partition on a backup HSM.

See also:

- "vtl backup" on page 83
- "vtl backup restore " on page 88
- "vtl backup append" on page 85
- "vtl backup token" on page 89

Options

-target <slot # or label> [mandatory] The slot number or the label of the target HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-partition <backup partition name> [mandatory] The name of the target partition on the Backup HSM.

Example

```
\LunaSA>vtl backup delete -t mylunabackup -p mylunapar1
*** Are you sure you want to delete mylunapar1 partition? [yes/no]: yes
Luna PED operation required to login to mylunabackup - use Security Officer (blue) PED key
Partition 'mylunapar1' deleted.
\LunaSA>
```


vtl backup restore

Name

vtl backup restore

Syntax

vtl backup restore -source <slot# or label> -partition <backupHSM partitionname> -r <backupHSM SO password> -u <backup partition user password> -target <slot# or label> -p <source password>

Description

This command is used remotely to restore Luna SA partition contents from a specified slot or labeled partition on a backup HSM. See also:

"vtl backup" on page 83

"vtl backup append" on page 85

"vtl backup delete " on page 87

"vtl backup token" on page 89

Options

-source <slot # or label> [mandatory] The slot number or the label of the source HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-partition <backup partition name> [mandatory] The name of the target partition on the Backup HSM.

-r <backup HSM SO password> The SO password of the Backup HSM, needed for password-authenticated HSMs only - ignored for PED-authenticated HSMs.

-u <backup HSM User password> The User password of the Backup HSM partition, needed for password-authenticated HSMs only - ignored for PED-authenticated HSMs.

-target <slot # or label> [mandatory] The slot number or the label of the target HSM. Do NOT use a numeral as the first character in a slot label. The command looks for a slot number first, and any numeral it sees is interpreted as a slot number.

-p <source password> source user password, if needed

Example

```
vtl backup restore -source 2 -partition mylunapar1 -target 1
Luna PED operation required to login to G5 - use User or Partition Owner (black) PED key
Luna PED operation required to login to mylunapar1 - use User or Partition Owner (black) PED key
Please enter the secret challenge: *******
2 objects found on source (slot #2)
Cloning object 0 - success
Cloning object 1 - success
2 objects  restored.
```

vtl backup token

Name

vtl backup token

Subcommands and Usage

Subcommand	Description
factoryreset	Factory reset for backup token. See "vtl backup token factoryreset " on page 90.
init	Initialize backup token. See "vtl backup token init " on page 91.
resize	Resize backup token container. See "vtl backup token resize " on page 92.
show licenses	Show all licenses for backup token. see "vtl backup token show licenses " on page 94.
show	Show all Luna UHD slots for backup token. See "vtl backup token show " on page 93
update	Update backup token. See "vtl backup token update " on page 95.

vtl backup token factoryreset

Name

vtl backup token factoryreset - factory reset a backup HSM.

Syntax

vtl backup token factoryreset -target <slot# or label>

Description

This command factory-resets a backup HSM connected to the Luna SA appliance.

Options

Option	Description
-target <token>	(mandatory) label or slot number for the target token/HSM

Example

If the Backup HSM has not been initialized since the last factory reset:

```
bash # ./vtl backup token factoryreset -target 1
*** Are you sure you wish to reset this HSM to factory default settings? [yes/no]: yes
Token is already zeroized
Error (RC_GENERAL_ERROR)
bash #
```

If the Backup HSM has been initialized since the last factory reset:

```
bash # ./vtl backup token factoryreset -target 1
*** Are you sure you wish to reset this HSM to factory default settings? [yes/no]: yes
'factory reset' successful.
bash #
```


vtl backup token init

Name

vtl backup token init - initialize a backup HSM.

Syntax

vtl backup token init -target <slot# or label> [-label <label>]

Description

This command initializes a backup HSM connected to the Luna SA appliance.

Options

Option	Description
-target <token>	(mandatory) label or slot number for the target token/HSM
-label <label>	(optional new label name for target token/HSM

Example

```
bash # ./vtl backup token init -target 1
*** Are you sure you wish to initialize this HSM? [yes/no]: yes
This HSM can be initialized to use either PED or password authentication.
*** Use PED authentication? [yes/no]: yes
Please enter the new label: G5backup2
Luna PED operation required to initialize backup token - use Security Officer (blue) PED key.
Luna PED operation required to login to no label - use Security Officer (blue) PED key
Luna PED operation required to set legacy cloning domain - use Domain (red) PED key.
'init' successful.
```


vtl backup token resize

Name

vtl backup token resize - resize backup token container.

Syntax

vtl backup token resize -target <slot# or label> -container <container> [-size <size>]

Description

This command resizes a backup HSM partition (connected to the Luna SA appliance).

Options

Option	Description
-target <token>	(mandatory) label or slot number for the target token/HSM
-container <container>	(mandatory) target token container (partition) name
-size <size>	(optional) target token container size in bytes

Example

```
bash # ./vtl backup token resize
 -target 1 -container backuppar
*** Are you sure you wish to resize this HSM? [yes/no]: yes
.
'resize' successful.
```


vtl backup token show

Name

vtl backup token show - show backup HSM slots or slot info.

Syntax

vtl backup token show -target <slot# or label>

Description

This command shows a summary of slots associated with a backup HSM connected to the Luna SA appliance, or shows slot info for a named slot.

Options

Option	Description
-target <token>	(optional) label or slot number for the target token/HSM

Example

```
bash # ./vtl backup token show
The following Luna UHD slots were found:
Slot #    Label         Serial #        Description     Status
slot #1   no label      7000179         Luna UHD slot   Present
slot #2   -             -               -               Not present
slot #3   -             -               -               Not present
bash #
```


vtl backup token show licenses

Name

vtl backup token show licenses - show licenses for a backup HSM .

Syntax

vtl backup token show licences -target <slot# or label>

Description

This command shows a summary of licenses associated with a backup HSM connected to the Luna SA appliance.

Options

Option	Description
-target <token>	(optional) label or slot number for the target token/HSM

Example

```
bash # ./vtl backup token show licenses

HSM CAPABILITY LICENSES
License ID      Description
621010355-000   621-010355-000 G5 Backup Device Base
621000005-001   621-000005-001 Backup Device Partitions 20
621000006-001   621-000006-001 Backup Device Storage 15.5 MB
621000007-001   621-000007-001 Backup Device Store MTK Split Externally
621000008-001   621-000008-001 Backup Device Remote Ped Enable

bash #
```

vtl backup token update

Name

vtl backup token update - update firmware or capability of a backup HSM.

Syntax

vtl backup token update firmware -target <slot# or label>

vtl backup token update capability -target <slot# or label>

Description

This command updates the firmware or the capabilities of a backup HSM. The firmware update file (fuf) or capability update file (cuf) must be ready to install.

Options

Option	Description
-target <token>	(mandatory) label or slot number for the target token/HSM

Example

```
bash # ./vtl backup token update firmware -target 1
Please enter firmware update file (fuf) name: lunasa_6.2.1_firmware_update.fuf
This command updates the token firmware. This process cannot be reversed.
Are you sure you want to update firmware? [yes/no]: yes
update firmware' successful.
```


vtl createCert

Name

vtl createCert

Syntax

vtl createCert -n <common name/server hostname> [-c <country code>] [-s <state>] [-l <locality>] [-o <organization name>] [-unit <organization unit name>] [-e <e-mail address>] [-P <private key out filename>][-C <certificate out filename>] [-v]

Description

Creates the client's certificate and private key that are used for NTLS. Re-creates the key and certificate if they already exist.

CAUTION: If the key and certificate are re-created, the client will need to be removed and re-registered from each of the Luna servers with which it was registered.

Note: The server hostname (-n) is the only mandatory field for certificate creation. This is because all other fields of the certificate are used simply for display and visual confirmation purposes. The NTLA never displays certificate data fields to the user, so the content in these fields is irrelevant.

Options

-n <server hostname> [mandatory] The hostname (or IP address) of the server to add.

-c <country> [optional] The country in which the client computer resides. (Data not used.)

-s <state> [optional] The state in which the client computer resides. (Data not used.)

-s <locality> [optional] The city/locality in which the client computer resides. (Data not used.)

-o <organization> [optional] The organization to which the client computer belongs. i.e. SafeNet-inc (Data not used.)

-u <organizational unit> [optional] The unit within the organization to which the client belongs. i.e. Engineering, or IT (Data not used.)

-e <e-mail> [optional] An E-mail address for the certificate. (Data not used.)

-P <private key outfile name> [optional - default filename is <hostname/ip>Key.pem] A filename for the private key to be created. Only use this switch if you have a need to override the default value.

-C <certificate outfile name> [optional - default filename is <hostname/ip>.pem] A filename for the certificate to be created. Use this switch only if you have a need to override the default value.

-v [optional] Verbose mode. Output extra information while creating the certificate and private key.

Example

Windows

```
vtl createCert -n test
Private Key created and written to: E:\temp\clientCerts\testKey.pem
Certificate created and written to: E:\temp\clientCerts\test.pem

vtl createCert -n test -v
Using configuration from C:\Program Files\SafeNet\LunaClient\openssl.cnf
It needs to be at least 1024
Writing new private key to stdout E:\temp\clientCerts\testKey.pem'
CA [CA]:CA
Ontario [Ontario]:Ontario
Ottawa [Ottawa]:Ottawa
My company [My company]:My company
 []:
test [test]:test
 []:
Private Key created and written to: E:\temp\clientCerts\testKey.pem
Certificate created and written to: E:\temp\clientCerts\test.pem
```

UNIX

```
vtl createCert -n test
Private Key created and written to: /usr/safenet/lunaclient/cert/client/testKey.pem
Certificate created and written to: /usr/safenet/lunaclient/cert/client/test.pem
```


vtl deleteServer

Name

vtl deleteServer

Syntax

vtl deleteServer -n <serverhostname>

Description

Removes the given host from the list of trusted Luna Servers. View a list of all trusted servers with the command vtl listServers.

Options

-n <server hostname> [mandatory] The hostname (or IP address) of the Luna server to add. Use the IP address if the server's certificate uses its ip address instead of its hostname. Use the vtl listServers command for a list of trusted servers.

Example

```
vtl delete -n LunaSA1
Server lunasa1 successfully removed from server list.
```


vtl examineCert

Name

vtl examineCert - Certificate details for this client

Syntax

vtl examineCert [-f <filespec-of-serverCert.pem>] [-h]

Description

Displays the details of the specified certificate. If the command is issued with no additional parameters, it returns the client certificate. If the -f option is used, then a filespec is required, and the command returns the details of the indicated certificate.

Options

-f [optional] Requires the filespec to the certificate file (usually a servercert). The server cert files are located in the cert/server (or cert\server) directory, and are of the form “nameCert.pem”, where “name” is the name that you gave when you ran the vtl addServer command.

-h [optional] The “help” text.

<nothing/default> display's the client's certificate

Example

Windows

```
C:\Program Files\SafeNet\LunaClient>vtl examineCert -f cert\server\bigCert.pem
Certificate:
Data:
Version: 3 (0x2)
Serial Number: 0 (0x0)
Signature Algorithm: sha256WithRSAEncryption
Issuer: C=CA, ST=Ontario, L=Ottawa, O=Chrysalis-ITS, CN=168.0.1.0
Validity
  Not Before: Nov 10 14:10:36 2011 GMT
  Not After : Nov 11 14:10:36 2021 GMT
Subject: C=CA, ST=Ontario, L=Ottawa, O=Chrysalis-ITS, CN=168.0.1.0
Subject Public Key Info:
  Public Key Algorithm: rsaEncryption
  RSA Public Key: (2048 bit)
    Modulus (2048 bit):
        00:a9:c3:db:59:33:b8:65:20:c9:13:f7:a7:e5:59:
      7b:12:a4:31:d3:62:36:9a:62:68:6e:1d:d7:c7:f0:
      8c:fd:06:43:f8:42:f7:8c:de:74:d1:38:a3:8f:37:
      94:c4:82:cc:67:d8:51:14:cd:e4:b7:dd:f8:ff:09:
      c8:03:f9:62:c5:ad:fc:4d:2e:fe:67:dd:6b:e7:de:
      bd:9e:bd:92:14:63:a6:99:2a:78:e7:72:6d:ba:79:
      3d:55:a8:a4:5d:85:11:36:9f:3d:4c:9a:e6:e8:bf:
      b4:5b:45:83:46:c4:2c:d9:22:fa:50:5a:28:ba:6e:
      2f:cb:2f:54:47:8d:3b:fd:73:bc:5a:ce:cd:bb:4e:
      ec:b5:1c:87:b6:b1:cd:53:77:f0:f2:36:e9:b2:3d:
```



```
      2e:61:6f:f2:73:c6:ad:c4:d4:fe:20:3b:de:e8:a9:
      a4:cd:93:17:0a:65:a5:58:ef:e3:11:d5:f0:ac:92:
      af:33:dc:1c:c0:8f:04:fc:13:53:65:7f:52:34:07:
      71:7a:9b:e5:d8:1e:e0:bd:ca:13:0f:f9:00:33:e5:
      2a:0c:79:78:42:ff:4c:1a:d6:83:2c:ae:bf:2d:1d:
      93:ac:f5:6b:60:97:ab:fb:1a:d5:86:2c:2f:3c:f6:
      7e:37:8d:77:0a:7a:dd:7c:38:61:26:9a:c9:c0:0d:
      b3:57
Exponent: 65537 (0x10001)
Signature Algorithm: sha256WithRSAEncryption
15:49:31:22:c4:1a:80:9f:2d:de:4b:df:63:b8:b0:16:b0:af:
7a:f4:8f:62:0b:ad:fa:21:b5:95:6e:fc:a6:09:b9:f9:5f:ea:
8e:c8:a7:d5:90:0b:12:ff:a6:34:b5:9a:02:7f:81:66:38:21:
c7:92:21:a2:d4:0f:e9:44:84:2a:f5:ea:d2:00:4b:f1:0f:d5:
55:5b:15:3e:b4:b5:b6:d4:32:7d:fe:8c:ef:80:ef:f8:dd:73:
e6:1e:a2:41:4c:8c:1d:c7:fa:2a:a9:25:ef:aa:29:8e:40:8e:
da:2a:3d:af:67:a7:7e:da:a9:76:6d:c6:10:e7:3a:5d:45:ac:
a0:f3:35:30:44:76:7c:b0:ce:61:19:0b:74:b1:3f:51:08:f9:
12:47:75:7c:33:0c:ee:02:d7:bb:48:10:6d:40:5b:fe:26:f2:
8f:28:0f:d9:2d:25:d9:af:49:44:b3:25:c6:cf:97:21:f0:3a:
0d:0e:41:30:34:56:e8:8d:6b:d6:36:fb:a9:79:e6:bc:dd:6b:
61:cf:98:01:c0:70:b2:81:41:1c:79:6e:58:47:e9:22:83:98:
9f:9f:62:87:e3:74:df:87:fe:0b:78:55:0f:1e:6e:56:21:b6:
0e:29:64:cb:75:de:90:82:bd:24:64:ef:db:8c:9b:5b:b4:7e:
86:61:89:64
```

The only difference for a UNIX client would be the path in the filespec.

vtl fingerprint

Name

vtl fingerprint

Syntax

vtl fingerprint [-f <filespec-of-serverCert.pem>] [-h]

Description

Displays the fingerprint of the specified certificate. If the command is issued with no additional parameters, it returns the client fingerprint. If the -f option is used, then a filespec is required, and the command returns the fingerprint of the indicated certificate.

Options

-f [optional] Requires the filespec to the certificate file (usually a servercert). The server cert files are located in the server/cert (or server\cert) directory, and are of the form “nameCert.pem”, where “name” is the name that you gave when you ran the vtl addServer command.

-h [optional] The “help” text.

Example

```
vtl fingerprint
Certificate fingerprint: 91:01:EC:BA:6A:31:19:69:CF:8D:1A:23:87:95:76:35.
```


vtl haAdmin

The HA vtl subcommands are used for creating and administering an HA group of Luna appliances for this Client.

myname@mycomputer:~>vtl haAdmin
Usage: vtl haAdmin (parameters):

Subcommands

Subcommand	Description
proxy (*)	(*for future use - not currently supported)
newGroup	Create a new HA group. See "vtl haAdmin newGroup " on page 113
deleteGroup	Deletes an existing HA group. See "vtl haAdmin deleteGroup " on page 105.
addMember	Add a member to an HA group. See "vtl haAdmin addMember " on page 103.
standbyMembers	Specify standby members of the HA group. See "vtl haAdmin standbyMembers" on page 118.
removeMember	Remove a member from an HA group. See "vtl haAdmin removeMember " on page 116.
synchronize	Synchronize an HA group. See "vtl haAdmin synchronize " on page 121.
recover	Recover a failed HA member. See "vtl haAdmin recover group " on page 115.
autoRecovery	HA AutoRecovery settings. See "vtl haAdmin autoRecovery " on page 104.
HALog	Set HA log file location. See "vtl haAdmin haLog " on page 107.
HAOnly	Show only HA slots and hide normal slots. See "vtl haAdmin HAOnly Client" on page 109.
show	Display HA setting, group property, and member status. See "vtl haAdmin show " on page 117.

vtl haAdmin addMember

Name

vtl haAdmin addMember - Add a member to an HA group

Syntax

vtl haAdmin addMember -group <groupNum> -serialNum <SN> -password <password>

Description

Add a member to a HA group that already exists on this client. If network replication is allowed on the partition, the new member will share the same HA key as the existing members in the group.

Use the command vtl haAdmin -synchronize to replicate any objects on other group members to the new member (only works if network replication is allowed - if network replication is not allowed, use the lunash:> partition backup and partition restore commands to manually copy objects among the HA group members.)

Options

-group <groupNum> [mandatory] The HA group's number. Group numbers can be found using the **vtl haAdmin -listGroups** command.

-serialNum <SN> [mandatory] The serial number of the partition to add to the group. The partition's serial number can be obtained using 'partition -show' from the lunash, or by using C_GetTokenInfo via a PKCS#11 application such as ckdemo. All partitions have unique serial numbers.

-password <password> [mandatory] The text password for the partitions. The password must be the same as other partitions in the group or an error will occur.

Example

```
vtl haAdmin addMember -group testgroup -serial 66010002 -password testpassword
Member 66010002 successfully added to group testgroup. New group configuration is:
HA Group Label:  testgroup
HA Group Number:  165010001
HA Group Slot#:  6
Synchronization: enabled
Group Members:  65010001, 66010002
Standby members: <none>
   In sync:  yes
Please use the command 'vtl haAdmin -synchronize' when you are ready to replicate data between
all members of the HA group. (If you have additional members to add, you may wish to wait until
you have added them before synchronizing to save time by avoiding multiple synchronizations.)
```

Note: Notice here that you are told to synchronize - do NOT synchronize if you intend to perform a recovery. Synchronization occurs automatically when you use the `vtl haAdmin recover` command.

vtl haAdmin autoRecovery

Name

vtl haAdmin autoRecovery - Set the autorecovery interval and retries.

Syntax

vtl haAdmin autorecovery [-retry <retry count> | -interval <seconds>]

Description

Set the HA autoRecovery retry count value - a positive value between 0 and 500 (or -1 for infinite retries), and the polling interval for those retries.

Options

-retry <retry count> [one or the other of '-retry' or '-interval' must be used] The number of times HA function will attempt to automatically recover a member that has failed to synchronize or has dropped from the HA group. Setting to a value of zero switches the feature off. Any other positive value (up to 500) switches it on. A value of -1 means infinite retry attempts can be made.

-interval <seconds> [one or the other of '-retry' or '-interval' must be used] The interval at which the HA function will attempt to automatically recover a member that has failed to synchronize or has dropped from the HA group. Set the polling interval between 60 seconds and 1200 seconds.

Example

```
C:\Program Files\SafeNet\LunaClient> vtl haAdmin autorecovery -retry 9

C:\Program Files\SafeNet\LunaClientClient>
```


vtl haAdmin deleteGroup

Name

vtl haAdmin deleteGroup - delete an HA group.

Syntax

vtl haAdmin deleteGroup -group <groupNumber> -password <password>

Description

Delete the specified HA group. After a group is deleted, it will no longer appear in the slot list in PKCS#11 applications.

During the delete, the application attempts to login to each partition and remove the HA key from it. If the NTLA is not correctly set up or if the user no longer has access to one or more of the partitions in the group, a warning message indicates that the HA key was not successfully removed.

CAUTION: Do not use this command when an HA group is shared among multiple clients, because the -deleteGroup command deletes the HA Key material, which is still required by the other clients. The other clients would find that their HA group had been destroyed.

If you wish to remove a client from an HA group where other clients continue to share the HA group, then edit the Chrystoki.conf or crystoki.ini file on that client and remove the "VirtualToken" section. (Never insert TAB characters into the chrystoki.ini (Windows) or crystoki.conf (UNIX) file.)

At that point, you still have an NTL connection which no longer sees the HA virtual Partition, but now sees the individual HSM Partitions on the Luna HSM.

You MUST NOT use the individual Partitions (from the HA virtual Partition), or the other clients will find their HA out-of-sync.

What you can do is login to the Luna HSM and de-register that client from those Partitions. You may then register other, non-HA partitions to that client without disturbing any remaining clients of the HA virtual partition.

Options

-group <groupNumber> [mandatory] The HA group's designating number. Group numbers can be found using the *vtl haAdmin -listGroups* command.

-password <password> [mandatory] The text password for the partitions. (All share the same password.)

Example

```
vtl haAdmin deleteGroup -group 165010001 -password testpassword
HA key removed from HA group member with serial number 65010001.
The HA group 165010001 was successfully deleted.
vtl haAdmin deleteGroup -group 165010001 -password testpassword
Warning:  This host is not assigned to a Luna SA partition with
the serial number 65010001, the HA key was not removed
from this group member.
The HA group 165010001 was successfully deleted.
```

vtl haAdmin haLog

Name

vtl haAdmin halog - set HA logging on or off.

Syntax

vtl haAdmin halog -path <log-file_path> [-maxlen <maximum-log-file-length>

Description

Set the HA logger on and logging to a file of 262144 bytes or larger, or set the HA logger off by specifying a log file length of 0 (zero).

Options

-enable Enable HA log.

-disable Disable HA log.

-path <log-file path> [mandatory] The path to the location where the logfile is stored. If there is a space in the path, then put quote characters around the entire path string.

-maxlen <maximum log-file length> [optional] The maximum allowable size the logfile can reach before it is overwritten. Possible settings are zero, which disables the HA logger, or a number equal to, or greater than, 262144 bytes, which enables the HA logger.

Example

```
C:\Program Files\SafeNet\LunaClient>vtl haadmin halog -path "C:\Program Files\SafeNet\Lun-
aClient"
C:\Program Files\Safenet\LunaClient>vtl haadmin show
================ HA Global Configuration Settings ===============
HA Auto Recovery:  disabled
Maximum Auto Recovery Retry:  0
Auto Recovery Poll Interval:  60 seconds
HA Logging:  disabled
Only Show HA Slots:  no
C:\Program Files\SafeNet\LunaClient>vtl haadmin -halog -enable
HA Log enabled
C:\Program Files\SafeNet\LunaClient>vtl haadmin -show
================ HA Global Configuration Settings ===============
HA Auto Recovery:  disabled
Maximum Auto Recovery Retry:  0
Auto Recovery Poll Interval:  60 seconds
HA Logging:  enabled
HA Log File:  C:\Program Files\SafeNet\LunaClient\haErrorLog.txt
Maximum HA Log File Length:  262144 bytes
Only Show HA Slots:  no
C:\Program Files\SafeNet\LunaClient>vtl haadmin -halog -maxlen 1000000
C:\Program Files\SafeNet\LunaClient>vtl haadmin -show
================ HA Global Configuration Settings ===============
HA Auto Recovery:  disabled
Maximum Auto Recovery Retry:  0
```



```
Auto Recovery Poll Interval:  60 seconds
HA Logging:  enabled
HA Log File:  C:\Program Files\SafeNet\LunaClient\haErrorLog.txt
Maximum HA Log File Length:  1000000 bytes
Only Show HA Slots:  no
```


vtl haAdmin HAOnly Client

The HAOnly subcommands are used for creating and administering an HA group of Luna appliances for this Client.

myname@mycomputer:~>vtl haAdmin HAOnly

Subcommands

Subcommand	Description
-enable	Show only HA slots when retrieving slot lists. See "vtl haAdmin HAOnly enable " on page 111.
-disable	Show all slots when retrieving slot lists. See "vtl haAdmin HAOnly disable " on page 110.

Note: This option affects all applications using this client.

vtl haAdmin HAOnly disable

Name

vtl haAdmin HAOnly - disable - disable showing of only HA virtual slots

Syntax

vtl haAdmin HAOnly -disable

Description

Configures the client to show all slots, rather than hide the physical slots and show only the HA virtual slots.

Options

None

Example

```
vtl haAdmin HAOnly - disable

HAOnly disabled.
```


vtl haAdmin HAOnly enable

Name

vtl haAdmin HAOnly - enable - show only HA virtual slots.

Syntax

vtl haAdmin HAOnly -enable

Description

Configures the client to show only the HA virtual slots, and not the individual physical slots that make up the HA group.

Options

None

Example

```
vtl haAdmin HAOnly - enable

HAOnly enabled.
```


vtl haAdmin HAOnly show

Name

vtl haAdmin HAOnly - show - show current status of HAOnly option.

Syntax

vtl haAdmin HAOnly -show

Description

Show the current status of the "HAOnly" display option.

Options

None

Example

```
vtl haAdmin HAOnly - show

This client is configured to show all slots.
```


vtl haAdmin newGroup

Name

vtl haAdmin newGroup - create a new HA group.

Syntax

vtl haAdmin newGroup -serialNum <serialnumber> -label <label> -password <password>

Description

Creates a new High Availability (HA) group. The user selects a label for the new group, and provides a primary partition and it's password. Using these, the HA group is set up and is ready for new partitions to be added to it. Note that the user must be assigned the partition in question, and the NTLA must be correctly established.

The new HA group will be assigned an HA group number that is used for all other commands associated with this HA group.

The new HA group will appear as an additional slot in the client machine's slot list. The slot will be denoted as an HA Virtual Card Slot slot-type when using C_GetSlotInfo call

If there are any existing objects on the partition, the user is asked if he would like to keep them, remove them, or quit to further examine them.

If this new HA group is a copy of a group on another client, the user will be warned that there is an existing HA key on the partition. If the user's intention is to have both clients able to talk to the same set of partitions in HA groups, the user must type 'copy' to keep and use the existing HA key. (If the user removes it, the partition will no longer be a working member of the other HA group(s) to which it belongs.)

CAUTION: VTL manages the HA groups that you create, and must therefore remember each group and each member (serial number) that is used. You might wish to create a group, then create additional groups based on the configuration of the first one, by "re-using" the primary member - deleting that primary member from the first group and using it to start another group [a Luna SA can be a member of just one HA group at one time].

This can work for a second and a third HA group, but cannot be done for any additional HA groups (fourth, fifth, etc.) unless you remove an existing group before you attempt to create any new group.

The maximum concurrent HA groups administered by one vtl and re-using the same primary member is three.

To administer many HA groups, all started by the same Luna SA, from one administrative workstation, run Virtual Machine environments on that workstation with a separate instance of vtl in each VM.

Options

-serialNum <serialnumber> [mandatory] The serial number of the primary partition for the group. The partition's serial number can be obtained using 'partition -show' from the lunash, or by using C_GetTokenInfo via a PKCS#11 application such as ckdemo. All partitions have unique serial numbers.

-label <label> [mandatory] Provide a label for the new HA group. This is the value that will be returned to the PKCS#11 call C_GetTokenInfo for the HA slot.

-password <password> [mandatory] The text password for the primary partition. Note that for Luna SA with Trusted Path Authentication partitions, all partitions that will be added to the HA group must share this password. You may wish to use the lunash command 'partition -changePw' to set the password before completing this step.

Example

```
vtl haAdmin -newGroup -label testgroup -serial 65010001 -password testpassword

Warning:  There are 2 objects currently on the new member.
    Do you wish to propagate these objects within the HA
    group, or remove them?
    Type 'copy' to keep and propagate the existing
    objects, 'remove' to remove them before continuing,
    or 'quit' to stop adding this new group member.
    >  copy
New group with label “testgroup” created at group number 165010001.
Group configuration is:
HA Group Label:  testgroup
HA Group Number:  1150520008
HA Group Slot #:  unknown
Synchronization:  enabled
Group Members:  150520008
Standby members:  <none>
In Sync:  yes
```

Error When Attempting More than Three Groups

The following is an example of what happens if you are re-using a primary Luna SA to attempt to create a fourth HA group, without deleting any of the earlier groups. VTL on your administrative computer must keep track of all HA groups that it is managing, and it allows a maximum of three:

```
hbash-3.2# ./vtl haadmin -new -l ha4 -s 951357004
Please enter the password for the partition:
> *******
 Warning: There are 119 objects currently on the new member.
          Do you wish to propagate these objects within the HA
          group, or remove them?
          Type 'copy' to keep and propagate the existing
          objects, 'remove' to remove them before continuing,
          or 'quit' to stop adding this new group member.
          > copy
Can not generate a unique serial number for the HA group.
You may want to delete any un-used HA group and try again.
 'vtl haAdmin -newGroup' aborted.
 bash-3.2# ./vtl
```


vtl haAdmin recover group

Name

vtl haAdmin recover -group - recover an HA group.

Syntax

vtl haAdmin recover -group <group name>

Description

Allow a previously removed member to rejoin an HA group, or a new appliance to replace a member that failed and was removed. This command is required if autorecover is disabled.

Options

-group <groupName> [mandatory] The HA group's name. Group names can be found using the *vtl haAdmin -show* command.

Example

```
bin]# ./vtl haadmin recover -group testgroup
Signal sent to HA group: testgroup to recover!
bin]#
```


vtl haAdmin removeMember

Name

vtl haAdmin removeMember - remove a member from an HA group.

Syntax

vtl haAdmin removeMember -group <groupNum> -serialNum <serialnumber> -password <password>

Description

Removes the specified member from the HA group. If the member is still accessible via the NTLA, the HA key will also be removed from the member, otherwise a warning will be printed that the key was not removed.

Currently the partition must be assigned to the user for the removeMember command to work. If it is not possible to assign the partition to the user, contact Technical Support to ask them how to manually remove the member from the HA group.

> ⚠ **CAUTION:** You should never manually remove members unless you absolutely must, because the application has many steps that cannot be replicated manually.

Options

-group <groupNumber> [mandatory] The HA group's designating number. Group numbers can be found using the *vtl haAdmin -listGroups* command.

-serialNum <serialNumber> [mandatory] The serial number of the partition to remove from the group. Use the *vtl haAdmin -listGroups* command to see a list of partition serial numbers that belong to the each HA group.

-password <password> [mandatory] The text password for the partitions.

Example

```
C:\Program Files\SafeNet\LunaClient>vtl haadmin removeMember -group testgroup -serial 150520009
-password default
Member 150520009 successfully removed from group testgroup. New group configuration is:
HA Group Label:  testgroup
HA Group Number:  1150520008
HA Group Slot #:  6
Synchronization:  enabled
Group Members:  150520008
Standby members:  <none>
In Sync:  yes
```


vtl haAdmin show

Name

vtl haAdmin show - show status of HA members.

Syntax

vtl haAdmin show

Description

Shows the cryptoki connectivity status of all currently configured HA members.

Options

-syncStatus (optional) show sync status for each group. Prompt for group password

-help (optional) display this message

Example

```
C:\Program Files\SafeNet\LunaClient>vtl haadmin -show
================ HA Global Configuration Settings ===============
HA Auto Recovery:  disabled
Maximum Auto Recovery Retry:  0
Auto Recovery Poll Interval:  60 seconds
HA Logging:  enabled
HA Log File:  C:\Program Files\SafeNet\LunaClient\haErrorLog.txt
Maximum HA Log File Length:  1000000 bytes
Only Show HA Slots:  no
================ HA Group and Member Information ================
HA Group Label:  testgroup
HA Group Number:  1150520008
HA Group Slot #:  6
Synchronization:  enabled
Group Members:  150520008
Standby members:  <none>
Slot #    Member S/N                    Member Label    Status
======    ==========                    ============    ======
1         150520008                     zspar           alive
```


vtl haAdmin standbyMembers

Name

vtl haAdmin standbyMembers

Syntax

vtl haAdmin standbyMembers [-set | -remove]

Subcommands

Subcommand	Description
-set	Use a list of serial numbers to add partitions to a named HA group, on standby. See "vtl haAdmin standbyMembers -set " on page 120.
-remove	Use a list of serial numbers to remove partitions as standby members from a named HA group. See "vtl haAdmin standbyMembers -remove " on page 119.

vtl haAdmin standbyMembers -remove

Name

vtl haAdmin standbyMembers -remove - remove standby HA members

Syntax

vtl haAdmin standbyMembers -remove

Description

Use a list of serial numbers to remove standby members from a named HA group.

Options

-group <groupName> [mandatory] The name of the HA group to modify.

-serialNum <serial number list> [mandatory] The serial numbers of the partitions to remove from the named group.

Example

```
vtl haAdmin standbyMembers -remove -group 165010001 -serial 66010002
```


vtl haAdmin standbyMembers -set

Name

vtl haAdmin standbyMembers -set - add standby HA members

Syntax

vtl haAdmin standbyMembers -set

Description

Adds members, from a list of partition serial numbers, to a named HA group, in standby status.

Options

-group <groupName> [mandatory] The name of the HA group to modify.

-serialNum <serial number list> [mandatory] The serial numbers of the partitions to add to the named group.

Example

```
vtl haAdmin standbyMembers -set -group 165010001 -serialnum 66010002
```


vtl haAdmin synchronize

Name

vtl haAdmin synchronize - synchronize contents among HA group members.

Syntax

vtl haAdmin synchronize [-enable] | [-disable] -group <groupNumber> -password <password>

Description

Synchronizes the contents of members of the HA group that have network replication enabled. The contents of each partition will be examine with those of all others to ensure that all objects are found on all partitions. SHA-1 digests (fingerprints) of the objects are used to identify two objects as being the same or different.

Synchronization is not usually needed since objects that are created on the HA slot are automatically replicated to all members that are available and have network replication allowed. Synchronization is required when one member was unavailable for a time when keys or other objects were created in the HA group, or when a key or object was added directly to a member of an HA group instead of to the group itself (i.e. if a key is generated on slot 1, which is partition 1, instead of slot 3 which is the HA group.)

Use the command with the "-enable" option to enable synchronization.

Use the command with neither "-enable" nor "-disable" to trigger synchronization (if it is enabled).

Use the command with the "-disable" option to disable synchronization.

Options

-enable [optional] Enables the synchronization.

-disable [optional] Disables the synchronization.

-group <groupNum> [mandatory] The group number of the HA group's to synchronize. Group numbers can be found using the *vtl haAdmin -listGroups* command.

-password <password> [mandatory] The text password for the partitions/group members. It is prompted if not supplied at the command line. Not needed for the -enable and -disable options.

Example

```
vtl haAdmin synchronize -group 165010001
Please enter the password for the member partitions:
> *******
No synchronization performed/needed.vtl haAdmin -synchronize -group 165010001
Synchronization completed.
```


vtl listServers

Name

vtl listServers

Syntax

vtl listServers

Description

Displays a list of the Luna Servers trusted by this client.

Options

None

Example

```
vtl listServers
Server: lunasa1
Server: test
```

vtl listSlots

Name

vtl listSlots

Syntax

vtl listServers

Description

Displays a list of all slots found.

Options

None

Example

```
:>vtl listSlots
Number of slots: 3
The following slots were found:

Slot#   Description     Label                   Serial#         Status
======  =============== ====================    ========        ===========
slot #1 Luna UHD Slot   mybackuppar             1505113         Present
slot #2 Luna UHD Slot   myHApar                 1234567         Present
slot #3 Luna UHD Slot   -                       -               Not present
:>
```


vtl logging configure

Name

vtl logging configure - set path to store log files

Syntax

vtl logging configure <logPath>

Description

Sets the directory path where log files are to be stored.

See "vtl logging show " on page 125 to display the current log path.

The client library writes log messages to SYSLOG on Linux/UNIX systems.
However, for Windows, the log messages are written to the file "LunaCryptokiLog.htm" at the location that you specify in <logPath>.

To demonstrate that the logging is working on a Windows platform, you could create an error situation as follows:

1. Enable the client side log on a Windows platform.
2. Create a client certificate.
3. Register the client with a Luna SA 5.x appliance.
4. Manually delete the client certificate file.
5. Run ckemo or another application against a partition on that Luna SA. NTL is broken for this client (due to the missing certificate), so any commands from your application should fail.
6. Check LunaCryptokiLog.htm and observe error messages written there.

Options

None

Example

```
C:\Program Files\SafeNet\LunaClient>vtl logging configure "C:\Program Files\SafeNet\LunaClient"
Success setting log path to C:\Program Files\SafeNet\LunaClient
```

vtl logging show

Name

vtl logging show - Displays the directory path where log files are stored.

Syntax

vtl logging show

Description

Displays the directory path where log files are stored.

See "vtl logging configure " on page 124 to set the log path.

Options

None

Example

```
C:\Program Files\SafeNet\LunaClient>vtl logging show
Client logging written to: C:\Program Files\SafeNet\LunaClient\LunaCryptokiLog.htm
```


vtl replaceserver

Name

vtl replaceServer

Syntax

vtl replaceServer -o <old server hostname> -n <new server hostname> -c <certificate filespec> [-htl]

Description

Replaces the specified old server in the client's list of trusted Luna Servers, with the specified new server .

Options

-o <old server hostname> [mandatory] The hostname (or IP address) of the server being replaced. Use the IP address if the server's certificate uses its ip address instead of its hostname.

-n <new server hostname> [mandatory] The hostname (or IP address) of the server that is replacing the previous server. Use the IP address if the server's certificate uses its ip address instead of its hostname. If you are uncertain what format the server's certificate uses contact your Luna appliance administrator, or look for the “CN=” field when using the vtl examineCert command.

-c <certificate filespec> [mandatory] The name (including the path to its location on your computer) of the server's certificate file.

-htl [optional] Require HTL (host trust link) an additional layer of trust, that separates the link authentication from specific hardware, allowing trust of virtual clients, such as in cloud environments - also can be used to enhance trust for non-virtual/non-cloud clients.

Example

```
bash # ./vtl replaceServer -o yourluna -n myluna -c server.pem -htl
New server myluna successfully added to server list.
Server yourluna successfully replaced with myluna.
```


vtl supportInfo

Name

vtl supportInfo

Syntax

vtl supportInfo

Description

Creates a client-side support information file (may be requested by Technical Support to help resolve an issue).

Options

None.

Example

```
C:\Program Files\Luna SA> vtl supportInfo
Creating client-side support information file now...
'vtl supportInfo' completed.
File "c_supportInfo.txt" created.
C:\Program Files\Luna SA>
```


vtl verify

Name

vtl verify

Syntax

vtl verify

Description

Verify the Luna SA slots/Partitions visible to this Client.

Options

None.

Example

```
bash-2.03# ./vtl verify
The following Luna SA Slots/Partitions were found:
Slot    Serial #        Label
====    ========        =====
 1      65091001        MyPartition
 2      65097001        YourPartition
 3      65093001        HisPartition
bash-2.03#
```

